UNIVERSIDADE DA BEIRA INTERIOR

Ciências da Saúde

Mindfulness trait in Portuguese Anaesthesiologists

The relationship with Burnout and Psychopathological Symptoms

Teresa Alexandra Santos Carvalho Lapa

Tese para a obtenção de Grau de Doutor em
Medicina
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Orientador: Prof. Doutor Joaquim Silva Viana
Co-orientadores: Prof. Doutor José Pinto Gouveia
Prof. Doutor José Martinez de Oliveira

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Doctoral Dissertation

Medicine

Speciality of Anaesthesiology

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Covilhã, May 2018

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Peace is This Moment Without Judgment

Do you think peace requires an end to war?
Or tigers eating only vegetables?
Does peace require an absence from
your boss, your spouse, yourself? …
Do you think peace will come some other place than here?
Some other time than Now?
In some other heart than yours?

Peace is this moment without judgment.
That is all. This moment in the Heart-space
where everything that is is welcome.
Peace is this moment without thinking
that it should be some other way,
that you should feel some other thing,
that your life should unfold according to your plans.

Peace is this moment without judgment,
this moment in the heart-space where
everything that is is welcome.

Dorothy Hun

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This work is the result of an academic course filled with challenges and learning with many obstacles and restarts, but that has contributed to my professional and personal growth. This work gave me the opportunity to connect with the difficulties that healthcare practitioners face in their professional life and to more deeply engage with my patients' experience, with a more aware and accepting attitude.

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Resumo alargado

Enquadramento: A anestesiologia é uma especialidade exigente em que os médicos estão expostos a elevados níveis de *stress* e múltiplos desafios emocionais.

Esta especialidade impõe capacidade de resposta rápida e assertiva, pois o risco de ocorrência de eventos críticos é constante. Quando um anestesiologista torna um doente inconsciente para uma intervenção cirúrgica, está a assumir uma grande responsabilidade, mesmo que se tratem de procedimentos muito simples. À medida que a população envelhece e a necessidade de intervenções na área da saúde dispara, o trabalho para os anestesiologistas aumenta em complexidade o que exige profissionais cada vez mais treinados e especializados.

O *stress* profissional e as suas implicações emocionais podem levar ao desenvolvimento de sintomatologia psicopatológica e *burnout*. O Síndrome de *burnout* é conceptualizado como um estado de exaustão física, emocional e mental, causado pelo envolvimento duradouro em situações de elevada exigência emocional no local de trabalho. O *burnout* interfere não apenas com o bem-estar individual dos médicos, mas também com a qualidade da prática médica, a segurança dos doentes, os custos da saúde e o bem-estar da família e dos colegas.

Os processos de regulação emocional parecem desempenhar um papel determinante no desenvolvimento do *burnout* e sintomatologia psicopatológica. Estes processos podem ser adaptativos ou mal adaptativos. Entre os adaptativos estão o *mindfulness* e a auto-compaixão e entre os mal-adaptativos estão a ruminação e a inflexibilidade psicológica.

A capacidade de reduzir os fatores de *stress* no local de trabalho é algumas vezes limitada, pelas características inerentes à profissão médica e de algumas especialidades, incluindo anestesiologia. Os efeitos dos fatores de *stress* são diferentes de pessoa para pessoa. A nossa atenção também deve ser direcionada para mecanismos pelos quais os fatores de stress produzem os seus efeitos sobre os profissionais expostos. Com este propósito, a nossa primeira tarefa foi desenvolver uma ferramenta para medir fatores de *stress* em anestesiologistas. Uma grande quantidade de instrumentos está disponível para medir o *burnout*, a ansiedade, a depressão, o *stress*, a qualidade de vida e todas as outras consequências possíveis dos fatores de *stress* no âmbito profissional. Se queremos desenvolver medidas práticas, uma necessidade lógica são instrumentos para medir os fatores de *stress* (ao contrário, seria impossível saber se diferentes efeitos são consequências de diferentes fatores de *stress* ou diferentes estratégias para contornar os seus efeitos).

Curiosamente, existe um grande número de ferramentas desenvolvidas para medir os efeitos dos fatores de *stress*, mas não havia até então, nenhum instrumento para medir especificamente os fatores de *stress*. Neste trabalho desenvolvemos e validámos uma escala de avaliação de fatores de *stress* em anestesiologistas (*Stressors questionnaire in anaesthesiologists)*.

As tarefas seguintes foram direcionadas para o objetivo principal do nosso estudo como um todo - alcançar uma melhor compreensão dos mecanismos de *burnout*, discriminar entre diferentes tipos de fatores de risco e estudar constructos da regulação emocional e avaliar mediações entre fatores de risco e as consequências finais (*burnou*t e sintomas psicopatológicos).

Em particular, nesta dissertação damos atenção às relações entre depressão e *burnout* e o papel protetor do traço de *mindfulness*. O *mindfulness* remete para a observação não julgadora da contínua corrente de estímulos internos e externos à medida que eles surgem. É fundamentalmente uma forma de consciência não elaborada, não-julgadora e centrada no presente, na qual cada pensamento, emoção ou sensação é notado e aceite tal como é. O *mindfulness* tem sido descrito na literatura como detendo qualidades de traço, enquanto uma capacidade inerente e natural do organismo humano. Esta qualidade pode ser promovida através de práticas meditativas e o seu treino tem sido incluído em intervenções com resultados positivos.

Adicionalmente, obtivemos novos dados sobre o *burnout* em anestesiologistas e médicos de outras especialidades, e suas relações com idade, gênero, estado civil, anos de experiência e outros dados sociodemográficos e laborais. Além disso, validámos o Inventário de *Burnout* de Copenhaga para português e desenvolvemos um índice global de burnout.

Objetivos: O objetivo principal deste trabalho foi estudar os constructos da regulação emocional nos anestesiologistas e investigar de que forma o traço de *mindfulness* está associado ao desenvolvimento de *burnout* e sintomatologia psicopatológica (stress, ansiedade e depressão), de forma a propor estratégias preventivas de *burnout* e promover o bem-estar dos anestesiologistas.

Métodos: O nosso estudo foi realizado com base num questionário anónimo em papel, aplicado a anestesiologistas, internos de anestesiologia e médicos de diferentes especialidades, em Portugal. Os dados foram colhidos através de questionários de auto-resposta, incluindo informações sociodemográficas e laborais, *burnout* e sintomatologia psicopatológica, satisfação de vida e regulação emocional (*mindfulness*, auto-compaixão, ruminação e inflexibilidade psicológica).

Participantes: A amostra total foi composta por 1358 médicos portugueses de diferentes especialidades de hospitais públicos e privados. Destes 637 eram especialistas em anestesiologia e 115 internos de anestesiologia.

Resultados: Os resultados indicaram que os níveis de *burnout* foram menores nos anestesiologistas em relação aos médicos de outras especialidades e, os internos de anestesiologia apresentaram níveis mais altos de *burnout* do que os especialistas de anestesiologia. Algumas variáveis sociodemográficas e laborais são preditoras de níveis mais elevados de burnout, como a maior carga de trabalho e trabalhar na região norte. Trabalhar na região sul e menos de 40 horas semanais são preditores de menores níveis de *stress.* Profissionais sem religião tendem a sofrer maiores níveis de depressão. Ser interno de anestesiologia está relacionado com níveis mais elevados de ansiedade. Beber mais de 5 bebidas alcoólicas por semana foi um preditor positivo de sintomatologia psicopatológica e ser não fumador é um preditor de menores níveis de *burnout*. Em relação aos fatores de risco (*stressores*), os nossos resultados mostraram que os fatores organizacionais são os preditores mais importantes de burnout. Relativamente aos processos de regulação emocional, descobrimos que a flexibilidade psicológica, o traço de *mindfulness* e a auto-compaixão estão relacionados com menores níveis de *burnout* e sintomatologia psicopatológica. Os fatores de stress profissional relacionam-se com o burnout, através da ruminação e da depressão, e o traço de mindfulness é um importante moderador da associação entre ruminação e depressão. Esses resultados sugerem que o *mindfulness* protege o impacto negativo da ruminação na depressão.

Conclusões: Esta dissertação contribui para uma maior compreensão dos processos de regulação emocional envolvidos na vulnerabilidade para desenvolver *burnout* e sintomatologia psicopatológica. Os nossos resultados sugerem que o traço de *mindfulness* atenua o impacto da ruminação na depressão. Estes estudos fornecem dados empíricos para o desenvolvimento de programas baseados no mindfulness e auto-compaixão como mecanismos para reduzir o *burnout* e os sintomatologia psicopatológica nos anestesiologistas. Investigação futura deve ser estimulada no sentido de desenvolver e aperfeiçoar programas baseados no *mindfulness* específicos para os anestesiologistas.

Palavras-chave: Síndrome de *Burnout*, fatores de stress, anestesiologistas, processos de regulação emocional, *mindfulness*

Abstract

Background: Anaesthesiology is a stressful occupation where physicians experience intense stress and have a great number of emotional demands. Professional stress and emotional demands can lead to burnout syndrome and psychopathology. Both interfere not only with the individual well-being of physicians, but also with the quality of medical practice, safety of patients, health costs and the well-being of families and colleagues. Emotion regulation processes seem to play a determinant role in the development and maintenance of burnout and psychopathology.

The ability to reduce stressors in the workplace is limited after a certain point by the inherent characteristics of the medical profession and of some specialities, including anaesthesiology. In consequence, as it is proved that the effects of stressors are different from person to person, to attain health benefits our attention must also be directed to the mechanisms by which the stressors produce their effects on the professionals exposed. To this end, our first task was to develop a tool to measure stressors in anaesthesiologists. An extensive number of tools are available to measure burnout, anxiety, depression, quality of life and all the other possible consequences of stressors in professional settings. If we want to develop practical measures to blunt the effect of stressors, a logical need are instruments to measure the stressors (otherwise it would be impossible to know if different effects are consequences of different stressors or of the different strategies to blunt their effects). It is strange that, in a great number of published papers on this subject, in opposition to a large number of tools developed to measure stressors effects, no tool existed until our own study to measure stressors itself.

Our next task was reach a better understanding of the mechanisms of burnout, discriminating between different types of stressors and studying emotion regulation constructs, evaluating the mediations between stressors and the final consequences (burnout and psychopathological symptoms). We paid particular attention to the relations between depression and burnout and the protective role of mindfulness trait.

Necessary for the previous tasks, but also relevant in themselves, we obtained new or additional data about burnout on anaesthesiologists and other Portuguese medical doctors and its relations with age, gender, marital status, residency, years of experience and other demographic data. Additionally, we validated the Copenhagen Burnout Inventory for Portuguese physicians and developed a global burnout index.

Methodology: Our studies were undertaken through the use of an anonymous paper survey to anaesthesiologists, anaesthesia residents and physicians from different medical specialties in Portugal. Data were collected through self-reported questionnaires, including demographic information, work experience, burnout and psychopathological symptoms, life satisfaction and emotion regulation processes (mindfulness, self-compassion, rumination and psychological inflexibility).

Participants: The total sample was composed of 1358 Portuguese physicians of different specialities from the public and private hospitals. From these 637 were anaesthesia specialists and 115 anaesthesia residents.

Results: Findings indicated that burnout scores were lower in anaesthesiologists when compared to other specialities, and anaesthesia residents had higher levels of burnout than anaesthesia specialists. Several socio-demographic and work-related variables predicted higher levels of burnout, namely being younger, higher workload and working in northern region. Working in the southern region and fewer than 40 hours per week predicted lower levels of stress. Professionals with no religion tend to suffer from greater levels of depression. Being an anaesthesia resident is related with higher levels of anxiety. Drinking more than 5 alcoholic drinks per week was a positive predictor of psychopathological symptoms and being a non-smoker is a predictor of less levels of burnout. Regarding stressors, our results showed that organizational stressors were the most important predictors of burnout. Regarding emotion regulation processes, we found that psychological flexibility, mindfulness trait, and self-compassion were related to less burnout and psychopathological symptoms. We found that job-related stressors impact on burnout through rumination and depression, and that mindfulness trait is a significant moderator of the association between rumination and depression. These results suggest that mindfulness buffers the negative impact of rumination on depression.

Conclusions: This dissertation contributes to a greater understanding of the emotion regulation processes involved in the vulnerability to develop burnout and psychopathological symptoms. Our findings suggest that mindfulness trait functions as a buffering that mitigates the impact of rumination on depression. Overall, our studies give a rational basis to support the development of mindfulness and self-compassion based interventions to reduce burnout and psychopathological symptoms in anaesthesiologists.

Keywords: Burnout Syndrome, stressors, anaesthesiologists, emotion regulation processes, mindfulness

Articles arising from this Thesis

Published Articles

Submitted articles

List of abbreviations

AAQ-II	Acceptance and Action Questionnaire-II
ACT	Acceptance and Commitment Therapy
ANOVA	Analysis of variance
CBI	Copenhagen Burnout Inventory
CFI	Comparative Fit Index
DASS	Depression, Anxiety and Stress Scales
FFMQ	Five Facet of Mindfulness Questionnaire
fMRI	Functional magnetic resonance imaging
GFI	Goodness of Fit Index
ICU	Intensive Care Unit
MANOVA	Multivariate analysis of variance
MBI	Mindfulness-Based Interventions
MBSR	Mindfulness-Based Stress Reduction
RMSEA	Root-Mean Square Error of Approximation
RRS	Ruminative Response Scale
SCS	Self-Compassion Scale
SDS	Sheehan Disability Scale
SPSS	Statistical Package for Social Sciences
SQA	Stress Questionnaire in Anaesthesiologists
SWLS	Satisfaction With Life Scale
VAS	Visual Analogue Scale
χ^2	chi-square

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Preface

The current research topic was inspired by the combination of my own personal interests and motivations and my mentors guidance, Professor Joaquim Viana and Professor José Pinto-Gouveia.

Thanks to this research work, I feel that I grew as a person, and that I can be a more empathic and serene doctor. These skills have been of great use not only in my day-to-day life as an anaesthesiologist, specially in the emergency department where I encounter multiple stressful situations and also allows me to help patients with chronic pain to be more mindful, and live with chronic pain in a more functional way.

It was very gratifying the personal contact with my colleagues to encourage them to cooperate with me by completing the questionnaire. The colleagues responded and participated very well, encouraging me to continue with this work. Multiple colleagues sent us letters explaining that in their departments this subject is a problem and congratulating us on this proposal. Some of them were looking for a solution and so were interested in our results to help them.

I realized that my work had the potential to help some colleagues to evolve into, and become, more accomplished and happier physicians.

During this time, I participated in multiple practical sessions of mindfulness and some retreats and I realised how we can relate to the world in a very different way. I confess that I often felt the magic in these practices! I have been able to distance myself from the problems and to see them from the outside, which is a much more favourable perspective, even when the problem is within ourselves.

The great challenge is to keep up and maintain these practices on a regular basis.

In the first part of this work, we decided to focus on the stress of anaesthesiologists, burnout, anxiety and depression. In the second part, we study the influence of different emotion regulation constructs in the development of these problems.

Chapter 1 - Introduction

1 - Introductory Note

To become an anaesthesiologist is the ambition of many young doctors. However, when they choose this challenging path, they often realize that the reality is different from their expectation. It is a speciality which requires a rapid and assertive response; the risk of critical events and loss of life is constant. With the growing ageing population, there is an increasing necessity of health interventions (Bodenheimer, Chen, & Bennett, 2009). Consequently, the role of the anaesthesiologists has grown markedly in complexity, requiring more and more training and greater efficiency.

In the daily professional life of anaesthesiologists, the demands of the role can be varied, complicated and endless, in a less than favourable environment, not only physically without break-rooms or natural light, but also emotionally as they are exposed to many challenges. These relate to not only with the patients' complexity but also difficult personal relationships in a competitive atmosphere. It is not unusual for a colleague to seem tired and to appear disconnected.

Prolonged exposure to professional stress and to situations of elevated emotional demand in the workplace can be conducive to pathological conditions such as anxiety, depression and burnout syndrome (Rada & Johnson-Leong, 2004; Schaufeli & Bakker, 2004). Burnout is defined as the state of physical, emotional and mental exhaustion and is characterized by the loss of enthusiasm for work, cynicism and reduced personal accomplishment (Maslach, Schaufeli, & Leiter, 2001).

The prevalence of burnout in doctors, in general, is high (Shanafelt et al., 2012) and being higher still in front line specialities, including emergency medicine. Frequently, doctors do not recognize their own exhaustion and carry on regardless.

The development of burnout syndrome is multifactorial. There are important risk factors related to the organizational structure of services, to excess of work, multiple deadlines, night work and difficult interpersonal relationships at work, specifically with leaders who do not receive adequate recognition (Stordeur, D'hoore, & Vandenberghe, 2001). Another group of burnout risk factors is related to the personal characteristics of each doctor and their way

of coping with different stressors. Female and younger doctors are generally more affected (Heinke et al., 2011).
It is known that burnout can have a negative impact on the physical and mental well-being of doctors as well as the satisfaction of their professional life (Wallace, Lemaire, & Ghali, 2009). Tired doctors have less empathy with their patients, taking less than optimal medical decisions and therefore being more exposed to clinical error. The repercussions of this are that the reduction in quality of patient care and reduction in patient satisfaction is a serious public health issue (Wallace et al., 2009).

My interest in this area arose from my own working background as an anaesthesiologist.
Every day, I think about how it is difficult to work as a physician and especially as an anaesthesiologist, a field with differentiated professionals, working in a controlled field with high standards of quality and with evident benefits for patient outcomes every day.

Increasingly I began to notice that some colleagues seemed unhappy, frequently suffering from stress, were disconnected from patients' needs, and that their job satisfaction seemed lower than expected. These were colleagues that I knew well, I respected, and I knew to be conscientious, good people who sought to do their best. It is possible that they felt the same about me.

I decided to research this problem and I learned of the concept of burnout. I studied burnout definitions, measurements, aetiologic factors and consequences. The majority of studies find work-related conditions associated with burnout development, but I was interested in an investigation of individual/intrinsic factors. Burnout has been studied since the eighties and many work-related strategies have been adopted and yet nothing has changed. On the contrary, burnout has been increasing in an epidemic way in the physician's world (Shanafelt, 2009). In Portugal, the trend is similar and Marôco et al. (2016) found that 47,8% of Portuguese healthcare professionals showed high burnout and that the perception of poor working conditions was the main predictor of burnout occurrence.

Additionally, in a Portuguese study of burnout, with 263 anaesthesiologists surveyed (Morais, Maia, Azevedo, Amaral, & Tavares, 2006), the prevalence of depersonalization was high (90.9%), emotional exhaustion was found to be 57.9% of those surveyed, and lack of personal accomplishment in 44.8% of those asked. Some other studies indicated an elevated level of depression, consumption of drugs (Booth et al., 2002; Lutsky et al., 1993) and higher suicide rates in anaesthetists (Lew, 1979). The development of psychopathological behaviours in anaesthesiologists can be a consequence of prolonged exposure to stress.

The negative aspects of stress regarding the conditions of anaesthesiologists have been thoroughly investigated, but it remains important to study and develop the strategies which can encourage the reduction of stress and improve working conditions. In order to do this, we need to better understand what predisposes anaesthetists to the development of burnout and psychopathology such as anxiety and depression. Not all anaesthesiologists respond equally to the demanding challenges they face daily. There seem to be intrinsic individual emotion regulation factors that predispose to different vulnerabilities to develop burnout or psychopathological symptoms.

The intrinsic individual characteristics of each anaesthesiologist can also be important in protection against the occurrence of these problems, namely the capacity to use and develop coping strategies and the existence of some personality traits, such as mindfulness.

Why is it that some doctors develop burnout and suffer from psychopathologic problems while others do not? It is probably due to the capacity of each individual to develop and use adaptive emotion regulation strategies that buffer the effect of professional stress.

Emotion regulation comprises a variety of processes that, according to its development or lack thereof, may be either protective factors against psychopathological symptoms or, on the contrary, risk factors for its development (Aldao & Nolen-Hoeksema, 2012b; Aldao, Nolen-Hoeksema, & Schweizer, 2010). Among these processes, we highlight mindfulness, as well as self-compassion, acceptance and rumination, as they are essential processes in the understanding of some clinical conditions (Bishop et al., 2004; Davidson et al., 2003; Neff, 2003a; Nolen-Hoeksema, 1991).

According to Baer (2003), mindfulness is about observation without judgement of external stimulus and internal thoughts as they occur constantly. It is fundamental to focus on an unelaborated consciousness which centres on the present moment, with each thought, emotion or sensation being noticed and accepted as it truly is (Kabat-Zinn, 1990; Segal, Williams, & Teasdale, 2002).

The majority of studies undertaken in this area primarily refer to the effects of mindfulness training as a clinical intervention. There has been growing interest in mindfulness as an approach to augment awareness and response in a positive way to mental processes associated with emotional stress and to non-adaptive behaviour (Bishop et al., 2004). Additionally, mindfulness has also been described in literature as a trait, inherently present in

the human organism (K. W. Brown & Ryan, 2004), and it can be increased and/or developed through meditative practices. Mindfulness training has been included in several interventions, in which a vast array of positive outcomes have been produced (Baer, 2003), particularly better self-regulation, well-being and less cognitive and emotional disturbance (K. W. Brown & Ryan, 2003). In fact, multiple studies have shown that individuals from the general population have different levels of mindfulness traits (K. W. Brown & Ryan, 2003; Carlson, Speca, Patel, & Goodey, 2004). These inter-individual differences have significant consequences in terms of their self-regulation and psychological well-being.

Mindfulness not only fosters greater acceptance and less reactivity in relation to stressful/threatening events, but also leads to more effective strategies for dealing with them (Weinstein, Brown, & Ryan, 2009). Recent studies have concluded that mindfulness-based stress reduction programs were associated with improvement in burnout scores and mental well-being scores in health professionalS (Escuriex & Labbé, 2011; Ireland et al., 2017; Krasner et al., 2009)

This project was developed to understand whether anaesthesiologists with higher mindfulness trait present less burnout and less psychopathological symptoms.

2 - Theoretical Framework

2.1 - Stress and Burnout Syndrome in Anaesthesiologists

Physicians are at significantly higher risk of suffering from stress and burnout in comparison with the general population due to the specific stressors of their occupation (Shanafelt, 2009; Shanafelt et al., 2012).

Anaesthesiology is a stressful occupation (Nyssen & Hansez, 2008) where physicians experience intense, emotion-laden interactions on a daily basis and have a great number of emotional demands. It is known that stress and emotional demands associated with this profession can lead to emotional and physical exhaustion (Maslach et al., 2001).

Not only do anaesthesiologists suffer from the negative consequences due to burnout and stress, but also their families, patients and colleagues feel the knock-on effects.

An extensive unequivocal literature on physician stress and burnout, its risk factors and consequences, has been published in the last 20 years, revealing a challenging problem.

The detailed analysis of this theme is developed in the review article "Burnout syndrome and well-being in anaesthesiologists: the importance of emotion regulation strategies", that is presented on the following pages.

Online version at http://www.minervamedica.it

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REVIEW

Burnout syndrome and wellbeing in anesthesiologists: the importance of emotion regulation strategies

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ABSTRACT

Anesthesiologists face stressful working conditions that can culminate in burnout syndrome. Despite various studies and protective measures which have attempted to prevent this situation, burnout continues to be a problem within the profession, impacting negatively on physicians' lives and their performance. In this review article mechanisms and consequences of burnout are described in addition to individual strategies for stress management and burnout reduction with potential impact on health care quality and wellbeing in anesthesiologists. Organizational strategies appear to have an important role in burnout reduction but need to be used in conjunction with individual programs. The latter are essential to both reducing stress and burnout in anesthesiologists and improving happiness and wellbeing. New measures of emotion regulation strategies such as mindfulness, self-compassion, resilience and empathy promotion have been shown to be approaches with substantial supporting evidence for reducing burnout and improving stress management. The evaluation and implementation of these self-regulatory competencies is a challenge. Further research is necessary to identify which programs will best suit the needs of anesthesiologists and to measure their effects on patient care and health care system quality.

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Key words: Anesthesiology - Professional burnout - Psychological stress - Emotions.

"*It is not what happens to you, but how you react to it that matters*" — this well-known quote of the Greek Epictetus (55-135 AD) is frequently forgotten when dealing with the subject of burnout. The individual mechanisms involved in response to external factors are essential to whether stress with potential to produce burnout causes harm or not.

Burnout is defined as a psychological phenomenon of continued exposure to work related stressors. According to Maslach *et al.*,[1] burnout is the process by which an employee's psychological resources are depleted due to prolonged stress at work. Symptoms consist of feeling emotionally depleted and cynical towards co-workers and patients in addition to feeling that they are not completing their tasks successfully. It is a matter of debate whether burnout is a form of depression or a distinct phenomenon.[2] It is usually considered to be a specific job-related problem whereas depression, being non-specif-

Comment in p. 136.

ic in its nature, can develop outside of the workplace.

Burnout continues to be a field of interest amongst anesthesiologists,[3] and according to some studies, it has been growing considerably.[4] However, in a specialty where quality and security are paramount it is alarming that its prevalence remains a problem.[5-7] Physician health and wellness is an extremely complex topic that is relevant to anesthesiologists at all stages of their careers. Like all medical areas, anesthesia is thought to have become safer for patients but more dangerous for physicians.[8] The work of an anesthesiologist is taxing due to a high array of demands, stressful situations and the need to be ready and alert for long periods of time. Continued exposure to these elements can culminate in a burnout situation, a process that leads to the loss of physical and mental energy.

Many of the sources of stress in anesthesia are well characterized,[5, 6, 9, 10] but the way they are interpreted and reacted to and how they lead to the development of burnout has not been clarified yet. The study of personal/individual traits related to emotion regulation can be important in clarifying burnout mechanisms and promoting strategies to deal with this problem.

Burnout mechanisms

The mechanisms by which stress and burnout manifest themselves as a consequence of the work situation are unclear.[11, 12]

A synchronized set of endocrine, immunological, autonomic, behavioral, cognitive and emotional responses to perceived threats characterizes stress response. There appears to be a clear link between the dysfunction of these mechanisms due to chronic stress and pathologic responses. Identification of these mechanisms can lead to strategies for prevention and treatment.

No biological markers of burnout have been found yet, despite several biomarkers having been tested for association.[2, 13] Growing evidence suggests that burnout may be associated with distinct alterations in the hypothalamic-pituitary-adrenal axis production of cortisol.[2, 13]

Recent studies suggest that dysfunction of stress response mediators as a consequence of chronic stress leads to stress related pathology. There are different convergent points in the brain for opioid/CRF (corticotropin-releasing factor) interaction, especially locus coeruleus (LC) and dorsal raphe nucleus,[14] in which an altered balance between the "pro-" and "anti-stress" systems occur. Endogenous neuromediators including opioids have been proposed to give protection against the effect of "pro-stress" mediator, CRF.[15] CRF is a brain neuromodulator that coordinates autonomic, behavioral and cognitive responses to stress and is considered the hypothalamic orchestrator of the stress response (Figure 1).[15]

Vulnerability to the pathological consequences of stress can be determined by innate individual differences in endogenous mechanisms that oppose the stress response. This variability may result from differences in enkephalin expression, opioid receptors sensitivity or polymorphisms.[16] It is known that females have a decreased MOR (μ-opioid receptor) sensitivity,[17] which would be consistent with reports stating that stress-related diseases are more prevalent in women. Beyond

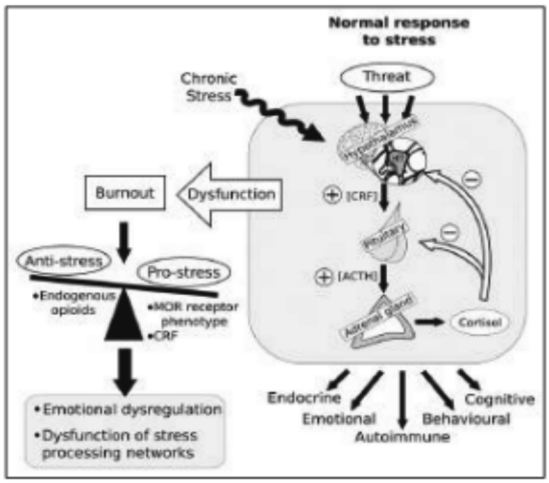

Figure 1.—Burnout mechanisms.
CRH: corticotropin-releasing factor; ACTH: adrenocorticotropic hormone; MOR: μ-opioid receptor.

this, it has been suggested that age-related individual differences are also related to developmental differences in enkephalin-MOR system.[16]

Several behavioral studies have found a relation between burnout and weakened emotional regulation and Tei *et al.*[18] suggest that burnout in physicians may be due to reduced empathy-related brain activity. Golkar *et al.*[12] (2014) have found by functional magnetic resonance imaging studies that individuals who suffered from chronic occupational stress were less able to modulate emotion and stress-processing networks. This supports the notion that burnout is a condition that is related to limbic system affection. An impairment of the ability to down-regulate negative emotions may make them more likely to suffer. The widespread use of brain imaging studies has shown the potential to predict burnout [18] and their association with psychological exams can help to understand this phenomenon.

Burnout risk factors

Burnout has become a prominent topic of research within the community of anesthesiologists. Multiple studies on job stress and burnout in anesthesia have been developed trying to identify the main stressors in anesthesia and risk factors for burnout development.

Social and work environment factors are important but personal variability appears to be as important and explains why different physicians within the same work environment react differently. These personal factors may be components of emotional regulation, genetically determined or not. We already have plenty of knowledge with regard to social factors and work environment,[9] but where individual characteristics are concerned there is a long and challenging task ahead. Furthermore, the interplay between each anesthesiologist and their environment is highly influential in the development of burnout.

Table I summarizes stress and burnout risk factors that are potential threats to physician wellness.

TABLE I.—*The epidemiology of stress and burnout: risk factors.*

Physician-related factors
– Female gender [7, 19]
– Residents and young specialists [6, 7]
– Suboptimum attention to self-wellness by physicians [20]
– Emotional profile and predisposing traits (perfectionism, neuroticism, workaholism) [3, 21]
– Difficult relationships with patients, their families and other medical staff [19]
– Anesthesiologist-surgeon conflicts [22]
– Genetic factors [23]
– Difficulty balancing personal and professional life [7]
Work-related environmental and organizational factors
– Excessive workload / production pressure / sleep deprivation [1, 20, 24]
– Poor work organization [19]
– Lack of clinical autonomy/lack of recognition [1, 19]
– Emotional interactions (deal with death and suffering) [5, 6]
– Poor leadership / lack of supervision [5]
– Non-reciprocal relationship that anesthesiologists have with their patients [5]
– Presence of non- skilled assistance in the operating theatre [19]
– Physical environment (noise, air quality, toxic exposure)
– Community hospitals *vs.* academic hospitals [5]
– On call work and work in emergency [25]
– Excessive administrative tasks [26]
– Work in large size teams [7]

Consequences of burnout

Burnout has been increasingly recognized as a burden for society as a whole. When physicians are dissatisfied the quality of health care systems is under threat. It is not only the wellbeing of the clinicians but also how they interact with their patients that is affected. Accumulating evidence indicates some of the potential risks of burnout (Table II).

Furthermore, burnout in the workplace has been described as being a contagious condition [38] which contributes to perpetuating the situation. It is essential to understand the factors that impact upon employee workplace stress and burnout so that initiatives with a potential positive effect can be developed reducing levels of stress and related negative outcomes.

Managing burnout

Burnout is complex and is unable to be treated by a specific intervention. Anti-depressive

TABLE II.—*The epidemiology of burnout: consequences of burnout.*

Physician
– Lower levels of empathy [27]
– Poor work performance, impaired decision making, self-reported suboptimal patient care [24]
– Increased risk of medical errors [24]
– Dissatisfied physicians and intention to leave [28]
– Sleep disorders [25]
– Increased cardiovascular risk [13]
– Diabetes [29]
– Obesity [30]
– Impaired cognitive function [31]
– Acceleration of the rate of biological aging [30]
– Alcoholism and drug addiction [32]
– Suicide ideation [33]
– Accidents after a nightshift [28]
– Conflict between family and professional life, interpersonal conflicts and marital problems [7, 28]
Patients
– Reduced adherence to treatment plans [34]
– Worsened clinical outcomes [34, 35]
– Lower patient satisfaction [34]
Healthcare system
– Overuse of resources and thereby increased costs of care [20]
– Reduced health outcomes [35]
– Reduced productivity [1, 36]
– Sick leave [37]

drugs and sleep inductors can be used when depression and sleep disturbances occur, but it is important to remember that these drugs do not resolve the problem.

There have been recent advances in the identification and characterization of stress-opposing neuromodulators such as endogenous opioids and their mechanisms. This could lead to a major advance in approaching the treatment of stress-related disorders.[15] However, these studies have not advanced beyond the laboratory as of yet. Therefore, early detection and prevention of these problems as well as the promotion of wellbeing are essential.

What can be done to alleviate burnout and improve wellbeing in anesthesiologists?

The above question, posed by Nyssen *et al.*[6] in 2003, is still relevant today. This subject has attracted a lot of attention and there are currently multiple studies in progress on how to prevent burnout and notice when physicians are at risk. The ability to provide quality care has been identified as the principal driver of physician satisfaction.[39] There are currently no fixed measures to promote physician wellness but some efforts have been made to develop preventive strategies as well as therapies in physicians with burnout. Further studies are required specifically with anesthesiologists.

Both organizational and individual interventions need to be implemented to address the problem.

Organizational strategies

It is important to promote strategies that increase wellbeing in the workplace. Promoting a holistic care culture amongst workers could be a significant job resource in predicting job satisfaction.[40] Healthcare centers have an economic stake in the wellbeing of the physicians, as when they are more satisfied they are generally more productive.[41] Table III shows a summary of organizational strategies.

Beyond the clinical help required when physicians have difficulties, a support network is essential,[44] not only when the problems occur but also when professionals need advice. It is important to perform a debriefing after critical events with the intention of constructive analysis and not to lay the blame on anyone. This is only possible with the existence of mentors who care about physician's wellbeing and consequently will aid in the prevention of burnout.

Individual strategies

As previously discussed, the individual response mechanisms to adverse events are a major determinant in the occurrence of burn-

TABLE III.—*Organizational strategies.*

Strategies for burnout prevention
– Reduce working hours and schedule flexibility [42]
– Improve physician autonomy, job control and organizational justice [43]
– Recognise physician value and opinion [44]
– Measurement of physician satisfaction [44] and wellness [20]
– Promote team work in small sized teams [7]
– Improve physician work environment [44]
– Physician wellness and health promotion programs
– Development of non-technical skills to help physicians resolve conflicts and crises (communication, decision-making, teamwork and leadership) [44, 45]

out. Several studies support the importance of promoting individual approaches in order to improve response to stressors and heighten wellbeing. Among these, there are specific strategies that could be implemented to achieve these goals, namely:

— encourage physicians to improve self-care and maintain their health: in all phases of a medical career the best prevention from burnout is to encourage personal and professional health including physical, emotional, psychological and spiritual wellbeing.[46] Physicians who take care of their health can transmit more credibility and motivation to their patients and residents [47] and this is particularly important in the context of anesthesia. A serious obstacle is that physicians frequently neglect their wellbeing and fail to seek help from others when advisable and anesthesiologists do not appear to be an exception. Other measures that are important in burnout prevention are the need for physical activity,[48] physical relaxation (*e.g.* massage),[49] healthy sleep, adequate rest and a healthy diet.[20, 30] Further work-life balance factors are family and friends,[8] and all of those mentioned should be taken good care of;

— encourage physicians towards a more engaging life and cultivate a sense of mastery, motivation and meaning in work with a positive attitude while nurturing a sense of calling;[50]

— improve communication skills and encourage physicians to function as team members, helping to improve relationships with patients and colleagues and manage conflicts. Both communication and contact with colleagues are important in burnout prevention in anesthesiologists [9] as is maintaining a connection with social support systems.[51] Simulation centers where these skills can be trained are another resource to prepare and equip professionals;

— encourage the readiness to seek help;[52]

— emotion regulation strategies in stress management and empathy: emotions are fundamental to judgement and decision making, even in clinical fields. Despite some studies having indicated that personal resources are not sufficient to counteract stress factors,[53] in the last few years, emotion regulation strategies based on mindfulness, self-compassion and acceptance have been shown to be approaches with substantial supporting evidence for reducing burnout and for stress management in physicians.[54, 55] Emotional competencies such as mindfulness, self-compassion, resilience and empathy are predictors of wellbeing [53] and must be promoted in the medical community.

These strategies are important as they have the potential to promote the reinterpretation of stressors, confronting emotions through acceptance and attentional processes and developing more functional and effective ways of dealing with them without necessarily changing the stressor itself.

Mindfulness

Mindfulness is a self-regulation tool, introduced by Kabat-Zinn [56] in the 1980s for stress management in chronic pain patients. It stems from Buddhism and is a way of meditating to cultivate present moment awareness. Its goal is to disengage from strong attachment to beliefs, thoughts or emotions, thus developing a greater sense of emotional balance and wellbeing.[57] There is neuro-scientific evidence for changes in mental processes and underlying neural circuits that are involved in meditation.[58]

Recently, it has been successfully implemented in areas such as physician stress management [58] and burnout, promoting wellbeing, improving empathy and increasing psychological resilience.[59] While the neuroscientific study of meditation is relatively new it has led to some promising findings that reveal how this approach may exert its effects and underscore the plasticity of the brain circuits that underlie complex regulatory mental functions.

Self-compassion

Self-compassion, is defined by being aware of and connected to one's own suffering, not avoiding it.[60] It is composed of three components one of which is mindfulness. It has also been suggested that the relationship between

mindfulness and wellbeing is partially mediated by self-compassion.[61] Compassion meditation is generally intended to cultivate both self-compassion and compassion towards others.

Self-compassion, has received a lot of attention recently as a means of cultivating resilience to stress, burnout and emotional exhaustion.[54] Beyond this it has been suggested that self-compassion is associated with healthy relationship function, with its benefits being not only personal but also interpersonal.[62] This potential in the interpersonal relationships of anesthesiologists should be further investigated.

Resilience

Resilience is the process of adapting to significant sources of stress or trauma.[63] It is a complex and multi-dimensional phenomenon and has been defined as the ability of a person to recover, rebound, adjust or even thrive following misfortune, change or adversity. It has been identified as an essential condition of wellbeing in physicians [53] and has been associated with lower prevalence of posttraumatic stress disorder and burnout.[64] With resilience the quality of care, caring and sustainability of the health care workforce can be improved.[53]

Empathy

Empathy is the ability to share or recognize emotions experienced by another person.[65] Empathy in physicians may help them to benefit from more meaningful work, increased wellbeing and reduced symptoms of burnout [27] and has been linked with increased levels of patient satisfaction. Recent studies have concluded that during medical training empathy declines and that distress is a key determinant in this.[66] To cultivate physician empathy it would be important to identify the exact reasons for empathy decline by making specific, evidence-based statements as well as developing targeted interventions.

Burnout is a multifactorial phenomenon, and it is possible that a multidimensional and holistic approach would be the most adequate. Physicians should try to find the appropriate engagement strategies for themselves. More and more importance is being given to empathy, humanism, self-compassion, mindfulness and resilience but measurement and implementation of these competencies in the medical community continues to be a challenge. Adding stress management training, based on these competences, to the anesthesia education curriculum could help anesthesiologists to deal more successfully with stress. Further research is necessary to identify which programs of emotion regulation strategies will best suit the needs of anesthesiologists and to measure these effects on patient care and health care system.

Wellbeing and high-quality healthcare

The quality of care in healthcare organizations is usually assessed by the use of patient-based indicators and the wellbeing of physicians is rarely taken into account.

However, the importance of this is being recognized and it has been reported that satisfied physicians tend to be more committed to the work of organizations, increase productivity and decrease treatment costs as well.[67]

Furthermore, it has been observed that physician wellbeing contributes to patients' adherence to treatment and satisfaction.[20] For this reason, healthcare centers have an economic stake in the wellbeing of the physicians, as when they are more satisfied they are generally more productive.[41]

Wellbeing is a prerequisite for good clinical practice which in turn leads to high quality healthcare.[68] For this to happen, the wellness of all members of the team must be taken care of, meaning that all are working in the same direction towards patient needs.

Future work will need to address additional questions: How to improve motivation, empathy and happiness in anesthesiologists? How to measure wellbeing in anesthesiologists? Could mindfulness trait be a good quality indicator? Which meditation practices are best for physicians, and particularly for anesthesiologists?

Conclusions

Anesthesiologists face a wide variety of stressors all of which may result in stress, depression and burnout and can be detrimental to patient care and health care systems.

Preventing and detecting burnout early in its course is important and it is a priority to develop a wellbeing culture in anesthesiologists' personal and professional life. Interventions to address and prevent burnout must begin early in anesthesia medical training and strategies must be developed to decrease workload while maximizing autonomy. In addition, efforts should be made to empower anesthesiologists to build the knowledge and skills necessary to become competent physicians, as well as the emotional health to face the challenges inherent in medical practice.

Up to now, research in this area has not been controlled and based on small samples. This fact suggests the need for further studies, prospective, with a controlled design and a more rigorous methodology.

Future prospective research should use multiple methodologies (psychological, neurochemistry and neuroimaging) to understand emotion regulation and the importance of mindfulness and self-compassion in stress and burnout management. In this way, it will be possible to outline more efficient strategies for prevention and treatment of burnout and therefore promote wellbeing in anesthesiologists.

Key messages

— Burnout is a serious problem among anesthesiologists and this impacts seriously in their performance.

— New approaches like bringing awareness towards emotions and mindfulness techniques seem to be highly promising institutional as well as personal interventions are the essential components necessary to win the battle against burnout.

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2.2 - The necessity of new fields of Investigation

Despite the current evidence of factors underlying burnout, the fact is that it continues to be a prevalent problem (Shanafelt et al., 2015) with significant implications for physicians and patient safety. The underlying mechanisms are under-explored. Particularly, a recent study by van der Wal, Bucx, Hendriks, Scheffer, & Prins (2016) highlights the role of personality traits, namely neuroticism. Despite the importance of this trait, many questions remain unanswered. We point out to these limitations in literature and propose to explore the role of other less explored constructs, related to emotion regulation. In this context, we sent a letter to the editor published in European Journal of Anaesthesiology. This letter is presented in the original version, on the following pages.

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fentanyl patch for several weeks prior to her death.[2] In this sense at least, the patient was not opioid nontolerant. Second, although we agree that the individual variation of tolerance is substantial, we were also quite surprised that a nonopioid-naïve patient could commit suicide with her standard patch. This may be an effect of the quicker rate of increase in blood concentration by oral ingestion, rather than the absolute concentration. And third, given that chronic pain itself is an independent risk factor for suicide, withholding pain therapy in acute episodes of any sort is probably not a good idea and an aggressive multimodal approach – as emphasised by Ruan and colleagues – is warranted.

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Psychological distress, burnout and personality traits in Dutch anaesthesiologists

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Editor,

We read the article 'Psychological distress, burnout and personality traits in Dutch anaesthesiologists' by Van der Wal *et al.*[1] that was recently published in the *European Journal of Anaesthesiology* and we must congratulate the authors on their work and efforts to raise awareness of burnout in anaesthetists. We would like to come forward with some contributions, as it is in line with the current work we are developing.

Although burnout as an overall research topic has been present in anaesthesia journals for more than a decade, it continues to be a problem without an effective solution. A recent publication by Shanafelt[2] seems to confirm this, showing that burnout is increasing toward epidemic levels with potential implications for society in general, and anaesthesia is no exception.

Interestingly enough, the article by Van der Wal *et al.* presents a prevalence of burnout in Dutch anaesthetists lower than published results from other countries.[2,3] This raises the question whether Dutch anaesthetists are more resilient or whether their organisations are more adequate, thus preventing them from developing higher levels of burnout? It would be worthwhile to perform a multicentre study in different countries to explore which are the characteristics of the countries with the lowest percentage of burnout. This research may in turn reveal important factors for burnout management, which depends not only on organisational factors but also on individual factors. The multiple organisational measures that have been widely recommended appear not to be effective in overcoming this problem. Moreover, anaesthesiology has inherent and unique characteristics that make it stressful. Studies including specific stressor evaluation in anaesthesia could be promising for a better understanding of true inducers of stress in the daily life of anaesthetists.

Many factors contribute to the vast array of ways in which each individual experiences, reacts and regulates stress. One of these factors is personality traits. Consistent with studies in other areas[4] Van der Wal *et al.* found that burnout in anaesthetists is related to neuroticism; and drew attention to the fact that personality traits are usually considered stable over time and are hard to change.

However, there is now increasing consensus that personality traits also continue to develop throughout adult life,[5] and personality theory also shifts in that direction. Van der Wal *et al.* suggest personality testing in the selection of anaesthesia residents to reduce burnout in future anaesthesiologists. As personality traits are not static and can be dynamically influenced by work life, assessing personality traits may be useful in detecting individuals at risk of developing burnout but should not exclude them. Physicians can evolve naturally or use psychological strategies to regulate stress and become good professionals.

Neuroticism is a rather general, nonspecific trait that has been associated with multiple psychopathologies, thus it is not at all surprising to find an association with burnout. To better understand the processes underlying burnout, research should focus on recent, more refined constructs, such as self-compassion and mindfulness. These constructs have been also described as personality traits and are emerging as interesting topics for research. Emotional regulation mechanisms are complex and these traits should not be considered independently, but their relative impact should be explored. In fact, emotional regulation skills appear to be centrally important in understanding how individuals respond to workplace stressors. These traits, as well as the interventions designed to promote them, seem to enhance better

emotional regulation profiles, improving stress outcomes and promoting well-being.[6] Standardised programmes such as Mindfulness-based Stress Reduction have also proved to benefit personality traits of neuroticism.[7]

Determining the differentiated influence of these psychological traits and processes in explaining anaesthetists' stress outcomes is a key step in the development of interventions to improve stress and burnout management. Therefore, in future studies of burnout in anaesthetists, mindfulness and self-compassion traits should be evaluated. Mindfulness and self-compassion based stress reduction programmes for anaesthetists need to be evaluated and their impact, not only upon professional well-being but also in clinical care outcomes.

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Reply to: psychological distress, burnout and personality traits in Dutch anaesthesiologists

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Editor,

We would like to thank Lapa *et al.*[1] for showing interest in our article 'Psychological distress, burnout and personality traits in Dutch anaesthesiologists'[2] and for acknowledging in their letter to the editor our efforts to raise awareness about burnout in anaesthesiologists through our work. They came forward with some interesting contributions, which we would like to address in this response.

Indeed our results show a lower prevalence of burnout in Dutch anaesthesiologists compared with other European countries. Our study pointed out that the prevalence of burnout in the general Dutch population is among the lowest in Europe.[3] It would be mere speculation to discuss explanations, which could be as miscellaneous as research methodological reasons, like the questionnaires or sample selection bias, or social or organisational factors. As to the latter it would certainly be interesting to compare work-related stressors and factors causing satisfaction (which are protective against burnout[4]) between countries in a multinational study. We recently submitted a second study that includes an analysis of the importance of work-related stressors and factors causing satisfaction in the daily life of the anaesthesiologist. Job satisfaction was related to good relationships with patients and families, and being appreciated by colleagues.

Lapa *et al.* argue that personality traits may not be written in stone, as once thought in psychological theory, and that individuals can evolve during their work life. They further state that for this reason, individuals should not be excluded on the basis of personality tests indicating they may be at risk for developing burnout. Indeed it is known that, for example, the general personality trait of neuroticism tends to gradually diminish over life.[5] Also people experience personal growth and develop during their professional life, but the ease in which they naturally adopt stress-relieving strategies or learn psychological means to regulate stress will be dependent on the type of person they are to begin with.[6,7] So individual susceptibility remains an important factor in the development of burnout. Of course, as an instrument of selection, the 'Big Five' personality trait model may be too general to use in the selection of future anaesthesiologists, let alone exclude them from the training programme. More refined personality constructs are needed in that respect. Identifying those constructs is a field of research that may yield results we can use, together with other instruments, to select people best suited for the inherent and unique characteristics that make anaesthesia stressful.

We endorse the positive effects Mindfulness-based Stress Reduction programmes can have on stress management and burnout development. Training in holistic self-care activities such as the introduction of life coaches and mindfulness meditation can be most valuable. The same holds for managerial interventions such as limited case loads and restructuring organisations to optimally support human development.[8]

In conclusion, burnout management depends, as Lapa *et al.* also indicate, both on organisational and on individual factors. To address the important problem of

2.3 - Emotions and Emotion Regulation

Abundant research has focused on emotional demands and their impact on physicians' mental health, stress, burnout and job satisfaction (Gundersen, 2001; Ramirez, Graham, Richards, Gregory, & Cull, 1996; Wallace et al., 2009). However, relatively little is known about emotion regulation in physicians.

In recent years, there has been a growing interest in understanding the processes of emotion regulation, as well as its role in the development and maintenance of psychopathology symptoms (Jazaieri, Urry, & Gross, 2013). In fact, there is cross-sectional evidence that emotion regulation deficits or emotional dysregulation negatively affect mental health, being associated with a series of psychopathological conditions, most notably depression and anxiety (Aldao et al., 2010; Ehring, Tuschen-Caffier, Schnülle, Fischer, & Gross, 2010; Gilbert & Procter, 2006; Gross & Muñoz, 1995; S. C. Hayes, 2004a; Hofmann, Grossman, & Hinton, 2011). Longitudinal studies have also demonstrated the link between maladaptive emotion regulation and the development of depressive symptoms (Aldao & Nolen-Hoeksema, 2012b; Kraaij, Garnefski, & Maes, 2002) and anxiety disorders (Aldao & Nolen-Hoeksema, 2012b; Aldao et al., 2010; Berking, Wirtz, Svaldi, & Hofmann, 2014; Cisler, Olatunji, Feldner, & Forsyth, 2010; Kashdan, Zvolensky, & McLeish, 2008).

The study of emotion and its regulation is extremely complex and the relationship between both (emotion and its regulation) is not yet fully understood. It is vital that the full range of emotions should be studied in order that we better understand the basic processes which operate across individuals and their inter-individual variability. Distinct emotions and cognitions are innate to the human brain, a pattern recognition and response engine that works on a psychobiological level, organizing the mind within.

The existing literature reveals a lack of consensus on the distinction between emotion and emotion regulation (Campos, Mumme, Kermoian, & Campos, 1994; Kagan, 1994; Stansbury & Gunnar, 1994). Emotions have been defined as powerful biologically endowed reactions that allow a quick appraisal of internal and external stimuli and fast organize our responses to cope in a protective way with such stimuli (Frijda, 1986). Emotions are necessary to provide information about critical events and our relationship to them (Clore, 1994) prompting to quickly react to threats in our lives. The triggers for emotional responses are external or internal events of importance which, when evaluated by the individual, set coordinated response tendencies underway, a combination of behavioural, experience and physiological systems (Gross, 1998).

Emotions are conceptualized, therefore, as including the emotional experience (e.g., fear), the physiological response (e.g., sweating), and the emotional expression (e.g., fleeting) (Linehan, 1993). Therefore, emotions are in themselves regulatory and crucial for one's survival. However, a balance needs to be struck between these strong reactions and the way they are regulated in order to avoid emotions to take control of our everyday encounters, both personal and professional.

2.3.1 - Emotions as regulatory protective stances

Emotion regulation refers to the process by which individuals influence their emotions, when they have them (i.e., their valence, intensity or duration), and how they experience and express those emotions (Gross, 1998; Thompson, 1990, 1994). This process may be automatic or controlled, conscious or unconscious, and it is a dynamic process, with continuous bidirectional excitatory or inhibitory interaction.

Research into the field of emotion is broadly split between those who contest that there are 'innate emotional circuits' responsible for our more basic and reactive behaviour, and others who insist that emotions are in fact a social construct or psychological manifestation, learned and created by physical and social interaction with the world. LeDoux (2012) considers that while this debate is important, the truth lies somewhere between these positions, and that an understanding of how individuals are triggered to respond to the basic emotions - fear, happiness, anger, sadness, disgust and surprise - is vital, though a much more complex task to undertake than this thesis seeks to answer.

Neuroscience and neuroimaging studies have been essential in clarifying these processes, suggesting that the amygdala is associated with the early detection of emotionally activating stimuli, such as threat stimuli, and that the hippocampus, insula, anterior cingulate cortex and the prefrontal cortex are involved in the processing of emotion regulation (LeDoux, 2000).

Survival of the human species has been ensured by its awareness to threatening environments, and the appropriate response emotionally triggering the appropriate reaction. The brain of all vertebrates retains very similar patterns of organization which denotes that these characteristics are essential to the survival of a species (McEwen, 2009). These combine with sensory-motor devices to allow the creatures' action and reaction to external stimuli.

The system responsible for this pattern of response is the threat-defense system, which is functionally focused on threat and self-protection, quick and prompt detection of threatening stimuli triggers emotional, cognitive and behavioural responses (Gilbert, 2001). This process involves activation of the hypothalamic pituitary adrenal axis and is processed through fast-processing systems in limbic areas such as the amygdala (LeDoux, 1998).

It does seem that response patterns for reacting to threat are innately 'wired' into the mental 'circuitry' of our brains. However, the reaction to said threat is not so 'wired', being more of a learned phenomenon. These threat stimuli can also be 'unlearned' and can be controlled to a greater or lesser degree by behavioural means (LeDoux, 2012).

The primary target of emotion regulation is to attain an optimal balance of the dynamics of each emotion, in order that said emotions may allow and enable an appropriate response to the stimuli at hand and its demands. Some definitions of emotion regulation emphasize the importance of the interpersonal/relational nature of emotion regulation (Campos, Walle, Dahl, & Main, 2011), giving a prominent place to the role of social relations in regulating emotions (Marroquín, 2011). Campos et al. (2011) considers that the regulation of emotion denotes in part managing conflicting objectives. Therefore, the regulation of emotion does not involve the control of an emotional state but rather the conflict in the objectives of differing individuals or the conflict between contradictory goals on an individual person. Every person has many, offering differing objectives, and these often clash with those of another person, causing regulatory change to be especially challenging in a social context. Given a thorough understanding of a situation, an inference of a person's strategy for managing conflicting objectives can be garnered, allowing the correct approach to regulating emotion in stressful circumstances. For instance, physicians' difficulties in interpersonal relationships may play an important role in emotion regulation.

Theoretical and empirical contributions emphasize the key role of social threats on a range of emotional and mental health problems (Gilbert, 2001). Humans are social animals, with evolved motivations and systems to stimulate positive affect in other to assure group-belonging and have the group support and protection. In human evolution, this was crucial for survival. In the modern world, a need for an awareness of corporeal threats is reduced, though not completely removed. Nonetheless, humans remained highly sensitive to signals of approval and acceptance vs. rejection or attacks from others. Therefore, our threat detection system turns to our social or professional standings (Gilbert, 1997, 1998, 2007).

Different individuals have differing sensitivities to threats and their responses and reactions also vary on an individual level (Calkins, 1994; Hariri & Holmes, 2006) with alternative strategies and approaches. We therefore need to know how susceptibility to the psychopathology is affected by these constructs. However, these strategies will continuously be affected by interactions between genes, environment and context (Hariri & Holmes, 2006; LeDoux, 2012), which makes the understanding emotion regulation very difficult to unravel.

People act and react according to their perceptions of threats, corporeal or social. As social beings, humans are somewhat aware of their reactions, although they may still be unable to control or modulate their response. Indeed, our perception of being unable to control our behaviour and emotional responses, can be a threat itself. We reflect, self-monitor and are aware of some of our motivations, and this has been undeniably useful for the development of mankind. However, these self-focused abilities are also unhelpful as we over-cogitate, ponder our internal world and ruminate on past events. Indeed, our own thoughts and internal events can activate the threat-defense system (Gilbert, 2001), which results in an unlimited opportunity for threat responses to be produced. Additionally, individuals tend to regulate their negative emotions (resulting from the activation of the threat-defense system) by using strategies that ironically result in an increase of that system, thus creating a positive loop that reinforces both the activation of the system and the strategy itself. This vicious circle is the root of psychopathological symptoms such as anxiety and depression.

2.3.2 - Functions and consequences of (mal)adaptive emotion regulation

Emotion regulation strategies (i.e., the processes through which individuals attempt to influence, change or control emotions) may be adaptive or maladaptive. However, this classification (adaptive / non-adaptive) seems to be neither linear nor applicable in all circumstances, since the strategies of emotion regulation are context-dependent (Gratz & Roemer, 2004) and dynamic processes depending also on the flexibility of each individual to use them (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004) and its specific objectives. For each individual to navigate successfully in their social world, it is important to be flexible and that it makes a dynamic use of the multiple strategies of regulation of the emotions (Ehrenreich, Fairholme, Buzzella, Ellard, & Barlow, 2007).

Emerging approaches to psychopathology and psychotherapy, labelled as the third wave cognitive-behavioural approaches, highlight the adaptive and necessary role of emotions. Moreover, these approaches emphasize that it is not the form, frequency or intensity of

internal events that is problematic but their function and how the individual regulates them (S. C. Hayes, Strosahl, & Wilson, 1999). These new conceptualization and treatment models are characterized by themes novel to psychotherapeutic interventions, including mindfulness, compassion and acceptance. The current dissertation focused on emotion regulation processes to comprehensively assess emotion regulation in the context of burnout and psychopathologic symptoms in anaesthesiologists.

2.3.2.1 - Maladaptive emotion regulation

Emotional dysregulation is a multidimensional construct (Gratz & Roemer, 2008) in which there is an inability to tolerate and experience unwanted and aversive emotional states and difficulty in controlling behaviours such as impulsive behaviour. It is a relevant factor for different forms of psychopathology (Aldao, 2013). Therefore, knowledge of this will have implications for preventive actions and intervention in problems related to psychopathology. Maladaptive strategies, include rumination, avoidance, and self-criticism. These strategies tend to have a positive association with psychopathology (Aldao & Nolen-Hoeksema, 2012a, 2012b; Aldao et al., 2010).

Multiple clinical conditions are characterized by the difficulty in regulating emotions, being the most frequent stress, depression, anxiety and personality disorders such as borderline personality disorder, eating disorders, etc (Ehring et al., 2010; Martin & Dahlen, 2005; Roemer et al., 2009; M. Wang & Saudino, 2011). Based on this knowledge, multiple theoretical models of psychopathology integrate an analysis centred on the processes of emotional deregulation, to explain its development and maintenance (Aldao & Nolen-Hoeksema, 2012a, 2012b; Kashdan & Breen, 2008).

Sim & Zeman (2005) find that multiple studies, both experimental and mediational, demonstrate that the effects of a stressor on psychopathological symptom development are mediated by emotion regulation skills. Other authors have reached very similar conclusions (Campbell-Sills, Barlow, Brown, & Hofmann, 2006; Rusting & Nolen-Hoeksema, 1998).

Thus, knowing the models and the affected competencies/skills of emotion regulation, it is possible to develop therapeutic approaches directed to the committed competences (Berking et al., 2008).

One maladaptive emotion regulation strategy that has been found to play a significant role in psychological adjustment and that will be focused in this research is rumination.

a) Rumination

Rumination is a construct characterized for a negative and constant problem-focus on an issue, thereby increasing the perceived severity of the issue. Rumination may be defined as a form of repetitive thought where a circular abstract-evaluative introspection takes hold as regards the causes and significance of the individual's negative or depressive emotions (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008).

It represents a maladaptive response that predicts negative outcomes. Several studies have demonstrated its association with depression (Cooney, Joormann, Eugène, Dennis, & Gotlib, 2010; Raes, 2010) and that the female gender is more vulnerable to rumination and inflexible thinking (Nolen-Hoeksema, Larson, & Grayson, 1999). This appears to be one of the explanations for gender differences in depression. In addition, rumination is a predictor of anxiety symptoms in patients with depressive disorders (Roelofs, Huibers, Peeters, Arntz, & van Os, 2008).

A possible mechanism through which rumination can prolong depression is by amplifying negative thinking, making it more frequent and creating a vicious cycle (Nolen-Hoeksema, 1991). By making thought more pessimistic and fatalistic, rumination prevents an effective resolution of problems (Lyubomirsky & Nolen-Hoeksema, 1995). Rumination is associated with interpersonal difficulties (Saffrey & Ehrenberg, 2007), a less favourable view of others, less satisfaction in relationships and worse social functioning (Lam, Schuck, Smith, Farmer, & Checkley, 2003).

Moreover, more ruminative people have less social support and more episodes of social friction (Nolen-Hoeksema & Davis, 1999; Nolen-Hoeksema et al., 2008). It is also associated with aggressive behaviours (Bushman, Bonacci, Pedersen, Vasquez, & Miller, 2005), self-harming behaviours (Armey & Crowther, 2008), alcohol abuse (Nolen-Hoeksema & Harrell, 2002) and suicidal ideation (Miranda & Nolen-Hoeksema, 2007).

In a study with teachers, rumination was a significant predictor of stress and burnout, and a study in intensive care professionals, reports significant indirect effects of ICU stressors on burnout, depression and risk of psychiatric morbidity via increased rumination (Vandevala et al., 2017).

That such ruminative thought exacerbates negative moods is found to be robust in experimental studies; it is a predictor of clinical depression (Nolen-Hoeksema et al., 2008; Watkins, 2008). Additionally, recent evidence suggests that less rumination correlates strongly with greater self-compassion (Neff, 2003a; Neff & Vonk, 2009). This ties in well with Leary et.

al study (Leary, Tate, Adams, Batts Allen, & Hancock, 2007) that found that people exhibiting self-compassionate traits experience less negative affect (and so are less anxious and less depressed) precisely because they ruminate less as regards the possible negative outcomes of events.

Given that rumination is associated with worse response to treatment in depressed patients (Ciesla & Roberts, 2002), a better understanding of this construct may help to develop more effective therapeutic protocols.

b) Experiential avoidance and psychological inflexibility

According to Acceptance and Commitment Therapy model (ACT), at the root of suffering are psychological processes such as cognitive fusion and experiential avoidance (S. C. Hayes, Luoma, Bond, Masuda, & Lillis, 2006; S. C. Hayes et al., 1999; S. C. Hayes & Smith, 2005).

Cognitive fusion occurs when the individual is unable to detach from the content of his/her cognitions, viewing them as a reflection of reality and as permanent events, instead of being transitory and subjective. When fused with one's cognitions these internal events tend to overdominate one's behaviours over other sources of behavioural regulation or direct consequences (S. C. Hayes et al., 2006, 1999). This process seems to fuel experiential avoidance, which is a process whereby individual attempts to change, evade, diminish or control the form or frequency of internal experiences (ex. emotions, thoughts, physical sensations) and the contexts in which they occur. Cognitive fusion occurs when the individual is unable to detach from the process of thinking, thus thoughts regulate over the behaviour (S. C. Hayes et al., 2006). When these processes dominate an individual experience this can result in psychological inflexibility.

In fact, psychological inflexibility results from being excessively enmeshed in one's internal experiences and attempting to avoid them, and having difficulties connecting with the context in the situation and choosing behaviour aligned with values and goals (S. C. Hayes et al., 1999). The problem with psychological inflexibility is that trying to control private experiences can actually lead to an increase in the intensity and frequency of these internal experiences which can result in psychopathology (S. C. Hayes & Smith, 2005; S. C. Hayes et al., 1999).

ACT posits that experiential avoidance and psychological inflexibility more broadly are at the core of human suffering (S. C. Hayes et al., 2006), being involved in the aetiology and maintenance of many forms of psychopathology (A. M. Hayes & Feldman, 2006; S. C. Hayes, 2004b). Studies show significant positive correlations between experiential avoidance and stress, anxiety and depression (Bond et al., 2011; A. M. Hayes & Feldman, 2006; Ruiz, 2010).

Also, a study in the Portuguese population has shown a strong association between experiential avoidance and depressive symptomatology, anxious symptomatology and negative affect (Pinto-Gouveia, Gregório, Dinis, & Xavier, 2012).

So, from an ACT standpoint, psychological problems are a result of this tendency to become overly enmeshed by internal emotions and thoughts with an over rigid conceptualization of the world rather than by the negative thoughts and emotions themselves; it is the loss purpose and perspective rather than the individual issue at hand (S. C. Hayes et al., 1999; Kashdan & Rottenberg, 2010).

Thus, the main goal of ACT is to promote psychological flexibility, that is the ability to connect with the present moment with acceptance rather than avoidance and to act in line with identified values and goals (S. C. Hayes et al., 1999).

2.3.2.2 - Adaptive emotion regulation

Adaptive emotion regulation strategies involve the ability to recognize and label the emotion, to accept it, and to monitor and consciously modify the emotional reaction to such emotion (Aldao & Nolen-Hoeksema, 2012a). Current theoretical suggestions and empirical evidence suggest that the ability to direct compassion to oneself when facing setbacks or experiencing difficult emotions is an effective emotion regulation process that may promote psychological adjustment (MacBeth & Gumley, 2012; Pinto-Gouveia, Duarte, Matos, & Fráguas, 2014). Moreover, the ability to notice and accept the ongoing thoughts and emotions in the present moment – mindfulness trait – is another process that promotes resilience and increases psychological well-being.

a) Self-compassion

Compassion involves attending to and the intention and motivation to relieve and prevent suffering (Dalai Lama, 1995; Gilbert, 2009; Gilbert & Choden, 2013). Compassionate feelings can be expressed in relation to oneself or to others.

Self-compassion is a relatively new concept that has been described as having an openness, awareness and acceptance of one's personal suffering; caring for oneself, being kind to oneself and being non-judgemental towards personal failings and shortfalls through the recognition that this is the normal human experience (Neff, 2003a, 2003b, 2008, 2009, 2011; Neff & Dahm, 2015). Neff considers that self-compassion is composed of three dimensions that represent a healthy attitude towards oneself: self-kindness (vs. self-judgement), a sense

of common human fallibility (vs. isolation) and mindfulness (vs. over-identification). These three components, although conceptually and experientially distinct, are interconnected.

Self-kindness involves the tendency to direct kindness, warmth and care towards the self when coping with distressing life events, rather than being self-critical. Self-compassion provides the emotional security necessary for the individual to have a conscious, clear and accurate observation of their mistakes and inadequacies (without judging them), encouraging them to make the necessary corrections in their response patterns, with patience and kindness; to enhance their health and well-being (Neff, 2003a, 2003b, 2004).

A sense of common humanity refers to the openness to viewing such difficult circumstances or setbacks as part of the human condition, with a sense of interconnectedness. The mindfulness dimension involves the awareness and acceptance of disturbing internal events (e.g., emotions), rather than ruminating about them or engaging in attempts to avoid them (Terry & Leary, 2011).

Thus, self-compassion can be conceptualized as an adaptive form of emotion regulation characterized by feelings of kindness, acceptance, and calmly directed toward oneself, especially at times of inadequacy, failure or difficult life circumstances (Gilbert & Irons, 2005).

Self-compassion has been shown to moderate a person's emotional reactivity to negative events. Self-compassion promotes the clear awareness of the current moment experience, of the emerging pattern of thoughts and emotions and behavioural reaction tendency, and to mindfully adopt more effective actions to cope with the situation in a way that enhances self-regulation and well-being (Gilbert & Choden, 2013; Terry & Leary, 2011). Therefore, self-compassion - however it is attained, be it experimentally induced or through a natural trait/personal characteristic tendency - attenuates negative reactions (Leary et al., 2007; Neff, Hsieh, & Dejitterat, 2005).

Some studies have shown that the ability to feel self-compassion is negatively associated with psychopathology, namely depression and anxiety (Gilbert, Clarke, Hempel, Miles, & Irons, 2004; Neff, 2003a, 2003b). It is also negatively associated with self-criticism, neuroticism and rumination (Neff, 2003b; Neff, Rude, & Kirkpatrick, 2007). On the other hand, there is growing evidence that psychological well-being is related to self-compassion and is regarded as a vital protective factor in the building of an individual's emotional resilience (Neff, 2003b; Neff et al., 2007; Raes, 2010). A recent meta-analysis is consistent with these results, highlighting the importance of self-compassion in reducing depression and anxiety rates and increasing stress resilience, improving individual well-being (MacBeth & Gumley, 2012).

Compassion-focused therapies aim to help individuals with high shame and self-criticism (Gilbert, 2010) to experience positive emotional experiences of warmth and security, in their relationship with others and with themselves, developing and strengthening the system of contentment; and promoting the connection to others and well-being (Gilbert, 1989, 2000, 2005, 2009; Gilbert & Procter, 2006). There is growing evidence that compassion-based approaches are effective in reducing psychopathological symptoms and in improving mental health in clinical and non-clinical samples (Kirby, 2016; Matos et al., 2017).

Even though there is a growing body of knowledge on the beneficial role of compassion as a protective factor against stressors and as a promoting factor of mental and physical health (MacBeth & Gumley, 2012; Neff, 2003a; Neff et al., 2007; Raes, 2010) only a few studies investigated the role of this construct in psychological adjustment of health professionals (Boellinghaus, Jones, & Hutton, 2014) and to our knowledge no study has yet investigated self-compassion in relation to burnout and psychopathological symptoms in anaesthesiologists.

b) Mindfulness

Mindfulness is a construct usually defined as a state of being aware and conscious of what is occurring in the present moment (K. W. Brown & Ryan, 2003); allowing the individual to be present for reality as it is, instead of reacting or processing it, as usual, through conceptual filters. Mindfulness also includes the adoption of an attitude of openness, non-judgement and acceptance towards experiences lived moment to moment (Bishop et al., 2004; Kabat-Zinn, 2003).

Mindfulness has been conceptualized at different levels. Some authors consider that mindfulness should be conceptualized as a trait or dispositional characteristic that is variable from individual to individual (K. W. Brown & Ryan, 2003; Davidson et al., 2003). Thus, although the state of mindful awareness is an inherent ability to the normal functioning of all human beings (Kabat-Zinn, 2003), it is likely that there are individual differences in the tendency to be mindful (K. W. Brown & Ryan, 2003). Other authors (Bishop et al., 2004) consider that mindfulness should be considered as a state which depends on the context. In practice, the coexistence of these two concepts seems to make sense, and thus, mindfulness can be conceptualized as an individual competence/trait that can be situationally improved through mindfulness skills practice, such as meditation.

Moreover, there is difficulty in theoretically characterizing mindfulness, with several definitions proposed (Bishop et al., 2004; K. W. Brown & Ryan, 2003; Chiesa, Serretti, & Jakobsen, 2013; Shapiro, Carlson, Astin, & Freedman, 2006), each measured with different

instruments specifically developed to grasp this construct. Some authors consider that mindfulness should be regarded as a one-dimensional construct, and can be evaluated through a single factor, labelled as attention and open awareness – Attention Awareness Scale – MAAS (K. W. Brown & Ryan, 2003). Baer, Smith, Hopkins, Krietemeyer, & Toney (2006) argue that mindfulness is a multifaceted construct, and should be evaluated by instruments with a multifactorial structure, which led to the development of the Five Facet of Mindfulness Questionnaire – FFMQ. These dimensions include observe, describe, not react to inner experiences, act with awareness and not judge inner experiences.

Thus, some researchers refer that the mindfulness construct can be used interchangeably as a trait, a state, a psychological process or as a technique or set of mindfulness meditation techniques (Fulton, Germer, & Siegel, 2005; S. C. Hayes & Wilson, 2003). This complexity makes it a difficult construct to investigate.

Generally, individuals who have a high level of mindfulness trait tend to have better mental health indices (K. W. Brown & Cordon, 2009; Keng, Smoski, & Robins, 2011). Mindfulness is reported to be negatively correlated with high levels of anxiety, stress, depression and rumination and has been positively associated with higher levels of well-being (K. W. Brown & Ryan, 2003). Mindfulness is also associated with better ability to regulate emotions, greater acceptance of emotions, and higher emotional intelligence (Baer, 2003; Baer, Smith, & Allen, 2004; K. W. Brown, Ryan, & Creswell, 2007; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007; Roemer et al., 2009).

A study with Chinese adults (Hou, Wong, Lo, Mak, & Ma, 2014) reported negative associations between all five mindfulness facets and stress. Di Benedetto and Swadling (Di Benedetto & Swadling, 2014), reported a strong negative correlation between mindfulness and burnout in Australian psychologists and Yang, Meredith, & Khan (2017) showed that mental health professionals who have higher levels of mindfulness have lower levels of stress and burnout. In this study, the act with awareness facet demonstrated the strongest negative association with stress and burnout.

Intervention programs based on mindfulness have had promising results in approaching a variety of clinical conditions, particularly in reducing stress and psychopathological symptoms and in improving well-being (N. B. Allen et al., 2006; Baer, 2003; Bishop, 2002; K. W. Brown et al., 2007; Keng et al., 2011; Khoury et al., 2013).

2.3.3 - Mindfulness-Based Interventions

Mindfulness-Based Interventions (MBI) aim to promote trait mindfulness through several formal and/or meditation practices which help the practitioner to establish a different relationship with internal events (thoughts, emotions and bodily sensations) based on an attitude of acceptance and non-judgement. Mindfulness meditation facilitates the development of a relationship of detachment with internal and external experiences (A. M. Hayes, 2004) and so the subjective events are observed and perceived as mere transient events of the mind (Bishop et al., 2004; S. C. Hayes et al., 1999; Shapiro et al., 2006; Teasdale, Segal, & Williams, 1995).

Shapiro et al. (2006) understand that through the training of mindfulness, the individual becomes able to de-identify himself from the content of his thoughts and to see the experience moment by moment with great clarity and objectivity. Other authors (S. C. Hayes et al., 1999; Safran & Segal, 1996), argue that it is the decentering perspective of mindfulness that explains the beneficial effects of mindfulness. In this way, the individual realizes that the reality of the moment is not absolute and therefore his thoughts do not necessarily reflect reality, observing them as transient events of the mind. In addition, the individual becomes able to distance himself from the literal meaning of his thoughts. In mindfulness-based interventions these mechanisms seem to explain a significant reduction of rumination levels (Deyo, Wilson, Ong, & Koopman, 2009).

Acceptance is another mechanism underlying interventions based on mindfulness and refers to the willingness to experience psychological events without having to avoid them (S. C. Hayes et al., 1999). Thus, with the development of an open attitude, with curiosity, with acceptance and without judgement, individuals who receive training in mindfulness, learn to recognize the transitory nature of conscious phenomena and to observe them without evaluating, avoiding or modifying them. With this perspective, the training of mindfulness fosters a greater cognitive-behavioural flexibility, less automaticity and reactivity (Shapiro et al., 2006) and greater capacity for emotional self-regulation (K. W. Brown & Ryan, 2003).

Jon Kabat-Zinn (1982, 1990, 1994) was at the forefront of the introduction of mindfulness meditation practices in health care, having developed in the 1980s a stress reduction program based on mindfulness – Mindfulness-based Stress Reduction Program (MBSR), originally developed for patients with chronic pain. Given the benefits of MBSR programs in this population, these programs based in this model, have been implemented in different contexts and populations. In general, researchers are unanimous about the benefits of mindfulness-

based approaches in a variety of clinical conditions. These interventions have shown efficacy in the treatment of anxiety, mood (Hofmann, Sawyer, Witt, & Oh, 2010), stress (Chiesa & Serretti, 2009), infertility problems (Galhardo, Cunha, & Pinto-Gouveia, 2013) and binge eating (Pinto-Gouveia et al., 2017).

Some studies (Creswell, Way, Eisenberger, & Lieberman, 2007), have suggested that mindfulness may reduce negative affect and promote greater physical health, in part, through labelling one's feelings. They found that individuals with more mindfulness traits have less reactivity to emotionally threatening negative stimuli compared to those with less mindfulness.

Functional Magnetic Resonance Imaging (fMRI) studies found that mindfulness interventions are associated with increased activations in prefrontal regions when compared to controls, especially during the expectation of negative and potentially negative images (Lutz et al., 2014). The authors of the study also found that there was increased activation in the regions of the brain associated with the regulation of emotion and reduced activation in the areas of the brain associated with the processing of emotional valence and arousal from an emotional expectation task showing emotion-regulating effects on a neural level, with mindfulness intervention.

2.3.3.1 - Mindfulness-Based Interventions in Burnout and Psychopathology

Currently, there are a substantial number of scientific studies showing that MBI is effective in reducing stress, depression and increasing well-being in different populations. For example, a systematic review, realized by Fjorback, Arendt, Ornbøl, Fink, & Walach (2011) concluded that MBSR can reduce stress and depression. Also, a meta-analysis concluded that MBSR is effective in reducing stress, depression, anxiety and distress, and improving the quality of life in non-clinical population (Khoury, Sharma, Rush, & Fournier, 2015). Regehr, Glancy, Pitts, & LeBlanc (2014) found significant reductions in anxiety and depression with mindfulness interventions in university students in their meta-analysis.

Mindfulness training can potentially reduce stress and burnout also in healthcare professionals (Escuriex & Labbé, 2011). However, only a limited number of interventions which target stress and burnout among physicians exists, and of those that exist have limited research on their efficacy. For example, a systematic review performed by McCray, Cronholm, Bogner, Gallo, & Neill (2008) concluded that few interventions exist to combat burnout in resident physicians.

A ten-week mindfulness intervention was found to reduce the number of stress-related symptoms of medical students (Rosenzweig, Reibel, Greeson, Brainard, & Hojat, 2003) although this study was not a randomized control trial.

Another study without a control group by Krasner et al. (2009) in primary care physicians found improvements in mindfulness, empathy, belief of the importance of psychosocial aspects of patient care, and reductions in burnout and mood disturbance as a result of an extensive, eight-week mindfulness education program.

A further systematic review and meta-analysis of randomized controlled trials in group interventions to promote mental health suggested that mindfulness interventions have a significant effect in reducing stress in health professional students. Nevertheless, this study did not show a significant effect of mindfulness interventions on depression nor anxiety (Lo et al., 2017).

A recent randomized controlled trial (Ireland et al., 2017), found that mindfulness training (10 - week of mindfulness training) was an effective way to reduce stress and burnout in primary care physicians of an emergency department.
A recent study in Portuguese Oncology Nurses, found that a six-week mindfulness-based intervention was effective in reducing burnout and compassion fatigue, and increasing satisfaction with life, trait mindfulness, self-compassion and psychological flexibility (Duarte & Pinto-Gouveia, 2016).

To the best of our knowledge, there is no study of mindfulness traits or mindfulness interventions in stress and burnout in anaesthesiologists. However, we consider relevant and urgent the increase of empirical studies that allow a greater understanding of the factors inducing stress in anaesthesiologists, as well as the study of emotional factors that interfere with the development of burnout, which can help develop effective interventions.

Chapter 2 - Objectives and Methodology

In this chapter, we present the systematization of the general and specific objectives that guided our research, as well as the applied methodology.

1 - Objectives

The main aim of the present study was to study the emotion regulation constructs in anaesthesiologists and investigate how mindfulness trait is associated with burnout and psychopathology (stress, anxiety and depression).

Secondary aims:
1 - Development and examination of a global index for Burnout Syndrome evaluation in physicians
2 - Study burnout, stress, depression and anxiety of Portuguese anaesthesiologists in comparison to physicians from other specialities.
3 - To understand and qualify the main stressors in anaesthesiologists' professional lives, and measure the level of associated stress
4 - Study the incidence and predictors of burnout and psychopathology symptoms in anaesthesiologists and anaesthesia residents
5 - Investigate mindfulness trait and its predictors in anaesthesiologists and anaesthesia residents
6 - Examining a path model testing the associations between stressors, rumination, depression, mindfulness and burnout in anaesthesiologists and anaesthesia residents

2 - Methodology

Initially, a literature review was carried out on burnout in anaesthesiologists, studying the main risk factors, consequences of burnout and strategies to deal with this syndrome . This review serves as a basis for formulating the research hypotheses and was presented as a review article (in the Theoretical Framework).

After the review study, an observational study was developed based on a questionnaire-based cross-sectional study. Data on personal characteristics, work experience, measures of stress, anxiety, depression, burnout, emotion regulation, psychological indicators and life satisfaction were collected (Appendix 1).

An anonymous self-reporting questionnaire-based survey was conducted across different anaesthesia departments of Portuguese hospitals. Additionally, it was randomly applied in other specialities departments from different regions of Portugal. Anonymity was ensured by inserting each completed questionnaire inside a sealed envelope, without any identification. A different page containing signed informed consent was immediately placed in a separate location to make identification impossible. The informed consent emphasised the voluntary nature of the study. The questionnaires took approximately 20 to 30 minutes to complete, and were delivered and collected by one of the authors personally or with the collaboration of a local proxy.
The study protocol was approved by the Ethical Committee of the Faculty of Health Sciences, University of Beira Interior, Portugal (Ethical Committee N. CE-FCS 2014/035). It was conducted between January 2014 and December 2014.

2.1 - Measures

Data were collected through a socio-demographic, work-related and socio-cultural data sheet and self-report questionnaires assessing burnout, depression, anxiety, stress, processes of emotion regulation (rumination, psychological inflexibility, self-compassion and mindfulness), satisfaction with life and disability.

The **Copenhagen Burnout Inventory** (CBI) was proposed by Kristensen, Borritz, Villadsen, & Christensen (2005) and was translated into Portuguese and validated by Fonte (2011). It considers fatigue and exhaustion as a central construct. The CBI is a 19-item questionnaire measuring three burnout sub-dimensions: personal burnout (six items), work-related burnout

(seven items) and patient-related burnout (six items). The original version presented a good internal consistency for all three subscales: personal burnout (α = .87), work-related burnout (α = .87) and patient-related burnout (α = .85). In the Portuguese version, the Cronbach's alpha coefficient observed in the three scales (.85, .87 and .84 respectively) indicated that the instrument has a good internal consistency. High degree of burnout was defined as 50 points or more.

The **Depression, Anxiety and Stress Scales-21** (DASS-21), was developed by Lovibond & Lovibond (1995) and was translated into Portuguese and validated by Ribeiro, Honrado, & Leal (2004) This is a self- reporting scale comprising 21 items distributed within three subscales developed to measure symptoms of depression, anxiety and stress. The Depression subscale measures low self-esteem and motivation, associated with feelings of hopelessness towards life goals. The Anxiety subscale assesses the connection between persistent anxiety state and the subjective feeling of fear as a response. The Stress subscale measures high levels of hyperarousal and tension, associated with low levels of resistance to frustration and disappointment. Participants are asked to indicate the degree to which each statement applied to them in the last week. In the original version, the authors found that all the subscales had an adequate to good internal consistency with α values of .81 for depression, .73 for anxiety and .81 for stress subscales. The Portuguese version showed also good internal consistency (Depression subscale Cronbach's α = .85; Anxiety subscale Cronbach's α = .74; Stress subscale Cronbach's α = .81).

Satisfaction with Life Scale (SWLS) was developed by Diener, Emmons, Larsen, & Griffin (1985) and was adapted to Portuguese by Simões (1992). It is a five-item scale designed to measure global cognitive judgements of one's life satisfaction. The scale shows good convergent validity with other scales and with other types of assessments of subjective well-being.

The Sheehan Disability Scale (SDS) was developed by Sheehan (Sheehan, 1983) and was translated into Portuguese by Pinto-Gouveia et al. (Pinto-Gouveia, Cunha, & Salvador, 2000). It includes three self-rated items designed to measure how work, social life and family life are impaired by current psychiatric symptoms such as panic, anxiety, phobia or depression. Each item includes an 11-point analogue scale that uses visual-spatial, numeric and verbal descriptive anchors simultaneously to represent the degree of disruption. It is a widely used, brief, reliable and valid self-rated measure of dysfunction for use in mental health research and clinical practice.

Ruminative Response Scale-10 (RRS-10) was developed by Treynor, Gonzalez, & Nolen-Hoeksema (2003) and was translated into Portuguese and validated by Dinis, Pinto-Gouveia, Duarte, & Castro (2011). It is a 10-item self-rated instrument that assesses rumination, a psychological process that has been described as a self-centred coping style that involves repetitive thinking on personal negative feelings, as well as a pattern of self-reflection on the events that have led to these feelings and/or its consequences (Lyubomirsky & Nolen-Hoeksema, 1993). This scale comprises of two factors, brooding and reflection. The total score of RRS-10 might be used as an overall measure of rumination, in which higher scores mean a greater degree of rumination. The internal consistency of the original scale was α = .85 for the total scale.

Five Facets of Mindfulness (FFMQ) is a 39-item self-report measure of the five facets of mindfulness, namely observing, describing, acting with awareness, non-judging of inner experience and non-reactivity to inner experience. It was developed by Baer et al. (2006), and showed good psychometric properties with alpha coefficients of: nonreactivity = .75, observing = .83, acting with awareness = .87, describing = .91, and nonjudging = .87. Thus, all five facet scales showed adequate to good internal consistency.
The Portuguese version was translated and validated by Gregório & Pinto-Gouveia (2011), and also showed good psychometric properties.

Acceptance and Action Questionnaire – II (AAQ-II) was developed by Bond et al. (2011) and the Portuguese version was validated by Pinto-Gouveia et al. (2012). The AAQ-II is a 7-item measure of psychological inflexibility. Answers are given on a 7-point scale ranging from 1= 'never true' to 7 = 'always true'. Higher scores indicate greater psychological inflexibility. The Portuguese version of the scale showed good internal consistency (α = .89) and good convergent and discriminant validity.

Self-Compassion Scale (SCS) was developed by Neff (2003b) and the Portuguese version was validated by Castilho & Pinto-Gouveia (2011). The SCS measures the way people act towards themselves in a number of situations. It's composed by 6 subscales, with a total of 26 items: (1) self-kindness ("I try to be loving towards myself when I'm feeling emotional pain"); (2) self-judgement ("When times are really difficult, I tend to be tough on myself"); (3) common humanity ("When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people"); (4) isolation ("When I think about my inadequacies, it tends to make me feel more separate and cut off from the rest of the world"); (5) mindfulness ("When I'm feeling down I try to approach my feelings with curiosity and openness"); and (6) over-identification ("When I'm feeling down I tend to obsess and fixate

on everything that's wrong"). A total score can be computed by reversing the items of the negative factors. In past research, the SCS has demonstrated good internal consistency (original version Cronbach's α = .92; Portuguese version Cronbach's α = .94).

In order to achieve the proposed objectives, we validated the Copenhagen Burnout Inventory for Portuguese physicians and a global burnout index was developed and tested (Chapter 3 – Section 1.2).

In addition, it was necessary to develop and validate a scale of evaluation of stressors in anaesthesiologists. This study was published as an original article in European Journal of Anaesthesiology (Chapter 3 – Section 2.3.1).

2.2 - Analytic Strategy

For descriptive analyses of the data, mean scores, standard deviations, medians, and percentiles were calculated for continuous variables. For categorical variables, percentages were calculated.

To determine if there was a significant relationship between two categorical variables was used chi-square tests for independence. Significant associations were identified considering adjusted standardized residuals that exceed +/- 2.

Pearson product-moment correlation coefficients were computed to measure the strength and direction of the association between two continuous variables.

A one-way analysis of variance (ANOVA) was used to identify significant differences between three or more independent groups. Homogeneity of variances among the groups was evaluated with Levene's test and when homogeneity was violated, we performed a Welch's *F* test, instead of *F* test. If the data met the assumption of homogeneity of variances, we used Tukey's post hoc test, otherwise we run the Games-Howell post hoc test. For scales with x dimensions, the ANOVAs were performed with an adjusted significant level, 5%/x, obtained by Bonferroni correction ($p < .050/x$).

Independent *t*-tests were used to compare the means between two independent groups. Levene's test was performed to test the homogeneity of variances.

A one-way multivariate analysis of variance (one-way MANOVA) was performed to determine whether there were any differences between independent groups on two or more continuous dependent variables. When the homogeneity of variance-covariance matrices was violated (evaluated with Levene's test), a Pillai's Trace test was performed. If the data met the assumption of homogeneity of variance-covariance matrices, a Wilks' Lambda test was used. If a statistically significant result was achieved, we continued with a *t*-test if there were two

independent groups or ANOVA and further post-hoc tests when there were more than two groups.

Multiple linear regressions were performed to study the predictors of a dependent variable. This statistical test provides the proportion of variance in a dependent variable that is explained by a combination of independent variables.

A path analysis was conducted to estimate the associations between the variables presented in the model to be tested.

The violation of normal distribution was verified with Skewness and Kurtosis coefficients (|Sk| <3 and |Ku|<10) (Kline, 2004).

The maximum likelihood estimation method was used to evaluate the regression coefficients significance. To evaluate the model fit the following goodness of fit indices were used: Chi-square (χ^2), Goodness of Fit Index (GFI), Comparative Fit Index (CFI), and Root-Mean Square Error of Approximation (RMSEA).

The bootstrap resampling method (with 2000 samples and 95% bias-corrected confidence intervals) was used to test the significance of the mediational paths. The effect is statistically significant ($p < .050$) if the lower and the upper bound interval of the confidence interval does not contain zero.

Except for analyses with a Bonferroni correction, the level of statistical significance considered was 5% ($p < .05$).

All statistical analyses were performed with the Statistical Package for Social Sciences software (SPSS, Version 19.0. Armonk, NY: IBM Corp.). The path analysis was conducted using Analysis of Moment Structures (AMOS, Version 24.0 Chicago: IBM SPSS) software.

Chapter 3 - Results

1 - Results in total sample

1.1 - Sample Characterization

1.1.1 - Socio-demographic data

The sample was composed of 1358 physicians: 637 anaesthesia specialists, 606 physicians of other specialities, and 115 anaesthesia residents. Of the anaesthesia specialists, 443 (69.9%) were female; 294 were 50 years or more (*M* = 47.16; *SD* = 10.12), ranging from 29 to 72; 443 (69.9%) were married or living common law, and 254 (40.8%) had 2 children. Of the physicians of other specialities, 328 (54.1%) were female; 272 were 50 years or more (*M* = 46.69; *SD* = 10.03), ranging from 26 to 70; 426 (70.3%) were married or living common law, and 249 (41.2%) had 2 children. Of the anaesthesia residents, 75 (67.6%) were female; all of them were less than 40 years (*M* = 28.48; *SD* = 2.20), ranging from 25 to 40; 89 (80.2%) were single, and 105 (94.6%) had no children.

There were significant differences in sex (χ^2 test: $p < .001$), marital status (χ^2 test: $p < .001$), and number of children (χ^2 test: $p < .001$) between anaesthesia specialists, physicians of other specialities, and anaesthesia residents. There were no significant differences in age (χ^2 test: $p = .836$) between anaesthesia specialists, physicians of other specialities, and anaesthesia residents. Descriptive results and chi-square statistic for these variables are presented in Table 1.

Table 1. Socio-demographic data (distribution of all participants)

	Anaesthesia specialists	Physicians of other specialties	Anaesthesia residents	χ^2 test
Sex				
Male	191 (30.1%)	278 **(45.9%)**	36 (32.4%)	$p < .001$
Female	443 (69.9%)	328 (54.1%)	75 (67.6%)	
Age (years)				
Mean ± *SD*	47.16 ± 10.12	46.69 ± 10.03	28.48 ± 2.20	
Min to Max	29 to 72	26 to 70	25 to 40	
< 40 years	190 (29.9%)	187 (31.4%)	111 (100%)	
40 to 49 years	152 (23.9%)	137 (23.0%)		$p = .836$
≥ 50 years	294 (46.2%)	272 (45.6%)		
Marital status				
Single	122 **(19.2%)**	98 **(16.2%)**	89 **(80.2%)**	
Divorced	58 (9.1%)	61 (10.1%)	1 **(0.9%)**	$p < .001$
Widowed	11 (1.7%)	21 **(3.5%)**	0 (0.0%)	
Married/Living common law	443 **(69.9%)**	426 **(70.3%)**	21 **(18.9%)**	
Number of children				
0	151 **(24.3%)**	145 **(24.0%)**	105 **(94.6%)**	
1	123 (19.8%)	129 (21.4%)	4 **(3.6%)**	
2	254 **(40.8%)**	249 **(41.2%)**	1 **(0.9%)**	$p < .001$
3	78 **(12.5%)**	64 (10.6%)	1 **(0.9%)**	
4 or more	16 (2.6%)	17 (2.8%)	0 (0.0%)	

Note. Adjusted standardized residuals in bold are those that exceed +/- 2.

1.1.2 - Work-related data

Of the anaesthesia specialists, 356 (56.4%) worked 41 to 60 hours per week; 368 (57.9%) worked only at public institution, 543 (85.6%) did night shifts; 425 (67.6%) slept 7 to 8 hours per night; 234 (37.2%) worked in the centre region; 354 (56.6%) did not do intra-hospital emergency; and 545 (87.2%) did not do extra-hospital emergency. Of the physicians of other specialities, 318 (52.6%) worked 41 to 60 hours per week; 302 (49.9%) worked only at public institution, 410 (67.7%) did night shifts; 439 (72.6%) slept 7 to 8 hours per night; 385 (64.3%) worked in the centre region; 266 (59.1%) did do intra-hospital emergency; and 384 (85.3%) did not do extra-hospital emergency. Of the anaesthesia residents, 74 (67.3%) worked 41 to 60 hours per week; 103 (92.8%) worked only at public institution, 97 (87.4%) did night shifts; 76 (69.1%) slept 7 to 8 hours per night; 48 (43.2%) worked in the centre region; 76 (84.4%) did do intra-hospital emergency; and 57 (63.3%) did not do extra-hospital emergency.

There were significant differences in workload (χ^2 test: $p < .001$), institution (χ^2 test: $p < .001$), night shifts (χ^2 test: $p < .001$), region (χ^2 test: $p < .001$), intra-hospital emergency (χ^2 test: $p < .001$), and extra-hospital emergency (χ^2 test: $p < .001$) between

anaesthesia specialists, physicians of other specialities, and anaesthesia residents. There were no significant differences in average night's sleep (χ^2 test: $p = .263$) between anaesthesia specialists, physicians of other specialities, and anaesthesia residents. Descriptive results and chi-square statistic for these variables are presented in Table 2.

Table 2. Work-related data (distribution of all participants)

	Anaesthesia specialists	Physicians of other specialities	Anaesthesia residents	χ^2 test
Workload (hour per week)				
≤ 40	65 **(10.3%)**	122 **(20.2%)**	17 (15.5%)	
41 to 60	356 (56.4%)	318 **(52.6%)**	74 **(67.3%)**	$p < .001$
61 to 80	173 **(27.4%)**	126 **(20.9%)**	17 **(15.5%)**	
> 80	37 (5.9%)	38 (6.3%)	2 (1.8%)	
Institution				
Only public	368 (57.9%)	302 **(49.9%)**	103 **(92.8%)**	
Public + private	232 (36.5%)	277 **(45.8%)**	8 **(7.2%)**	$p < .001$
Only private	36 (5.7%)	26 (4.3%)	0 **(0.0%)**	
Night shifts				
No	91 (14.4%)	196 **(32.3%)**	14 (12.6%)	$p < .001$
Yes	543 **(85.6%)**	410 (67.7%)	97 **(87.4%)**	
Average night's sleep (hours per night)				
≤ 6	198 (31.5%)	157 (26.0%)	33 (30.0%)	
7 to 8	425 (67.6%)	439 (72.6%)	76 (69.1%)	$p = .263$
> 8	6 (1.0%)	9 (1.5%)	1 (0.9%)	
Region				
North	167 **(26.6%)**	81 **(13.5%)**	33 **(29.7%)**	
Centre	234 **(37.2%)**	385 **(64.3%)**	48 (43.2%)	$p < .001$
South	214 **(34.0%)**	104 **(17.4%)**	26 (23.4%)	
Islands	14 **(2.2%)**	29 **(4.8%)**	4 (3.6%)	
Intra-hospital emergency				
No	354 (56.6%)	184 (40.9%)	14 (15.6%)	$p < .001$
Yes	271 **(43.4%)**	266 **(59.1%)**	76 **(84.4%)**	
Extra-hospital emergency				
No	545 (87.2%)	384 (85.3%)	57 (63.3%)	$p < .001$
Yes	80 **(12.8%)**	66 **(14.7%)**	33 **(36.7%)**	

Note. Adjusted standardized residuals in bold are those that exceed +/- 2.

Some work-related variables were not intentionally filled by anaesthesia residents, and only anaesthesia specialist and physicians of other specialities were considered. Of the anaesthesia specialists, 306 (48.3%) were hospital assistant; 214 (33.6%) were more than 20 years of experience; 594 (94.3%) had work contract; 440 (69.6%) were not involved in management positions; 376 (60.0%) were involved in medical education; 544 (86.6%) did not work with

intensive care patients; 515 (82.0%) did not work with chronic pain patients; and 539 (86.8%) worked with paediatric patients. Of the physicians of other specialities, 335 (56.6%) were hospital assistants; 233 (38.6%) were more than 20 years of experience; 543 (90.2%) had work contract; 427 (71.0%) were not involved in management positions; 395 (65.7%) were involved in medical education; 376 (83.6%) did not work with intensive care patients; 379 (84.2%) did not work with chronic pain patients; and 380 (84.4%) did not work with paediatric patients.

There were significant differences in professional category (χ^2 test: $p = .009$), years of experience (χ^2 test: $p < .001$), professional situation (χ^2 test: $p = .007$), involvement in medical education (χ^2 test: $p = .037$), and work with paediatrics patients (2 test: $p < .001$) between anaesthesia specialists, physicians of other specialities, and anaesthesia residents. There were no significant differences in involvement in management positions (χ^2 test: $p = .583$), work with intensive care patients (χ^2 test: $p = .160$), and work with chronic pain patients (χ^2 test: $p = .340$) between anaesthesia specialists, physicians of other specialities, and anaesthesia residents. Descriptive results and chi-square statistic for these variables are presented in Table 3.

Table 3. Work-related data (anaesthesia and physicians of other specialities)

	Anaesthesia specialists	Physicians of other specialities	χ^2 test
Professional category			
Hospital Assistant	306 (48.3%)	335 **(56.6%)**	
Graduate Assistant	237 (37.4%)	195 (32.9%)	$p = .009$
Senior Graduate Assistant	91 **(14.4%)**	62 (10.5%)	
Experience (years)			
≤ 3	60 (9.4%)	90 **(14.9%)**	
4 to 5	75 (11.8%)	57 (9.4%)	
6 to 10	106 (16.7%)	96 (15.9%)	$p < .001$
11 to 20	181 **(28.5%)**	128 (21.2%)	
> 20	214 (33.6%)	233 (38.6%)	
Professional situation			
With work contract	594 **(94.3%)**	543 (90.2%)	$p = .007$
Without work contract	36 (5.7%)	59 **(9.8%)**	
Involvement in management positions			
No	440 (69.6%)	427 (71.0%)	$p = .583$
Yes	192 (30.4%)	174 (29.0%)	
Involvement in medical education			
No	251 (40.0%)	206 (34.3%)	$p = .037$
Yes	376 (60.0%)	395 **(65.7%)**	
Work with intensive care patients			
No	544 (86.6%)	376 (83.6%)	$p = .160$
Yes	84 (13.4%)	74 (16.4%)	
Work with chronic pain patients			
No	515 (82.0%)	379 (84.2%)	$p = .340$
Yes	113 (18.0%)	71 (15.8%)	
Work with paediatrics patients			
No	82 (13.2%)	380 (84.4%)	$p < .001$
Yes	539 **(86.8%)**	70 **(15.6%)**	

Note. Adjusted standardized residuals in bold are those that exceed +/- 2.
These variables were not intentionally filled by anaesthesia residents.

1.1.3 - Socio-cultural data

Of the anaesthesia specialists, 490 (77.2%) were non-smokers; 575 (91.6%) consumed 5 or less drinks per week, 362 (56.9%) did not do any physical activity; 584 (91.8%) did not take part in any charitable event; 539 (84.7%) did not do any continuous education activity; 561 (88.2%) had leisure activities; 535 (84.5%) did not have meditation experience; and 386 (61.0%) had no regular religious practice. Of the physicians of other specialities, 486 (80.3%) were non-smokers; 541 (90.9%) consumed 5 or less drinks per week, 354 (58.5%) did not do any physical activity; 578 (95.5%) did not take part in any charitable event; 518 (85.6%) did not do any continuous education activity; 469 (77.5%) had leisure activities; 524 (86.8%) did not have meditation experience; and 372 (61.7%) had no regular religious practice. Of the anaesthesia residents, 90 (81.8%) were non-smokers; 106 (97.2%) consumed 5 or less drinks per week, 61 (55.5%) did not do any physical activity; 99 (90.0%) did not take part in any charitable event; 67 (60.9%) did not do any continuous education activity; 90 (81.8%) had leisure activities; 92 (83.6%) did not have meditation experience; and 64 (58.2%) had no regular religious practice.
There were significant differences in physical activities (χ^2 test: $p = .024$), charity activities (χ^2 test: $p = .011$), continuous education activities (χ^2 test: $p < .001$), and leisure activities (χ^2 test: $p < .001$) between anaesthesia specialists, physicians of other specialities, and anaesthesia residents. There were no significant differences in smoking (χ^2 test: $p = .114$), alcoholic drink consumption (χ^2 test: $p = .086$), meditation experience (χ^2 test: $p = .458$) and religious practice (χ^2 test: $p = .865$) between anaesthesia specialists, physicians of other specialities, and anaesthesia residents. Descriptive results and chi-square statistic for these variables are presented in Table 4.

Table 4. Socio-cultural data (distribution of all participants)

	Anaesthesia specialists	Physicians of other specialities	Anaesthesia residents	χ^2 test
Smoking				
No	490 (77.2%)	486 (80.3%)	90 (81.8%)	
Occasionally	49 (7.7%)	54 (8.9%)	5 (4.5%)	$p = .114$
Regularly	96 (15.1%)	65 (10.7%)	15 (13.6%)	
Alcoholic drink consumption (per week)				
≤ 5	575 (91.6%)	541 (90.9%)	106 (97.2%)	$p = .086$
> 5	53 (8.4%)	54 (9.1%)	3 (2.8%)	
Physical activities				
No	362 (56.9%)	354 (58.5%)	49 (44.5%)	$p = .024$
Yes	274 (43.1%)	251 (41.5%)	61 **(55.5%)**	
Charity activities				
No	584 (91.8%)	578 (95.5%)	99 (90.0%)	$p = .011$
Yes	52 (8.2%)	27 **(4.5%)**	11 (10.0%)	
Continuous education activities				
No	539 (84.7%)	518 (85.6%)	67 (60.9%)	$p < .001$
Yes	97 (15.3%)	87 **(14.4%)**	43 **(39.1%)**	
Leisure activities				
No	75 (11.8%)	136 (22.5%)	20 (18.2%)	$p < .001$
Yes	561 **(88.2%)**	469 **(77.5%)**	90 (81.8%)	
Meditation experience				
No	535 (84.5%)	524 (86.8%)	92 (83.6%)	$p = .458$
Yes	98 (15.5%)	80 (13.2%)	18 (16.4%)	
Religious practice				
Regular practice	95 (15.0%)	91 (15.1%)	15 (13.6%)	
No regular practice	386 (61.0%)	372 (61.7%)	64 (58.2%)	$p = .865$
No religion	152 (24.0%)	140 (23.2%)	31 (28.2%)	

Note. Adjusted standardized residuals in bold are those that exceed +/- 2.

1.2 - Development and evaluation of a global index from Copenhagen Burnout Inventory in physicians

We validated the Copenhagen Burnout Inventory for Portuguese physicians and developed a global burnout index. The detailed analysis of this work is in the manuscript "Development and evaluation of a global burnout index from Copenhagen Burnout Inventory in physicians" and is presented on the following pages.

Title

Development and evaluation of a global burnout index from Copenhagen Burnout Inventory in physicians

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ABSTRACT

Aims: The aim of this study was to provides evidence for the viability of using Copenhagen Burnout Inventory (CBI) as a 1-factor measure, creating a global burnout index.

Method: This study followed a cross-sectional design in a sample of Portuguese physicians (N=1348). A confirmatory factor analyses (CFA) was conducted and the CBI´s three-factor structure was tested. In addition, a model with a 2nd order factor was tested with the goal of achieving a one-factor structure that would allow a global burnout index.

Results: CFA showed a good model fit of both the three-factor and one-factor model, having the latter a significant better fit. CBI showed good psychometric properties for both structures, with good reliability according to Chronbach's alphas and Average Variance Extracted between factors. CBI was statistically and positively correlated with depression, anxiety and stress symptoms, as well as rumination, and negatively correlated with life satisfaction.

Conclusions: Our results showed that CBI is a validity measure of burnout related to the physician, the work itself and the patient. Also, our results show the viability of using CBI as a one-factor measure of global burnout score.

KEYWORDS

Emotional Fatigue, Burnout, Exhaustion, Physicians, Self-assessment, Well-being, Validity, Stress

INTRODUCTION

Burnout is common among physicians and it can be a precursor of serious problems such as dissatisfaction with work, work-family conflicts [1] and suicidal ideation [2,3]. Negative effect in practitioner's performance have strong impact on patients themselves, and it yields an inherent burden on health care services [4].
The importance of assessing burnout in physicians has long been recognized. The tool most commonly used to evaluate burnout is the Maslach Burnout Inventory (MBI) [5], a three-factor questionnaire that assesses emotional exhaustion, depersonalization and low sense of personal accomplishment, which has

become the gold standard metric of burnout. MBI has been used across a wide range of demographic and professional populations, although several criticisms have been raised concerning this instrument. Some authors have pointed out that MBI lacks balance, i.e. the three dimensions assessed are not weighted equally with lack of clarity between the three subscales. Specifically, high scores in exhaustion and depersonalization usually relate to low scores in personal accomplishment [6]. Additionally, depersonalization has been considered a mechanism of coping with exhaustion, whilst personal accomplishment is a consequence of exhaustion, rather than a dimension of burnout itself [6,7].

In order to tackle these limitations, another measure of burnout was developed. The Copenhagen Burnout Inventory (CBI) [6] is an open source tool developed to assess burnout in a less complex manner. CBI differentiates three life domains from which emotional exhaustion may arise: personal, work-related and patient-related. Personal burnout is the extent of physical and psychological exhaustion felt by a person, their occupation notwithstanding. Work-related burnout is the degree of physical and psychological exhaustion that is perceived by the person in relation to their work. Patient-related burnout is the degree of physical and psychological exhaustion felt by the person with regard to their work with clients [6]. In sum, CBI has been described as a more straightforward measure [8], with two advantages comparing to MBI: it assesses the same overall construct (burnout) in different contexts, discriminating between three dimensions of burnout rather than its consequences - which could lead to erroneous interpretation of results.
Although CBI had characteristics to be a suitable measure for assessing burnout as an underlying construct of emotional exhaustion, a global burnout index derived from the whole questionnaire was never validated through a robust statistical procedure [9,10]. The main purpose of our study is to develop and evaluate an index from the three dimensions of the CBI. This is a part of a larger study that explores a set of factors and consequences related to burnout in Portuguese anesthesiologists. As CBI was not yet validated to Portuguese physicians, this study presents its validation study in this sample, and explores the internal consistency as well as its factor structure. It further examines the concurrent, divergent and incremental validity through its correlation with other measures of psychological processes and functioning.

METHODS

Study design

With approval by Ethics Committee (Faculty of Health Sciences, University of Beira Interior) and participant informed consent, an anonymous paper survey was conducted in Portuguese physicians from different medical specialties. Data were collected through self-reported questionnaires including demographic information, work experience and measures of stress, anxiety, depression, burnout, rumination and life satisfaction.

Participants

The total sample was composed of 1348 Portuguese physicians of different specialties from public and private hospitals.

Instruments

- The Copenhagen Burnout Inventory (CBI) was developed by Kristensen et al. [6] and considers fatigue and exhaustion as core constructs. This 19-items questionnaire measures three burnout sub-dimensions: personal burnout (6 items), work-related burnout (7 items), and patient-related burnout (6 items). It was translated into Portuguese and validated to Portuguese nurses by Cesaltino Fonte [11]. The original

version presented a good internal consistency for all three subscales: personal burnout (α = .87), work-related burnout (α = .87) and patient-related burnout (α = .85). In Portuguese version, the Cronbach's alpha coefficient observed in three scales (.845; .866 and .843 respectively) indicated that the instrument has a good internal consistency.

- Depression, Anxiety and Stress Scales (DASS-21), was developed by Lovibond and Lovibond [12] with a Portuguese version by Pais-Ribeiro, Honrado and Leal [13]. It is a self-reported scale with 21 items with three subscales which aim to measure symptoms of depression, anxiety and stress. Originally, the authors found that all subscales have adequate to good internal consistency with alpha's values of .81 for depression .73 for anxiety and .81 for stress.

- Satisfaction With Life Scale (SWLS), developed by Diener [14] and adapted to Portuguese by Simões [15], is a 5-item scale designed to measure global cognitive judgements of life satisfaction. It shows good convergent validity with other scales and with other types of assessments of subjective well-being. The original version found good internal consistency or the scale (Chronbach alpha´s between .61 and . 81). The Portuguese version study found a good internal consistency (α = .77).

- Sheehan Disability Scale (SDS), described by Sheehan [16] and translated to Portuguese by Pinto-Gouveia [17] includes three self-rated items designed to measure to what degree work, social life, and family life are impaired by current psychiatric symptoms (e.g., panic, anxiety, phobia, or depression). Each item includes an 11-point analogue scale using visual-spatial, numeric and verbal descriptive markers simultaneously to represent the level of disruption. This is a brief measure of impairment in functioning widelly used in mental health research and practice.

- Ruminative Response Scale (RRS-10) was developed by Treynor, Gonzalez & Nolen-Hoeksema [18] – Portuguese version by Dinis et al. [19]. This 10-item instrument assesses rumination, a self-focused psychological process that involves repetitive thinking on personal negative feelings, as well as a pattern of self-reflection on the events that have led to these feelings and/or its consequences [20]. The internal consistency of the original scale was α = .85 for the total scale. It is generally accepted that rumination is an important psychological process related to depression [20], thus being a relevant variable in a burnout study such ours.

Reliability and validity tests

Reliability of CBI was obtained by computing Cronbach's α. Construct validity was tested by comparing burnout scores with known socio-demographic groups. Criteria validity was assessed via correlation with different measures. Discriminant validity was assessed comparing Average Variance Extracted (AVE) of each factor with the shared variance between factors. The AVE of two factors need both to be larger than their shared variance (i.e., square of the correlation between them) [21].

Analytical Plan

Z-scores (|Z|>3) determined univariate outliers and multivariate outliers considered through Mahalanobis distance (D^2<.0010). Normality was assessed by coefficients of skewness (Sk) and Kurtosis (Ku). For each of the three burnout dimensions, where participants missed fewer than three items, these missing items were imputed based upon their scores for the other dimension items. Individuals who had three or more items missing for the same dimension, were excluded from further analysis. At the end, six participants were excluded from our sample given the aforementioned criteria.

Continuous variables were characterized using means and standard deviations and categorical variable were expressed as absolute and relative frequencies. Correlations between CBI and other scales, such as DASS-21, SDS, rumination and SWLS were evaluated by the estimation of Pearson correlation coefficients and intraclass correlation coefficient.

Factor structure was evaluated by confirmatory factor analysis (CFA) and covariance matrices were used to analyze the measurement models. Model fit was assessed by maximum likelihood estimation and goodness of fit was evaluated with root-mean-square error of approximation (RMSEA), chi-square (x^2),

normed chi-square (x^2/df), Comparative Fit Index (CFI), Incremental Fit Index (IFI) and Standardized Root Mean Square Residual (SRMR). When RMSEA, one of the most informative fit indices [22] lies between .05 and .08, the fit is considered reasonable. It is also considered reasonable when Normed chi-square values lies between 2 and 5 [23,24] and CFI and IFI are greater than .90. For SRMR, a value less than .10 and of .08 (in a more conservative view) are considered a good fit [25].
To improve the goodness of fit, items with factor loadings lower than .4, or with modification indexes (MI) for model fit improvement greater than 11 ($p<.001$) were removed from the model [9]. The adjustment of the model took the MI into consideration. The chi-square test was used to test whether two different models were significantly different, one where it was only considered information regarding the amount of observed variables´ variance explained by the underlying latent variable factor (Model 1); and other where it was also considered the Correlated errors (Model 2).
For continuous variables, means were compared between three or more group considering ANOVA with F test or Welch test. The last one was used when the null hypothesis of variances homogeneity was rejected by Levene's test. When means were compared between two groups, T test was used instead.
SPSS software (v.19; SPSS Inc., Chicago, IL, USA) was used to implement all the descriptive and correlational procedures, and AMOS software (v.21; SPSS Inc.) was used to conduct CFA, considering Structural Equation Modeling (SEM).

RESULTS

Results from statistical analyses on normality showed there were no severe violations of normality.

Demographic data

The 1348 respondents had a mean age of 45.39 years (SD = 10.93), 62.5% are female and 37.5% male. From the total sample, 57.2% worked exclusively in the public sector and the majority has more than 11 years of work experience (55.9%) with a weekly workload between 40 to 60 hours (55.6%).

Confirmatory factor analysis

A three factor model was computed (Model 1) in order to test its factor structure.
Model 1 presented poor model fit, according to its model fit indices. CFI and IFI didn't reach the suggested cut-off value .90. [9] Model 1 presented an RMSEA greater than .08 and a SRMR higher than .05, which also suggest a poor fit of the model (see table 1).

Table 1 - Confirmatory Factor Analyses (n=1348)

	x^2	df	p value	NC	CFI	IFI	RMSEA	SRMR
Model 1. 3-factor CBI	1906,925	149	<.001	12,798	.879	.879	.094	.058
Model 2. Correlated errors	649,486	134	< .001	4,847	.965	.965	.053	.044
Model 3. 2nd order	618,766	131	< .001	4,652	.967	.967	.052	.043

NC=Normed chi-square (x^2/df); CFI=Comparative Fit Index; IFI=Iterative Fit Index;
RMSEA=Root Mean Square Error of Approximation; SRMR=Standardised Root Mean Residual;
df=degrees of freedom

A second model (model 2) was also considered, based on the first model's Modification Indices (MI). Considering the MI´s values, it seemed appropriate to test a new model in which items' errors are

correlated. On Personal Burnout factor, the following pairs of items share variance: CBI1 and CBI2, CBI3 and CBI4, CBI1 and CBI5, CBI2 and CBI5; onto Work Burnout factor the following pairs of items share variance CBI8 and CBI9, CBI12 and CBI13; onto Patient Burnout factor the following pairs of items share variance CBI10 and CBI11, CBI15 and CBI16. It seems that the errors associated to the following pairs of items CBI1 and CBI7, CBI2 and CBI14, CBI5 and CBI7, CBI8 and CBI10, CBI9 and CBI10, CBI12 and CBI15, CBI14 and CBI16. In fact, this model showed a better fit, as described in Table 2. The normed chi-square was lower than the value observed for model 1, but it was still above 2; CFI and IFI were both higher than .90; RMSEA shows a better fit (lower than .08); also SRMR confirms a better model fit, as SRMR is lower than .05. Model 2 was significantly better than model 1 (DIFFTEST; ΔX^2=1257,439, df=15) (figure 1).

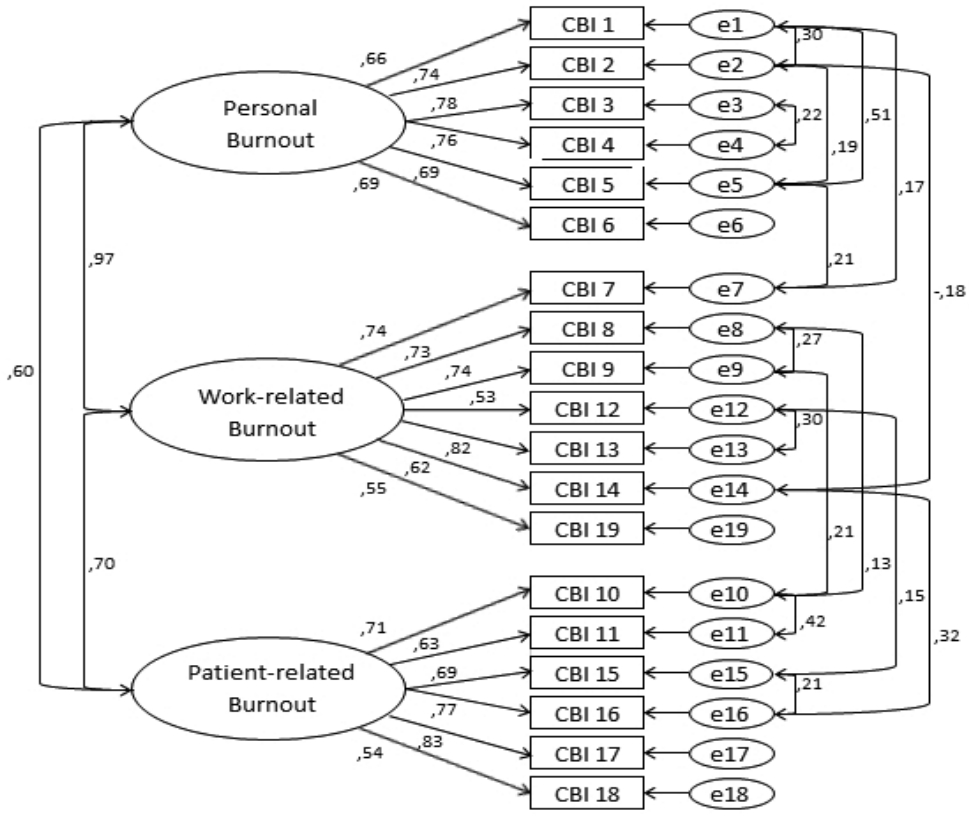
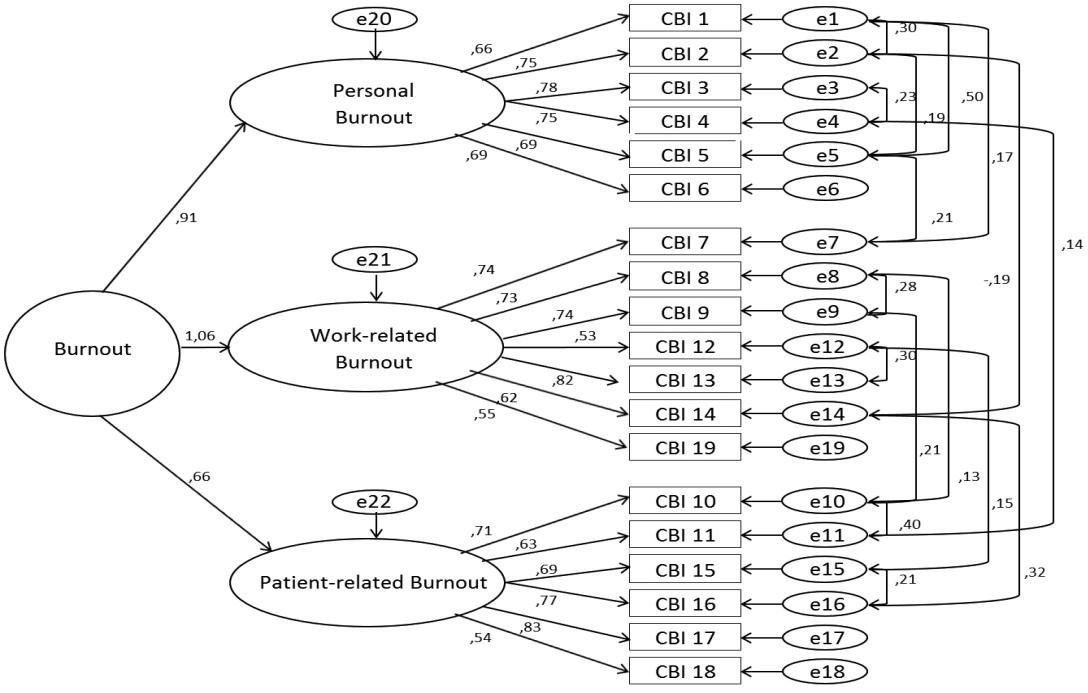


Figure 1. Model 2 – Physician Burnout as a 3-factor model

After we test a third model in which a global latent (2nd order) factor was tested. The rationale behind this structure follows the clinical necessity to have an overall global burnout index, which the three-factor structure does not provide. Thus, a third model (Model 3) with a latent 2nd order factor ("Burnout") was computed. Model 3 presented better model fit indices than Model 2 (see Table 1) and this improvement in fit was statistically significant (DIFFTEST; ΔX^2=30,720, df=3) (figure 2).



$X^2(133)=618,77$; $p<0,001$; $NC(X^2/df)=4,65$; CFI=0,97; IFI=0,97; RMSEA=0,05; SRMR=0,04

Figure 2. Model 3 – Physician Burnout as a 2nd order factor

Reliability Analyses

Results suggested reasonable composite reliability since Cronbach's α was .88 for Personal dimension, .86 for Work dimension and .85 for Patient dimension. For global burnout index, Cronbach's α is .905.

The calculated AVE were .52 for Personal, .48 for Work and .49 for Patient, and it provides measure of individual item reliability. Discriminant validity was assessed by comparing AVE and the square of correlation (r^2) between factors. Good discriminant validity was obtained between Work and Patient (r^2=.49), and between Personal and Patient (r^2=.36), but not between Personal and Work (r^2=.94).

Criterion validity

Table 2 shows the correlations between the CBI and other study measures, considering our total sample (n=1348).

Table 2 - Correlations between CBI and other constructs

Measure		Personal Burnout		Work Burnout		Patient Burnout		Global Burnout	
DASS21	Stress	.485	<.001	.496	<.001	.324	<.001	.499	<.001
	Depression	.482	<.001	.503	<.001	.371	<.001	.519	<.001
	Anxiety	.385	<.001	.385	<.001	.284	<.001	.403	<.001
SDS	work	.491	<.001	.538	<.001	.358	<.001	.532	<.001
	social life	.561	<.001	.586	<.001	.331	<.001	.566	<.001
	affective life	.552	<.001	.588	<.001	.349	<.001	.571	<.001
RRS - rumination		.428	<.001	.406	<.001	.248	<.001	.412	<.001
SWLS		-.386	<.001	-.442	<.001	-.354	<.001	- .454	<.001
Personal Burnout		1		.814	<.001	.474	<.001	.868	<.001
Work Burnout		.814	<.001	1		.616	<.001	.934	<.001
Patient Burnout		.474	<.001	.616	<.001	1	1	.807	<.001

The three subscales of CBI (personal, work and patient) correlated positively with the three dimensions of SDS scale, stress, depression and anxiety and rumination. On the other hand, it correlates negatively with life satisfaction. These results indicate that the CBI has good construct validity. Similarly, the total scale (global burnout index) is significantly correlated with all variables in the expected direction.

Table 3 - CBI differences among known groups

Demographics	Personal Burnout		Work-related Burnout		Patient-related Burnout		Global Burnout	
	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p
Gender								
Male (n=504)	41,9 (17,0)	<.001	38,4 (17,4)	<.001	26,7 (19,2)	.018	35,8 (15,8)	.001
Female (n=841)	48,6 (16,8)		42,5 (17,2)		24,1 (19,1)		38,6 (15,4)	
Age (years)								
<40 (n=490)	47,9 (16,8)		42,4 (16,5)		26,1 (19,3)		39,0 (15,0)	
40-49 (n=293)	47,6 (16,2)	<.001	42,1 (16,9)	.004	25,3 (19,6)	.197	38,5 (15,1)	.002
>=50 (n=564)	43,6 (17,8)		39,1 (18,3)		24,0 (18,8)		35,8 (16,2)	
Region								
North (n=281)	45,4 (18,3)		40,9 (17,2)		25,7 (19,1)		37,5 (15,7)	
Centre (n=662)	46,5 (16,7)	.803	41,1 (17,4)	.152	25,8 (20,0)	.071	37,9 (15,7)	.226
South (n=343)	45,7 (17,8)		41,1 (17,8)		23,3 (18,2)		36,9 (15,7)	
Islands (n=47)	45,4 (12,7)		36,5 (13,0)		21,4 (14,7)		34,5 (10,9)	
Institution								
Only Public (n=770)	47,0 (17,2)		41,8 (17,4)		25,1 (19,3)		38,2 (15,6)	
Public+Priv (n=514)	44,5 (17,0)	.035	39,5 (16,9)	.074	25,0 (19,1)	.915	36,5 (15,3)	.172
Only Private (n=62)	46,3 (18,4)		41,6 (20,8)		24,1 (19,1)		37,6 (17,0)	
Experience (years)								
Intern (n=111)	50,2 (18,7)		42,9 (16,3)		22,7 (16,9)		38,9 (13,9)	
≤3 (n=150)	46,4 (15,7)		42,4 (16,1)		27,7 (19,8)		39,0 (14,5)	
4-5 (n=131)	46,9 (16,4)	.001	42,2 (16,9)	.048	27,8 (20,1)	.105	39,1 (15,3)	.036
6-10 (n=202)	48,3 (15,1)		42,8 (15,9)		25,8 (19,0)		39,2 (14,5)	
11-20 (n=309)	46,4 (17,6)		40,9 (17,7)		24,2 (19,3)		37,4 (16,0)	
>20 (n=442)	43,4 (17,9)		39,0 (18,4)		24,2 (19,1)		35,7 (16,3)	
Workload (h/week)								
≤40 (n=204)	43,9 (15,8)		39,7 (17,2)		27,2 (19,9)		37,1 (15,3)	
41-60 (n=744)	46,6 (17,0)	.200	41,2 (17,0)	.677	24,9 (18,9)	.289	37,7 (15,3)	.962
61-80 (n=314)	46,4 (17,5)		41,6 (17,6)		24,0 (18,6)		37,6 (15,6)	
>80 (n=77)	46,3 (20,1)		40,8 (20,0)		25,9 (21,6)		37,8 (18,4)	

Differences in CBI according to gender, age, speciality, years of experience and institution

In order to investigate whether burnout differs among known groups, we explored differences in CBI according to gender, age groups, specialists/residents, years of experience in specialists and site of practice (table 3).

As is described in Table 3, results showed that women present significantly higher burnout, as well as younger physicians and more recent specialists.

DISCUSSION

The current study tested the factor structure of CBI in which a latent 2nd order factor was created, allowing to produce a global burnout score that results from the average of the total items´ scores in CBI. Our results support that this index - potentially useful by it communicative simplicity - is a valid way to express results from the studies on burnout.

This conclusion is supported by several of our findings. The confirmatory factor analyses showed that both the 3-factor and the 1-factor (2nd order structure) presented good model fit, and therefore CBI can be interpreted based on these two different structures depending on the specific research question. Nevertheless, it is worth noting that the 1-factor model presented significantly better model fit than the 3-factor model, which suggests that using the global burnout score is not only suitable but actually preferable. To our knowledge, this is the first study that has presented a reliable structure to measure a global burnout index in physicians, and the first to compare this structure with a 3-factor structure.

The endeavor to achieve a global burnout index has already been pursued in a sample of students [9], but the global index resulted from three different burnout scales (CBI, MBI and Oldenburg Burnout Inventory). Although this was a valuable effort, to use this index would imply using a large number of items that derive from different conceptualizations of burnout. In fact, some authors suggest that dimensions in MBI (depersonalization and personal accomplishment) do not measure burnout [6,7].

Our results from reliability analyses showed that CBI (both its 3-factor and global factor structures) presented good internal consistency. These results are aligned with other studies from different populations, such as Taiwan employees [8], Chinese Human Service workers [26], and Australian dentists [27]. Interestingly in our results is that the Average Variance Extracted showed that the three subscales (personal, work-related and patient-related) presented good discriminant validity, even though it suggested that CBI did not discriminate the personal and work-related subscales. It can be interpreted as suggesting that some aspects that underlie personal-related burnout are associated with work-related ones.

Correlation analyses showed that CBI presented good criterion validity in our sample, as all three subscales as well as its global burnout index were significantly correlated with depression, anxiety and stress symptoms, rumination and satisfaction with life, in the expected direction, i.e., CBI was positively correlated with psychopathological symptoms and rumination, and negatively associated with satisfaction with life. This is in line with previous studies that associate depression and stress with burnout [28] and show its detrimental impact on satisfaction with life [29]. The relationship between burnout and rumination has not been extensively explored. Nevertheless, the relationship between depression and burnout is well-known, as well as the impact of rumination on the development and maintenance of depressive symptoms [20].

Additionally, we found a significant difference in burnout (both 3-factor and 1-factor) in gender (women presented higher burnout than men) and in age (younger physicians presented more burnout). Interestingly enough, no differences were found in patient-related burnout. Further studies should address this and explore underlying reasons for this result. Also, differences were found in personal-related burnout according to institution of practice, in which those who practice exclusively in public health sector presented more burnout that those practicing in private or both. Interestingly, no differences were found according to workload. One possible way of making sense of these results is by

assuming that burnout has more to do with personal variables, such as emotion regulation skills and social support. However, we advise great caution with drawing definite conclusions, as we should consider the different sample sizes of each group.

Some limitations should be considered when these results are interpreted. The cross-sectional nature of the design prevents us from drawing conclusions regarding causality between variables. This is particularly relevant when interpreting results from correlational analyses. Additionally, the current study did not explore temporal stability of the measure, which is an important factor when asserting validity. Future studies should conduct temporal stability analyses following a longitudinal design, as well as normative studies in a representative sample. Finally, the assessment was conducted using self-report measures, which do not account for social desirability which may have biased the results. One possible way of controlling for this would be by conducting a burnout clinical interview, whose results would or would not corroborate results from CBI.

In conclusion, the current paper provides evidence for the viability of using CBI as a 1-factor measure, which allows clinicians and researchers to attain a single straightforward global burnout index. Additionally, our results provided evidence for the validity of CBI as a robust measure of burnout related to the physician, the work itself and the patient. On the one hand, an assessment of different areas in which burnout arise (personal, work, patient) provides a better understanding of the different routes that lead to burnout. This is highly useful because we can work on these areas to develop specific strategies to prevent further burnout. However, by having a one factor index available, allows us the best of both worlds.

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Conflicts of interest
None.

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1.3 - Study of Burnout Syndrome

1.3.1 - Prevalence of burnout among anaesthesia specialists, anaesthesia residents and physicians of other specialities

Anaesthesia specialists have the lowest prevalence of all type of burnout, 38.3% have personal burnout, 32.2% have work-related burnout, 9.0% have patient-related burnout and 17.1% have total burnout. In all situations, anaesthesia specialists have lower prevalence comparing with mean burnout among all participating physicians. Considering personal burnout, anaesthesiology residents have significantly higher percentage, 54.1%; medical specialities (46.7%), family and occupational medicine (48.7%) and other specialities (59.3%) have significantly higher prevalence of work-related burnout; Family and occupational medicine have the higher prevalence of patient-related burnout (25.4%) and total burnout (30.8%).

There were significant differences considering, personal burnout (χ^2 test: $p = .004$), work-related burnout (χ^2 test: $p < .001$), patient-related burnout (χ^2 test: $p < .001$), and total burnout (χ^2 test: $p = .003$) between anaesthesia specialists, physicians of other specialties, and anaesthesia residents. There were no significant differences in average night's sleep (χ^2 test: $p = .263$) between anaesthesia specialists, physicians of other specialities, and anaesthesia residents. Descriptive results and chi-square statistic for these variables are presented in Table 5.

Figure 1, Figure 2, Figure 3 and Figure 4 exhibit graphic representation of personal burnout, work-related burnout and patient-related burnout among anaesthesia specialists, physicians of other specialties, and anaesthesia residents, respectively.

Table 5. Prevalence of burnout among participants

	Personal burnout	Work-related burnout	Patient-related burnout	Total burnout
Anaesthesiology and Intensive medicine	**249/650 (38.3%)**	**209/649 (32.2%)**	**59/652 (9.0%)**	**111/651 (17.1%)**
Anaesthesiology Residents	**59/109 (54.1%)**	41/111 (36.9%)	10/111 (9.0%)	22/111 (19.8%)
Diagnostic Speciality	19/32 (59.4%)	16/32 (50.0%)	4/27 (14.8%)	11/32 (34.4%)
Paediatric	12/22 (54.5%)	12/22 (54.5%)	4/22 (18.2%)	7/22 (31.8%)
Medical specialities	91/182 (50.0%)	**86/184 (46.7%)**	32/182 (17.6%)	48/184 (26.1%)
Obstetrics and gynaecology	24/48 (50.0%)	21/49 (42.9%)	9/49 (18.4%)	11/49 (22.4%)
Family and occupational medicine	59/120 (49.2%)	**58/119 (48.7%)**	**30/118 (25.4%)**	**37/120 (30.8%)**
Surgical speciality	69/150 (46.0%)	62/150 (41.3%)	25/150 (16.7%)	34/150 (22.7%)
Other*	14/27 (51.9%)	**16/27 (59.3%)**	5/27 (18.5%)	9/27 (33.3%)
χ^2 test	$p = .004$	$p < .001$	$p < .001$	$p = .003$
Mean burnout among all physicians participating	596/1340 (44.5%)	521/1343 (38.8%)	178/1338 (13.3%)	290/1346 (21.5%)

Note. Adjusted standardized residuals in bold are those that exceed +/- 2.

* Other includes the remaining specialities grouped because of the small number individually

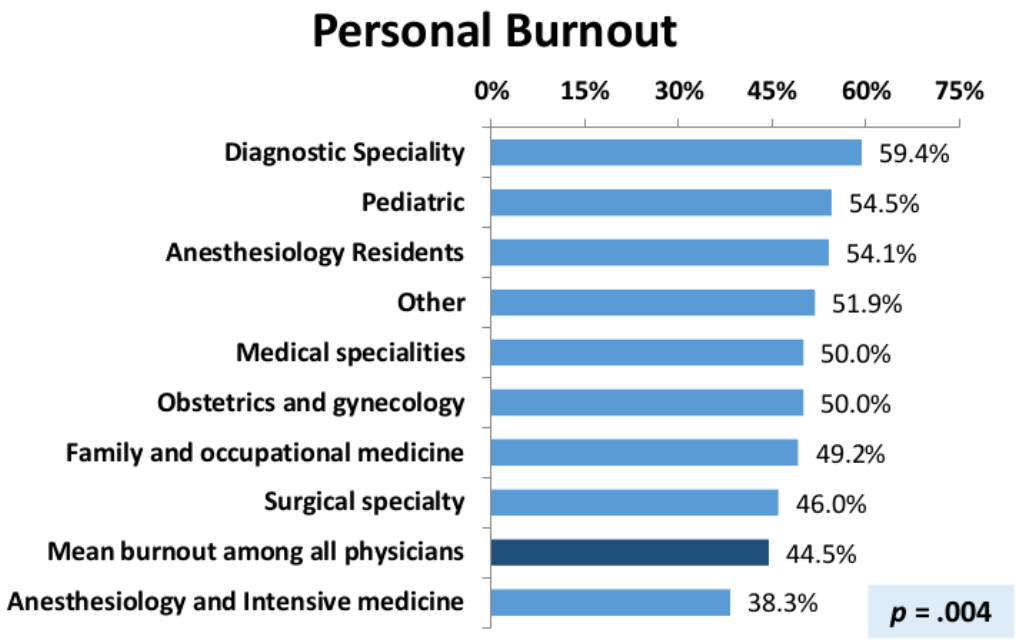

Figure 1: Distribution of personal burnout

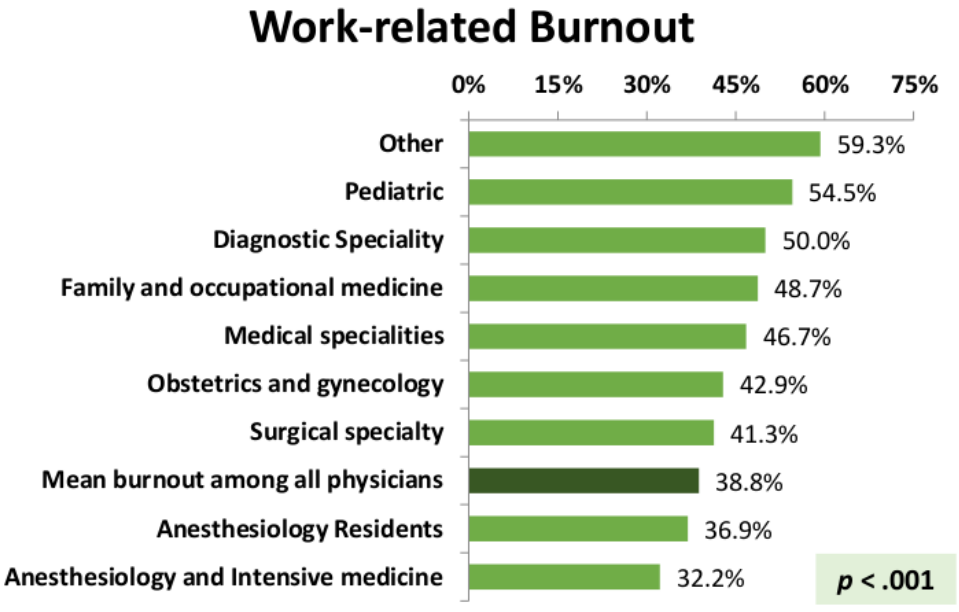

Figure 2: Distribution of work-related burnout

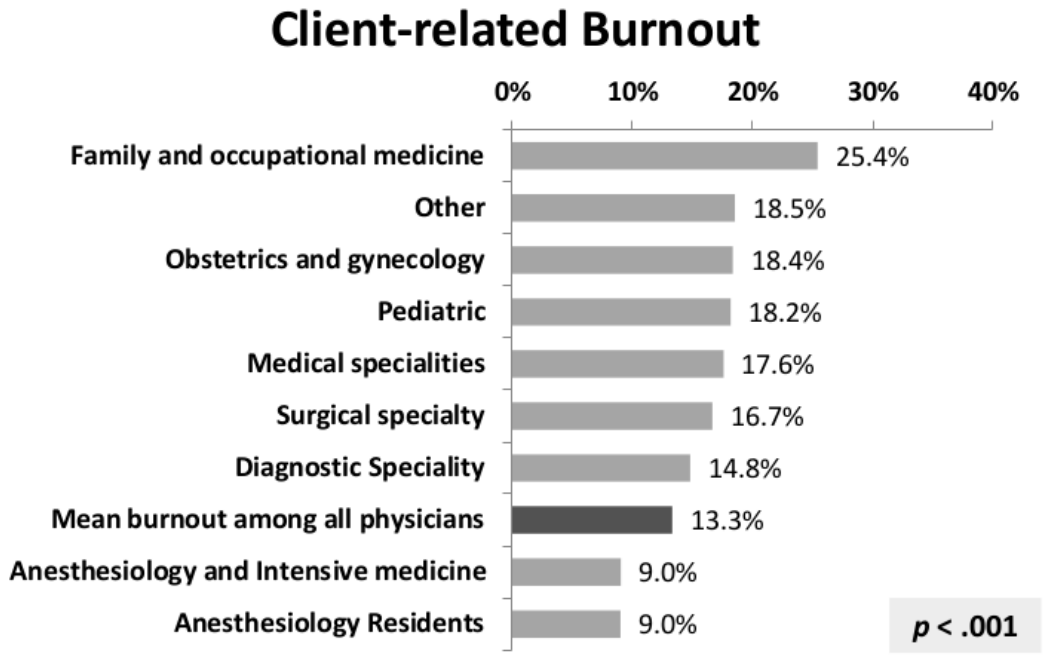

Figure 3: Distribution of patient-related burnout

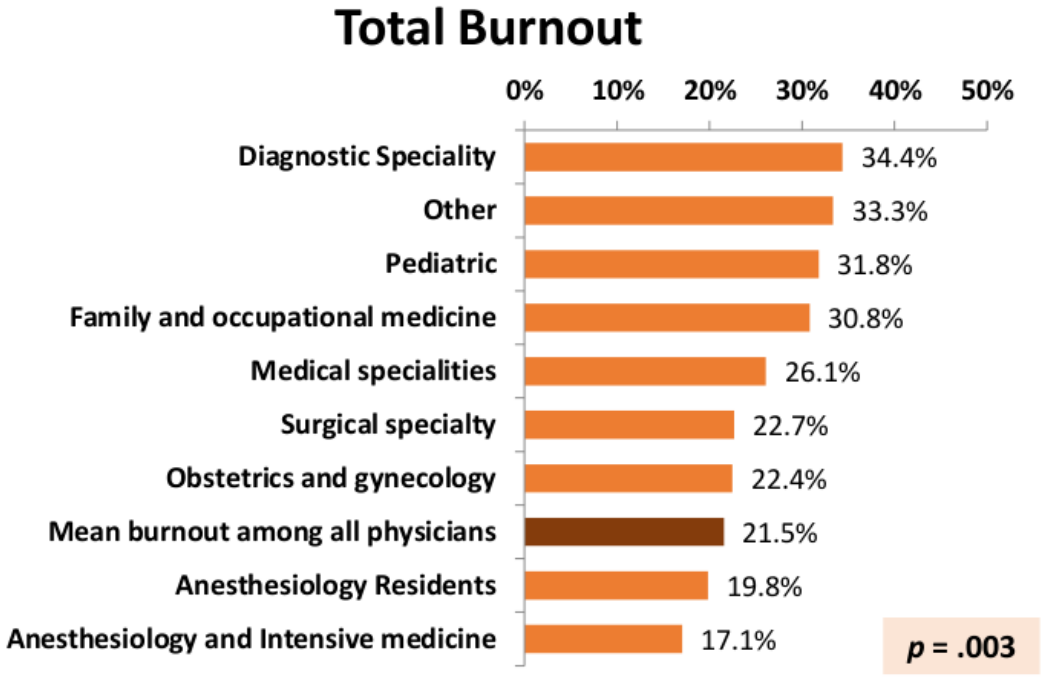

Figure 4: Distribution of total burnout

1.4 - Study of Psychological Variables

A one-way analysis of variance (ANOVA) was used to identify differences between participants groups in regards to each instrument used. When the homogeneity of variances was violated, we performed a Welch *F* test. If the data met the assumption of homogeneity of variances, we used Tukey's post hoc test. If the data did not meet the homogeneity of variances assumption, we run the Games-Howell post hoc test.

Burnout. A one-way ANOVA was used to analyse burnout – personal burnout, work-related burnout, patient-related burnout and total burnout – between the three groups of participants (anaesthesia specialists, physicians of other specialities, and anaesthesia residents). There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction ($p < .017$) (*F*: $p < .001$ for personal burnout, work-related burnout, and total burnout; Welch's *F*: $p < .001$ for patient-related burnout). Post hoc tests revealed that personal burnout, work-related burnout, patient-related burnout and total burnout from anaesthesia specialists were statistically significantly lower than physicians of other specialities. Also, personal burnout and total burnout from anaesthesia specialists were statistically significantly lower than anaesthesia residents. Patient-related burnout from anaesthesia residents was statistically significantly lower than physicians of other specialities (Table 6).

Mindfulness. A one-way ANOVA was used to analyse mindfulness – observing, describing, acting with awareness, non-judging, non-reactivity and total mindfulness – between the three groups of participants (anaesthesia specialists, physicians of other specialities, and anaesthesia residents). There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction ($p < .010$) (*F*: $p < .001$ for observing, and total mindfulness). Post hoc tests revealed that observing, and total mindfulness from anaesthesia specialists was statistically significantly higher than physicians of other specialities and anaesthesia residents (Table 7).

Disability. A one-way ANOVA was used to analyse disability – work, social life, and family life – between the three groups of participants (anaesthesia specialists, physicians of other specialities, and anaesthesia residents). There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction ($p < .017$) (*F*: $p < .001$ for affective life; Welch's *F*: $p < .001$ for work, and social life). Post hoc tests revealed that work, social life, and affective life from anaesthesia specialists was statistically significantly lower than physicians of other specialities and anaesthesia residents. Also,

affective life from physicians of other specialities was statistically significantly lower than anaesthesia residents (Table 8).

Acceptance and Action. A one-way ANOVA was used to analyse psychological inflexibility between the three groups of participants (anaesthesia specialists, physicians of other specialities, and anaesthesia residents). There was a statistically significant difference between groups as determined by one-way ANOVA (*F*: $p = .026$). Post hoc tests revealed that psychological inflexibility from anaesthesia specialists were statistically significantly lower than anaesthesia residents (Table 9).

Depression, Anxiety, and Stress. A one-way ANOVA was used to analyse depression, anxiety, and stress between the three groups of participants (anaesthesia specialists, physicians of other specialities, and anaesthesia residents). There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction ($p < .017$) (Welch's *F*: $p = .010$ for stress and $p = .004$ for anxiety). Post hoc tests revealed that anxiety from anaesthesia specialists was statistically significantly lower than anaesthesia residents. Regarding stress, the post hoc test has no statistical power to detect differences between groups (Table 10).

Ruminative Responses. A one-way ANOVA was used to analyse ruminative responses between the three groups of participants (anaesthesia specialists, physicians of other specialities, and anaesthesia residents). There was not a statistically significant difference between groups as determined by one-way ANOVA (*F*: $p = .066$) (Table 11).

Satisfaction with life. A one-way ANOVA was used to analyse satisfaction with life between the three groups of participants (anaesthesia specialists, physicians of other specialities, and anaesthesia residents). There was not a statistically significant difference between groups as determined by one-way ANOVA (*F*: $p = .314$) (Table 12).

Self-compassion. A one-way ANOVA was used to analyse self-compassion – self-kindness, self-judgement, common humanity, isolation, mindfulness, over-identification, total self-compassion – between the three groups of participants (anaesthesia specialists, physicians of other specialities, and anaesthesia residents). There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction ($p < .0083$) (*F*: $p = .002$ for mindfulness, $p = .022$ for total self-compassion). Post hoc tests revealed that mindfulness and total self-compassion from anaesthesia specialists were statistically significantly higher than anaesthesia residents (Table 13).

Table 6: Copenhagen Burnout Inventory (descriptive statistics and ANOVA test)

	Participants	*n*	*M*	*SD*	Med	Min	Max	25	75	Welch *F*/ *F* test	Tukey/ Games-Howell Test
Personal burnout	Anaesthesia specialists	635	43.57	17.18	41.67	0.0	87.5	29.17	54.17		Physicians of other specialities > Anaesthesia specialists (p < .001)
	Physicians of other specialities	606	47.95	16.59	50.00	0.0	100.0	37.50	58.33	p < .001	
	Anaesthesia residents	111	50.20	18.73	50.00	8.3	95.8	37.50	62.50		Anaesthesia residents > Anaesthesia specialists
Work-related burnout	Anaesthesia specialists	635	38.25	16.95	39.29	0.0	96.4	25.00	50.00		
	Physicians of other specialities	606	43.40	17.70	42.86	0.0	96.4	32.14	53.57	p < .001	Physicians of other specialties > Anaesthesia specialists (p < .001)
	Anaesthesia residents	111	42.92	16.28	42.86	10.7	85.7	32.14	53.57		
Patient-related burnout	Anaesthesia specialists	635	21.35	17.51	20.83	0.0	91.7	8.33	33.33		
	Physicians of other specialities	602	29.45	20.25	29.17	0.0	100.0	12.50	41.67	p < .001	Physicians of other specialties > Anaesthesia specialists (p < .001)
	Anaesthesia residents	111	22.75	16.87	20.83	0.0	75.0	8.33	29.17		Physicians of other specialties > Anaesthesia residents
Total Burnout	Anaesthesia specialists	590	34.58	15.00	32.89	0.00	88.16	23.68	44.74		
	Physicians of other specialities	573	40.46	15.90	40.79	3.95	97.37	28.95	50.00	p < .001	Physicians of other specialties > Anaesthesia specialists (p < .001)
	Anaesthesia residents	109	39.30	13.60	38.16	9.21	72.37	30.26	46.05		Anaesthesia residents > Anaesthesia specialists

Table 7. Five Facet Mindfulness Questionnaire (descriptive statistics and ANOVA test)

	Participants	*n*	*M*	*SD*	Med	Min	Max	25	75	Welch *F*/ *F* test	Tukey/Games-Howell Test
Observing	Anaesthesia specialists	633	23.88	6.12	24	8	40	19	28.5		Anaesthesia specialists > Physicians of other specialities (p < .001) Anaesthesia specialists > Anaesthesia residents (p = .006)
	Physicians of other specialities	606	21.99	6.28	22	8	39	17	27	p < .001	
	Anaesthesia residents	111	21.91	6.73	22	9	39	16	27		
Describing	Anaesthesia specialists	633	28.99	5.71	29	9	40	25	33		
	Physicians of other specialities	605	28.46	5.45	29	10	40	25	32	p = .028	
	Anaesthesia residents	111	27.55	5.94	27	11	40	24	32		
Acting with Awareness	Anaesthesia specialists	633	31.13	5.35	31	9	40	28	35		
	Physicians of other specialities	606	30.32	6.05	31	9	40	26	35	p = .013	
	Anaesthesia residents	111	29.82	6.02	30	18	40	26	34		
Non-judging	Anaesthesia specialists	633	28.85	6.34	29	9	40	25	33		
	Physicians of other specialities	606	28.71	6.26	29	10	40	24	34	p = .860	
	Anaesthesia residents	111	29.03	6.40	30	12	40	25	33		
Non-reactivity	Anaesthesia specialists	632	20.66	4.48	21	7	34	18	23.75		
	Physicians of other specialities	602	20.14	4.43	20	7	35	17	23	p = .080	
	Anaesthesia residents	111	20.03	4.41	20	9	31	17	23		
Total mindfulness	Anaesthesia specialists	632	133.47	15.25	133	76	181	124	142		Anaesthesia specialists > Anaesthesia residents (p = .003) Anaesthesia specialists > Physicians of other specialties (p < .001)
	Physicians of other specialities	602	129.56	15.35	130	84	170	118	140	p < .001	
	Anaesthesia residents	111	128.33	15.27	127	93	185	118	138		

Table 8. Sheehan Disability Scale (descriptive statistics and ANOVA test)

	Participants	*n*	*M*	*SD*	Med	Min	Max	25	75	Welch *F*/ *F* test	Tukey/Games-Howell Test
Work	Anaesthesia specialists	624	2.59	2.00	2	0	10	1	4		Physicians of other specialities > Anaesthesia specialists (p < .001)
	Physicians of other specialities	596	3.31	2.19	3	0	10	2	5	p < .001	
	Anaesthesia residents	111	3.52	2.29	3	0	8	2	5		Anaesthesia residents > Anaesthesia specialists (p < .001)
Social Life	Anaesthesia specialists	624	3.31	2.48	3	0	10	1	5		Physicians of other specialities > Anaesthesia specialists (p = .003)
	Physicians of other specialities	596	3.80	2.68	3	0	10	2	6	p < .001	
	Anaesthesia residents	111	4.34	2.82	4	0	10	2	7		Anaesthesia residents > Anaesthesia specialists (p = .001)
Affective life	Anaesthesia specialists	624	3.35	2.49	3	0	10	1	5		Physicians of other specialities > Anaesthesia specialists (p = .009)
	Physicians of other specialities	596	3.78	2.49	3.5	0	10	2	6	p < .001	Anaesthesia residents > Physicians of other specialities (p = .016)
	Anaesthesia residents	111	4.50	2.76	4	0	10	2	7		Anaesthesia residents > Anaesthesia specialists (p < .001)

Table 9. Acceptance and Action Questionnaire-II (descriptive statistics and ANOVA test)

	Participants	*n*	*M*	*SD*	Med	Min	Max	25	75	*F* test	Tukey Test
Psychological inflexibility	Anaesthesia specialists	630	17.64	8.20	16	7	48	11	22		
	Physicians of other specialities	605	18.35	8.42	17	7	47	12	23	p = .026	Anaesthesia residents > Anaesthesia specialists (p = .027)
	Anaesthesia residents	110	19.86	8.68	18	7	43	13	25		

Table 10. Depression, Anxiety and Stress Scales (descriptive statistics and ANOVA test)

	Participants	*n*	*M*	*SD*	Med	Min	Max	25	75	Welch *F* test	Games-Howell Test
Stress	Anaesthesia specialists	626	5.29	3.63	5	0	20	3	7		The post hoc test has no statistical power to detect differences
	Physicians of other specialities	601	5.76	4.14	5	0	21	3	8	p = .010	
	Anaesthesia residents	109	6.50	4.58	6	0	21	3	9		
Depression	Anaesthesia specialists	626	2.75	3.30	2	0	20	0	4		
	Physicians of other specialities	601	3.12	3.54	2	0	21	1	5	p = .059	
	Anaesthesia residents	109	3.45	3.72	2	0	19	1	4.5		
Anxiety	Anaesthesia specialists	626	2.19	2.64	1	0	15	0	3		Anaesthesia residents > Anaesthesia specialists (p = .005)
	Physicians of other specialities	601	2.47	3.18	1	0	21	0	3	p = .004	
	Anaesthesia residents	109	3.25	3.33	2	0	14	1	5		

Table 11. Ruminative Responses *Scale-10 (descriptive statistics and ANOVA test)*

	Participants	*n*	*M*	*SD*	Med	Min	Max	25	75	*F* test
Ruminative Responses	Anaesthesia specialists	623	9.01	5.36	9	0	30	5	12	
	Physicians of other specialities	595	9.09	5.40	9	0	26	5	13	p = .066
	Anaesthesia residents	109	10.31	6.06	10	0	27	6	13	

Table 12. Satisfaction with Life Scale (descriptive statistics and ANOVA test)

	Participants	*n*	*M*	*SD*	Med	Min	Max	25	75	*F* test
Satisfaction with life	Anaesthesia specialists	622	18.58	4.58	19	5	25	16	22	
	Physicians of other specialities	596	18.45	4.79	19	5	25	15	22	p = .314
	Anaesthesia residents	105	19.20	4.42	20	7	25	17	23	

Table 13. Self-compassion Scale (descriptive statistics and ANOVA test)

	Participants	*n*	*M*	*SD*	Med	Min	Max	25	75	*F* test	Tukey Test
Self-kindness	Anaesthesia specialists	627	14.49	4.10	14	5	25	12	17		
	Physicians of other specialities	598	14.07	4.12	14	5	25	11	17	p = .140	
	Anaesthesia residents	109	13.92	4.08	15	5	25	11	17		
Self-judgement	Anaesthesia specialists	627	12.45	4.12	12	5	25	9	15		
	Physicians of other specialities	600	12.42	4.17	12	5	25	9	15	p = .160	
	Anaesthesia residents	108	13.24	4.87	13	5	25	9.25	16		
Common humanity	Anaesthesia specialists	628	12.97	3.30	13	4	20	11	15		
	Physicians of other specialities	602	12.80	3.39	13	4	20	11	15	p = .295	
	Anaesthesia residents	108	12.45	3.45	12.5	4	20	10	15		
Isolation	Anaesthesia specialists	626	9.18	3.36	9	4	20	7	12		
	Physicians of other specialities	600	9.34	3.41	9	4	20	7	12	p = .057	
	Anaesthesia residents	109	10.03	3.81	9	4	19	7	13		
Mindfulness	Anaesthesia specialists	627	13.87	3.13	14	4	20	12	16		Anaesthesia specialists > Anaesthesia residents (p = .008)
	Physicians of other specialities	601	13.39	3.26	14	4	20	11	16	p = .002	
	Anaesthesia residents	109	12.90	3.07	13	4	20	10	15		
Over-identification	Anaesthesia specialists	627	9.47	3.35	9	4	20	7	12		
	Physicians of other specialities	600	9.54	3.55	9	4	20	7	12	p = .236	
	Anaesthesia residents	108	10.08	3.76	10	4	20	7.25	12		
Total self-compassion	Anaesthesia specialists	626	88.24	15.36	89	33	130	78	98		Anaesthesia specialists > Anaesthesia residents (p = .021)
	Physicians of other specialities	598	86.96	15.48	87	33	129	77	98	p = .022	
	Anaesthesia residents	108	83.93	16.57	86	36	128	75	94		

2 - Results in a sample of anaesthesia specialists and residents

2.1 - Sample Characterization

2.1.1 - Working areas of anaesthesia specialists

Of the anaesthesia specialists, 618 (98.4%) worked in anaesthesia, 515 (82.0%) did not work in chronic pain, 544 (86.6%) did not work in intensive care, 315 (50.2%) did not work in emergency and 539 (86.8%) did work in paediatrics.

Within the anaesthesia working area, 471 (79.0%) worked in anaesthesia for major general surgery, 437 (73.3%) worked in anaesthesia for minor general surgery, 592 (94.3%) did not work in cardiac surgery, 454 (72.3%) did not work in vascular surgery, 315 (50.2%) worked in plastic surgery, 531 (84.6%) worked in thoracic surgery, 427 (68.0%) worked in urology, 448 (71.3%) worked in orthopaedics, 414 (65.9%) worked in gynaecology, 361 (57.5%) worked in obstetrics, 378 (60.2%) worked in ENT speciality, 331 (52.7%) worked in ophthalmology, 444 (70.7%) provided anaesthesia outside the operating room, 381 (60.7%) worked in the post-anaesthesia care unit, 314 (50.0%) worked in acute pain, 440 (70.1%) worked in ambulatory surgery, and 577 (92.0%) did not work in neurosurgery (Table 14).

Table 14. Distribution of anaesthesia specialists by working areas

	No	Yes
Anaesthesia	10 (1.6%)	618 (98.4%)
General surgery	100 (15.9%)	528 (84.1%)
Major	125 (21.0%)	471 (79.0%)
Minor	159 (26.7%)	437 (73.3%)
Cardiac surgery	592 (94.3%)	36 (5.7%)
Vascular surgery	454 (72.3%)	174 (27.7%)
Plastic surgery	313 (49.8%)	315 (50.2%)
Thoracic surgery	531 (84.6%)	97 (15.4%)
Urology	201 (32.0%)	427 (68.0%)
Orthopaedics	180 (28.7%)	448 (71.3%)
Gynaecology	214 (34.1%)	414 (65.9%)
Obstetrics	267 (42.5%)	361 (57.5%)
Ear, nose and throat	250 (39.8%)	378 (60.2%)
Ophthalmology	297 (47.3%)	331 (52.7%)
Anaesthesia outside the operating room	184 (29.3%)	444 (70.7%)
Post-anaesthesia care unit	247 (39.3%)	381 (60.7%)
Acute pain	314 (50.0%)	314 (50.0%)
Ambulatory surgery	188 (29.9%)	440 (70.1%)
Neurosurgery	577 (92.0%)	50 (8.0%)
Chronic pain	515 (82.0%)	113 (18.0%)
Intensive care	544 (86.6%)	84 (13.4%)
Emergency	315 (50.2%)	313 (49.8%)
Paediatrics	82 (13.2%)	539 (86.8%)

2.2 - Correlations

Pearson product-moment correlations were computed to assess the relationship between burnout (personal burnout, work-related burnout, patient-related burnout and total burnout), mindfulness (observing, describing, acting with awareness, non-judging, non-reactivity and total mindfulness), disability (work, social life, and family life), psychological inflexibility, depression, anxiety, and stress, ruminative responses, self-compassion (self-kindness, self-judgement, common humanity, isolation, mindfulness, over-identification, total self-compassion), satisfaction with life, and stressors (clinical, team and organisational stressors) on anaesthesia specialists (Table 15), anaesthesia residents (Table 16) and both (Table 17).

2.2.1 - Anaesthesia specialists

Regarding burnout, there were negative statistically significant correlations between burnout and mindfulness (except for observing), positive dimensions of self-compassion (self-kindness, mindfulness), and satisfaction with life. Also, there were positive statistically significant correlations between burnout and disability, psychological inflexibility, stress, depression, anxiety, rumination, negative dimensions of self-compassion (self-judgement, isolation and over-identification), and all stressors.

Concerning mindfulness, there were negative statistically significant correlations between mindfulness dimensions (except for observing) and disability, psychological inflexibility, stress, depression, anxiety, rumination, negative dimensions of self-compassion, and stressors. In contrast, there were positive statistically significant correlations between mindfulness (except for observing), and positive dimensions of self-compassion and satisfaction with life, and also between observing and rumination, all dimensions of self-compassion and organisational stressor.

As regards stress, depression and anxiety, there were negative statistically significant correlations between stress, depression and anxiety and positive dimensions of self-compassion, and satisfaction with life. Moreover, there were positive statistically significant correlations between stress, depression and anxiety and disability, psychological inflexibility, rumination, negative dimensions of self-compassion, and stressors.

In relation to anaesthesia stressors, there were negative statistically significant correlations between clinical stressor and work disability, and between clinical, team and organisational stressors, and mindfulness (self-compassion dimension) and satisfaction with life. Also, there were positive statistically significant correlations between clinical, team and organisational stressors and disability (except for clinical stressor and work disability), psychological inflexibility, rumination, and negative dimensions of self-compassion.

2.2.2 - Anaesthesia residents

In relation to burnout, there were negative statistically significant correlations between burnout and mindfulness dimensions (except for observing and non-reactivity), and satisfaction with life, and also between personal burnout and self-kindness and mindfulness (self-compassion dimensions). In contrast, there were positive statistically significant correlations between personal and work-related burnout and disability, psychological inflexibility, stress, depression, anxiety, rumination, negative dimensions of self-compassion (self-judgement, isolation and over-identification), and team and organisational stressors. Likewise, there were positive statistically significant correlations between patient-related burnout and disability (work and social life), psychological inflexibility, stress, depression, anxiety, isolation, over-identification and the three stressors.

Regarding mindfulness, there were negative statistically significant correlations between describing, acting with awareness, and non-judging and disability, psychological inflexibility, stress, depression, anxiety (except for describing), rumination (except for describing), self-judgement (except for describing), isolation (except for describing), over-identification, and stressors. In contrast, there were positive statistically significant correlations between observing and disability, psychological inflexibility, stress, depression, anxiety, rumination, self-kindness, self-judgement, isolation, and over-identification. Also, there were positive statistically significant correlations between mindfulness dimensions and positive dimensions of self-compassion and satisfaction with life (except for observing).

Concerning stress, depression and anxiety there were negative statistically significant correlations between depression and self-kindness, between stress and mindfulness (self-compassion dimension), and also between stress, depression and anxiety and satisfaction with life. Moreover, there were positive statistically significant correlations between depression, anxiety, and stress and disability, psychological inflexibility, rumination, negative dimensions of self-compassion, and team and organisational stressors.

As regards to anaesthesia stressors, there were negative statistically significant correlations between clinical stressor and work disability, and also between team and organisational stressors and self-kindness, mindfulness and satisfaction with life. In contrast, there were positive statistically significant correlations between clinical stressor and psychological inflexibility and isolation, and also between team and organisational stressors and disability (except for team stressor and social life disability), psychological inflexibility, rumination, and negative dimensions of self-compassion.

2.2.3 - Anaesthesia specialists and residents

As regards to burnout, there were negative statistically significant correlations between burnout and mindfulness dimensions (except for observing), satisfaction with life, and positive dimensions of self-compassion (self-kindness, common humanity, mindfulness) and total self-compassion. In contrast, there were positive statistically significant correlations between burnout and disability, psychological inflexibility, stress, depression, anxiety, rumination, negative dimensions of self-compassion (self-judgement, isolation and over-identification), and all stressors.

In relation to mindfulness, there were negative statistically significant correlations between mindfulness dimensions (except for observing) and disability, psychological inflexibility, stress, depression, anxiety, rumination, negative dimensions of self-compassion (self-judgement, isolation, over-identification) and stressors. In contrast, there were positive statistically significant correlations between mindfulness (except for observing), and positive dimensions of self-compassion (self-kindness, common humanity, mindfulness) and total self-compassion and satisfaction with life. Regarding mindfulness dimension observing, there were positive statistically significant correlations between this dimension and psychological inflexibility, stress, anxiety, rumination, all dimensions of self-compassion and organisational stressor.

Concerning stress, depression and anxiety, there were negative statistically significant correlations between stress, depression and anxiety and positive dimensions of self-compassion, total self-compassion, and satisfaction with life. Moreover, there were positive statistically significant correlations between stress, depression and anxiety and disability, psychological inflexibility, rumination, negative dimensions of self-compassion, and stressors.

Regarding anaesthesia stressors, there were negative statistically significant correlations between team and organisational stressors and self-kindness; and also between all anaesthesia stressors mindfulness, total self-compassion, and satisfaction with life. There were positive statistically significant correlations between clinical, team and organisational stressors and disability, psychological inflexibility, rumination, and negative dimensions of self-compassion.

Table 15. Pearson product-moment correlations for anaesthesia specialists

	Personal Burnout	Work-related burnout	Patient-related burnout	Total Burnout	Observing	Describing	Acting with Awareness	Non-judging	Non-reactivity	Total mindfulness	Work	Social Life	Affective life	Psychological inflexibility	Stress	Depression	Anxiety	Rumination	Self-kindness	Self-judgement	Common humanity	Isolation	Mindfulness	Over-identification	Total self-compassion	Satisfaction with life	Clinical stressor	Team stressor	Organisational stressor
Personal Burnout	1																												
Work-related burnout	.77***	1																											
Patient-related burnout	.50***	.59***	1																										
Total Burnout	.88***	.93***	.80***	1																									
Observing	.02	.06	.04	.40	1																								
Describing	-.13**	-.13**	-.14***	-.17***	.23***	1																							
Acting with Awareness	-.41***	-.42***	-.36***	-.47***	-.08*	.33***	1																						
Non-judging	-.35***	-.34***	-.29***	-.38***	-.29***	.18***	.42***	1																					
Non-reactivity	-.15***	-.14***	-.06	-.14**	.35***	.24***	.05	-.14***	1																				
Total mindfulness	-.37***	-.35***	-.30***	-.41***	.44***	.73***	.62***	.46***	.49***	1																			
Work	.40***	.45***	.36***	.84***	.05	-.15***	-.31***	-.32***	-.17***	-.32***	1																		
Social Life	.54***	.48***	.38***	.57***	.02	-.21***	-.37***	-.34***	-.16***	-.39***	.61***	1																	
Affective life	.54***	.48***	.37***	.57***	.01	-.22***	-.41***	-.37***	-.18***	-.42***	.60***	.84***	1																
Psychological inflexibility	.50***	.47***	.36***	.53***	.07	-.32***	-.48***	-.60***	-.08*	-.52***	.44***	.53***	.60***	1															
Stress	.45***	.42***	.28***	.45***	.03	-.21***	-.44***	-.41***	-.11**	-.42***	.39***	.51***	.52***	.59***	1														
Depression	.47***	.43***	.34***	.49***	-.02	-.26***	-.39***	-.42***	-.11**	-.45***	.33***	.44***	.50***	.66***	.66***	1													
Anxiety	.39***	.38***	.28***	.41***	.05	-.20***	-.32***	-.36***	-.09*	-.34***	.30***	.39***	.37***	.48***	.69***	.62***	1												
Rumination	.39***	.37***	.29***	.41***	.17***	-.15***	-.35***	-.52***	-.02	-.33***	.36***	.40***	.44***	.60***	.51***	.48***	.37***	1											
Self-kindness	-.21***	-.15***	-.10*	-.19***	.27***	.32***	.14***	.16***	.33***	.44***	-.10*	-.21***	-.21***	-.30***	-.25***	-.31***	-.21***	-.13**	1										
Self-judgement	.39***	.35***	.26***	.40***	.12**	-.23***	-.37***	-.61***	.00	-.42***	.29***	.38***	.38***	.61***	.46***	.46***	.34***	.62**	-.30***	1									
Common humanity	-.08*	-.05	-.03	-.07	.27***	.25***	.02	.06	.32***	.30***	-.06	-.09*	-.09*	-.18***	-.10*	-.18***	-.11**	-.01	.58***	-.07	1								
Isolation	.44***	.41***	.32***	.46***	.13**	-.32***	-.44***	-.52***	-.08*	-.46***	.32***	.42***	.48***	.69***	.50***	.57***	.34***	.66***	-.24***	.70***	-.12**	1						
Mindfulness	-.29***	-.26***	-.17***	-.29***	.29***	.39***	.24***	.21***	.40***	.55***	-.21***	-.27***	-.27***	-.39***	-.33***	-.35***	-.27***	-.21***	.66***	-.26***	.64***	-.36***	1						
Over-identification	.46***	.42***	.28***	.46***	.10**	-.36***	-.45***	-.58***	-.08*	-.47***	.34***	.43***	.46***	.68***	.54***	.54***	.38***	.64***	-.29***	.76***	-.14***	.78***	-.41***	1				
Total self-compassion	-.44***	-.38***	-.27***	-.44***	.11**	.41***	.39***	.49***	.27***	.61***	-.30***	-.42***	-.44***	-.66***	-.51***	-.56***	-.38***	-.53***	.72***	-.74***	.57***	-.74***	.75***	-.78***	1				
Satisfaction with life	-.38***	-.37***	-.31***	-.42***	-.03	.18***	.22***	.31***	.15***	.30***	-.25***	-.36***	-.41***	-.51***	-.33***	-.49***	-.29***	.37***	.33***	-.37***	.24***	-.47***	.35***	-.39***	.50***	1			
Clinical stressor	.26***	.26***	.15***	.26***	.04	-.15***	-.15***	-.25***	-.09*	-.21***	-.21***	.25***	.22***	.26***	.19***	.15***	.12**	.23***	-.04	.18***	.03	.25***	-.11**	.28***	-.19***	-.11**	1		
Team stressor	.35***	.33***	.23***	.36***	.08	-.13**	-.21***	-.26***	-.09*	-.22***	.30***	.30***	.33***	.33***	.26***	.22***	.24***	.22***	-.09*	.18***	-.03	.28***	-.17***	.28***	-.24***	-.16***	.45***	1	
Organisational stressor	.44***	.42***	.25***	.43***	.11**	-.10*	-.23***	-.27***	-.07	-.20***	.27***	.33***	.32***	.31***	.28***	.23***	.21***	.22***	-.05	.21***	.01	.27***	-.08*	.24***	-.20***	-.16***	.36***	.55***	1

Note. * $p < .05$; ** $p < .01$; *** $p < .001$

Table 16. Pearson product-moment correlations for anaesthesia residents

	Personal Burnout	Work-related burnout	Patient-related burnout	Total Burnout	Observing	Describing	Acting with Awareness	Non-judging	Non-reactivity	Total mindfulness	Work	Social Life	Affective life	Psychological inflexibility	Stress	Depression	Anxiety	Rumination	Self-kindness	Self-judgement	Common humanity	Isolation	Mindfulness	Over-identification	Total self-compassion	Satisfaction with life	Clinical stressor	Team stressor	Organisational stressor
Personal Burnout	1																												
Work-related burnout	.78***	1																											
Patient-related burnout	.20***	.37***	1																										
Total Burnout	.85***	.92***	.63***	1																									
Observing	.20*	.25**	.13	.24*	1																								
Describing	-.31**	-.16	-.13**	-.34***	.20*	1																							
Acting with Awareness	-.46***	-.44***	-.37***	-.52***	-.21*	.29**	1																						
Non-judging	-.46***	-.39***	-.27**	-.48***	-.37***	.17	.50***	1																					
Non-reactivity	-.15	-.13	-.13	-.17	.25**	.20*	.00	-.13	1																				
Total mindfulness	-.45***	-.32***	-.34***	-.48***	.35***	.72***	.62***	.48***	.42***	1																			
Work	.67***	.63***	.24***	.67***	.26**	-.27**	-.40***	-.43***	-.17	-.38***	1																		
Social Life	.58***	.51***	.08***	.55***	.23*	-.26**	-.22*	-.30**	-.06	-.23*	.71***	1																	
Affective life	.65***	.57***	.17	.64***	.30***	-.20*	-.31**	-.43***	-.16	-.29**	.70***	.83***	1																
Psychological inflexibility	.47***	.40***	.31**	.51***	.33***	-.23*	-.47***	-.65***	-.10	-.43***	.51***	.41***	.55***	1															
Stress	.58***	.48***	.29**	.57***	.38***	-.17*	-.43***	-.60***	-.09	-.35***	.58***	.47***	.60***	.63***	1														
Depression	.53***	.38***	.34***	.54***	.31**	-.24*	-.44***	-.56***	.02	-.36***	.50***	.41***	.46***	.71***	.69***	1													
Anxiety	.43***	.44***	.36***	.49***	.32**	-.06	-.36***	-.41***	-.11	-.23*	.48***	.34***	.38***	.49***	.70***	.58***	1												
Rumination	.58***	.47***	.18	.53***	.34***	-.07	-.38***	-.58***	.00	-.27**	.48***	.40***	.57***	.68***	.65***	.59***	.45***	1											
Self-kindness	-.21*	-.14	-.06	.20*	.29**	.33***	.07	.17	.35***	.45***	-.18	-.14	-.13	-.13	-.05	-.52***	-.06	.01	1										
Self-judgement	.51***	.37***	.15	.47***	.31**	-.14	-.32**	-.69***	-.02	-.34***	.47***	.42***	.50***	.69***	.53***	.58***	.34***	.68***	-.22*	1									
Common humanity	-.17	-.06	-.09	-.14	.06	.29**	.10	.09	.38***	.33**	-.15	-.02	-.01	-.14	-.04	-.12	-.11	.05	.61***	-.05	1								
Isolation	.55***	.38***	.25**	.52***	.24*	-.15	-.39***	-.61***	-.08	-.39***	.52***	.39***	.49***	.75***	.61***	.62***	.41***	.66***	-.24***	.77***	-.15	1							
Mindfulness	-.28**	-.18	-.15	-.27**	.14	.34***	.10	.23*	.38***	.44***	-.29**	-.14	-.17	-.27**	-.22*	-.16	-.18	-.10	.73***	-.22*	.72***	-.32**	1						
Over-identification	.49***	.37***	.22*	.47***	.27**	-.14***	-.46***	-.73***	-.03	-.44***	.48***	.44***	.54***	.75***	.65***	.60***	.42***	.68***	-.16	.83***	-.08	.78***	-.41***	1					
Total self-compassion	-.53***	-.36***	-.21*	-.49***	.10	.31**	.35***	.61***	.27**	.55***	-.49***	-.38***	-.45***	-.66***	-.50***	-.52***	-.36***	-.52***	.67***	-.77***	.56***	-.79***	.72***	-.77***	1				
Satisfaction with life	-.40***	-.37***	-.39***	-.50***	-.08	.27**	.42***	.33***	.06	.39***	-.36***	-.25*	-.33***	-.46***	-.40***	-.56***	-.23*	.40***	.15	-.31**	.18	-.45***	.23*	-.36***	.38***	1			
Clinical stressor	.07	.18	.20*	.18	-.07	-.11	-.25**	-.05	-.21*	-.26**	-.19*	.12	.13	.21*	.11	-.01	.14	.13	-.09	.16	.07	.20*	-.10	.18	-.16	-.12	1		
Team stressor	.38***	.36***	.24*	.41***	-.02	-.24*	-.16	-.21*	-.14	-.29**	.32**	.18	.23*	.24*	.24*	.21*	.21*	.29**	-.24*	.26**	-.10	.32**	-.29**	.23*	-.34***	-.21*	.48***	1	
Organisational stressor	.50***	.48***	.19*	.49***	.11	-.21*	-.23*	-.23*	-.27**	-.30**	.52***	.46***	.47***	.31**	.36***	.28**	.27**	.34***	-.26**	.31**	-.16	.36***	-.30**	.35***	-.41***	-.24*	.34***	.55***	1

Note. * p < .05; ** p < .01; *** p < .001

Table 17. Pearson product-moment correlations for anaesthesia specialists and residents

	Personal Burnout	Work-related burnout	Patient-related burnout	Total Burnout	Observing	Describing	Acting with Awareness	Non-judging	Non-reactivity	Total mindfulness	Work	Social Life	Affective life	Psychological inflexibility	Stress	Depression	Anxiety	Rumination	Self-kindness	Self-judgement	Common humanity	Isolation	Mindfulness	Over-identification	Total self-compassion	Satisfaction with life	Clinical stressor	Team stressor	Organisational stressor
Personal Burnout	1																												
Work-related burnout	.82***	1																											
Patient-related burnout	.45***	.58***	1																										
Total Burnout	.88***	.93***	.78***	1																									
Observing	.03	.06	.06	.06	1																								
Describing	-.17***	-.19***	-.16***	-.20***	.24***	1																							
Acting with Awareness	-.43**	-.45***	-.36***	-.48***	-.10**	.33***	1																						
Non-judging	-.37***	-.37***	-.28***	-.39***	-.31***	.17***	.43***	1																					
Non-reactivity	-.16***	-.15***	-.07	-.15***	.34***	.24***	.04	-.14***	1																				
Total mindfulness	-.39***	-.40***	-.31**	-.43***	.43***	.73***	.63***	.46***	.48***	1																			
Work	.46***	.53***	.33***	.52***	.07	-.18***	-.34***	-.33***	-.18***	-.35***	1																		
Social Life	.56***	.58***	.33***	.57***	.05	-.23***	-.35***	-.33***	-.15***	-.37***	.64***	1																	
Affective life	.57***	.59***	.34***	.58***	.05	-.23***	-.40***	-.37***	-.19***	-.41***	.63***	.84***	1																
Psychological inflexibility	.51***	.52***	.36***	.53***	.11**	-.31***	-.48***	-.61***	-.09*	-.52***	.46***	.52***	.60***	1															
Stress	.48***	.46***	.28***	.48***	.08*	-.21***	-.44***	-.44***	-.11**	-.41***	.44***	.51***	.55***	.60***	1														
Depression	.49***	.48***	.34***	.50***	.03	-.26***	-.40***	-.44***	-.09*	-.44***	.37***	.44***	.50***	.67***	.67***	1													
Anxiety	.41***	.40***	.29***	.43***	.08*	-.18***	-.33***	-.36***	-.10**	-.33***	.35***	.39***	.38***	.49***	.70***	.61***	1												
Rumination	.43***	.41***	.27***	.43***	.19***	-.15***	-.36***	-.53***	-.02	-.33***	.39***	.40***	.47***	.61***	.54***	.51***	.39***	1											
Self-kindness	-.21***	-.20***	-.09*	-.20***	.28***	.32***	.14***	.17***	.34***	.44***	-.12**	-.21***	-.20***	-.28***	-.22***	-.27***	-.19***	-.12**	1										
Self-judgement	.42***	.40***	.24***	.41***	.15***	-.22***	-.37***	-.62***	-.00	-.41***	.33***	.39***	.41***	.62***	.48***	.49***	.35***	.63***	-.29***	1									
Common humanity	-.10***	-.09*	-.04	-.09*	.24***	.26***	.04	.02	.33***	.31***	-.08*	-.09*	-.09*	-.18***	-.09*	-.17***	-.11**	-.00	.59***	-.07	1								
Isolation	.47***	.45***	.30***	.47***	.14***	-.30***	-.44***	-.53***	-.09*	-.45***	.36***	.42***	.48***	.70***	.52***	.58***	.36***	.66***	-.24***	.72***	-.13***	1						
Mindfulness	-.30***	-.29***	-.17***	-.30***	.28***	.39***	.23***	.21***	.40***	.54***	-.24***	-.26***	-.27***	-.38***	-.32***	-.33***	-.27***	-.20***	.67***	-.26***	.65***	-.36***	1						
Over-identification	.47***	.45***	.27***	.47***	.13***	-.25***	-.45***	-.60***	-.08*	-.47***	.37***	.44***	.48***	.69***	.56***	.55***	.39***	.65***	-.27***	.77***	-.14***	.79***	-.39***	1				
Total self-compassion	-.46***	-.44***	-.26***	-.45***	.08*	.40***	.39***	.51***	.28***	.61***	-.35***	-.42***	-.45***	-.66***	-.51***	-.55***	-.39***	-.53***	.71***	-.74***	.58***	-.75***	.75***	-.78***	1				
Satisfaction with life	-.37***	-.41***	-.32***	-.42***	-.05	.19***	.25***	.31***	.14***	.31***	-.26***	-.33***	-.39***	-.50***	-.34***	-.50***	-.27***	-.37***	.30***	-.36***	.23***	-.46***	.32***	-.38***	.47***	1			
Clinical stressor	.24***	.25***	.16***	.25***	.01	-.15***	-.17***	-.22***	-.11**	-.23***	.22***	.24***	.22***	.26***	.18***	.13***	.13***	.22***	-.05	.18***	.03	.24***	-.11**	.27***	-.19***	-.11**	1		
Team stressor	.36***	.36***	.23***	.37***	.05	-.16***	-.21***	-.25***	-.11**	-.24***	.31***	.29***	.32***	.32***	.26***	.22***	.24***	.24***	-.11**	.20***	-.04	.29***	-.20***	.28***	-.26***	-.16***	.46***	1	
Organisational stressor	.46***	.44***	.24***	.45***	.09*	-.13**	-.24***	-.26***	-.11**	-.23***	.33***	.37***	.36***	.32***	.31***	.25***	.23***	.25***	-.09*	.23***	-.02	.30***	-.13***	.27***	-.24***	-.16***	.36***	.55***	1

Note. * $p < .05$; ** $p < .01$; *** $p < .001$

2.3 - Study of Stressors

2.3.1 - Stressors in anaesthetists – development and validation of a new questionnaire

We develop and validate a scale for evaluation of stressors in anaesthesiologists. This study was published as an original article in European Journal of Anaesthesiology, and is presented on the following pages.

EJA

Eur J Anaesthesiol 2016; **33:**1–9

ORIGINAL ARTICLE

Stressors in anaesthesiology: development and validation of a new questionnaire

A cross-sectional study of Portuguese anaesthesiologists

Teresa A. Lapa, Sérgio A. Carvalho, Joaquim S. Viana, Pedro L. Ferreira and José Pinto-Gouveia

BACKGROUND Stress in anaesthesiologists is a common and multifactorial problem related to patients, colleagues and organisations. The consequences of stress include depression, work–home conflicts and burnout. Reduction in stress can be achieved by reducing the number and magnitude of stressors or by increasing resilience strategies.

OBJECTIVES We have created the self-reporting 'Stress Questionnaire in Anaesthesiologists' (SQA), to qualify the sources of stress in anaesthesiologists' professional lives, and measure the level of associated stress. Our study aimed to develop and validate the SQA using exploratory and confirmatory factor analyses. Construct validity was assessed through correlations between SQA and negative psychological outcomes as well as by comparing perception of stress among different known groups.

DESIGN A questionnaire-based cross-sectional, correlational, observational study.

SETTINGS The study was conducted between January 2014 and December 2014, throughout different anaesthesia departments in Portuguese hospitals. Data collection was from a representative subset at one specific time point.

PARTICIPANTS A sample of 710 anaesthesia specialists and residents from Portugal.

MAIN OUTCOME MEASURES The primary outcome measure was to identify specific stressors in anaesthesiologists. Secondary outcome was the association between stressors and burnout, depression symptoms, anxiety, stress, rumination, satisfaction with life and functional impairment.

RESULTS The exploratory analysis showed the SQA is a tri-dimensional instrument and confirmatory analysis showed the tri-dimensional structure presented good model fit. The three dimensions of SQA correlated positively with other stress measures and burnout, but negatively with satisfaction with life.

CONCLUSION SQA is a well adjusted measure for assessing stressors in anaesthesia physicians and includes clinical, organisational and team stress factors. Results showed that the SQA is a robust and reliable instrument.

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Introduction

Professional stress is well described in clinical anaesthesia. It can lead to burnout[1–3] and may have a negative impact on physical and mental well-being, personal life and even patient care, with consequences for the healthcare system generally.[3,4]

Managing the effects of stress in the professional environment can occur through two pathways.[5,6] One is by limiting exposure to work-related stressors, and this may include the improvement of organisational factors.[7,8] A recent Cochrane review[9] concluded that implementing change required attention to the reduction of specific stressors. A logical alternative is the development of emotional regulation strategies with the potential to increase personal resilience to adverse conditions[8,10] and reduce pervasive psychological processes that maintain psychopathological symptoms, such as rumination.[11]

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A significant number of tools are available for measuring the effects of stress such as loss of well-being,[4] burnout,[12,13] mental distress[14] and impaired professional performance in healthcare providers.[15,16] These tools are broadly used in studies evaluating these effects in physicians of different specialities, including anaesthesia, and also in studies that measure the value of measures intended to increase resilience against stress. To accurately assess the efficacy and effectiveness of an intervention on stress effects, we need to quantify not only the effects (the consequences of stress) but also the number and amplitude of stressors (the causes of the effects).

To our knowledge, no appropriate instrument exists at the moment specifically for the evaluation of stressors in anaesthesia physicians.

Our aim is to describe the development of the Stress Questionnaire in Anaesthesiologists (SQA) in a sample of anaesthesia physicians, and examine the responsible factors followed by item reduction. We also sought to examine its factor structure in two other samples, and examine the concurrent, divergent and incremental validity through correlation with a wide range of other measures of psychological process and function.

Methods

Study design

The study protocol was approved by the Ethical Committee of the Faculty of Health Sciences, University of Beira Interior, Portugal (Ethical Committee N. CE-FCS 2014/035). It was conducted between January 2014 and December 2014.

An anonymous self-reporting questionnaire-based survey was conducted across different anaesthesia departments of Portuguese hospitals. Data on personal characteristics, work experience, measures of stress, anxiety, depression, burnout, emotional regulation, psychological indicators and life satisfaction were collected.

To be enrolled, participants needed to meet one of the following inclusion criteria: to be a physician specialised in anaesthesiology, registered and active in Portugal, or a resident in an anaesthesiology program. The sole exclusion criterion was inability to speak fluent Portuguese.

Anonymity was ensured by inserting each completed questionnaire inside a sealed envelope, without any identification. A different page containing signed informed consent was immediately placed in a separate location to make identification impossible. The informed consent emphasised the voluntary nature of the study. The questionnaires took approximately 20 to 30 min to complete, and were delivered and collected by one of the authors personally or with the collaboration of a local proxy.

Construction of the scale/item development

To categorise the sources of stress in anaesthesiologists' professional lives and to measure the level of stress associated with these factors, a questionnaire with 10 items was developed.

In a first step a literature review on stressors in anaesthesia was conducted to understand the most cited stress-inducing factors.[2,7,14,17] The list of these factors was then complemented by clinical information through informal discussions with two senior anaesthesia consultants, two residents, six anaesthesia consultants and two anaesthesia specialists suffering from stress disorders. Finally, this list was edited by a panel of 12 experts with the intention of compressing it to a manageable set of factors. This panel was composed of six anaesthesiologists, two psychiatrists and four experienced psychotherapists. They agreed that the items were pertinent and of theoretical relevance, and that its terminology was accurate. They finished with a set of 10 items considered to be inducers of stress in anaesthesiologists' professional life:

1. Patients in the highest degree of American Society of Anesthesiologists' (ASA) physical status classification
2. Complex surgical interventions
3. Anticipation of difficulty in intubation
4. Work off-site, with different teams and equipment
5. Relationships with surgeons
6. Relationships with remaining anaesthetic team
7. Poor working conditions
8. Inability to keep up to date (theoretical knowledge and new technologies)
9. Organisation of the anaesthesiology department
10. Lack of time to organise the department or difficulty with its organisation.

Each SQA item contains a 0 to 10 visual analogue scale (VAS), a continuous measurement device[18] with higher values reflecting greater stress. Responses were calculated by manually measuring the distance from 0 to the marked area in a 0 to 100 mm scale. This type of scale allows reliable detection of small changes and is used in the fields of pain and fatigue research.[19]

The SQA was originally written in Portuguese, translated into English by a native English professional translator, and then translated back into Portuguese by a bilingual Portuguese psychologist. The similarity of these Portuguese versions was judged by a native English speaker, also fluent in Portuguese, who considered them to be satisfactory. Subsequent testing has been performed with the original Portuguese version.

Participants

The total sample of anaesthesiologists was divided into three different groups. The third group exclusively comprised residents. The first of the two remaining groups was used to conduct an exploratory factorial analysis and a

confirmatory analysis was performed on the other. The two samples were randomly generated with 35% in sample 1 and 65% in sample 2. The decision not to split the total sample in half was because structural equation modelling (through which the confirmatory analysis is conducted) requires a larger sample than exploratory factorial analysis. Randomisation was conducted using the SPSS function 'RV.BERNOULLI', which provides a random value from a Bernoulli distribution with the specified probability value. In this case, it was given a probability 0.65.

Reliability and validity tests

The reliability of SQA was assessed by computing Cronbach's α and composite reliability.

Construct validity was assessed via correlation with different measures, across the three different samples. We used the following measurement instruments:

- The short-form version of the Depression, Anxiety and Stress Scales-21, was developed by Lovibond and Lovibond[20] and was translated into Portuguese and validated by Pais-Ribeiro *et al.*[21] This is a self-reporting scale comprising 21 items distributed within three subscales developed to measure symptoms of depression, anxiety and stress. In the original version, the authors found that all the subscales had an adequate to good internal consistency with α values of 0.81 for depression, 0.73 for anxiety and 0.81 for stress subscales.
- The Copenhagen Burnout Inventory (CBI) was proposed by Kristensen *et al.*[22] and was translated into Portuguese and validated by Cesaltino Fonte.[23] It considers fatigue and exhaustion as a central construct. The CBI is a 19-item questionnaire measuring three burnout sub-dimensions: personal burnout (six items), work-related burnout (seven items) and client-related burnout (six items).
- Satisfaction with Life Scale (SWLS) was developed by Diener *et al.*[24] and was adapted to Portuguese by Simões.[25] It is a five-item scale designed to measure global cognitive judgments of one's life satisfaction. The scale shows good convergent validity with other scales and with other types of assessments of subjective well-being.
- The Sheehan Disability Scale (SDS) was described by Sheehan[26] and was translated into Portuguese by Pinto-Gouveia *et al.*[27] It includes three self-rated items designed to measure how work, social life and family life are impaired by current psychiatric symptoms such as panic, anxiety, phobia or depression. Each item includes an 11-point analogue scale that uses visual-spatial, numeric and verbal descriptive anchors simultaneously to represent the degree of disruption. It is a widely used, brief, reliable and valid self-rated measure of dysfunction for use in mental health research and clinical practice.
- Ruminative Response Scale (RRS-10) was developed by Treynor *et al.*[28] and was translated into Portuguese and validated by Dinis *et al.*[29] It is a 10-item self-rated instrument that assesses rumination, a psychological process that has been described as a self-centered coping style that involves repetitive thinking on personal negative feelings, as well as a pattern of self-reflection on the events that have led to these feelings and/or its consequences.[30] This scale comprises two factors, brooding and reflection. Using the total score of the 10 items, it might be used as an overall measure of rumination, in which higher scores mean a greater degree of rumination. The internal consistency of the original scale was $\alpha = 0.85$ for the total scale.

Analytical plan

The existence of univariate outliers was determined considering z-scores ($|Z| > 3$) and multivariate outliers through Mahalanobis distance ($D2 < 0.0010$). Normality was also assessed by coefficients of skewness (Sk) and Kurtosis (Ku).

Wherever individuals missed less than three items on the SQA, these missing items were imputed based upon their scores for the other SQA items. Wherever an individual had three or more items missing on the SQA, they were excluded from further analysis.

A χ^2 test was used to compare the differences between the three samples. Multiple comparisons were also made between each pair of samples using the χ^2 test, adjusting the level of significance to 0.017, using the Bonferroni method.

Analysis of variance with the Welch test was used to compare the mean ages of the three samples and the comparisons of each pair of samples were performed using the Games–Howell test.

In sample 1, an exploratory factor analysis was performed to identify latent variables underlying the observed ones.[31] Three criteria were considered to determine the number of factors to retain: Kaiser's criterion, scree plot and percentage of variance explained at least 60%.[32]

The adjustment of the model took into account the modification indices. To test if two different models were significantly different, the χ^2 difference test was performed. The items' factor loadings ($\lambda \geq 0.50$) have also been analysed as it supplies information with regard to the amount of variance of observed variables explained by the underlying latent variable factor.

To confirm the dimensional structure obtained in the previous step, a confirmatory factorial analysis (CFA) was conducted across samples 2 and 3 (residents). For each sample, covariance matrices were used to analyse the measurement models and the model fit

Table 1 Anaesthesiologists' characteristics

	S1	S2	S3
Size	209	390	111
Sex[a]			
Female	146 (70.2%)	270 (69.2%)	75 (67.6%)
Male	62 (29.8%)	120 (30.8%)	36 (32.4%)
Age[b] (years)			
<40 years	63 (30.1%)	124 (31.8%)	110 (99.1%)
40 to 49 years	57 (27.3%)	88 (22.6%)	1 (0.9%)
≥50 years	89 (42.6%)	178 (45.6%)	0 (0%)
Mean ± SD[c]	47.0 ± 10.0	46.6 ± 10.2	28.5 ± 2.2
Min to max	30 to 72	29 to 69	25 to 40
Region[d]			
North	55 (26.7%)	105 (27.2%)	33 (29.7%)
Centre	88 (42.7%)	127 (32.9%)	48 (43.2%)
South	56 (27.2%)	148 (38.3%)	26 (23.4%)
Islands	7 (3.4%)	6 (1.6%)	4 (3.6%)
Institution[e]			
Only public	112 (53.6%)	227 (58.4%)	103 (92.8%)
Public + private	84 (40.2%)	140 (36.0%)	8 (7.2%)
Only private	13 (6.2%)	22 (5.7%)	0 (0.0%)
Experience[f] (years)			
Residents	0 (0.0%)	0 (0.0%)	111 (100%)
≤3	15 (7.2%)	45 (11.6%)	0 (0.0%)
4 to 5	26 (12.4%)	48 (12.3%)	0 (0.0%)
6 to 10	41 (19.6%)	62 (15.9%)	0 (0.0%)
11 to 20	60 (28.7%)	108 (27.8%)	0 (0.0%)
>20	67 (32.1%)	126 (32.4%)	0 (0.0%)
Workload[g] (hour per week)			
≤40	17 (8.1%)	38 (9.9%)	17 (15.5%)
41 to 60	122 (58.4%)	214 (55.7%)	74 (67.3%)
61 to 80	56 (26.8%)	112 (29.2%)	17 (15.5%)
>80	14 (6.7%)	20 (5.2%)	2 (1.8%)

min = minimum; max = maximum; S1 = sample 1; S2 = sample 2; S3 = sample 3. [a] χ^2 test: $P = 0.889$. [b] χ^2 test: $P < 0.001$; multiple χ^2 test: S1 vs. S2, $P = 0.438$; S1 vs. S3, $P < 0.001$; S2 vs. S3, $P < 0.001$. ($\alpha = 0.017$). [c] Welch test: $P < 0.001$; multiple Games–Howell test: S1 vs. S2, $P = 0.916$; S1 vs. S3, $P < 0.001$; S2 vs. S3, $P < 0.001$. ($\alpha = 0.050$). [d] χ^2 test: $P = 0.013$; multiple χ^2 test: S1 vs. S2, $P = 0.015$; S1 vs. S3, $P = 0.886$; S2 vs. S3, $P = 0.018$. ($\alpha = 0.017$). [e] χ^2 test: $P < 0.001$; multiple χ^2 test: S1 vs. S2, $P = 0.533$; S1 vs. S3, $P < 0.001$; S2 vs. S3, $P < 0.001$. ($\alpha = 0.017$). [f] χ^2 test: $P < 0.001$; multiple χ^2 test: S1 vs. S2, $P = 0.444$; S1 vs. S3, $P < 0.001$; S2 vs. S3, $P < 0.001$. ($\alpha = 0.017$). [g] χ^2 test: $P = 0.018$; multiple χ^2 test: S1 vs. S2, $P = 0.702$; S1 vs. S3, $P = 0.007$; S2 vs. S3, $P = 0.005$. ($\alpha = 0.017$).

was assessed by maximum likelihood estimation. The root mean square error of approximation (RMSEA) is considered to be one of the most informative fit indices,[33] and a reasonable fit if RMSEA lies between 0.05 and 0.08.

The overall adjustment of the models was assessed by considering goodness-of-fit indices, namely χ^2, normed χ^2(χ^2/df), comparative fit index (CFI), incremental fit index (IFI), RMSEA and standardised root mean square residual (SRMR). Normed χ^2 values are considered acceptable if between 2 and 5.[34,35]

It was predicted that the SQA would correlate positively with other stress, anxiety and depression measures such as Depression, Anxiety and Stress Scales-21, and also burnout syndrome evaluated by CBI and rumination. The SQA should also correlate negatively with measures associated with good function and well-being, such as Satisfaction with Life Scale.

IBM SPSS Statistics for Windows, Version 19.0 (IBM Corp., Armonk, NY, USA) was used to implement all the descriptive and correlational procedures, and AMOS Version 21 (SPSS, Chicago, IL, USA) was used to conduct CFA.

Results

Participant data

Some 635 (47.8%) out of a total of 1254 anaesthesia specialists and 111 (38.4%) of a possible 291 residents returned their questionnaires. A total of 5.7% of anaesthesiologists' and 0% of residents' questionnaires had missing data and were excluded, leaving 599 in samples 1 and 2. General data are shown in Table 1.

The randomisation of 599 specialists into two samples for factorial analysis produced sample 1 ($n = 209$) in whom an exploratory oblique (Direct Oblimin) factorial analysis was conducted, and sample 2 ($n = 390$) in whom we conducted a CFA. A second CFA was performed in the third sample comprising residents ($n = 111$).

Exploratory factor analysis and item reduction

For the SQA 10 items, the Keiser–Meier–Olkin test of sampling adequacy was 0.836, indicating a good degree of nonunique covariance among the set of items.[36] A significant Bartlett's test of sphericity ($\chi^2 = 758.266$, df = 45, $P < 0.001$) also indicated that the data were suitable for factor analysis.

According to the three criteria described, we retained three dimensions to define the factors. We inspected the matrices and no item was eliminated as all loadings were above 0.4 and none had loadings above 0.4 on more than one factor.[37] The final exploratory factor analysis of these 10 items provided evidence for the existence of three factors which explain 66.2% of the total variance (Table 2).

These factors were, respectively, interpretable as clinical, team and organisational stress factors. The Cronbach's α reliability coefficients associated with these factors are also very good.

Confirmatory factor analysis and invariance of factor loadings

CFA was conducted in samples 2 and 3, through which the SQA factor structure was confirmed. In anaesthesia residents (sample 3) the SQA items were the same, except for item 6, which resulted from the mean value of two additional items: relations with anaesthesia specialists and with other anaesthesia residents.

With sample 2, results indicated no severe violation of normality ($|Sk| < 3$ and $|Ku| < 10$). There were no univariate (for each item $|Z| < 3$) and multivariate ($D2 > 0.0010$) outliers. Model fit indices showed reasonable global fit (Table 3).

Table 2 Initial exploratory factor analysis among anaesthesiologists ($n = 209$)

Item	Clinical stress factor loading (factor 1)	Team stress factor loading (factor 2)	Organisational stress factor loading (factor 3)
Patients in the highest degree of ASA classification	0.868	−0.029	0.005
Complex surgical interventions	0.788	−0.114	0.010
Anticipation of difficulty in intubation	0.446	−0.137	0.353
Work off-site, with different teams and equipment	0.199	−0.492	0.117
Relationships with surgeons	0.068	−0.743	−0.068
Relationships with remaining anaesthetic team	−0.027	−0.667	0.101
Lack of good working conditions	0.152	0.113	0.731
Inability to keep up to date	0.189	−0.041	0.516
Organisation of the anaesthesiology department	−0.186	−0.268	0.527
No time or difficult to organise it	−0.108	−0.110	0.494
Eigenvalue	4.219	1.471	0.930
Percentage variance explained, %	42.2	14.7	9.3
Cronbach's α	0.818	0.717	0.735

Factor 1: first rotated factor highly correlated with clinical stress; factor 2: second rotated factor highly correlated with team stress; factor 3: third rotated factor highly correlated with organisational stress. Rotated factor loadings vary between −1 and 1. An item is more associated to a factor when respective loading is higher than 0.400 or lower than −0.400. ASA, American Society of Anesthesiologists' physical status.

Model 1 presented reasonable model fit, according to its model fit indices. CFI reached the suggested cut-off value 0.90,[32] although IFI did not reach that value. Model 1 presented an RMSEA greater than 0.08. Finally, considering SRMR, it presented a value higher than 0.05, which suggest a poor fit of the model.

Based on the first model's modification indices it seems appropriate to test a new model in which items' errors (items II9 and II10, II4 and II6, and II5 and II6) were correlated. This model 2 showed a better fit, as described in Table 3. The normed χ^2 was lower than the value observed for model 1, but it was still above 2; CFI and IFI were both higher than 0.90; RMSEA shows a better fit (between 0.05 and 0.08); also SRMR confirms a better model fit, as SRMR is lower than 0.05. In fact, model 2 was significantly better than model 1 (DIFFTEST; $\Delta\chi^2 = 56.998$, df = 3; Fig. 1).

These results suggested reasonable reliability as internal consistency Cronbach's α was 0.84 for clinical stress dimension, 0.72 for team stress dimension and 0.68 for organisational stress dimension. The calculated average variance extracted (AVE) was 0.66 for clinical stress, 0.48 for team stress and 0.33 for organisational stress, and it provides a measure of individual item reliability. Discriminant validity was assessed by comparing AVE and the square of correlation (r^2) between factors. Good discriminant validity was obtained between clinical stress and team stress ($r^2 = 0.31$), between clinical stress and organisational stress ($r^2 = 0.18$), and between team stress and organisational ($r^2 = 0.66$).

Using sample 3, the CFA ($n = 111$), according to Sk and Ku values, there was not a severe violation of normality ($|Sk| < 3$ and $|Ku| < 10$). There were no univariate (for each item $|Z| < 3$) and multivariate ($D^2 > 0.0010$) outliers.

Results from the residents' subgroup showed a poor model fit. However, the modification indices values suggested a model in which some errors were correlated (Table 3), in particular errors associated with the following pairs of items: II1 and II2, and II4 and II6.

Both II1 and II2 load onto the clinical stress factor, and items II4 and II6 both load onto the team stress factor. For that reason, we conducted a CFA with a model in which we correlated errors. This second model presented significantly better goodness-of-fit indices comparing with the first model (DIFFTEST; $\Delta\chi 2 = 18.831$, df = 2; Fig. 2).

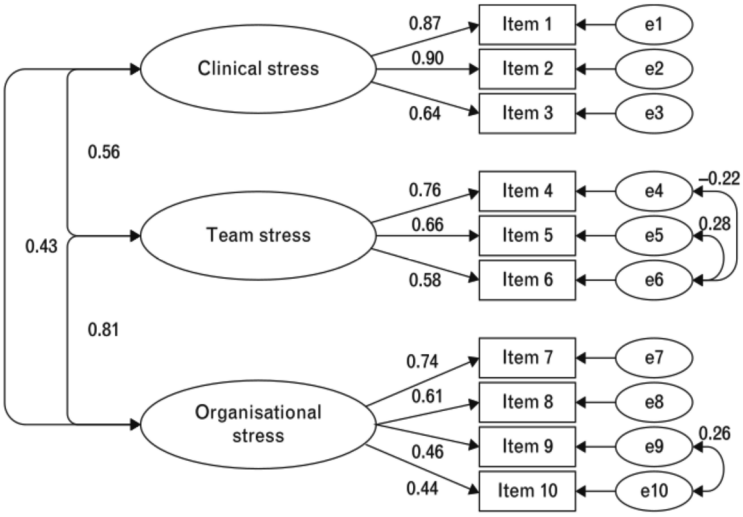
Concerning reliability, the results suggest reasonable scores: Cronbach's was 0.87 for clinic stress, 0.71 for team stress and 0.67 for organisational stress. The calculated AVE was 0.61 for clinic stress, 0.51 for team stress and 0.36 for organisational stress. Good discriminant validity was obtained between clinic stress and team stress ($r^2 = 0.37$), between clinical and organisational stress ($r^2 = 0.13$), and between team and organisational stress ($r^2 = 0.46$).

Table 3 Confirmatory factor analyses

Anaesthesia sample ($n = 390$)	χ2	df	*P* value	NC	CFI	IFI	RMSEA	SRMR
Model 1. 3-factor SQA	147,778	32	<0.001	4.618	0.913	0.878	0.096	0.065
Model 2. Correlated errors	90,780	29	<0.001	3.13	0.954	0.954	0.074	0.049
Residents sample ($n = 111$)								
Model 1. 3-factor SQA	80,609	32	<0.001	2.519	0.873	0.878	0.120	0.086
Model 2. Correlated errors	61,778	30	0.001	2.059	0.917	0.920	0.100	0.080

NC, normed χ^2 (χ2/df); CFI, comparative fit index; IFI, iterative fit index; RMSEA, root mean square error of approximation; SRMR, standardised root mean residual; df, degrees of freedom.

Fig. 1



$\chi^2(29) = 90.78$; $P < 0.001$; NC(χ^2/df) = 3.13; CFI = 0.95; IFI = 0.95; RMSEA = 0.07; SRMR = 0.05

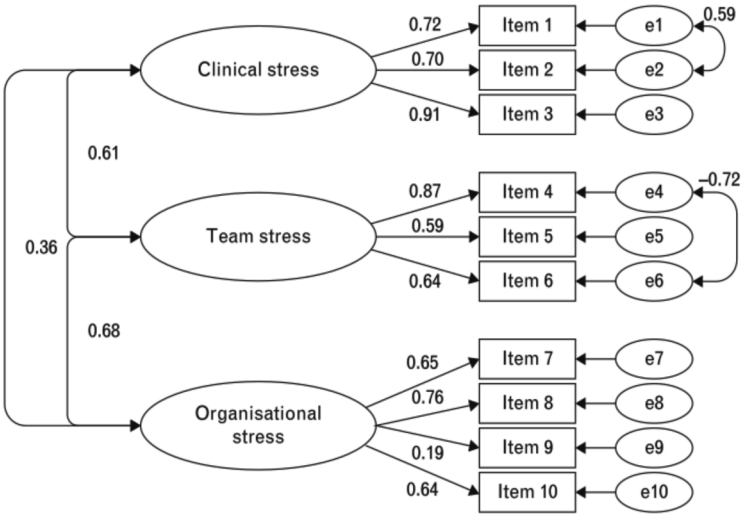
Item loading of the SQA in anaesthesiologists ($n = 390$). e1, e2, e3, e4, e5, e6, e7, e8, e9, e10: residual error variances of the observed variables.

Construct validity

The study was conducted with the total sample of satisfactory questionnaires ($n = 710$). The three subscales have shown acceptable internal consistencies (clinical stress subscale Cronbach's $\alpha = 0.839$; team stress subscale Cronbach's $\alpha = 0.733$; organisational stress subscale Cronbach's $\alpha = 0.693$).

To investigate whether perception of stress differed among known groups, we analysed how sensitive the

Fig. 2



$\chi^2(30) = 61.78$; $P < 0.001$; NC(χ^2/df) = 2.06; CFI = 0.92; IFI = 0.92; RMSEA = 0.10; SRMR = 0.08

Item loading of the SQA in anaesthesia residents ($n = 111$). e1, e2, e3, e4, e5, e6, e7, e8, e9, e10: residual error variances of the observed variables.

Table 4 **SQA differences among known groups**

	Clinical stress		Team stress		Organisational stress	
Personal data	Mean ± SD	*P*	Mean ± SD	*P*	Mean ± SD	*P*
Sex						
Male ($n=218$)	5.32 ± 1.97	0.002	4.53 ± 1.83	0.236	5.46 ± 1.78	0.615
Female ($n=491$)	5.80 ± 1.84		4.71 ± 1.84		5.53 ± 1.73	
Age (years)						
<40 ($n=297$)	5.81 ± 1.80	0.124	4.89 ± 1.66	0.008	5.72 ± 1.74	0.013
40 to 49 ($n=146$)	5.44 ± 1.93		4.66 ± 1.81		5.47 ± 1.74	
≥50 ($n=267$)	5.58 ± 1.96		4.40 ± 2.00		5.29 ± 1.73	
Region						
North ($n=193$)	5.58 ± 1.85	0.047	4.64 ± 1.82	0.087	5.26 ± 1.63	0.071
Centre ($n=263$)	5.88 ± 1.82		4.86 ± 1.80		5.67 ± 1.74	
South ($n=230$)	5.42 ± 2.02		4.44 ± 1.87		5.51 ± 1.82	
Islands ($n=17$)	5.90 ± 1.57		4.74 ± 2.04		5.88 ± 1.99	
Institution						
Only public ($n=442$)	5.78 ± 1.85	0.048	4.68 ± 1.80	0.896	5.55 ± 1.74	0.248
Public + private ($n=232$)	5.40 ± 1.92		4.61 ± 1.92		5.50 ± 1.75	
Only private ($n=35$)	5.56 ± 2.12		4.63 ± 1.83		5.04 ± 1.78	
Experience (years)						
Intern ($n=111$)	6.00 ± 1.85	0.190	4.98 ± 1.70	0.005	6.08 ± 1.81	<0.001
≤3 ($n=60$)	5.80 ± 1.62		4.83 ± 1.59		5.24 ± 1.64	
4 to 5 ($n=74$)	5.47 ± 1.83		4.68 ± 1.62		5.65 ± 1.71	
6 to 10 ($n=103$)	5.71 ± 1.80		4.97 ± 1.80		5.67 ± 1.78	
11 to 20 ($n=168$)	5.65 ± 1.97		4.71 ± 1.82		5.45 ± 1.69	
>20 ($n=193$)	5.43 ± 1.98		4.21 ± 2.02		5.16 ± 1.70	
Workload (h per week)						
≤40 ($n=72$)	5.66 ± 1.89	0.020	4.54 ± 2.01	0.690	5.35 ± 1.86	0.102
41 to 60 ($n=410$)	5.82 ± 1.81		4.74 ± 1.74		5.46 ± 1.70	
61 to 80 ($n=185$)	5.34 ± 2.04		4.59 ± 1.98		5.75 ± 1.80	
>80 ($n=36$)	5.26 ± 1.91		4.54 ± 1.90		5.12 ± 1.78	

SQA was in taking into account sex, age group, specialists/residents, years of experience of the specialists and site of practice (Table 4).

From this table, it is evident that female anaesthesiologists have higher clinical stress perception, and also physicians with a lower weekly workload. The greatest stress is seen among the younger and less experienced clinicians.

Criterion validity

Considering the three samples ($n=710$), Table 5 shows correlation between SQA and other measures.

The three subscales of SQA (clinical, team and organisational stress) correlated positively with burnout, the three dimensions of Sheehan Disability Scale, stress, depression, anxiety and rumination. In contrast, it correlates negatively with life satisfaction. These results indicate that the SQA has good validity.

Discussion

We developed the Stress Questionnaire in Anaesthesiologists (SQA), a 10-item summated self-rating scale, for the assessment of stressors in anaesthesia physicians. Stressors are characteristics that increase the probability of stress outcomes and have different effects in a variety of medical specialities.[38] We should evaluate and explore the main stressors in anaesthesiologists to be able to better reduce negative stress consequences in personal and professional lives.[2,14]

The SQA is a questionnaire that measures specific stressors and can be used to identify problems in the working conditions of anaesthesia physicians to encourage and improve the development of 'wellness'. In addition to developing an instrument that measures specific stressors in anaesthesia professionals, this study set out to explore its factor structure and psychometric properties, to establish its accuracy.

Although stress in anaesthesiologists has long been recognised as an increasing problem with serious complications, to our knowledge there is no well characterised instrument with reliable psychometric properties to quantify specific stressors in anaesthesia physicians. One study that claimed to measure stressors in anaesthesiologists failed to use a well validated tool.[7] Other studies have used open questions as a way of assessing stress factors,[39] but few have been used to measure stressors in samples that include- anaesthesiologists and they were not developed to grasp specific stressors in this area.[38,40,41]

As a consequence of the lack of a suitable measure of stress factors, we are unable to compare our data with psychometric analyses that used others instruments. The question then becomes: how are we able to prove that we are presenting a valuable tool for research and clinical purposes?

In the first instance we should employ standard criteria to scale validation. Results from the internal consistency

Table 5 Correlations between SQA and other constructs

Measure	Clinical stress		Team stress		Organisational stress	
DASS-21						
Stress	0.178	<0.001	0.258	<0.001	0.306	<0.001
Depression	0.131	0.001	0.223	<0.001	0.248	<0.001
Anxiety	0.134	<0.001	0.238	<0.001	0.234	<0.001
Burnout						
Personal	0.238	<0.001	0.356	<0.001	0.462	<0.001
Work	0.257	<0.001	0.339	<0.001	0.437	<0.001
Patient	0.153	<0.001	0.230	<0.001	0.237	<0.001
SDS						
Work	0.222	<0.001	0.308	<0.001	0.338	<0.001
Social life	0.237	<0.001	0.290	<0.001	0.372	<0.001
Affective life	0.216	<0.001	0.319	<0.001	0.363	<0.001
RRS						
Rumination	0.219	<0.001	0.236	<0.001	0.249	<0.001
SWLS	−0.110	0.004	−0.163	<0.001	−0.166	<0.001

DASS-21, Depression, Anxiety and Stress Scales-21; RRS, Ruminative Response Scale; SDS, Sheehan Disability Scale; SWLS, Satisfaction with Life Scale.

analysis suggest that the SQA is a reliable instrument for measuring stressors in anaesthesiologists, and the CFA showed that its three-factor (clinical, team and organisational stress) structure presents a good fit. As a result, this study shows that the SQA is a robust and reliable measure. Respondents' feedback indicated that the scale was easy to use and that it might support anaesthesia physicians' understanding of the different stress factors. As the instrument only contains 10 items, the questionnaire can be integrated into everyday hospital activity.

The three dimensions (clinical, team and organisational stress) that resulted from the exploratory and CFAs characterise the different widely described stressors in anaesthesia.[2,7,13,17,42] Younger and less experienced anaesthesiologists show higher team and organisational stressors; women and physicians with less workload also showed higher clinical stress.

Some inducers of stress identified in anaesthesiologists are related to the organisational environment. These factors are the best documented inducers of stress in this workgroup,[2] and the result of the factor analyses confirmed this. The clinical dimension obtained through the factor analyses also confirms that anaesthesia physicians endure stressful situations such as anticipation of difficult airway and more difficult, frail, vulnerable and demanding patients. Surgical procedures are getting more and more complex and this translates into a feeling of greater responsibility for the life of the patient, another source of stress. With respect to the team dimension, anaesthesia is a profession which demands that one adapts to team work; demands increase as different medical specialities request the services of anaesthesiologists. Problems among team members are common and this atmosphere can lead to tension and conflict.[1]

The SQA showed promise as a measure of stressors in anaesthesiologists, and might be a valuable tool for the study of the impact of stress in this professional group. Although small in magnitude, correlation analysis showed that the SQA was positively associated with burnout, anxiety, depression, stress symptoms in general and overall impairment in function. Additionally the SQA showed positive association with rumination, which has been identified as an important psychological factor in the development and maintenance of symptoms of depression.[43] The SQA was shown to correlate negatively with satisfaction with life, which corroborates its validity. These correlations support the SQA as a valuable instrument in the study of stressors in anaesthesia physicians.

The SQA might be of value in research on stressors in other countries, and comparisons among them could be advantageous in increasing appropriate coping strategies. Although this remains to be shown, we can argue that within the developed world, stressors for anaesthesiologists have a certain degree of similarity (at least in what is measurable), but some variation could be observed among different hospitals. It is also expected that the SQA would be a screening test for variables which are not so easily measured.

A second and definitive way to prove the usefulness of our tool could be achieved by future studies using it for two different aims.

One is in screening for signs of stress at work. It has been shown that chronic stress among healthcare personnel may be preventable if cases at risk are identified at an early stage.[44] The authors consider that the SQA could be an important tool in the identification of anaesthesiologists at risk of developing stress-related difficulties. As a result, by exploring and understanding stressors, more effective preventive measures for anaesthesiologists can be introduced.

The other is the evaluation of preventive strategies to increase stress resilience in professionals where action on stressors is considered to be restricted or limited. If we want to prove the efficacy of these psychological approaches, we need to prove that interventional and control groups are subjected to similar stressors and, as far as we know, our tool is the first one for this purpose. Longitudinal studies are necessary to make conclusions with regard to the predictive validity of the questionnaire. It would also be desirable to collect additional data from the sample for the present study.

There are limitations with our study, such as the cross-sectional nature of the current design, which does not allow us to establish causal relations between the different variables correlated. Another limitation is the SQA, which was exclusively a Portuguese version. The English version would need separate validation in an Anglophone subgroup. It had a paper-based format that was costly in terms of the time required to read the data: the exact position of each mark had to be determined by hand. All

this would change considerably with computerisation. The rise of Internet-based research has led to a reduction in the practical drawbacks associated with the VAS, which has become a measurement device that is used widely.[45] Future research should consider validating the SQA using a VAS generator.

In conclusion, we have developed and validated a stress factor questionnaire in anaesthesiologists. The SQA, as presented here, is a reliable and valid questionnaire, which provides a more accurate assessment of different stressors in anaesthesia physicians. The SQA is a short, practical and thus economically effective instrument that might inform health service management of which factors should be taken into account to make the hospital work place a more appealing one. SQA will contribute to advances in the study of stress in anaesthesiologists and hopefully to the improvement of well-being in a safer climate in healthcare.

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2.3.2 - Study of stressors

2.3.2.1 - Stressors and socio-demographic data

Stressors and age. A one-way MANOVA was performed to determine whether there were any differences between age groups on three types of stressors. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was carried out. There was a statistically significant difference in stressors based on age groups, *F*: $p = .022$; partial $\eta^2 = .010$. There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction ($p < .017$) (Welch's *F*: $p = .008$ for team stressor, *F*: $p = .013$ for organisational stressor). Post hoc tests revealed that team and organisational stressors from anaesthetists 50 or more years of age were statistically significantly lower than anaesthetists less than 40 years (Table 18).

Table 18. SQA and age (Descriptive statistics and ANOVA test)

	Age	*n*	*M*	*SD*	Min	Max	Welch *F*/ *F* test	Tukey/Games-Howell Test
Clinical stressor	< 40	298	5.81	1.80	0.73	9.77		
	40-49	148	5.45	1.92	0.00	8.83	$p = .122$	
	≥ 50	272	5.57	1.95	0.67	9.72		
Team stressor	< 40	297	4.89	1.66	0.58	8.80		
	40-49	146	4.66	1.81	0.00	8.78	$p = .008$	(< 40 years) > (≥ 50 years) ($p = .006$)
	≥ 50	270	4.40	2.00	0.35	9.90		
Organisational stressor	< 40	297	5.72	1.74	0.58	9.64		
	40-49	147	5.50	1.76	0.00	9.14	$p = .013$	(< 40 years) > (≥ 50 years) ($p = .009$)
	≥ 50	271	5.28	1.72	0.28	9.08		

Stressors and sex. A one-way MANOVA was performed to determine whether there were any differences between sex groups on three types of stressors. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was a statistically significant difference in stressors based on sex groups, *F:* $p = .024$; partial $\eta^2 = .013$. Independent *t*-tests using the Bonferroni correction ($p < .017$) were run to determine if there were differences in stressors based on sex groups. The results showed that male anaesthetists had statistically significantly lower clinical stressor compared to female anaesthetists (Table 19).

Table 19. SQA and sex (Descriptive statistics and t-test)

	Sex	*n*	*M*	*SD*	Min	Max	*t*-test
Clinical stressor	Male	221	5.34	1.97	0.00	9.72	$p = .003$
	Female	496	5.79	1.83	0.67	9.77	
Team stressor	Male	220	4.55	1.83	0.00	9.90	$p = .293$
	Female	492	4.71	1.85	0.35	9.13	
Organisational stressor	Male	220	5.47	1.78	0.00	9.64	$p = .693$
	Female	494	5.53	1.74	0.28	9.45	

2.3.2.2 - Stressors and work-related data

Stressors and workload. A one-way MANOVA was performed to determine whether there were any differences between workload groups on three types of stressors. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was carried out. There was a statistically significant difference in stressors based on workload groups, *F*: $p = .006$; partial $\eta^2 = .011$. A one-way ANOVA using the Bonferroni correction ($p < .017$) had no statistical power to detect differences (Table 20).

Table 20. SQA and workload (Descriptive statistics and ANOVA test)

	Workload	*n*	*M*	*SD*	Min	Max	*F*
Clinical stressor	≤ 40	74	5.68	1.87	1.33	9.13	$p = .021$
	41 to 60	415	5.81	1.81	0.67	9.77	
	61 to 80	186	5.34	2.04	0.00	9.27	
	> 80	36	5.26	1.91	1.81	8.96	
Team stressor	≤ 40	72	4.54	2.01	0.35	9.13	$p = .694$
	41 to 60	413	4.74	1.75	0.47	9.02	
	61 to 80	185	4.59	1.98	0.00	9.90	
	> 80	36	4.54	1.90	0.38	8.47	
Organisational stressor	≤ 40	72	5.35	1.86	0.28	9.08	$p = .101$
	41 to 60	415	5.47	1.70	0.58	9.14	
	61 to 80	185	5.75	1.80	0.00	9.64	
	> 80	36	5.12	1.78	0.49	8.81	

Stressors and region. A one-way MANOVA was performed to determine whether there were any differences between region groups on three types of stressors. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was a statistically significant difference in stressors based on region groups, *F*: $p = .025$; partial $\eta^2 = .009$. A one-way ANOVA using the Bonferroni correction ($p < .017$) had no statistical power to detect differences (Table 21).

Table 21. SQA and region (Descriptive statistics and ANOVA test)

	Region	*n*	*M*	*SD*	Min	Max	*F*
Clinical stressor	North	194	5.58	1.85	0.89	9.72	$p = .036$
	Centre	268	5.88	1.81	0.00	9.77	
	South	231	5.41	2.01	0.58	9.12	
	Islands	17	5.90	1.57	2.29	8.34	
Team stressor	North	194	4.65	1.82	0.35	9.63	$p = .073$
	Centre	265	4.85	1.80	0.00	9.13	
	South	230	4.44	1.87	0.38	9.90	
	Islands	17	4.74	2.04	1.37	8.80	
Organisational stressor	North	194	5.26	1.62	0.94	9.05	$p = .057$
	Centre	267	5.67	1.75	0.00	9.64	
	South	230	5.51	1.82	0.28	9.45	
	Islands	17	5.88	1.99	2.48	8.88	

Stressors and medical emergency. A one-way MANOVA was performed to determine whether there were any differences between medical emergency groups on three types of stressors. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was a statistically significant difference in stressors based on medical emergency groups, *F:* $p = .010$; partial $\eta^2 = .017$. Independent *t*-tests using the Bonferroni correction ($p < .017$) were run to determine if there were differences in stressors based on medical emergency. The results showed that anaesthetists who did not do medical emergency had statistically significantly lower organizational stressor compared to anaesthetists who did do medical emergency (Table 22).

Table 22. SQA and medical emergency (descriptive statistics and t-test)

	Medical emergency	*n*	*M*	*SD*	Min	Max	*t*-test
Clinical stressor	No	304	5.56	1.90	0.00	9.37	$p = .213$
	Yes	385	5.73	1.88	0.58	9.77	
Team stressor	No	301	4.49	1.94	0.00	8.63	$p = .026$
	Yes	384	4.80	1.77	0.47	9.90	
Organisational stressor	No	303	5.28	1.80	0.00	9.14	$p = .001$
	Yes	384	5.70	1.67	0.58	9.64	

Stressors and years of experience. A one-way MANOVA was performed to determine whether there were any differences between years of experience groups on three types of stressors. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was a statistically significant difference in stressors based on years of experience groups, *F*: $p = .002$; partial $\eta^2 = .017$. There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction ($p < .017$) (Welch's *F*: $p = .005$ for team stressor, *F*: $p < .001$ for organisational stressor). Post hoc tests revealed that team and organisational stressors from anaesthesia specialists more than 20 years of experience was statistically significantly lower than anaesthesia residents. Also, post hoc tests revealed that team stressor from anaesthesia specialists more than 20 years of experience was statistically significantly lower than anaesthesia 6 to 10 years of experience (Table 23).

Table 23. SQA and years of experience (descriptive statistics and ANOVA test)

	Years of experience	*n*	*M*	*SD*	Min	Max	Welch *F*/ *F* test	Tukey/Games-Howell Test
Clinical stressor	Anaesthesia residents	111	6.00	1.85	0.73	9.77	$p = .186$	
	≤ 3	60	5.80	1.62	2.33	9.13		
	4 to 5	74	5.47	1.83	1.00	9.37		
	6 to 10	104	5.72	1.79	0.58	8.83		
	11 to 20	171	5.66	1.95	0.00	8.96		
	> 20	197	5.42	1.98	0.67	9.72		
Team stressor	Anaesthesia residents	111	4.98	1.70	0.58	8.63	$p = .005$	(Anaesthesia residents) > (> 20 years) ($p = .006$) (6 to 10 years) > (> 20 years) ($p = .014$)
	≤ 3	60	4.83	1.59	0.94	8.20		
	4 to 5	74	4.68	1.62	1.08	7.98		
	6 to 10	103	4.97	1.80	0.38	8.80		
	11 to 20	168	4.71	1.82	0.00	9.90		
	> 20	196	4.21	2.02	0.38	9.13		
Organisational stressor	Anaesthesia residents	111	6.08	1.81	0.58	9.64	$p < .001$	(Anaesthesia residents) > (> 20 years) ($p < .001$)
	≤ 3	60	5.24	1.64	1.59	8.08		
	4 to 5	74	5.65	1.71	0.94	9.05		
	6 to 10	104	5.70	1.80	1.48	9.14		
	11 to 20	168	5.45	1.69	0.00	9.05		
	> 20	197	5.16	1.70	0.28	9.08		

Note. This variable was not intentionally filled by anaesthesia residents.

2.3.2.3 - Stressors and socio-cultural data

Stressors and physical activities. A one-way MANOVA was performed to determine whether there were any differences between physical activities groups on three types of stressors. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was performed. There was a statistically significant difference in stressors based on physical activities groups, *F:* $p = .021$; partial $\eta^2 = .014$. Independent *t*-tests using the Bonferroni correction ($p < .017$) were run to determine if there were differences in stressors based on physical activities groups and they had no statistical power to detect differences (Table 24).

Table 24. SQA and physical activities (descriptive statistics and t-test)

	Physical activities	*n*	*M*	*SD*	Min	Max	*t*-test
Clinical stressor	No	391	5.77	1.91	0.00	9.72	$p = .030$
	Yes	325	5.49	1.85	0.89	9.77	
Team stressor	No	390	4.63	1.89	0.00	9.90	$p = .691$
	Yes	321	4.70	1.78	0.38	9.13	
Organisational stressor	No	392	5.44	1.76	0.00	9.14	$p = .214$
	Yes	321	5.61	1.72	0.58	9.64	

Stressors and leisure activities. A one-way MANOVA was performed to determine whether there were any differences between leisure activities groups on three types of stressors. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was a statistically significant difference in stressors based on leisure activities groups, *F:* $p < .036$; partial $\eta^2 = .012$. Independent *t*-tests using the Bonferroni correction ($p < .017$) were run to determine if there were differences in stressors based on leisure activities and they had no statistical power to detect differences (Table 25).

Table 25. SQA and leisure activities (descriptive statistics and t-test)

	Leisure activities	*n*	*M*	*SD*	Min	Max	*t*-test
Clinical stressor	No	91	5.49	1.91	1.33	9.03	$p = .324$
	Yes	625	5.67	1.88	0.00	9.77	
Team stressor	No	89	4.87	1.89	0.35	9.90	$p = .285$
	Yes	622	4.63	1.83	0.00	9.13	
Organisational stressor	No	89	5.90	1.84	1.62	9.01	$p = .029$
	Yes	624	5.46	1.73	0.00	9.64	

Stressors and religious practice. A one-way MANOVA was performed to determine whether there were any differences between religious practice groups on three types of stressors. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was a statistically significant difference in stressors based on religious practice groups, *F: p* = .006; partial η^2 = .013. There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction ($p < .017$) (Welch's *F*: *p* = .002 for clinical stressor). Post hoc tests revealed that clinical stressor from no religious anaesthetists was statistically significantly lower than anaesthetists with regular religious practice (Table 26).

Table 26. SQA and religious practice (descriptive statistics and ANOVA test)

	Religious practice	***n***	***M***	***SD***	**Min**	**Max**	***F* test**	**Tukey/Games-Howell Test**
Clinical stressor	Regular practice	10	6.07	1.67	2.03	9.50	p = .002	(Regular practice) > (No regular practice) (p = .131) (Regular practice) > (No religion) (p = .002) (No regular practice) > (No religion) (p = .044)
	No regular practice	435	5.71	1.84	0.67	9.77		
	No religion	172	5.23	2.07	0.00	9.05		
Team stressor	Regular practice	106	4.70	2.02	0.35	9.02	p = .903	
	No regular practice	431	4.67	1.80	0.38	9.90		
	No religion	171	4.59	1.84	0.00	8.52		
Organisational stressor	Regular practice	106	5.39	1.69	0.49	9.05	p = .582	
	No regular practice	432	5.51	1.72	0.28	9.64		
	No religion	172	5.60	1.85	0.00	9.05		

One-way MANOVA were performed and there were no differences between marital status (*F: p* = .314; partial η^2 = .005), number of children (*F: p* = .173; partial η^2 = .006), institution (*F: p* = .118; partial η^2 = .007), night shifts (*F: p* = .126; partial η^2 = .008), average night's sleep (*F: p* = .179; partial η^2 = .006), intra-hospital emergency (*F: p* = .105; partial η^2 = .009), extra-hospital emergency (*F: p* = .092; partial η^2 = .009), smoking (*F: p* = .293; partial η^2 = .005), alcoholic drink consumption (*F: p* = .360; partial η^2 = .005), charity activities (*F: p* = .316; partial η^2 = .005), continuous education activities (*F: p* = .472; partial η^2 = .004), and meditation experience (*F: p* = .909; partial η^2 = .001) on three types of stressors.

2.3.3 - What stressors are inducing more stress on anaesthetists?

A general linear model measures was run to study what stressor is inducing more stress on anaesthesia specialists and residents. The variance between two groups of anaesthetists - specialists and residents - (between-subject variance) and the variance of the three stressors in each individual (within-subject variance) were tested.

Between-subject variance

The tests of between-subjects effects determined whether being anaesthesia specialist or resident was associated with differences in the three stressors. After computed the mean score of all three stressors, results indicated that anaesthetist groups, F (1, 711) = 11.01, p = .001, partial η^2 = .015, significantly differ in stressors. Anaesthesia residents (M = 9.85, SD = 2.47) showed higher mean score of stressors than anaesthesia specialists (M = 8.99, SD = 2.51).

Within-subject variance

Multivariate test statistics (Pillai's Trace, Wilks' Lambda, Hotelling's Trace and Roy's Largest Root) were computed to detect repeated-measures effects. The significant p-values showed that the three stressors differ in each individual, F (2, 710) = 79.43, p < .001, partial η^2 = .183, indicating that one stressor may induce more or less stress than the others. However, there was not a significant interaction between being an anaesthesia specialist or resident and stressors, F (2, 710) = 1.58, p = .207, partial η^2 = .004, meaning that the observed differences in the three stressors for each individual do not differ between anaesthesia specialists and residents.

Pairwise comparisons were computed to determine what stressors differ from each other (Table 27). There were significant differences in anaesthetists between clinic stressor and team stressor (p < .001), and between team stressor and organisational stressor (p < .001), but no significant differences between clinic stressor and organisational stressor (p = .668).

Table 27. Pairwise comparisons between the three stressors for anaesthetists

Stressor	*M*	*SD*	*F* test	Pairwise comparisons
Clinical	5.65	1.89		Clinical > Team (p < .001)
Team	4.66	1.84	p < .001	Organisational > Team (p < .001)
Organisational	5.51	1.75		Clinical > Organisational (p = .668)

2.4 - Study of Depression, Anxiety and Stress

2.4.1 - Incidence

To study the distribution of depression, anxiety and stress (assessed through DASS-21) in anaesthesia specialists and residents was used the following cut-off scores (Table 28).

Table 28. Cut-off scores for DASS-21

	Depression	Anxiety	Stress
Normal	0-4	0-3	0-7
Mild	5-6	4-5	8-9
Moderate	7-10	6-7	10-12
Severe	11-13	8-9	13-16
Extremely Severe	14 +	10 +	17 +

From the total sample of anaesthesia specialists and residents, we found that 575 (78.2%), 72 (9.8%), 57 (7.8%), 17 (2.3%) and 14 (1.9%) anaesthetists showed normal, mild, moderate, severe and extremely severe levels of depression, respectively. Moreover, 548 (74.6%), 84 (11.4%), 55 (7.5%), 27 (3.7%), and 21 (2.9%) anaesthetists exhibited normal, mild, moderate, severe and extremely severe levels of anxiety, respectively. Also, 562 (76.5%), 73 (9.9%), 56 (7.6%), 39 (5.3%), and 5 (0.7%) anaesthetists showed normal, mild, moderate, severe and extremely severe levels of stress. Table 29 shows the number and percentage of anaesthesiologists and anaesthesia residents for cut-off scores of DASS-21.

There were significant differences in anxiety (χ^2 test: $p = .002$) and stress (χ^2 test: $p = .006$) between anaesthesiologists and anaesthesia residents. These results indicate that anaesthesiologists have more percentage of normal anxiety and stress, but also less percentage of extremely severe anxiety and severe stress than anaesthesia residents (Table 29).

Table 29. Number and percentage of anaesthetists for cut-off scores of DASS-21

		Anaesthesiologists *n* (%)	Residents *n* (%)	Anaesthesiologists + Residents *n* (%)	χ^2 test
Depression	Normal	493 (78.8%)	82 (75.2%)	575 (78,2%)	
	Mild	63 (10.1%)	9 (8.3%)	72 (9,8%)	
	Moderate	46 (7.3%)	11 (10.1%)	57 (7,8%)	*p* = .469
	Severe	14 (2.2%)	3 (2.8%)	17 (2,3%)	
	Extremely Severe	10 (1.6%)	4 (3.7%)	14 (1,9%)	
Anxiety	Normal	477 (**76.2%**)	71 (**65.1%**)	548 (74,6%)	
	Mild	71 (11.3%)	13 (11.9%)	84 (11,4%)	
	Moderate	46 (7.3%)	9 (8.3%)	55 (7,5%)	*p* = .002
	Severe	20 (3.2%)	7 (6.4%)	27 (3,7%)	
	Extremely Severe	12 (**1.9%**)	9 (**8.3%**)	21 (2,9%)	
Stress	Normal	491 (**78.4%**)	71 (**65.1%**)	562 (76,5%)	
	Mild	61 (9.7%)	12 (11.0%)	73 (9,9%)	
	Moderate	44 (7.0%)	12 (11.0%)	56 (7,6%)	*p* = .006
	Severe	27 (**4.3%**)	12 (**11.0%**)	39 (5,3%)	
	Extremely Severe	3 (0.5%)	2 (1.8%)	5 (0,7%)	

Note. Adjusted standardized residuals in bold are those that exceed +/- 2.

Figure 5, Figure 6 and Figure 7 represent the distributions in percentages of the anaesthetist's sample in the depression, anxiety and stress dimensions of DASS-21, respectively.

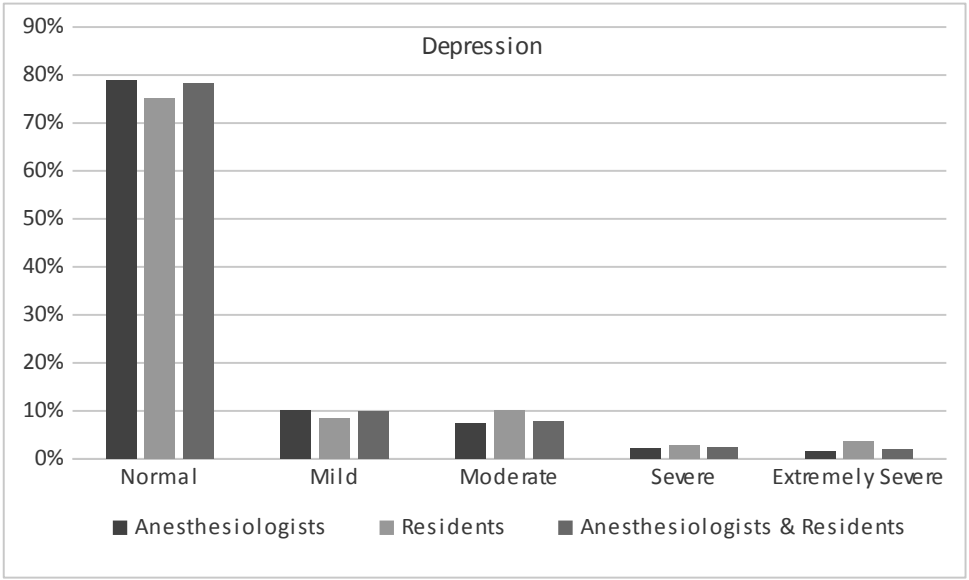

Figure 5. Depression distribution in anaesthetists

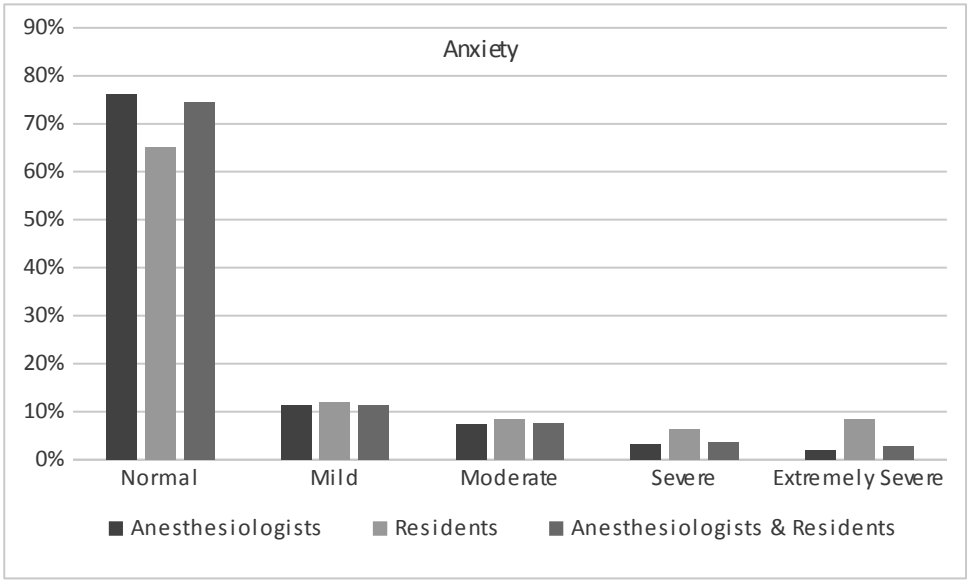

Figure 6. Anxiety distribution in anaesthetists

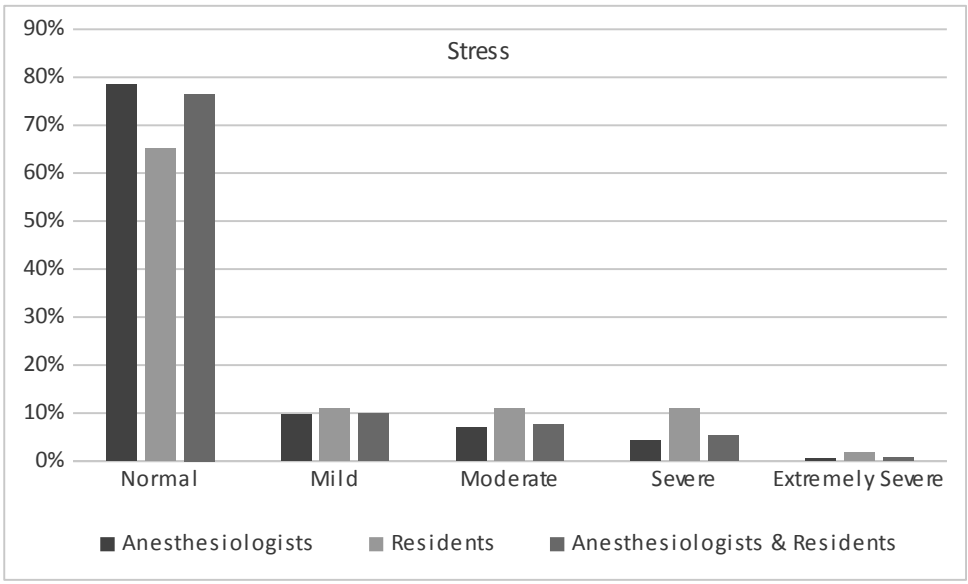

Figure 7. Stress distribution in anaesthetists

2.4.2 - Study of Depression, anxiety and stress

2.4.2.1 - Depression, anxiety and stress and socio-demographic data

Depression, anxiety and stress and age. A one-way MANOVA was performed to determine whether there were any differences between age groups on depression, anxiety and stress. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was carried out. There was a statistically significant difference in depression, anxiety and stress based on age groups, *F*: $p = .005$; partial $\eta^2 = .013$. There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction ($p < .017$) (*F*: $p < .001$ for stress, *F*: $p < .001$ for anxiety). Post hoc tests revealed that stress from anaesthetists 50 or more years of age was statistically significantly lower than anaesthetists less than 40 years. Post hoc tests had no statistical power to detect multiple comparisons for anxiety (Table 30).

Table 30. DASS-21 and age (descriptive statistics and ANOVA test)

	Age	*n*	*M*	*SD*	Min	Max	*F* test	Tukey Test
Stress	< 40	294	5.98	4.08	0.00	21.00	$p = .007$	(< 40 years) > (≥ 50 years) ($p = .005$)
	40-49	152	5.49	3.68	0.00	18.00		
	≥ 50	288	4.95	3.52	0.00	17.00		
Depression	< 40	294	3.02	3.53	0.00	20.00	$p = .577$	
	40-49	152	2.64	3.21	0.00	15.00		
	≥ 50	288	2.80	3.30	0.00	20.00		
Anxiety	< 40	294	2.70	2.92	0.00	14.00	$p = .012$	
	40-49	152	2.10	2.59	0.00	14.00		
	≥ 50	288	2.12	2.70	0.00	15.00		

Depression, anxiety and stress and sex. A one-way MANOVA was performed to determine whether there were any differences between sex groups on depression, anxiety and stress. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was a statistically significant difference in depression, anxiety and stress based on sex groups, *F:* $p = .025$; partial $\eta^2 = .013$. Independent *t*-tests using the Bonferroni correction ($p < .017$) were run to determine if there were differences in depression, anxiety and stress based on sex groups, but they had no statistical power to detect differences (Table 31).

Table 31. DASS-21 and sex (descriptive statistics and t-test)

	Sex	*n*	*M*	*SD*	Min	Max	*t*-test
Stress	Male	221	5.05	3.75	0.00	19.00	$p = .036$
	Female	511	5.67	3.82	0.00	21.00	
Depression	Male	221	2.93	3.21	0.00	18.00	$p = .682$
	Female	511	2.83	3.45	0.00	20.00	
Anxiety	Male	221	2.25	2.61	0.00	14.00	$p = .467$
	Female	511	2.40	2.85	0.00	15.00	

Depression, anxiety and stress and number of children. A one-way MANOVA was performed to determine whether there were any differences between number of children groups on depression, anxiety and stress. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was performed. There was a statistically significant difference in depression, anxiety and stress based on number of children groups, *F: p* = .017; partial η^2 = .010. There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction (*p* < .017) (Welch's *F*: *p* = .015 for depression, Welch's *F*: *p* = .008 for anxiety). Post hoc tests revealed that anxiety from anaesthetists with 3 or more children was statistically significantly lower than anaesthetists with no children. Post hoc tests had no statistical power to detect multiple comparisons for depression (Table 32).

Table 32. DASS-21 and number of children (descriptive statistics and ANOVA test)

	Number of children	*n*	*M*	*SD*	Min	Max	Welch's *F*	Games-Howell Test
Stress	0	253	5.94	4.20	0.00	21.00	*p* = .041	
	1	125	5.47	3.29	0.00	16.00		
	2	250	5.18	3.70	0.00	18.00		
	3 or more	92	4.84	3.45	0.00	17.00		
Depression	0	253	3.26	3.81	0.00	20.00	*p* = .015	
	1	125	2.94	3.21	0.00	13.00		
	2	250	2.53	3.02	0.00	20.00		
	3 or more	92	2.33	3.03	0.00	18.00		
Anxiety	0	253	2.80	3.14	0.00	14.00	*p* = .008	(3 or more) > (0 children) (*p* = .008)
	1	125	2.15	2.50	0.00	15.00		
	2	250	2.04	2.46	0.00	14.00		
	3 or more	92	1.99	2.61	0.00	12.00		

2.4.2.2 - Depression, anxiety and stress and work-related data

Depression, anxiety and stress and institution. A one-way MANOVA was performed to determine whether there were any differences between institution groups on depression, anxiety and stress. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was performed. There was a statistically significant difference in depression, anxiety and stress based on institution groups, *F:* $p < .001$; partial $\eta^2 = .018$. There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction ($p < .017$) (Welch's *F*: $p < .001$ for depression, Welch's *F*: $p = .006$ for anxiety). Post hoc tests revealed that depression from anaesthetists who worked only in public institutions was statistically significantly higher than anaesthetists who worked only in private institutions and in public and private institutions. Also, post hoc tests revealed that anxiety from anaesthetists who worked only in public institutions was statistically significantly higher than anaesthetists who worked both in public and private institutions (Table 33).

Table 33. DASS-21 and institution (descriptive statistics and ANOVA test)

	Institution	*n*	*M*	*SD*	Min	Max	Welch *F*/ *F* test	Tukey/Games-Howell Test
	Only public	460	5.69	3.87	0.00	21.00		
Stress	Public + private	238	5.02	3.57	0.00	19.00	$p = .025$	
	Only private	36	5.36	4.05	0.00	16.00		
	Only public	460	3.13	3.44	0.00	20.00		(Only public) > (Public + private) ($p < .001$)
Depression	Public + private	238	2.37	3.12	0.00	20.00	$p < .001$	
	Only private	36	2.22	3.20	0.00	13.00		(Only public) > (Only private) ($p = .001$)
	Only public	460	2.50	2.84	0.00	15.00		
Anxiety	Public + private	238	2.07	2.68	0.00	14.00	$p = .006$	(Only public) > (Public + private) ($p = .005$)
	Only private	36	2.06	2.30	0.00	10.00		

Depression, anxiety and stress and medical emergency. A one-way MANOVA was performed to determine whether there were any differences between medical emergency groups on depression, anxiety and stress. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was performed. There was a statistically significant difference in depression, anxiety and stress based on medical emergency groups, *F: p* = 001; partial η^2 = .023. Independent *t*-tests using the Bonferroni correction ($p < .017$) were run to determine if there were differences in depression, anxiety and stress based on medical emergency groups. The results showed that anaesthetists who did do medical emergency had statistically significantly higher stress, depression and anxiety compared to anaesthetists who did not do medical emergency (Table 34).

Table 34. DASS-21 and work in medical emergency (descriptive statistics and t-test)

	Medical emergency	*n*	*M*	*SD*	Min	Max	*t*-test
Stress	No	308	4.86	3.49	0.00	17.00	$p < .001$
	Yes	395	5.90	3.89	0.00	21.00	
Depression	No	308	2.31	2.91	0.00	18.00	$p < .001$
	Yes	395	3.24	3.57	0.00	20.00	
Anxiety	No	308	1.93	2.46	0.00	15.00	$p = .001$
	Yes	395	2.60	2.89	0.00	14.00	

Depression, anxiety and stress and intra-hospital emergency. A one-way MANOVA was performed to determine whether there were any differences between intra-hospital emergency groups on depression, anxiety and stress. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was performed. There was a statistically significant difference in depression, anxiety and stress based on intra-hospital emergency groups, *F:* $p < .001$; partial $\eta^2 = .029$. Independent *t*-tests using the Bonferroni correction ($p < .017$) were run to determine if there were differences in depression, anxiety and stress based on intra-hospital emergency groups. The results showed that anaesthetists who did do intra-hospital emergency had statistically significantly higher stress, depression and anxiety compared to anaesthetists who did not do intra-hospital emergency (Table 35).

Table 35. DASS-21 and work in intra-hospital emergency (descriptive statistics and t-test)

	Intra-hospital emergency	*n*	*M*	*SD*	Min	Max	*t*-test
Stress	No	361	5.06	3.64	0.00	20.00	$p = .003$
	Yes	342	5.85	3.83	0.00	21.00	
Depression	No	361	2.42	3.05	0.00	20.00	$p < .001$
	Yes	342	3.26	3.56	0.00	19.00	
Anxiety	No	361	1.98	2.43	0.00	15.00	$p = .001$
	Yes	342	2.65	2.98	0.00	14.00	

Depression, anxiety and stress and years of experience. A one-way MANOVA was performed to determine whether there were any differences between years of experience groups on depression, anxiety and stress. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was performed. There was a statistically significant difference in depression, anxiety and stress based on years of experience groups, *F*: $p = .003$; partial $\eta^2 = .016$. There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction ($p < .017$) (Welch's *F*: $p = .013$ for stress, and Welch's *F*: $p = .005$ for anxiety). Post hoc tests revealed that stress from anaesthesia specialists more than 20 years of experience was statistically significantly lower than anaesthesia residents. Also, post hoc tests revealed that anxiety from anaesthesia residents was statistically significantly higher than specialists 6 to 10 years of experience and anaesthetists more than 20 years of experience (Table 36).

Table 36: the DASS-21 and years of experience (descriptive statistics and ANOVA test)

	Years of experience	*n*	*M*	*SD*	Min	Max	Welch *F*	Games-Howell Test
Stress	Anaesthesia residents	109	6.50	4.58	0.00	21.00	$p = .013$	(Anaesthesia residents) > (> 20 years) ($p = .005$)
	≤ 3	60	5.82	4.09	0.00	20.00		
	4 to 5	74	5.45	3.74	0.00	13.00		
	6 to 10	103	5.59	3.57	0.00	16.00		
	11 to 20	177	5.44	3.57	0.00	18.00		
	> 20	211	4.82	3.53	0.00	16.00		
Depression	Anaesthesia residents	109	3.45	3.72	0.00	19.00	$p = .060$	
	≤ 3	60	3.15	4.24	0.00	20.00		
	4 to 5	74	2.76	3.14	0.00	14.00		
	6 to 10	103	2.45	2.89	0.00	15.00		
	11 to 20	177	2.98	3.47	0.00	18.00		
	> 20	211	2.59	3.11	0.00	20.00		
Anxiety	Anaesthesia residents	109	3.25	3.33	0.00	14.00	$p = .005$	(Anaesthesia residents) > (6 to 10 years) ($p = .011$); (Anaesthesia residents) > (> 20 years) ($p = .002$)
	≤ 3	60	2.62	2.63	0.00	11.00		
	4 to 5	74	2.32	2.98	0.00	14.00		
	6 to 10	103	2.11	2.43	0.00	14.00		
	11 to 20	177	2.18	2.49	0.00	10.00		
	> 20	211	2.07	2.75	0.00	15.00		

Note. This variable was not intentionally filled by anaesthesia residents.

2.4.2.3 - Depression, anxiety and stress and socio-cultural data

Depression, anxiety and stress and leisure activities. A one-way MANOVA was performed to determine whether there were any differences between leisure activities groups on depression, anxiety and stress. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was performed. There was a statistically significant difference in depression, anxiety and stress based on leisure activities groups, *F:* $p < .001$; partial $\eta^2 = .055$. Independent *t*-tests using the Bonferroni correction ($p < .017$) were run to determine if there were differences in depression, anxiety and stress based on leisure activities groups. The results showed that stress and depression from anaesthetists who did do leisure activities were statistically significantly lower than anaesthetists who did not do leisure activities (Table 37).

Table 37: DASS-21 and leisure activities (descriptive statistics and t-test)

	Leisure activities	*n*	*M*	*SD*	Min	Max	*t*-test
Stress	No	93	6.35	4.03	0.00	16.00	$p = .003$
	Yes	640	5.34	3.77	0.00	21.00	
Depression	No	93	4.39	4.33	0.00	20.00	$p < .001$
	Yes	640	2.64	3.16	0.00	20.00	
Anxiety	No	93	3.04	3.41	0.00	15.00	$p = .017$
	Yes	640	2.25	2.66	0.00	14.00	

One-way MANOVA were performed and there were no statistically significant differences between marital status (*F:* $p = .244$; partial $\eta^2 = .005$), workload (*F:* $p = .562$; partial $\eta^2 = .004$), night shifts (*F:* $p = .501$; partial $\eta^2 = .003$), average night's sleep (*F:* $p = .211$; partial $\eta^2 = .006$), region (*F:* $p = .068$; partial $\eta^2 = .008$), extra-hospital emergency (*F:* $p = .057$; partial $\eta^2 = .011$), smoking (*F:* $p = .464$; partial $\eta^2 = .004$), alcoholic drink consumption (*F:* $p = .454$; partial $\eta^2 = .004$), physical activities (*F:* $p = .363$; partial $\eta^2 = .005$), charity activities (*F:* $p = .207$; partial $\eta^2 = .007$), continuous education activities (*F:* $p = .198$; partial $\eta^2 = .007$), mediation experience (*F:* $p = .059$; partial $\eta^2 = .011$) and religious practice (*F:* $p = .674$; partial $\eta^2 = .003$) on depression, anxiety and stress.

2.4.3 - Predictors of Stress, depression and anxiety

2.4.3.1 - Predictors of stress

A multiple linear regression was run to predict stress on anaesthetists from all socio-demographic, work-related, socio-cultural and psychological variables. The model was statistically significant, $F(10, 604) = 52.446$, $p < .001$, and explained 46% of the variance in stress ($R^2 = .465$). Table 38 shows the variables that were statistically significant to the prediction. This result shows that acting with awareness, mindfulness, working in South region and working 40 or fewer hours per week predict lower levels of stress. Contrarily, high levels of psychological inflexibility, rumination, personal burnout, over-identification and consuming more than 5 alcoholic drinks per week contribute to the increase of stress on anaesthetists.

Table 38: Predictors of stress

Predictor (*n* = 695)	***b***	***SE***	**ß**	***t***	***p***
Constant	3.926	1.275		3.078	.002
Acting with Awareness (FFMQ)	-0.083	0.025	-0.117	-3.319	.001
Mindfulness (SCS)	-0.098	0.041	-0.080	-2.386	.017
Psychological inflexibility (AAQ-II)	0.105	0.021	0.230	5.047	< .001
Rumination (RRS)	0.132	0.029	0.192	4.585	< .001
Personal burnout (CBI)	0.032	0.008	0.149	4.078	< .001
South region	-0.669	0.241	-0.083	-2.780	.006
> 5 alcoholic drink consumption/week	1.094	0.437	0.075	2.500	.013
Workload ≤ 40 hours/week	-0.990	0.394	-0.075	-2.514	.012
Over-identification (FFMQ)	0.119	0.053	0.107	2.264	.024

Note. FFMQ = Five Facet Mindfulness Questionnaire; SCS = Self-Compassion Scale; AAQ-II = Acceptance and Action Questionnaire-II; RRS-10 = Ruminative Responses Scale-10; CBI = Copenhagen Burnout Inventory.

2.4.3.2 - Predictors of depression

A multiple linear regression was run to predict depression on anaesthetists from all socio-demographic, work-related, socio-cultural and psychological variables. The model was statistically significant, F (9, 608) = 70.884, p < .001, and explained 51% of the variance in depression (R^2 = .512). Table 39 shows the variables that were statistically significant to the prediction. This result shows that high levels of psychological inflexibility, personal burnout, isolation, consuming more than 5 alcoholic drinks per week, and having no religion contribute to the increase of depression on anaesthetists.

Table 39: Predictors of depression

Predictor (*n* = 683)	***b***	***SE***	**Β**	***t***	***p***
Constant	-2.788	0.468		-5.953	< .001
Psychological inflexibility (AAQ-II)	0.189	0.016	0.472	11.505	< .001
Personal burnout (CBI)	0.030	0.006	0.160	4.749	< .001
Isolation (SCS)	0.183	0.039	0.188	4.721	< .001
> 5 Alcoholic drink consumption (per week)	0.850	0.367	0.067	2.314	.021
No religion	0.450	0.223	0.058	2.013	.045

Note. AAQ-II = Acceptance and Action Questionnaire-II; CBI = Copenhagen Burnout Inventory; SCS = Self-Compassion Scale.

2.4.3.3 - Predictors of anxiety

A multiple linear regression was run to predict anxiety on anaesthetists from all socio-demographic, work-related, socio-cultural and psychological variables. The model was statistically significant, $F(5, 609) = 48.271$, $p < .001$, and explained 28% of the variance in anxiety ($R^2 = .284$). Table 40 shows the variables that were statistically significant to the prediction. This result shows that high levels of acting with awareness predicts lower levels of anxiety. Contrarily, being an anaesthesia resident, high levels of psychological inflexibility, and personal burnout contribute to the increase of anxiety on anaesthetists.

Table 40: Predictors of anxiety

Predictor (*n* = 725)	***b***	***SE***	**ß**	***t***	***p***
Constant	0.332	0.827		0.402	.688
Acting with Awareness (FFMQ)	-0.044	0.020	-0.085	-2.142	.033
Anaesthesia resident	0.719	0.273	0.091	2.638	.009
Psychological inflexibility (AAQ-II)	0.116	0.014	0.353	8.498	< .001
Personal burnout (CBI)	0.027	0.006	0.172	4.181	< .001

Note. FFMQ = Five Facet Mindfulness Questionnaire; AAQ-II = Acceptance and Action Questionnaire-II; CBI = Copenhagen Burnout Inventory.

2.5 - Study of Burnout Syndrome

2.5.1 - Incidence

2.5.1.1 - Burnout distribution in anaesthetists

From the total sample of anaesthesia specialists and residents, we found that 313 (42.0%) anaesthetists showed personal burnout, 218 (29.2%) anaesthetists exhibited work-related burnout, 68 (9.1%) anaesthetists showed patient-related burnout and 132 (17.7%) anaesthetists revealed total burnout. Table 41 shows the distribution of anaesthetists with burnout. Figure 8 exhibit the burnout distribution in anaesthetists.

Table 41: Number and percentage of anaesthetists with burnout

	Anaesthesiologists	Residents	Anaesthesiologists + Residents
Personal burnout	254 (40.0%)	59 (53.2%)	313 (42.0%)
Work-related burnout	178 (28.0%)	40 (36.0%)	218 (29.2%)
Patient-related burnout	58 (9.1%)	10 (9.0%)	68 (9.1%)
Total burnout	110 (17.3%)	22 (19.8%)	132 (17.7%)

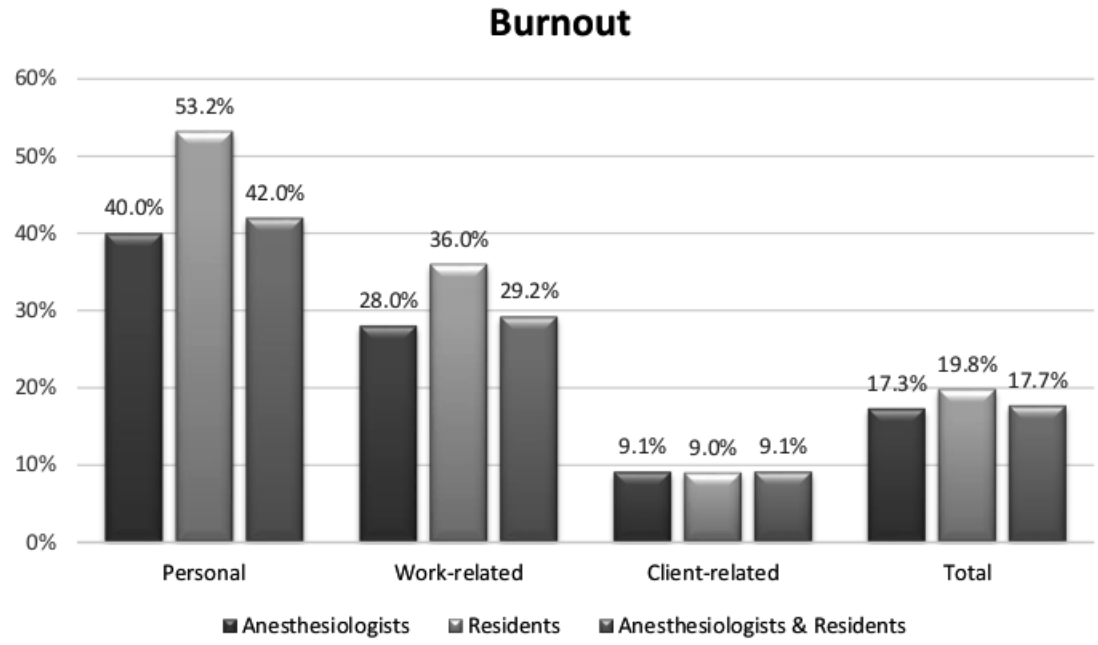

Figure 8. Burnout distribution in anaesthetists

There was a significant difference in personal burnout (χ^2 test: p = .002) between anaesthesia specialists and anaesthesia residents. This result indicates that anaesthesia residents have more percentage of personal burnout than anaesthesia specialists (Table 42).

Table 42: Distribution of anaesthesia specialists and anaesthesia residents by burnout

		Anaesthesia specialists	Anaesthesia residents	χ^2 test
Personal burnout	No	387 (61.4%)	50 (45.9%)	p = .002
	Yes	243 (38.6%)	**59 (54.1%)**	
Work-related burnout	No	424 (67.4%)	70 (63.1%)	p = .370
	Yes	205 (32.6%)	41 (36.9%)	
Patient-related burnout	No	574 (90.8%)	101 (91.0%)	p = .955
	Yes	58 (9.2%)	10 (9.0%)	
Total burnout	No	525 (82,7%)	89 (80,2%)	p = .525
	Yes	110 (17,3%)	22 (19,8%)	

2.5.1.2 - Burnout distribution in anaesthesia specialists and residents

From the sample of anaesthesia specialists, we found that 243 (38.5%) anaesthetists exhibited high levels of personal burnout, 205 (32.5%) anaesthetists reported high levels of work-related burnout, 58 (9.2%) anaesthetists revealed high levels of patient-related burnout, and 110 (17.3%) anaesthetists exhibited high levels of total burnout.

From the sample of anaesthesia residents, we detected 59 (54.1%) anaesthesia residents with high levels of personal burnout, 41 (36.9%) anaesthesia residents exhibited high levels of work-related burnout, 10 (9.1%) anaesthesia residents reported high levels of patient-related burnout, and 22 (19.8%) anaesthesia residents revealed high levels of total burnout (Table 43).

Table 43: Burnout distribution among anaesthesia specialists and residents

		No burnout	Burnout	Total
Personal burnout	Anaesthesia specialists	388 (61.5%)	243 (38.5%)	631
	Anaesthesia residents	50 (45.9%)	59 (54.1%)	109
Work-related burnout	Anaesthesia specialists	425 (67.5%)	205 (32.5%)	630
	Anaesthesia residents	70 (63.1%)	41 (36.9%)	111
Patient-related burnout	Anaesthesia specialists	575 (90.8%)	58 (9.2%)	633
	Anaesthesia residents	101 (91.8%)	10 (9.1%)	110
Total burnout	Anaesthesia specialists	525 (82.7%)	110 (17.3%)	635
	Anaesthesia residents	89 (80.2%)	22 (19.8%)	111

2.5.1.3 - Burnout distribution in male and female anaesthetists

From the sample of anaesthesia specialists and residents, we found that 237 (46.4%) female anaesthetists and 64 (28.3%) male anaesthetists showed high levels of personal burnout, 184 (36.0%) female anaesthetists and 62 (27.3%) male anaesthetists exhibited high levels of work-related burnout, 38 (7.4%) female anaesthetists and 30 (13.2%) male anaesthetists reported high levels of patient-related burnout and 91 (17.6%) female anaesthetists and 41 (18.1%) male anaesthetists showed high levels of total burnout (Table 44).

Table 44: Burnout distribution among male and female anaesthetists

		No burnout	Burnout	Total
Personal burnout	Male	162 (71.7%)	64 (28.3%)	226
	Female	274 (53.6%)	237 (46.4%)	511
Work-related burnout	Male	165 (72.7%)	62 (27.3%)	227
	Female	327 (64.0%)	184 (36.0%)	511
Patient-related burnout	Male	197 (86.8%)	30 (13.2%)	227
	Female	476 (92.6%)	38 (7.4%)	514
Total burnout	Male	186 (81.9%)	41 (18.1%)	227
	Female	425 (82.4%)	91 (17.6%)	516

2.5.2 - Study of burnout syndrome

2.5.2.1 - Burnout and socio-demographic data

Burnout and age. A one-way MANOVA was performed to determine whether there were any differences between age groups on three types of burnout. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was carried out. There was a statistically significant difference in burnout based on age groups, F: $p < .001$; partial $\eta^2 = .026$. There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction ($p < .017$) (F: $p < .001$ for personal burnout, F: $p = .003$ for work-related burnout, Welch's F: $p = .005$ for patient-related burnout). Post hoc tests revealed that personal burnout from anaesthetists 50 or more years of age was statistically significantly lower than anaesthetists less than 50 years. Also, post hoc tests revealed that work-related and patient-related burnout from anaesthetists 50 or more years of age were statistically significantly lower than anaesthetists less than 40 years. Regarding total burnout, there was a statistically significant difference between groups as determined

by one-way ANOVA (*F*: $p < .001$). A Tukey post hoc test revealed that total burnout was statistically significantly lower from anaesthetists 50 or more years of age compared to anaesthetists less than 40 years (Table 45).

Table 45: CBI and age (descriptive statistics and ANOVA test)

	Age	*n*	*M*	*SD*	Min	Max	Welch *F*/ *F* test	Tukey/Games-Howell Test
Personal burnout	< 40	300	47.82	17.51	4.17	95.83	$p < .001$	(< 40 years) > (≥ 50 years) ($p < .001$)
	40-49	153	46.10	15.90	8.33	87.50		(40-49 years) > (≥ 50 years) ($p = .001$)
	≥ 50	292	40.43	17.71	0.00	87.50		
Work-related burnout	< 40	300	44.92	13.56	10.71	82.14	$p = .003$	(< 40 years) > (≥ 50 years) ($p = .002$)
	40-49	153	43.42	13.62	3.57	85.71		
	≥ 50	292	41.58	14.34	10.71	89.29		
Patient-related burnout	< 40	300	23.89	18.51	0.00	91.67	$p = .005$	(< 40 years) > (≥ 50 years) ($p = .004$)
	40-49	153	20.10	16.77	0.00	75.00		
	≥ 50	292	19.99	16.32	0.00	87.50		
Total Burnout	< 40	300	37.91	14.79	2.63	76.32	$p < .001$	(< 40 years) > (≥ 50 years) ($p < .001$)
	40-49	153	35.54	13.46	7.89	76.32		
	≥ 50	292	32.25	15.46	0.00	88.16		

Burnout and sex. A one-way MANOVA was performed to determine whether there were any differences between sex groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was a statistically significant difference in burnout based on sex groups, *F:* $p < .001$; partial $\eta^2 = .089$. Independent *t*-tests using the Bonferroni correction ($p < .017$) were run to determine if there were differences in burnout based on sex groups. The results showed that male anaesthetists had statistically significantly lower personal and work-related burnout compared to female anaesthetists. Also, the results showed that female anaesthetists had statistically significantly lower patient-related burnout compared to male anaesthetists. Regarding total burnout, the results showed no statistically significantly difference between male and female anaesthetists as determined by a *t*-test ($p = .086$) (Table 46).

Table 46: CBI and sex (descriptive statistics and t-test)

	Sex	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	Male	227	39.87	18.20	0.00	91.67	$p < .001$
	Female	516	46.65	16.91	0.00	95.83	
Work-related burnout	Male	227	40.62	14.74	3.57	89.29	$p < .001$
	Female	516	44.52	13.42	10.71	85.71	
Patient-related burnout	Male	227	24.60	18.20	0.00	79.17	$p = .001$
	Female	516	20.27	16.89	0.00	91.67	
Total Burnout	Male	227	33.74	16.14	0.00	77.79	$p = .086$
	Female	516	35.88	14.42	2.63	88.16	

Burnout and marital status. A one-way MANOVA was performed to determine whether there were any differences between marital status groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was not a statistically significant difference in burnout based on marital status groups, *F: p* = .111; partial η^2 = .006. Regarding total burnout, there was not a statistically significant difference between groups as determined by one-way ANOVA (*F*: *p* = .243) (Table 47).

Table 47: CBI and marital status (descriptive statistics and ANOVA test)

	Marital status	*n*	*M*	*SD*	Min	Max	*F* test
Personal burnout	Single	211	46.67	17.80	4.17	95.83	
	Divorced	59	45.03	19.22	0.00	87.50	
	Widowed	11	43.56	16.91	25.00	75.00	
	Married/Living common law	462	43.47	17.20	0.00	87.50	
Work-related burnout	Single	211	44.38	13.62	14.29	85.71	
	Divorced	59	43.46	15.28	14.29	89.29	
	Widowed	11	36.69	19.89	3.57	67.86	
	Married/Living common law	462	42.92	13.74	10.71	85.71	
Patient-related burnout	Single	211	23.39	17.40	0.00	83.33	
	Divorced	59	20.42	20.16	0.00	91.67	
	Widowed	11	18.94	20.61	0.00	58.33	
	Married/Living common law	462	20.97	16.92	0.00	79.17	
Total Burnout	Single	211	36.89	14.48	1.32	85.53	*p* = .243
	Divorced	59	34.52	16.70	5.26	88.16	
	Widowed	11	32.06	19.30	9.21	59.21	
	Married/Living common law	462	34.54	14.85	0.00	76.32	

Burnout and number of children. A one-way MANOVA was performed to determine whether there were any differences between number of children groups on three types of burnout. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was performed. There was a statistically significant difference in burnout based on number of children groups, *F:* $p = .005$; partial $\eta^2 = .018$. Independent *t*-tests using the Bonferroni correction ($p < .017$) were run to determine if there were differences in burnout based on number of children groups. The results showed that anaesthetists with no children had statistically significantly higher personal, work-related, and patient-related burnout compared to anaesthetists with one or more children. Regarding total burnout, the results showed a statistically significantly difference between anaesthetists with no children and with one or more children as determined by a *t*-test ($p < .001$), indicating that anaesthetists with no children had statistically significantly higher total burnout compared to anaesthetists with one or more children (Table 48).

Table 48: CBI and number of children (descriptive statistics and t-test)

	Number of children	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	0	256	47.10	18.27	4.17	95.83	$p = .003$
	1 or more	475	43.03	17.14	0.00	87.50	
Work-related burnout	0	256	45.19	14.54	14.29	89.29	$p = .004$
	1 or more	475	42.14	13.54	3.57	85.71	
Patient-related burnout	0	256	24.19	19.16	0.00	91.67	$p = .003$
	1 or more	475	19.99	16.23	0.00	75.00	
Total Burnout	0	256	37.72	15.74	1.32	88.16	$p < .001$
	1 or more	475	33.67	14.44	0.00	76.32	

2.5.2.2 - Burnout and work-related data

Burnout and workload. A one-way MANOVA was performed to determine whether there were any differences between workload groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was carried out. There was not a statistically significant difference in burnout based on workload groups, *F*: p = .854; partial η^2 = .002. Regarding total burnout, there was not a statistically significant difference between groups as determined by one-way ANOVA (Welch's *F*: p = .536) (Table 49).

Table 49: CBI and workload (descriptive statistics and ANOVA test)

	Workload	*n*	*M*	*SD*	Min	Max	Welch's *F*
Personal burnout	≤ 40	82	44.01	15.99	0.00	79.17	
	41 to 60	428	44.17	17.06	0.00	91.67	
	61 to 80	190	46.12	17.76	0.00	95.83	
	> 80	39	45.77	23.54	0.00	83.33	
Work-related burnout	≤ 40	82	44.08	15.20	14.29	85.71	
	41 to 60	428	42.97	13.27	10.71	85.00	
	61 to 80	190	44.11	14.11	3.57	89.29	
	> 80	39	43.97	16.86	14.29	75.00	
Patient-related burnout	≤ 40	82	22.11	16.89	0.00	83.33	
	41 to 60	428	21.23	17.49	0.00	91.67	
	61 to 80	190	21.83	17.20	0.00	79.17	
	> 80	39	24.68	19.46	0.00	75.00	
Total Burnout	≤ 40	82	35.03	14.85	7.89	85.53	
	41 to 60	428	34.74	14.48	2.63	88.16	p = .536
	61 to 80	190	36.53	15.13	0.00	77.79	
	> 80	39	36.93	19.09	0.00	76.32	

Burnout and institution. A one-way MANOVA was performed to determine whether there were any differences between institution groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was not a statistically significant difference in burnout based on institution groups, *F: p* = .148; partial η^2 = .006. Regarding total burnout, there was not a statistically significant difference between groups as determined by one-way ANOVA (*F: p* = .238) (Table 50).

Table 50: CBI and institution (descriptive statistics and ANOVA test)

	Institution	***n***	***M***	***SD***	**Min**	**Max**	***F* test**
Personal burnout	Only public	469	45.43	17.69	0.00	95.83	
	Public + private	240	43.10	17.41	0.00	83.33	
	Only private	36	42.01	16.13	12.50	70.83	
Work-related burnout	Only public	469	44.10	13.76	3.57	89.29	
	Public + private	240	41.95	14.09	10.71	85.71	
	Only private	36	41.19	14.23	14.29	64.29	
Patient-related burnout	Only public	469	21.29	17.11	0.00	91.67	
	Public + private	240	22.32	18.25	0.00	83.33	
	Only private	36	19.44	15.81	0.00	58.33	
Total Burnout	Only public	469	35.81	14.90	0.00	88.16	
	Public + private	240	34.26	15.15	0.00	85.53	*p* = .238
	Only private	36	32.52	14.29	5.26	60.53	

Burnout and night shifts. A one-way MANOVA was performed to determine whether there were any differences between night shifts groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was not a statistically significant difference in burnout based on night shifts groups, *F*: $p = .238$; partial $\eta^2 = .006$. Regarding total burnout, there was not a statistically significant difference between groups as determined by a *t*-test ($p = .295$) (Table 51).

Table 51: CBI and night shifts (descriptive statistics and t-test)

	Night shifts	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	No	105	42.71	17.57	0.00	80.00	
	Yes	638	44.95	17.53	0.00	95.83	
Work-related burnout	No	105	43.46	15.22	10.71	89.29	
	Yes	638	43.32	13.73	3.57	85.71	
Patient-related burnout	No	105	20.88	18.39	0.00	83.33	
	Yes	638	21.68	17.29	0.00	91.67	
Total Burnout	No	105	33.82	16.16	3.95	85.53	$p = .295$
	Yes	638	35.47	14.79	0.00	88.16	

Burnout and average night's sleep. A one-way MANOVA was performed to determine whether there were any differences between average night's sleep groups on three types of burnout. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was performed. There was a statistically significant difference in burnout based on average night's sleep groups, *F:* $p = .001$; partial $\eta^2 = .021$. Independent *t*-tests using the Bonferroni correction ($p < .017$) were run to determine if there were differences in burnout based on average night's sleep groups. The results showed that anaesthetists who slept more than 6 hours per night had statistically significantly lower personal compared to anaesthetists who slept 6 or fewer hours per night. Regarding total burnout, the results showed no statistically significantly difference between average night's sleep groups as determined by a *t*-test ($p = .219$) (Table 52).

Table 52: CBI and average night's sleep (descriptive statistics and t-test)

	Average night's sleep	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	≤ 6	231	47.04	18.09	4.17	95.83	$p = .005$
	> 6	506	43.45	17.25	0.00	87.50	
Work-related burnout	≤ 6	231	44.81	14.46	14.29	85.71	$p = .019$
	> 6	506	42.57	13.69	3.57	89.29	
Patient-related burnout	≤ 6	231	20.32	16.17	0.00	70.83	$p = .344$
	> 6	506	22.05	17.99	0.00	91.67	
Total Burnout	≤ 6	231	36.17	14.53	1.32	72.37	$p = .219$
	> 6	506	34.71	15.25	0.00	88.16	

Burnout and region. A one-way MANOVA was performed to determine whether there were any differences between region groups on three types of burnout. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was performed. There was not a statistically significant difference in burnout based on region groups, *F: p* = .238; partial η^2 = .005. Regarding total burnout, there was not a statistically significant difference between groups as determined by one-way ANOVA (Welch's *F*: *p* = .715) (Table 53).

Table 53: CBI and region (descriptive statistics and ANOVA test)

	Region	***n***	***M***	***SD***	**Min**	**Max**	**Welch's *F***
Personal burnout	North	200	44.33	19.34	0.00	95.83	
	Centre	280	45.24	16.49	4.17	91.67	
	South	240	43.78	17.73	0.00	83.33	
	Islands	18	46.39	12.47	25.00	66.67	
Work-related burnout	North	200	43.81	14.60	14.29	85.71	
	Centre	280	43.05	13.21	3.57	82.14	
	South	240	43.21	14.44	10.71	89.29	
	Islands	18	42.26	10.77	25.00	67.86	
Patient-related burnout	North	200	23.65	19.38	0.00	91.67	
	Centre	280	21.24	17.39	0.00	87.50	
	South	240	20.53	15.95	0.00	83.33	
	Islands	18	15.97	12.48	0.00	37.50	
Total Burnout	North	200	35.91	16.75	0.00	76.32	*p* = .715
	Centre	280	35.24	14.20	2.63	88.16	
	South	240	34.62	14.76	3.95	85.53	
	Islands	18	33.32	9.45	11.84	47.21	

Burnout and intra-hospital emergency. A one-way MANOVA was performed to determine whether there were any differences between intra-hospital emergency groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was a statistically significant difference in burnout based on intra-hospital emergency groups, *F:* $p = .005$; partial $\eta^2 = .018$. Independent *t*-tests using the Bonferroni correction ($p < .017$) were run to determine if there were differences in burnout based on intra-hospital emergency. The results showed that anaesthetists who did not do intra-hospital emergency had statistically significantly lower personal, work-related, and patient-related burnout compared to anaesthetists who did do intra-hospital emergency. Regarding total burnout, the results showed a statistically significantly difference between groups as determined by a *t*-test, indicating that anaesthetists who did not do intra-hospital emergency had statistically significantly lower total burnout compared to anaesthetists who did do intra-hospital emergency (Table 54).

Table 54: CBI and intra-hospital emergency (descriptive statistics and t-test)

	Intra-hospital emergency	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	No	366	42.88	17.71	0.00	95.83	$p = .006$
	Yes	347	46.35	16.84	0.00	91.67	
Work-related burnout	No	366	41.73	13.94	3.57	85.71	$p = .001$
	Yes	347	44.91	13.72	14.29	89.29	
Patient-related burnout	No	366	20.02	17.03	0.00	87.50	$p = .005$
	Yes	347	23.59	17.75	0.00	91.67	
Total Burnout	No	366	33.48	15.06	0.00	88.16	$p = .001$
	Yes	347	37.18	14.72	1.32	85.53	

Burnout and extra-hospital emergency. A one-way MANOVA was performed to determine whether there were any differences between extra-hospital emergency groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was carried out. There was a statistically significant difference in burnout based on extra-hospital emergency groups, *F:* $p = .043$; partial $\eta^2 = .012$. Independent *t*-tests using the Bonferroni correction ($p < .017$) were run to determine if there were differences in burnout based on extra-hospital emergency. The results showed that anaesthetists who did not do extra-hospital emergency had statistically significantly lower personal burnout compared to anaesthetists who did do extra-hospital emergency. Regarding total burnout, the results showed a statistically significantly difference between groups as determined by a *t*-test, indicating that anaesthetists who did not do extra-hospital emergency had statistically significantly lower total burnout compared to anaesthetists who did do extra-hospital emergency (Table 55).

Table 55: CBI and extra-hospital emergency (descriptive statistics and t-test)

	Extra-hospital emergency	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	No	601	43.78	17.10	0.00	91.67	$p = .006$
	Yes	112	48.79	18.22	4.17	95.83	
Work-related burnout	No	601	42.90	13.86	3.57	85.71	$p = .104$
	Yes	112	45.31	14.12	10.71	89.29	
Patient-related burnout	No	601	21.41	17.04	0.00	87.50	$p = .279$
	Yes	112	23.62	19.57	0.00	91.67	
Total Burnout	No	601	34.70	14.77	0.00	88.16	$p = .017$
	Yes	112	38.39	15.89	1.32	77.79	

Burnout and professional category. A one-way multivariate analysis of variance (one-way MANOVA) was performed to determine whether there were any differences between professional category groups on three types of burnout. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was performed. There was a statistically significant difference in burnout based on professional category groups, *F*: $p = .001$; partial $\eta^2 = .017$. There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction ($p < .017$) (*F*: $p < .001$ for personal burnout, *F*: $p = .001$ for work-related burnout, and Welch *F*: $p = .001$ for patient-related burnout). Post hoc tests revealed that personal, work-related and patient-related burnout from hospital assistants were statistically significantly higher than senior graduate assistants. Also, post hoc tests revealed that personal and work-related burnout from anaesthesia residents were statistically significantly higher than senior graduate assistants and personal burnout from anaesthesia residents was statistically significantly higher than graduate assistants. Regarding total burnout, there was a statistically significant difference between groups as determined by one-way ANOVA (*F*: $p < .001$). A Tukey post hoc test revealed that total burnout was statistically significantly lower from graduate assistants compared to anaesthesia residents and also total burnout was statistically significantly lower from senior graduate assistants compared to anaesthesia residents, hospital assistants and graduate assistants (Table 56).

Table 56: CBI and professional category (descriptive statistics and ANOVA test)

	Professional category	*n*	*M*	*SD*	Min	Max	Welch *F*/ *F* test	Tukey/Games-Howell Test
Personal burnout	Anaesthesia Resident	111	50.23	18.69	8.33	95.83	$p < .001$	Anaesthesia Resident > Graduate Assistant ($p = .001$)
	Hospital Assistant	306	46.13	16.30	0.00	83.33		Anaesthesia Resident > Senior Graduate Assistant ($p < .001$)
	Graduate Assistant	235	42.82	18.05	0.00	87.50		Hospital Assistant > Senior Graduate Assistant ($p < .001$)
	Senior Graduate Assistant	91	37.45	16.24	0.00	83.33		
Work-related burnout	Anaesthesia Resident	111	42.92	16.28	10.71	85.71	$p < .001$	Anaesthesia Resident > Senior Graduate Assistant ($p < .001$)
	Hospital Assistant	306	40.41	15.92	0.00	92.86		Hospital Assistant > Senior Graduate Assistant ($p < .001$)
	Graduate Assistant	235	37.93	18.28	0.00	96.43		
	Senior Graduate Assistant	91	32.10	15.25	0.00	71.43		
Patient-related burnout	Anaesthesia Resident	111	22.75	16.87	0.00	75.00	$p = .002$	Hospital Assistant > Senior Graduate Assistant ($p = .003$)
	Hospital Assistant	306	23.18	18.41	0.00	91.67		
	Graduate Assistant	235	20.37	17.35	0.00	87.50		
	Senior Graduate Assistant	91	17.35	13.93	0.00	66.67		
Total Burnout	Anaesthesia Resident	111	38.83	13.93	9.21	72.37	$p < .001$	Anaesthesia Resident > Graduate Assistant ($p = .006$)
	Hospital Assistant	304	36.53	14.33	0.00	76.32		Anaesthesia Resident > Senior Graduate Assistant ($p < .001$)
	Graduate Assistant	233	33.43	15.15	0.00	77.79		Hospital Assistant > Senior Graduate Assistant ($p < .001$)
	Senior Graduate Assistant	90	28.75	12.70	2.63	63.16		Graduate Assistant > Senior Graduate Assistant ($p = .043$)

Note. This variable was not intentionally filled by anaesthesia residents.

Burnout and anaesthesia specialists/residents. A one-way MANOVA was performed to determine whether there were any differences between anaesthesia specialists/residents on three types of burnout. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was performed. There was a statistically significant difference in burnout based on anaesthesia specialists/residents, *F:* $p < .001$; partial $\eta^2 = .021$. Independent *t*-tests using the Bonferroni correction ($p < .017$) were run to determine if there were differences in burnout based on anaesthesia specialists/residents. The results showed that anaesthesia specialists had statistically significantly lower personal and work-related burnout compared to anaesthesia residents. Regarding total burnout, the results showed a statistically significantly difference between groups as determined by a *t*-test ($p = .005$), indicating that anaesthesia specialists had statistically significantly lower total burnout compared to anaesthesia residents (Table 57).

Table 57: CBI and anaesthesia specialists/residents (descriptive statistics and t-test)

	Specialists/residents	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	anaesthesia specialists	635	43.59	17.20	0.00	87.50	$p < .001$
	anaesthesia residents	111	50.23	18.69	8.33	95.83	
Work-related burnout	anaesthesia specialists	635	38.25	16.95	0.00	96.43	$p = .015$
	anaesthesia residents	111	42.92	12.28	10.71	85.71	
Patient-related burnout	anaesthesia specialists	635	21.28	17.56	0.00	91.67	$p = .281$
	anaesthesia residents	111	22.75	16.87	0.00	75.00	
Total Burnout	anaesthesia specialists	635	34.56	15.09	0.00	88.16	$p = .005$
	anaesthesia residents	111	38.83	13.93	9.21	72.37	

Burnout and years of experience. A one-way MANOVA was performed to determine whether there were any differences between years of experience groups on three types of burnout. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was performed. There was a statistically significant difference in burnout based on years of experience groups, *F*: $p < .001$; partial $\eta^2 = .026$. There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction ($p < .017$) (*F*: $p < .001$ for personal burnout, *F*: $p = .010$ for work-related burnout, Welch's *F*: $p < .001$ for patient-related burnout). Post hoc tests revealed that personal burnout from anaesthetists more than 20 years of experience was statistically significantly lower than anaesthesia residents and anaesthetists 6 to 10 years of experience. Also, post hoc tests revealed that work-related burnout from anaesthetists more than 20 years of experience was statistically significantly lower than anaesthesia residents. Patient-related burnout from anaesthetists 11 or more years of experience was statistically significantly lower than anaesthetists 4 to 5 years of experience. Regarding total burnout, there was a statistically significant difference between groups as determined by one-way ANOVA (*F*: $p < .001$). A Tukey post hoc test revealed that anaesthetists more than 20 years of experience was statistically significantly lower than anaesthesia residents, anaesthetists 4 to 5 years of experience and anaesthetists 6 to 10 years of experience (Table 58).

Table 58: CBI and years of experience (descriptive statistics and ANOVA test)

	Years of experience	*n*	*M*	*SD*	Min	Max	Welch *F*/ *F* test	Tukey/Games-Howell Test
Personal burnout	Anaesthesia residents	111	50.20	18.73	8.33	95.83	$p < .001$	(6 to 10 years) > (> 20 years) ($p < .001$) (Anaesthesia residents) > (> 20 years) ($p < .001$)
	≤ 3	60	43.50	16.03	4.17	75.00		
	4 to 5	75	46.00	17.45	8.33	75.00		
	6 to 10	106	47.85	15.41	16.67	79.17		
	11 to 20	181	44.81	17.58	0.00	87.50		
	> 20	212	39.55	17.26	0.00	83.33		
Work-related burnout	Anaesthesia residents	111	45.95	13.34	17.86	78.57	$p = .010$	(Anaesthesia residents) > (> 20 years) ($p = .010$)
	≤ 3	60	42.32	14.02	14.29	71.43		
	4 to 5	75	43.90	13.78	17.86	82.14		
	6 to 10	106	45.22	12.94	10.71	75.00		
	11 to 20	181	43.39	14.69	3.57	89.29		
	> 20	212	40.95	13.87	14.29	85.71		
Patient-related burnout	Anaesthesia residents	111	22.75	16.87	0.00	75.00	$p < .001$	(4 to 5 years) > (11 to 20 years) ($p = .015$) (4 to 5 years) > (> 20 years) ($p = .004$)
	≤ 3	60	19.17	18.48	0.00	79.17		
	4 to 5	75	28.57	20.59	0.00	91.67		
	6 to 10	106	23.55	17.61	0.00	75.00		
	11 to 20	181	20.05	17.39	0.00	87.50		
	> 20	212	19.41	15.40	0.00	83.33		
Total Burnout	Anaesthesia residents	111	38.83	13.93	9.21	72.37	$p = < .001$	(Anaesthesia residents) > (> 20 years) ($p < .001$) (4 to 5 years) > (> 20 years) ($p = .008$) (6 to 10 years) > (> 20 years) ($p = .001$)
	≤ 3	60	34.04	15.07	2.63	76.32		
	4 to 5	75	38.23	16.12	7.89	75.00		
	6 to 10	106	37.90	13.60	13.16	76.32		
	11 to 20	181	34.90	15.42	0.00	88.16		
	> 20	212	31.45	14.63	0.00	85.53		

Note. This variable was not intentionally filled by anaesthesia residents.

Burnout and professional situation. A one-way MANOVA was performed to determine whether there were any differences between professional situation groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was not a statistically significant difference in burnout based on professional situation groups, *F: p* < .389; partial η^2 = .005. Regarding total burnout, there was not a statistically significant difference between groups as determined by *t*-test (*p* = .221) (Table 59).

Table 59: CBI and professional situation (descriptive statistics and t-test)

	Professional situation	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	With work contract	592	43.75	17.07	0.00	87.50	
	Without work contract	36	42.29	18.89	4.17	75.00	
Work-related burnout	With work contract	592	43.14	13.88	3.57	89.29	
	Without work contract	36	39.70	15.56	14.29	71.43	
Patient-related burnout	With work contract	592	21.58	17.70	0.00	91.67	
	Without work contract	36	17.82	15.13	0.00	58.33	
Total Burnout	With work contract	592	34.80	15.03	0.00	88.16	*p* = .221
	Without work contract	36	31.63	16.19	7.89	65.79	

Note. This variable was not intentionally filled by anaesthesia residents.

Burnout and management positions. A one-way MANOVA was performed to determine whether there were any differences between management positions groups on three types of burnout. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was performed. There was not a statistically significant difference in burnout based on management positions groups, *F:* $p < .071$; partial $\eta^2 = .011$. Regarding total burnout, there was a statistically significant difference between groups as determined by *t*-test ($p = .004$), showing that anaesthetists who had management positions had statistically significantly lower total burnout compared to anaesthetists who did not hold management positions (Table 60).

Table 60: CBI and management positions (descriptive statistics and t-test)

	Management positions	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	No	439	44.47	17.94	0.00	87.50	
	Yes	191	41.56	15.29	0.00	83.33	
Work-related burnout	No	439	43.71	14.69	10.71	89.29	
	Yes	191	40.82	12.13	3.57	82.14	
Patient-related burnout	No	439	22.49	18.28	0.00	91.67	
	Yes	191	18.59	15.43	0.00	66.67	
Total Burnout	No	439	35.62	15.82	0.00	88.16	$p = .004$
	Yes	191	32.11	13.11	2.63	65.79	

Note. This variable was not intentionally filled by anaesthesia residents.

Burnout and medical education. A one-way MANOVA was performed to determine whether there were any differences between medical education groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was not a statistically significant difference in burnout based on medical education groups, *F:* $p < .327$; partial $\eta^2 = .006$. Regarding total burnout, there was not a statistically significant difference between groups as determined by a *t*-test ($p = .346$) (Table 61).

Table 61: CBI and medical education (descriptive statistics and t-test)

	Medical education	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	No	251	43.70	18.55	0.00	87.50	
	Yes	374	43.52	16.34	0.00	87.50	
Work-related burnout	No	251	43.01	14.86	10.71	89.29	
	Yes	374	42.64	13.45	3.57	85.71	
Patient-related burnout	No	251	22.71	18.27	0.00	87.50	
	Yes	374	20.25	17.00	0.00	91.67	
Total Burnout	No	251	35.24	16.48	0.00	88.16	$p = .346$
	Yes	374	34.03	14.18	5.26	76.32	

Note. This variable was not intentionally filled by anaesthesia residents.

Burnout and work with intensive care patients. A one-way MANOVA was performed to determine whether there were any differences between work with intensive care patients groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was not a statistically significant difference in burnout based on work with intensive care patients groups, *F: p* < .184; partial η^2 = .008. Regarding total burnout, there was not a statistically significant difference between groups as determined by a *t*-test (*p* = .158) (Table 62).

Table 62: CBI and work with intensive care patients (descriptive statistics and t-test)

	Work with intensive care patients	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	No	543	43.30	17.12	0.00	87.50	
	Yes	83	46.28	16.85	10.00	79.17	
Work-related burnout	No	543	42.49	13.94	3.57	89.29	
	Yes	83	44.97	13.90	10.71	75.00	
Patient-related burnout	No	543	21.31	17.6	0.00	91.67	
	Yes	83	21.30	17.29	0.00	79.17	
Total Burnout	No	543	33.93	14.55	0.00	77.79	*p* = .158
	Yes	83	36.36	14.98	13.16	76.32	

Note. This variable was not intentionally filled by anaesthesia residents.

Burnout and work with chronic pain patients. A one-way MANOVA was performed to determine whether there were any differences between work with chronic pain patients groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was not a statistically significant difference in burnout based on work with chronic pain patients groups, *F:* $p < .230$; partial $\eta^2 = .007$. Regarding total burnout, there was not a statistically significant difference between groups as determined by a *t*-test ($p = .118$) (Table 63).

Table 63: CBI and work with chronic pain patients (descriptive statistics and t-test)

	Work with chronic pain patients	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	No	513	43.09	17.11	0.00	87.50	
	Yes	113	46.45	16.85	4.17	87.50	
Work-related burnout	No	513	42.55	14.04	3.57	89.29	
	Yes	113	44.05	13.51	10.71	85.71	
Patient-related burnout	No	513	20.86	17.51	0.00	87.50	
	Yes	113	23.35	17.46	0.00	91.67	
Total Burnout	No	513	33.83	14.85	0.00	77.79	$p = .118$
	Yes	113	36.22	13.38	1.32	67.11	

Note. This variable was not intentionally filled by anaesthesia residents.

Burnout and work with paediatrics patients. A one-way MANOVA was performed to determine whether there were any differences between work with paediatrics patients groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was not a statistically significant difference in burnout based on work with paediatrics patients groups, *F:* $p < .419$; partial $\eta^2 = .005$. Regarding total burnout, there was not a statistically significant difference between groups as determined by a *t*-test ($p = .253$) (Table 64).

Table 64: CBI and work with paediatrics patients (descriptive statistics and t-test)

	Work with paediatrics patients	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	No	80	45.76	15.75	10.00	87.50	
	Yes	539	43.27	17.29	0.00	87.50	
Work-related burnout	No	80	45.02	11.86	17.86	71.43	
	Yes	539	42.50	14.30	3.57	89.29	
Patient-related burnout	No	80	22.25	15.94	0.00	62.50	
	Yes	539	21.22	17.77	0.00	91.67	
Total Burnout	No	80	35.97	13.02	9.74	67.11	$p = .253$
	Yes	539	33.96	14.85	0.00	77.79	

Note. This variable was not intentionally filled by anaesthesia residents.

2.5.2.3 - Burnout and socio-cultural data

Burnout and smoking. A one-way MANOVA was performed to determine whether there were any differences between smoking groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was not a statistically significant difference in burnout based on smoking groups, *F*: $p < .366$; partial $\eta^2 = .004$. Regarding total burnout, there was not a statistically significant difference between groups as determined by a *t*-test ($p = .071$) (Table 65).

Table 65: CBI and smoking (descriptive statistics and t-test)

	Smoking	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	Smoker	165	45.90	17.37	0.00	95.83	
	Non-smoker	578	44.17	17.66	0.00	91.67	
Work-related burnout	Smoker	165	44.96	13.25	17.86	82.14	
	Non-smoker	578	42.79	14.11	3.57	89.29	
Patient-related burnout	Smoker	165	23.66	18.63	0.00	91.67	
	Non-smoker	578	20.91	17.01	0.00	83.33	
Total Burnout	Smoker	165	37.03	14.91	9.21	88.16	$p = .071$
	Non-smoker	578	34.64	15.01	0.00	85.53	

Burnout and alcoholic drink consumption. A one-way MANOVA was performed to determine whether there were any differences between alcoholic drink consumption groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was a statistically significant difference in burnout based on alcoholic drink consumption groups, *F: p* < .020; partial η^2 = .013. Independent *t*-tests using the Bonferroni correction (*p* < .017) were run to determine if there were differences in burnout based on alcoholic drink consumption, but they had no statistical power to detect differences. Regarding total burnout, there was not a statistically significant difference between groups as determined by a *t*-test (*p* = .537) (Table 66).

Table 66: CBI and alcoholic drink consumption (descriptive statistics and t-test)

	Alcoholic drink consumption	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	≤ 5	679	44.94	17.36	0.00	95.83	*p* = .032
	> 5	56	39.96	20.18	0.00	79.17	
Work-related burnout	≤ 5	679	43.37	13.85	3.57	89.29	*p* = .338
	> 5	56	41.72	14.83	17.86	85.00	
Patient-related burnout	≤ 5	679	21.21	17.10	0.00	87.50	*p* = .260
	> 5	56	24.55	19.72	0.00	91.67	
Total Burnout	≤ 5	679	35.23	14.81	0.00	88.16	*p* = .537
	> 5	56	33.95	16.72	7.89	76.32	

Burnout and physical activities. A one-way MANOVA was performed to determine whether there were any differences between physical activities groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was not a statistically significant difference in burnout based on physical activities groups, *F: p* < .907; partial η^2 = .001. Regarding total burnout, there was not a statistically significant difference between groups as determined by a *t*-test (*p* = .523) (Table 67).

Table 67: CBI and physical activities (descriptive statistics and t-test)

	Physical activities	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	No	409	44.94	17.88	0.00	95.83	
	Yes	335	44.08	17.25	0.00	91.67	
Work-related burnout	No	409	43.49	14.38	3.57	89.29	
	Yes	335	43.04	13.43	14.29	85.00	
Patient-related burnout	No	409	21.50	17.95	0.00	91.67	
	Yes	335	21.50	16.74	0.00	75.00	
Total Burnout	No	409	35.48	15.59	0.00	88.16	*p* = .523
	Yes	335	34.78	14.26	0.00	73.68	

Burnout and charity activities. A one-way MANOVA was performed to determine whether there were any differences between charity activities groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was not a statistically significant difference in burnout based on charity activities groups, *F:* $p < .396$; partial $\eta^2 = .004$. Regarding total burnout, there was not a statistically significant difference between groups as determined by a *t*-test ($p = .982$) (Table 68).

Table 68: CBI and charity activities (descriptive statistics and t-test)

	Charity activities	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	No	682	44.46	17.52	0.00	95.83	
	Yes	62	45.50	18.51	0.00	83.33	
Work-related burnout	No	682	43.37	13.91	3.57	85.71	
	Yes	62	42.40	14.52	14.29	89.29	
Patient-related burnout	No	682	21.57	17.49	0.00	91.67	
	Yes	62	20.71	16.58	0.00	70.83	
Total Burnout	No	682	35.16	14.96	0.00	88.16	$p = .982$
	Yes	62	35.21	15.51	2.63	77.79	

Burnout and continuous education activities. A one-way MANOVA was performed to determine whether there were any differences between continuous education activities groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was carried out. There was not a statistically significant difference in burnout based on continuous education activities groups, *F: p* < .094; partial η^2 = .009. Regarding total burnout, there was not a statistically significant difference between groups as determined by a *t*-test (*p* = .278) (Table 69).

Table 69: CBI and continuous education activities (descriptive statistics and t-test)

	Continuous education activities	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	No	604	43.95	17.40	0.00	95.83	
	Yes	140	47.13	18.23	4.17	87.50	
Work-related burnout	No	604	43.06	14.24	3.57	89.29	
	Yes	140	44.28	12.61	17.86	75.00	
Patient-related burnout	No	604	21.68	17.52	0.00	91.67	
	Yes	140	20.72	16.93	0.00	75.00	
Total Burnout	No	604	34.88	15.07	0.00	88.16	*p* = .278
	Yes	140	36.41	14.68	2.63	72.37	

Burnout and leisure activities. A one-way MANOVA was performed to determine whether there were any differences between leisure activities groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was a statistically significant difference in burnout based on leisure activities groups, *F:* $p < .040$; partial $\eta^2 = .011$. Independent *t*-tests using the Bonferroni correction ($p < .017$) were run to determine if there were differences in burnout based on leisure activities. The results showed that anaesthetists who had leisure activities had statistically significantly lower personal burnout compared to anaesthetists who had not leisure activities. Regarding total burnout, there was a statistically significant difference between groups as determined by *t*-test ($p = .002$), indicating that anaesthetists who had leisure activities had statistically significantly lower total burnout compared to anaesthetists who did not do leisure activities (Table 70).

Table 70: CBI and leisure activities (descriptive statistics and t-test)

	Leisure activities	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	No	95	49.68	19.11	0.00	91.67	$p = .004$
	Yes	649	43.80	17.25	0.00	95.83	
Work-related burnout	No	95	46.44	15.74	14.29	89.29	$p = .030$
	Yes	649	42.83	13.62	3.57	85.00	
Patient-related burnout	No	95	24.05	19.48	0.00	87.50	$p = .231$
	Yes	649	21.13	17.06	0.00	91.67	
Total Burnout	No	95	39.59	17.07	0.00	88.16	$p = .002$
	Yes	649	34.52	14.57	0.00	76.32	

Burnout and meditation experience. A one-way MANOVA was performed to determine whether there were any differences between meditation experience groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was not a statistically significant difference in burnout based on meditation experience groups, *F:* $p < .411$; partial $\eta^2 = .004$. Regarding total burnout, there was not a statistically significant difference between groups as determined by *t*-test ($p = .491$) (Table 71).

Table 71: CBI and meditation experience (descriptive statistics and t-test)

	Meditation experience	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	No	626	44.54	17.53	0.00	95.83	
	Yes	115	44.96	17.80	8.33	87.50	
Work-related burnout	No	626	43.37	13.84	3.57	89.29	
	Yes	115	42.67	14.57	10.71	85.71	
Patient-related burnout	No	626	21.84	17.35	0.00	91.67	
	Yes	115	19.46	17.39	0.00	83.33	
Total Burnout	No	626	35.33	14.99	0.00	88.16	$p = .491$
	Yes	115	34.28	15.01	6.58	85.53	

Burnout and religious practice. A one-way MANOVA was performed to determine whether there were any differences between religious practice groups on three types of burnout. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was not a statistically significant difference in burnout based on religious practice groups, *F:* $p < .071$; partial $\eta^2 = .010$. Regarding total burnout, there was not a statistically significant difference between groups as determined by *t*-test ($p = .130$) (Table 72).

Table 72: CBI and religious practice (descriptive statistics and t-test)

	Regular religious practice	*n*	*M*	*SD*	Min	Max	*t*-test
Personal burnout	No	632	44.67	17.75	0.00	95.83	
	Yes	109	43.88	16.71	4.17	87.50	
Work-related burnout	No	632	43.65	14.06	3.57	89.29	
	Yes	109	41.29	13.27	14.29	75.00	
Patient-related burnout	No	632	22.02	17.62	0.00	91.67	
	Yes	109	18.36	15.95	0.00	75.00	
Total Burnout	No	632	35.51	15.05	0.00	88.16	$p = .130$
	Yes	109	33.15	14.60	1.32	76.32	

2.5.3 - Predictors of burnout

2.5.3.1 - Predictors of personal burnout

A multiple linear regression was run to predict personal burnout on anaesthetists from all socio-demographic, work-related, socio-cultural and psychological variables. The model was statistically significant, $F(11, 603) = 46.568$, $p < .001$, and explained 46% of the variance in personal burnout ($R^2 = .459$). Table 73 shows the variables that were statistically significant to the prediction. This result shows that high levels of acting with awareness and non-reactivity, younger anaesthetists, and working 80 or fewer hours per week predict lower levels of personal burnout. Contrarily, high levels of psychological inflexibility, organisational stressor, describing, depression, self-judgement, and be a woman contribute to the increase of personal burnout.

Table 73: Predictors of personal burnout

Predictor (*n* = 692)	***b***	***SE***	**ß**	***t***	***p***
Constant	46.513	6.520		7.134	< .001
Psychological inflexibility (AAQ-II)	0.257	0.100	0.122	2.580	.010
Organisational stressor (SQA)	2.827	0.322	0.283	8.785	< .001
Acting with Awareness (FFMQ)	-0.686	0.115	-0.210	-5.972	< .001
Describing (FFMQ)	0.332	0.102	0.111	3.272	.001
Non-reactivity (FFMQ)	-0.410	0.122	-0.106	-3.364	.001
Depression (DASS-21)	1.117	0.218	0.213	5.134	< .001
Self-judgement (SCS)	0.370	0.163	0.090	2.268	.024
Age	-0.183	0.056	-0.118	-3.290	.001
Female	5.148	1.170	0.137	4.400	< .001
Workload: ≤ 80 hours	-5.227	2.373	-0.067	-2.203	.028

Note. AAQ-II = Acceptance and Action Questionnaire-II; SQA = Stress Questionnaire in Anaesthesiologists; FFMQ = Five Facet Mindfulness Questionnaire; DASS-21 = Depression, Anxiety and Stress Scales; SCS = Self-Compassion Scale.

2.5.3.2 - Predictors of work-related burnout

A multiple linear regression was run to predict work-related burnout on anaesthetists from all socio-demographic, work-related, socio-cultural and psychological variables. The model was statistically significant, $F(10, 604) = 46.151$, $p < .001$, and explained 43% of the variance in work-related burnout ($R^2 = .424$). Table 74 shows the variables that were statistically significant to the prediction. This result shows that high levels of acting with awareness, working 60 or fewer hours per week and having meditation experience predict lower levels of work-related burnout. Contrarily, high levels of psychological inflexibility, organisational stressor, anxiety, depression, be a woman and working in the north region contribute to the increase of work-related burnout.

Table 74: Predictors of work-related burnout

Predictor (*n* = 692)	***b***	***SE***	**ß**	***t***	***p***
Constant	33.514	4.613		7.265	< .001
Psychological inflexibility (AAQ-II)	0.372	0.090	0.184	4.141	< .001
Organisational stressor (SQA)	2.622	0.317	0.273	8.276	< .001
Acting with Awareness (FFMQ)	-0.625	0.110	-0.199	-5.684	< .001
Anxiety (DASS-21)	0.526	0.242	0.085	2.169	.030
Depression (DASS-21)	0.783	0.236	0.155	3.316	.001
Workload: ≤ 60 hours	-3.649	1.124	-0.102	-3.247	.001
Female	3.429	1.146	0.095	2.991	.003
North region	3.429	1.146	0.095	2.991	.024
Meditation experience	-3.047	1.469	-0.065	-2.075	.038

Note. AAQ-II = Acceptance and Action Questionnaire-II; SQA = Stress Questionnaire in Anaesthesiologists; FFMQ = Five Facet Mindfulness Questionnaire; DASS-21 = Depression, Anxiety and Stress Scales.

2.5.3.3 - Predictors of patient-related burnout

A multiple linear regression was run to predict patient-related burnout on anaesthetists from all socio-demographic, work-related, socio-cultural and psychological variables. The model was statistically significant, $F(9, 605) = 21.054$, $p < .001$, and explained 24% of the variance in total burnout ($R^2 = .239$). Table 75 shows the variables that were statistically significant to the prediction. This result shows that high levels of acting with awareness, being a woman, having 2 or more children and working 80 or fewer hours per week predict lower levels of patient-related burnout. Contrarily, high levels of psychological inflexibility, organisational stressor, and depression, and work in the north region contribute to the increase of patient-related burnout.

Table 75: Predictors of patient-related burnout

Predictor (*n* = 677)	***b***	***SE***	**Β**	***t***	***p***
Constant	38.518	6.078		6.337	< .001
Psychological inflexibility (AAQ-II)	0.275	0.107	0.131	2.564	.011
Acting with Awareness (FFMQ)	-0.736	0.132	-0.225	-5.584	< .001
Depression (DASS-21)	0.615	0.256	0.117	2.401	.017
Organisational stressor (SQA)	4.078	1.399	0.104	2.915	< .001
North region	-4.130	1.358	-0.110	-3.041	.004
Female	0.615	0.256	0.117	2.401	.002
2 or more children	-2.996	1.346	-0.086	-2.226	.026
Workload: ≤ 80 hours	-5.545	2.816	-0.071	-1.969	.049

Note. AAQ-II = Acceptance and Action Questionnaire-II; FFMQ = Five Facet Mindfulness Questionnaire; DASS-21 = Depression, Anxiety and Stress Scales; SQA = Stress Questionnaire in Anaesthesiologists.

2.5.3.4 - Predictors of total burnout

A multiple linear regression was run to predict total burnout on anaesthetists from all socio-demographic, work-related, socio-cultural and psychological variables. The model was statistically significant, $F(12, 602) = 45.453$, $p < .001$, and explained 48% of the variance in total burnout ($R^2 = .475$). Table 76 shows the variables that were statistically significant to the prediction. This result shows that high levels of acting with awareness and non-reactivity, older anaesthetists, non-smokers and working 80 or fewer hours per week predict lower levels of total burnout. Contrarily, high levels of psychological inflexibility, organisational stressor, anxiety, depression and rumination and working in the north region contribute to the increase of total burnout.

Table 76: Predictors of total burnout

Predictor (*n* = 677)	***b***	***SE***	**β**	***t***	***p***
Constant	48.762	5.348		9.117	< .001
Psychological inflexibility (AAQ-II)	0.264	0.082	0.147	3.224	.001
Organisational stressor (SQA)	2.306	0.273	0.270	8.438	< .001
Acting with Awareness (FFMQ)	-0.607	0.095	-0.217	-6.402	< .001
Depression (DASS-21)	0.647	0.202	0.144	3.200	.001
Age	-0.139	0.048	-0.105	-2.902	.004
Non-smokers	-2.521	1.084	-0.070	-2.325	.020
Anxiety (DASS-21)	0.453	0.208	0.083	2.175	.030
North region	2.550	1.008	0.076	2.530	.012
Workload: ≤ 80 hours	-5.110	2.008	-0.076	-2.544	.011
Non-reactivity (FFMQ)	-0.214	0.099	-0.064	-2.157	.031
Rumination (RRS-10)	0.208	0.103	0.077	2.012	.045

Note. AAQ-II = Acceptance and Action Questionnaire-II; SQA = Stress Questionnaire in Anaesthesiologists; FFMQ = Five Facet Mindfulness Questionnaire; DASS-21 = Depression, Anxiety and Stress Scales; RRS-10 = Ruminative Responses Scale-10.

2.6 - Study of Mindfulness Trait

2.6.1 - Study of mindfulness

2.6.1.1 - Mindfulness and socio-demographic data

Mindfulness and age. A one-way MANOVA was performed to determine whether there were any differences between age groups on five facets of mindfulness. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was carried out. There was a statistically significant difference in mindfulness facets based on age groups, *F*: $p = .001$; partial $\eta^2 = .020$. There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction ($p < .010$) (*F*: $p < .001$ for observing). Post hoc tests revealed that observing facet from anaesthetists 50 or more years of age was statistically significantly higher than anaesthetists less than 40 years. Regarding total mindfulness, there was a statistically significant difference between groups as determined by one-way ANOVA (*F*: $p = .002$). A Games-Howell post hoc test revealed that total mindfulness was statistically significant higher from anaesthetists 50 or more years of age compared to anaesthetists less than 40 years (Table 77).

Table 77: FFMQ and age (descriptive statistics and ANOVA test)

	Age	*n*	*M*	*SD*	Min	Max	Welch *F*/ *F* test	Tukey/Games-Howell Test
Observing	< 40	300	22.44	6.35	8.00	40.00	$p < .001$	(≥ 50 years) > (< 40 years) ($p < .001$)
	40-49	152	24.07	6.00	8.00	38.00		
	≥ 50	291	24.54	6.09	8.00	40.00		
Describing	< 40	300	28.38	5.90	9.00	40.00	$p = .278$	
	40-49	152	29.08	6.34	13.00	40.00		
	≥ 50	291	29.04	5.28	14.00	40.00		
Acting with awareness	< 40	300	30.27	5.66	9.00	40.00	$p = .017$	
	40-49	152	30.91	5.64	13.00	40.00		
	≥ 50	291	31.60	5.11	18.00	40.00		
Non-judging	< 40	300	28.98	6.51	9.00	40.00	$p = .897$	
	40-49	152	28.72	6.21	14.00	40.00		
	≥ 50	291	28.80	6.07	11.00	40.00		
Non-reactivity	< 40	299	20.32	4.41	7.00	32.00	$p = .351$	
	40-49	152	20.55	4.24	8.00	32.00		
	≥ 50	291	20.88	4.60	9.00	34.00		
Total mindfulness	< 40	299	130.30	16.26	76.00	185.00	$p = .002$	(≥ 50 years) > (< 40 years) ($p = .001$)
	40-49	152	133.34	16.47	79.00	181.00		
	≥ 50	291	134.86	13.40	97.00	169.00		

Mindfulness and sex. A one-way MANOVA was performed to determine whether there were any differences between sex groups on five facets of mindfulness. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was performed. There was a statistically significant difference in mindfulness facets based on sex groups, *F:* $p = .002$; partial $\eta^2 = .025$. Independent *t*-tests using the Bonferroni correction ($p < .010$) were run to determine if there were differences in mindfulness facets based on sex groups. The results showed that male anaesthetists had statistically significant lower observing facet and higher non-judging facet compared to female anaesthetists. Regarding total mindfulness, the results showed no statistically significant difference between male and female anaesthetists as determined by a *t*-test ($p = .364$) (Table 78).

Table 78: FFMQ and sex (descriptive statistics and t-test)

	Sex	*n*	*M*	*SD*	Min	Max	*t*-test
Observing	Male	225	22.24	6.18	8.00	39.00	$p < .001$
	Female	516	24.18	6.20	8.00	40.00	
Describing	Male	225	28.80	5.37	11.00	40.00	$p = .982$
	Female	516	28.79	5.91	9.00	40.00	
Acting with awareness	Male	225	31.15	5.34	16.00	40.00	$p = .618$
	Female	516	30.83	5.54	9.00	40.00	
Non-judging	Male	225	29.78	6.11	13.00	40.00	$p = .009$
	Female	516	28.45	6.31	9.00	40.00	
Non-reactivity	Male	224	20.14	4.68	9.00	32.00	$p = .073$
	Female	516	20.76	4.34	7.00	34.00	
Total mindfulness	Male	224	131.97	13.81	92.00	176.00	$p = .364$
	Female	516	133.01	16.02	76.00	185.00	

2.6.1.2 - Mindfulness and work-related data

Mindfulness and medical emergency. A one-way MANOVA was performed to determine whether there were any differences between medical emergency groups on five facets of mindfulness. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was not a statistically significant difference in mindfulness facets based on medical emergency groups, *F:* $p = .162$; partial $\eta^2 = .011$. Regarding total mindfulness, the results showed a statistically significant difference between medical emergency groups as determined by a *t*-test ($p = .012$), indicating that anaesthetists who did not do medical emergency had statistically significantly higher total mindfulness compared to anaesthetists who did do medical emergency (Table 79).

Table 79: FFMQ and medical emergency (descriptive statistics and t-test)

	Medical emergency	*n*	*M*	*SD*	Min	Max	*t*-test
Observing	No	312	23.81	6.19	8.00	40.00	
	Yes	399	23.56	6.22	8.00	40.00	
Describing	No	312	29.03	5.83	9.00	40.00	
	Yes	399	28.45	5.65	11.00	40.00	
Acting with awareness	No	312	31.53	5.42	13.00	40.00	
	Yes	399	30.55	5.42	9.00	40.00	
Non-judging	No	312	29.31	6.14	11.00	40.00	
	Yes	399	28.50	6.27	9.00	40.00	
Non-reactivity	No	311	20.72	4.58	9.00	34.00	
	Yes	399	20.45	4.40	7.00	32.00	
Total mindfulness	No	311	134.32	15.73	79.00	181.00	$p = .012$
	Yes	399	131.52	15.03	76.00	185.00	

Mindfulness and intra-hospital emergency. A one-way MANOVA was performed to determine whether there were any differences between intra-hospital emergency groups on five facets of mindfulness. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was not a statistically significant difference in mindfulness facets based on intra-hospital emergency groups, *F:* $p = .215$; partial $\eta^2 = .010$. Regarding total mindfulness, the results showed a statistically significant difference between intra-hospital emergency groups as determined by a *t*-test ($p = .033$), indicating that anaesthetists who did not do intra-hospital emergency had statistically significantly higher total mindfulness compared to anaesthetists who did do intra-hospital emergency (Table 80).

Table 80: FFMQ and intra-hospital emergency (descriptive statistics and t-test)

	Intra-hospital emergency	*n*	*M*	*SD*	Min	Max	*t*-test
Observing	No	365	23.65	6.16	8.00	40.00	
	Yes	346	23.69	6.25	8.00	40.00	
Describing	No	365	28.95	5.81	9.00	40.00	
	Yes	346	28.45	5.66	11.00	40.00	
Acting with awareness	No	365	31.41	5.39	13.00	40.00	
	Yes	346	30.52	5.46	9.00	40.00	
Non-judging	No	365	29.31	6.12	9.00	40.00	
	Yes	346	28.38	6.31	11.00	40.00	
Non-reactivity	No	364	20.62	4.52	7.00	34.00	
	Yes	346	20.52	4.44	8.00	32.00	
Total mindfulness	No	364	133.86	15.41	79.00	181.00	$p = .033$
	Yes	346	131.57	15.31	76.00	185.00	

Mindfulness and years of experience. A one-way MANOVA was performed to determine whether there were any differences between years of experience groups on five facets of mindfulness. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was a statistically significant difference in mindfulness facets based on years of experience groups, *F:* $p < .001$; partial $\eta^2 = .018$. There were statistically significant differences between groups as determined by one-way ANOVA using the Bonferroni correction ($p < .010$) (*F*: $p < .001$ for observing, and *F*: $p = .004$ for acting with awareness). Post hoc tests revealed that observing, and acting with awareness facets from anaesthesia specialists 11 to 20 years of experience was statistically significantly higher than anaesthesia residents. Also, post hoc tests revealed that observing facet from anaesthesia specialists 11 to 20 years of experience was statistically significantly higher than anaesthesia with 3 or fewer years of experience. Regarding total mindfulness, there was a statistically significant difference between groups as determined by one-way ANOVA (*F*: $p < .001$). A Tukey post hoc test revealed that anaesthetists 11 to 20 years of experience and more than 20 years of experience had statistically significantly higher total mindfulness than anaesthesia residents (Table 81).

Table 81: FFMQ and years of experience (descriptive statistics and ANOVA test)

	Years of experience	*n*	*M*	*SD*	Min	Max	*F* test	Tukey Test
Observing	Anaesthesia residents	111	21.91	6.73	9.00	39.00	$p < .001$	(11 to 20 years) > (Anaesthesia residents) ($p = .001$) 11 to 20 years > (≤ 3 years) ($p = .007$)
	≤ 3	60	21.68	6.27	8.00	36.00		
	4 to 5	75	22.92	6.37	9.00	40.00		
	6 to 10	106	23.64	5.70	8.00	37.00		
	11 to 20	179	24.89	5.93	10.00	39.00		
	> 20	212	24.16	6.16	8.00	40.00		
Describing	Anaesthesia residents	111	27.55	5.94	11.00	40.00	$p = .031$	
	≤ 3	60	29.32	5.43	20.00	40.00		
	4 to 5	75	29.56	6.12	9.00	40.00		
	6 to 10	106	27.89	5.96	13.00	40.00		
	11 to 20	179	29.26	5.89	13.00	40.00		
	> 20	212	29.01	5.35	14.00	40.00		
Acting with awareness	Anaesthesia residents	111	29.82	6.02	18.00	40.00	$p = .004$	(11 to 20 years) > (Anaesthesia residents) ($p = .008$)
	≤ 3	60	31.33	4.59	21.00	40.00		
	4 to 5	75	30.57	5.77	16.00	40.00		
	6 to 10	106	29.72	6.04	9.00	40.00		
	11 to 20	179	31.92	5.31	13.00	40.00		
	> 20	212	31.30	4.96	19.00	40.00		
Non-judging	Anaesthesia residents	111	29.03	6.40	12.00	40.00	$p = .424$	
	≤ 3	60	28.87	6.14	9.00	40.00		
	4 to 5	75	29.75	6.53	11.00	40.00		
	6 to 10	106	28.45	6.73	11.00	40.00		
	11 to 20	179	28.15	5.99	11.00	40.00		
	> 20	212	29.32	6.19	11.00	40.00		
Non-reactivity	Anaesthesia residents	111	20.03	4.41	9.00	31.00	$p = .227$	
	≤ 3	60	20.53	4.38	7.00	31.00		
	4 to 5	74	21.23	4.24	12.00	32.00		
	6 to 10	106	19.85	4.66	8.00	32.00		
	11 to 20	179	20.97	4.10	9.00	34.00		
	> 20	212	20.66	4.78	9.00	32.00		
Total mindfulness	Anaesthesia residents	111	128.33	15.27	93.00	185.00	$p = .001$	(11 to 20 years) > (Anaesthesia residents) ($p = .002$) (> 20 years) > (Anaesthesia residents) ($p = .007$)
	≤ 3	60	131.73	15.32	98.00	168.00		
	4 to 5	74	133.66	17.94	92.00	176.00		
	6 to 10	106	129.55	16.15	76.00	175.00		
	11 to 20	179	135.20	15.43	98.00	181.00		
	> 20	212	134.45	13.24	97.00	167.00		

Note. This variable was not intentionally filled by anaesthesia residents.

Mindfulness and anaesthesia specialists/residents. A one-way MANOVA was performed to determine whether there were any differences between anaesthesia specialists/residents on five facets of mindfulness. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was a statistically significant difference in mindfulness facets based on anaesthesia specialists/residents, *F:* $p = .002$; partial $\eta^2 = .025$. Independent *t*-tests using the Bonferroni correction ($p < .010$) were run to determine if there were differences in mindfulness facets based on anaesthesia specialists/residents. The results showed that anaesthesia specialists had statistically significant higher observing facet than anaesthesia residents. Regarding total mindfulness, the results showed a statistically significant difference between groups as determined by a *t*-test ($p = .001$), indicating that anaesthesia specialists had statistically significantly higher total mindfulness compared to anaesthesia residents (Table 82).

Table 82: FFMQ and anaesthesia specialists/residents (descriptive statistics and t-test)

	Specialists/residents	*n*	*M*	*SD*	Min	Max	*t*-test
Observing	anaesthesia specialists	633	23.88	6.12	8.00	40.00	$p = .002$
	anaesthesia residents	111	21.91	6.73	9.00	39.00	
Describing	anaesthesia specialists	633	28.99	5.71	9.00	40.00	$p = .012$
	anaesthesia residents	111	27.55	5.94	11.00	40.00	
Acting with awareness	anaesthesia specialists	633	31.13	5.35	9.00	40.00	$p = .025$
	anaesthesia residents	111	29.82	6.02	18.00	40.00	
Non-judging	anaesthesia specialists	633	28.85	6.26	9.00	40.00	$p = .804$
	anaesthesia residents	111	29.03	6.40	12.00	40.00	
Non-reactivity	anaesthesia specialists	632	20.66	4.48	7.00	34.00	$p = .156$
	anaesthesia residents	111	20.03	4.41	9.00	31.00	
Total mindfulness	anaesthesia specialists	632	133.47	15.25	76.00	181.00	$p = .001$
	anaesthesia residents	111	128.33	15.27	93.00	185.00	

2.6.1.3 - Mindfulness and socio-cultural data

Mindfulness and physical activities. A one-way MANOVA was performed to determine whether there were any differences between physical activities groups on five facets of mindfulness. The homogeneity of variance-covariance matrices was violated, thus a Pillai's Trace test was performed. There was a statistically significant difference in mindfulness facets based on physical activities groups, *F*: $p = .007$; partial $\eta^2 = .021$. Independent *t*-tests using the Bonferroni correction ($p < .010$) were run to determine if there were differences in mindfulness facets based on physical activities groups, but they had no statistical power to detect differences. Regarding total mindfulness, the results showed a statistically significant difference between groups as determined by a *t*-test ($p = .022$), indicating that anaesthetists who did do physical activities had statistically significantly higher total mindfulness than anaesthetists who did not do physical activities (Table 83).

Table 83: FFMQ and physical activities (descriptive statistics and t-test)

	Physical activities	*n*	*M*	*SD*	Min	Max	*t*-test
Observing	No	407	23.21	6.23	8.00	39.00	$p = .078$
	Yes	335	24.03	6.26	9.00	40.00	
Describing	No	407	28.33	6.10	9.00	40.00	$p = .018$
	Yes	335	29.29	5.30	11.00	40.00	
Acting with awareness	No	407	31.00	5.53	9.00	40.00	$p = .643$
	Yes	335	30.90	5.38	14.00	40.00	
Non-judging	No	407	28.50	6.42	9.00	40.00	$p = .064$
	Yes	335	29.38	6.07	12.00	40.00	
Non-reactivity	No	407	20.53	4.63	7.00	32.00	$p = .861$
	Yes	334	20.60	4.29	9.00	34.00	
Total mindfulness	No	407	131.58	16.45	76.00	185.00	$p = .022$
	Yes	334	134.12	13.83	79.00	176.00	

Mindfulness and leisure activities. A one-way MANOVA was performed to determine whether there were any differences between leisure activities groups on five facets of mindfulness. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was not a statistically significant difference in mindfulness based on leisure activities groups, *F:* $p = .134$; partial $\eta^2 = .011$. Regarding total mindfulness, the results showed a statistically significant difference between leisure activities groups as determined by a *t*-test ($p = .043$), indicating that anaesthetists who did do leisure activities had statistically significantly higher total mindfulness compared to anaesthetists who did not do leisure activities (Table 84).

Table 84: FFMQ and leisure activities (descriptive statistics and t-test)

	Leisure activities	*n*	*M*	*SD*	Min	Max	*t*-test
Observing	No	94	22.62	6.08	9.00	32.00	
	Yes	648	23.72	6.27	8.00	40.00	
Describing	No	94	28.70	5.97	11.00	39.00	
	Yes	648	28.77	5.75	9.00	40.00	
Acting with awareness	No	94	29.96	6.09	9.00	40.00	
	Yes	648	31.10	5.35	13.00	40.00	
Non-judging	No	94	27.91	6.59	11.00	40.00	
	Yes	648	29.04	6.22	9.00	40.00	
Non-reactivity	No	94	20.16	4.60	9.00	30.00	
	Yes	647	20.62	4.46	7.00	34.00	
Total mindfulness	No	94	129.35	15.50	76.00	162.00	$p = .043$
	Yes	647	133.21	15.30	79.00	185.00	

Mindfulness and meditation practice. A one-way MANOVA was performed to determine whether there were any differences between meditation practice groups on five facets of mindfulness. The homogeneity of variance-covariance matrices was not violated, thus a Wilks' Lambda test was performed. There was a statistically significant difference in mindfulness facets based on meditation practice groups, *F:* $p < .001$; partial $\eta^2 = .070$. Independent *t*-tests using the Bonferroni correction ($p < .010$) were run to determine if there were differences in mindfulness facets based on meditation practice groups. The results showed that observing, describing and non-reactivity facets from anaesthetists who practiced meditation were statistically significantly higher than those who did not practice meditation. Regarding total mindfulness, the results showed a statistically significant difference between groups as determined by a *t*-test ($p < .001$), indicating that anaesthetists who practiced meditation had statistically significantly higher total mindfulness compared to anaesthetists who did not practice meditation (Table 85).

Table 85: FFMQ and meditation practice (descriptive statistics and t-test)

	Meditation practice	*n*	*M*	*SD*	Min	Max	*t*-test
Observing	No	624	22.88	6.06	8.00	39.00	$p < .001$
	Yes	115	27.38	5.89	13.00	40.00	
Describing	No	624	28.50	5.76	9.00	40.00	$p = .005$
	Yes	115	30.22	5.61	18.00	40.00	
Acting with awareness	No	624	30.98	5.42	9.00	40.00	$p = .723$
	Yes	115	30.88	5.74	13.00	40.00	
Non-judging	No	624	29.14	6.13	11.00	40.00	$p = .011$
	Yes	115	27.65	6.95	9.00	40.00	
Non-reactivity	No	624	20.35	4.45	7.00	32.00	$p = .004$
	Yes	114	21.67	4.51	9.00	34.00	
Total mindfulness	No	624	131.85	14.93	76.00	181.00	$p < .001$
	Yes	114	137.59	16.98	95.00	185.00	

One-way MANOVA were performed and there were no statistically significant differences between marital status (*F: p* = .215; partial η^2 = .009), number of children (*F: p* = .163; partial η^2 = .009), workload (*F: p* = .290; partial η^2 = .008), institution (*F: p* = .109; partial η^2 = .011), night shifts (*F: p* = .555; partial η^2 = .005), average night's sleep (*F: p* = .068; partial η^2 = .012), region (*F: p* = .087; partial η^2 = .010), medical emergency (*F: p* = .162; partial η^2 = .011), intra-hospital emergency (*F: p* = .215; partial η^2 = .010), extra-hospital emergency (*F: p* = .231; partial η^2 = .010), smoking (*F: p* = .242; partial η^2 = .009), alcoholic drink consumption (*F: p* = .513; partial η^2 = .006), charity activities (*F: p* = .549; partial η^2 = .005), continuous education activities (*F: p* = .497; partial η^2 = .006), leisure activities (*F: p* = .134; partial η^2 = .011) and religious practice (*F: p* = .251; partial η^2 = .009) on five facets of mindfulness.

Regarding total mindfulness, the tests performed (*t*-test or ANOVA) showed no statistically significant differences between total mindfulness and marital status (*F: p* = .117), number of children (*F: p* = .501), workload (*F: p* = .218), institution (*F: p* = .054), night shifts (*t*-test*: p* = .948), average night's sleep (*F: p* = .206), region (*F: p* = .245), extra-hospital emergency (*t*-test*: p* = .191), smoking (*F: p* = .354), alcoholic drink consumption (*t*-test*: p* = .490), charity activities (*t*-test*: p* = .068), continuous education activities (*t*-test*: p* = .408), religious practice (*F: p* = .994).

2.6.2 - Predictors of Mindfulness traits

2.6.2.1 - Predictors of observing facet

A multiple linear regression was run to predict observing facet on anaesthetists from all socio-demographic, work-related, socio-cultural and psychological variables. The model was statistically significant, $F(11, 603) = 19.522$, $p < .001$, and explained 26% of the variance in observing facet ($R^2 = .263$). Table 86 shows the variables that were statistically significant to the prediction. This result shows that working 40 or fewer hours per week, regular religious practice and sleeping 8 or fewer hours per night predict lower levels of observing facet. Contrarily, high levels of self-kindness, self-judgement, common humanity, isolation and organisational stressor, older anaesthetists and meditation experience contribute to the increase of observing facet on anaesthetists.

Table 86: Predictors of observing facet

Predictor (*n* = 730)	*b*	*SE*	Β	*t*	*p*
Constant	11.270	3.722		3.028	.003
Self-kindness (SCS)	0.403	0.070	0.265	5.789	< .001
Self-judgement (SCS)	0.184	0.077	0.124	2.372	.018
Common humanity (SCS)	0.217	0.082	0.115	2.638	.009
Isolation (SCS)	0.199	0.095	0.108	2.095	.037
Meditation experience	3.897	0.636	0.221	6.127	< .001
Age (years)	0.113	0.024	0.202	4.785	< .001
Organisational stressors (SQA)	0.295	0.133	0.082	2.209	.028
Workload ≤ 40 hours/week	-1.876	0.779	-0.086	-2.409	.016
Regular religious practice	-1.407	0.616	-0.081	-2.283	.023
Average night's sleep: ≤ 8 hours	-7.150	3.181	-0.079	-2.248	.025

Note. SCS = Self-Compassion Scale; SQA = Stress Questionnaire in Anaesthesiologists.

2.6.2.2 - Predictors of describing facet

A multiple linear regression was run to predict describing facet on anaesthetists from all socio-demographic, work-related, socio-cultural and psychological variables. The model was statistically significant, $F(9, 605) = 19.015$, $p < .001$, and explained 22% of the variance in describing facet ($R^2 = .220$). Table 87 shows the variables that were statistically significant to the prediction. This result shows that being an anaesthesia resident and high levels of psychological inflexibility and isolation predict lower levels of describing facet. Contrarily, high levels of self-kindness, common humanity and rumination, meditation experience, widowed anaesthetists and sleeping 6 or fewer hours per night contribute to the increase of describing facet on anaesthetists.

Table 87: Predictors of describing facet

Predictor (*n* = 730)	***b***	***SE***	**Β**	***t***	***p***
Constant	27.835	1.241		22.423	< .001
Anaesthesia resident	-1.237	0.606	-0.074	-2.042	.042
Psychological inflexibility (AAQ-II)	-0.131	0.037	-0.187	-3.567	< .001
Self-kindness (SCS)	0.169	0.064	0.120	2.618	.009
Meditation experience	1.797	0.598	0.110	3.006	.003
Isolation (SCS)	-0.384	0.093	-0.225	-4.123	< .001
Widowed	5.402	1.748	0.112	3.091	.002
Common humanity (SCS)	0.209	0.077	0.120	2.696	.007
Rumination (RRS-10)	0.134	0.053	0.126	2.502	.013
Average night's sleep: ≤ 6 hours	0.943	0.450	0.076	2.096	.037

Note. AAQ-II = Acceptance and Action Questionnaire-II; SCS = Self-Compassion Scale; RRS-10 = Ruminative Responses Scale-10.

2.6.2.3 - Predictors of acting with awareness facet

A multiple linear regression was run to predict acting with awareness facet on anaesthetists from all socio-demographic, work-related, socio-cultural and psychological variables. The model was statistically significant, $F(8, 606) = 36.992$, $p < .001$, and explained 33% of the variance in acting with awareness facet ($R^2 = .328$). Table 88 shows the variables that were statistically significant to the prediction. This result shows that high levels of psychological inflexibility, work-and patient-related burnout, over-identification and stress, having 2 or more children and having no religion predict lower levels of acting with awareness facet.

Table 88: Predictors of acting with awareness facet

Predictor (n = 730)	*b*	*SE*	β	*t*	*p*
Constant	40.001	0.645		62.012	< .001
Psychological inflexibility (AAQ-II)	-0.067	0.033	-0.104	-2.051	.041
Work-related burnout (CBI)	-0.047	0.015	-0.149	-3.244	.001
Over-identification (SCS)	-0.298	0.075	-0.189	-3.965	< .001
Patient-related burnout (CBI)	-0.047	0.013	-0.152	-3.719	< .001
Stress (DASS-21)	-0.216	0.062	-0.153	-3.516	< .001
2 or more children	-1.043	0.387	-0.097	-2.692	.007
No religion	-1.058	0.422	-0.084	-2.505	.013

Note. AAQ-II = Acceptance and Action Questionnaire-II; CBI = Copenhagen Burnout Inventory; SCS = Self-Compassion Scale; DASS-21 = Depression, Anxiety and Stress Scales.

2.6.2.4 - Predictors of non-judging facet

A multiple linear regression was run to predict non-judging facet on anaesthetists from all socio-demographic, work-related, socio-cultural and psychological variables. The model was statistically significant, $F(8, 606) = 74.732$, $p < .001$, and explained 50% of the variance in non-judging facet ($R^2 = .497$). Table 89 shows the variables that were statistically significant to the prediction. This result shows that high levels of psychological inflexibility, over-identification, self-judgement, common humanity, organisational stressor and anxiety, and working in the north region predict lower levels of non-judging facet. Contrarily, being an anaesthesia resident contribute to the increase of non-judging facet on anaesthetists.

Table 89: Predictors of non-judging facet

Predictor (n = 730)	*b*	*SE*	β	*t*	*p*
Constant	44.717	1.086		41.177	< .001
Anaesthesia resident	1.467	0.534	0.081	2.746	.006
Over-identification (SCS)	-0.340	0.095	-0.184	-3.575	< .001
Psychological inflexibility (AAQ-II)	-0.217	0.033	-0.287	-6.567	< .001
Self-judgement (SCS)	-0.394	0.070	-0.266	-5.608	< .001
Common humanity (SCS)	-0.151	0.056	-0.080	-2.710	.007
North region	-1.034	0.409	-0.073	-2.529	.012
Organisational stressors (SQA)	-0.249	0.111	-0.069	-2.246	.025
Anxiety (DASS-21)	-0.157	0.077	-0.068	-2.047	.041

Note. SCS = Self-Compassion Scale; AAQ-II = Acceptance and Action Questionnaire-II; SQA = Stress Questionnaire in Anaesthesiologists; DASS-21 = Depression, Anxiety and Stress Scales.

2.6.2.5 - Predictors of non-reactivity facet

A multiple linear regression was run to predict non-reactivity facet on anaesthetists from all socio-demographic, work-related, socio-cultural and psychological variables. The model was statistically significant, $F(9, 605) = 18.139$, $p < .001$, and explained 21% of the variance in non-reactivity facet ($R^2 = .212$). Table 90 shows the variables that were statistically significant to the prediction. This result shows that working in centre region and high levels of clinical stressor and personal burnout predict lower levels of non-reactivity facet. Contrarily, high levels of self-kindness, common humanity, and self-judgement, working only in private institutions, and meditation experience contributes to the increase of non-reactivity facet on anaesthetists.

Table 90: Predictors of non-reactivity facet

Predictor (*n* = 716)	***b***	***SE***	**ß**	***t***	***p***
Constant	13.494	1.061		12.712	< .001
Self-kindness (SCS)	0.256	0.051	0.237	5.012	< .001
Common humanity (SCS)	0.296	0.061	0.220	4.898	< .001
Self-judgement (SCS)	0.181	0.044	0.171	4.129	< .001
Clinical stressor (SQA)	-0.242	0.088	-0.103	-2.743	.006
Personal burnout (CBI)	-0.028	0.010	-0.108	-2.658	.008
Only private institution	1.733	0.757	0.083	2.288	.022
Meditation experience	1.097	0.460	0.087	2.382	.018
Centre region	-0.721	0.337	-0.078	-2.139	.033

Note. SCS = Self-Compassion Scale; SQA = Stress Questionnaire in Anaesthesiologists; CBI = Copenhagen Burnout Inventory.

2.6.2.6 - Predictors of total mindfulness

A multiple linear regression was run to predict total mindfulness facet on anaesthetists from all socio-demographic, work-related, socio-cultural and psychological variables. The model was statistically significant, $F(12, 602) = 41.145$, $p < .001$, and explained 45% of the variance in total mindfulness ($R^2 = .451$). Table 91 shows the variables that were statistically significant to the prediction. This result shows that being an anaesthesia resident, smoking regularly and high levels of psychological inflexibility, over-identification, patient-related burnout, clinical stressor and stress predict lower levels of total mindfulness. Contrarily, older anaesthetists, being single, having meditation experience, and high levels of self-kindness and common humanity contribute to the increase of total mindfulness on anaesthetists.

Table 91: Predictors of total mindfulness

Predictor (n = 734)	*b*	*SE*	Β	*t*	*p*
Constant	128.256	3.887		32.997	< .001
Anaesthesia resident	-2.093	1.713	-0.047	-1.222	.222
Psychological inflexibility (AAQ-II)	-0.411	0.087	-0.219	-4.711	< .001
Self-kindness (SCS)	0.824	0.147	0.218	5.606	< .001
Meditation experience	6.149	1.355	0.141	4.538	< .001
Over-identification (SCS)	-0.626	0.201	-0.136	-3.116	.002
Patient-related burnout (CBI)	-0.093	0.029	-0.104	-3.177	.002
Age (years)	0.160	0.052	0.116	3.079	.002
Common humanity (SCS)	0.496	0.175	0.106	2.830	.005
Clinical stressor (SQA)	-0.767	0.262	-0.094	-2.924	.004
Single	3.141	1.224	0.090	2.566	.011
Stress (DASS-21)	-0.361	0.161	-0.087	-2.240	.025
Regular smoking	-2.903	1.344	-0.066	-2.159	.031

Note. AAQ-II = Acceptance and Action Questionnaire-II; SCS = Self-Compassion Scale; CBI = Copenhagen Burnout Inventory; SQA = Stress Questionnaire in Anaesthesiologists; DASS-21 = Depression, Anxiety and Stress Scales.

2.7 - The protective role of mindfulness trait in anaesthesiologists' burnout – A moderated mediation study

We evaluated the role of mindfulness trait, rumination and depression in the relationship between job-related stressors and burnout syndrome. This study is presented on the following pages.

The protective role of mindfulness trait in anaesthesiologists' burnout – A moderated mediation study

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ABSTRACT

Burnout has been reported as a problem in anaesthesiologists, with little consensus on methods to effectively reduce it. In this study we evaluated the role of mindfulness trait, rumination and depression in the relationship between job-related stressors and burnout syndrome. This study had a cross-sectional design. The sample included questionnaire responses received from 651 Portuguese anaesthesiologists and anaesthesiology residents. The tested model accounted for 37% of burnout variance, 8% of both rumination and mindfulness variance and 39% of depression variance. Rumination and depression explain the effect of stressors on burnout. Mindfulness was a significant moderator in the association between rumination and depression. These findings suggest that rumination and depression are mediators in the relationship between stressors and burnout and also mindfulness may buffer the negative impact of rumination on depression. These results suggest a promising field to develop burnout prevention strategies based on the increase of individual emotion regulation strategies.

INTRODUCTION

Anaesthesiologists face specific professional stressors[1–3] that can put them at increased risk for physical illness and mental disturbances, such as depression, anxiety and burnout[4–6] with individual and professional implications, compromising patient safety[7,8]. Burnout syndrome – a response to prolonged chronic job-related stressors – has a negative impact on physicians, patients (poor quality of care provision, increased risk of medical errors) and healthcare organisations (increases in health costs, promotes early

retirement)[9–13]. The central aspect of burnout is emotional exhaustion, which is characterised by a depletion of personal resources in meeting the demands of challenging situations[14].

Multiple factors can contribute to burnout development, namely factors related to the idiocyncracies inherent to the individuality of each physician. We can observe that not all professionals exposed to the same stressors and same conditions will develop burnout or psychopathological symptoms and it is known that there is great inter-individual variability in how people respond to stressors[15,16]. This is remarkably important when discussing solutions to the prevention of burnout in health care services, given that reduction of some organisational stressors are difficult to attain, even when existing a clear conscience of the role of those factors as stressors. Even when they are modifiable factors, the measures to modify them can take a long time[17–19].

These statements are supported by studies proving that the impact of stressors on the development of psychopathological symptoms is not straightforward, and is mediated by emotion regulation skills[20–22] defined as the attempt to influence which emotions one has, as well as when we have them and how one expresses those emotions.[23] Indeed, there is growing evidence that emotion regulation skills are involved in the resistance to burnout, even if only a few studies have explored this relationship in physicians.

One study found that the ability to regulate one's emotions was significantly positively correlated with job satisfaction and significantly and negatively with burnout in a sample of 123 high-school teachers.[24]

Another study, conducted in a sample of 80 physicians and 76 nurses, found that emotion regulation outputs (emotional dissonance and display of negative emotions) significantly predicted burnout.[25] This provides evidence that when studying the processes conducting to job-burnout, we need to consider the role of emotion regulation processes, rather than merely focusing on the environmental factors that impact burnout.

One widely studied emotion regulation process is rumination. Although rumination is traditionally conceptualized as a response style characterized by repetitive passive thinking on personal negative emotions, symptoms and distress,[26] new developments on the study of rumination have proposed that rumination is an emotion regulation strategy focused on avoidance. Specifically, some studies have proposed that rumination and

depression are significantly correlated when rumination functions as a way of avoiding unwanted negative internal experiences.[27,28] In other words, these studies suggest that the repetitive thinking that underlies rumination aims at down-regulating negative emotions. Paradoxically, this psychological process that is engaged in with the purpose of solving problems, turns into an ineffective emotion regulation strategy by the person remaining fixated on the problems and perseveratively thinking on it.[29] In fact, the nefarious impact of rumination on depression is widely established, with several prospective longitudinal studies showing that people who ruminate when distressed experience longer periods of depression and are more prone to develop depressive disorders.[30,31] This poses an interesting question on whether rumination has a role in the development of burnout, and how depression might operate in this relationship, given that some studies indicate that depression predicts burnout.[32]

There is a growing interest in psychological sciences on exploring the benefits of ancient meditative practices. Claimed to be rooted in Buddhist philosophical tradition, mindfulness was introduced in behavioural medicine as a way of reducing stress in chronic pain,[33] and is now vastly studied as a therapeutic approach in health and psychological conditions.[34–36] Although studies put usually the focus on the effectiveness of mindfulness as a therapeutic approach some suggest that mindfulness is itself a trait.

There are several definitions of mindfulness, but a consensus exists that it involves the self-regulation of attention (bringing awareness and sustaining attention to the present moment) and the adoption of a particular orientation towards one's experience (characterized by curiosity, openness and acceptance).[37] Following the assertion that although almost everyone has the capacity to be mindful (i.e. to self-regulate the experience of the present moment with curiosity, openness and acceptance), individuals may vary in their propensity or willingness to do so, due to a variety of individual and contextual factors.[38] Several studies identified negative correlations between mindfulness, rumination and several psychopathological symptoms, particularly depression. In fact, it has been proposed that ruminative thinking patterns are the basis for the maladaptive cognitive processes that lead to depression relapse,[39] and that mindfulness training might reduce this relationship by providing a more effective way of relating to one's negative emotions when compared to rumination.[40] This seems to lay sufficient rationale for our hypothesis that different levels of mindfulness trait have

different impacts on the relationship between rumination and depressive symptoms. In spite of the growing evidence concerning the relationship between mindfulness and mental health, the moderating effect of mindfulness trait on the relationship between rumination and depression has never been tested in a sample of physicians.

The aim of our study is to explore, based on a comprehensive cross-sectional model, the psychological processes implicated in the relationship between stressors and burnout in anesthesiologists. We hypothesize that the impact of the different stressors (clinical, team and organizational) on burnout symptoms have a sequential mediation by rumination and depressive symptoms and this mediation is moderated by mindfulness traits.

METHODS

Study design

Data were collected through self-reported questionnaires of burnout, psychopathological symptoms (stress, depression and anxiety), rumination and mindfulness. The study was approved by the Ethics Committee of the Faculty of Health Sciences, University of Beira Interior and written informed consent was obtained from all participants. It is a part of a broader study about burnout in medical doctors and some data of the collected questionnaires, connected or not to data collected in other medical specialties, are used for different purposes and are published[3] or to be published elsewhere.

Participants

To be enrolled, participants needed to meet one of the following inclusion criteria: to be a physician specialised in anaesthesiology, registered and active in Portugal, or a resident in a certified anaesthesiology program. Exclusion criterion was the inability to speak fluent Portuguese. Valid responses are received from 651 anaesthesiologists and anaesthesia residents from Portuguese public and private hospitals. Mean age was 43.64 years (*SD* = 11.42), 69.2% were female and 30.8% male, 62.0% worked exclusively in the public sector and the majority had more than 11 years of work experience (50.3%) with a weekly workload between 40 to 60 hours (58.8%).

Instruments

Stressors Questionnaire in Anaesthetists (SQA)[3] is an instrument developed to allow an objective evaluation of the sources of stress in anaesthetists' professional lives, and to measure the level of stress associated with these factors. SQA assess clinical, team and organizational stressors, and these three subscales have shown acceptable internal consistencies.

The Copenhagen Burnout Inventory (CBI)[41,42] measure three burnout sub-dimensions: personal burnout (6 items), work-related burnout (7 items), and client-related burnout (6 items). Lapa et al. [43] proposed a global burnout index with the total score of CBI.

Ruminative Response Scale (RRS-10)[44,45] is a 10-item instrument that assesses two factors of rumination: reflection and brooding.

Depression, Anxiety and Stress Scales-21 (DASS-21)[46,47] is a 21-item self-reported scale that measure symptoms of depression, anxiety and stress.

Five Facets of Mindfulness Questionnaire (FFMQ)[48,49] is a 39-item self-report questionnaire that measures the five facets of mindfulness (observing, describing, acting with awareness, non-judgment and non-reacting but also total FFMQ.

Analytic Strategy

A path analysis was conducted using the software AMOS 24.0 (Analysis of Moment Structures) to estimate the associations between the variables presented in the model to be tested. The violation of normal distribution was verified with Skewness and Kurtosis coefficients ($|Sk|<3$ and $|Ku|<10$).[50] The maximum likelihood estimation method was used to evaluate the regression coefficients significance. To evaluate the model fit was used the following goodness of fit indices: Chi-square (χ^2), Goodness of Fit Index (GFI), Tucker Lewis Index (TLI), Comparative Fit Index (CFI), and Root-Mean Square Error of Approximation (RMSEA). The bootstrap resampling method (with 2000 samples and 95% bias-corrected confidence intervals) was used to test the significance of the mediational paths. The effect was statistically significant ($p < .050$) if the lower and the upper bound interval of the confidence interval does not contain zero.

RESULTS

Descriptive and correlation analyses

Descriptive statistics, Cronbach's alphas and Pearson's correlations between the studied variables are presented in Table 1. Clinical, team and organizational stressors presented weak positive correlations with rumination and depression, weak negative correlations with mindfulness and weak to moderate positive correlations with burnout. Rumination was weakly negatively associated with mindfulness and moderately positively associated with depression and burnout. Depression and burnout presented a positive moderated association.

Table 1
Descriptive statistics, Cronbach's alphas and correlations between the studied variables

	1	2	3	4	5	6	*M*	*SD*	α
1. Clinical Stressor (SQA)	1						5.67	1.89	.82
2. Team stressor (SQA)	.464***	1					4.67	1.81	.72
3. Organisational stressor (SQA)	.361***	.548***	1				5.50	1.74	.74
4. Rumination (RRS-10)	.214***	.235***	.246***	1			9.26	5.49	.85
5. Mindfulness (FFMQ)	-.215***	-.239***	-.227***	-.335***	1		132.38	15.28	.84
6. Depression (DASS-21)	.132**	.238***	.243***	.505***	-.439***	1	2.84	3.39	.87
7. Burnout (CBI)	.248***	.341***	.430***	.427***	-.414***	.497***	28.05	10.41	.90

Note. SQA = Stress Questionnaire in Anaesthesiologists; RRS-10 = Ruminative Responses Scale-10; FFMQ = Five Facet Mindfulness Questionnaire; DASS-21 = Depression, Anxiety and Stress Scales; CBI = Copenhagen Burnout Inventory. *** $p < .001$; ** $p < .01$

Path analysis

The study aimed to test whether rumination and depression mediate the relationship between clinical, team and organisational stressors and burnout, and whether mindfulness functions as moderator of the effect of rumination on depression.

Regarding univariate and multivariate normality, the coefficients of Skewness and Kurtosis confirmed that was no serious violation of normal distribution (values of Skewness ranging from -2.12 to 2.03, and Kurtosis values between -0.40 and 8.47).

The effects of clinical stressor on depression (b = -.10; SEb = .06; Z = -1.63; p = .103; β = -.06), clinical stressor on burnout (b = .26; SEb = .19; Z = 1.33; p = .184; β = .05), clinical stressor on interaction term (b = 2.14; SEb = 2.09; Z = 1.02; p = .306; β = .05), team stressor on depression (b = .10; SEb = .07; Z = 1.41; p = .160; β = .05), and team stressor on burnout (b = .33; SEb = .23; Z = 1.47; p = .142; β = .06) were non-significant. After the elimination of those pathways, the effects of team stressor on interaction term (b = -4.09; SEb = 2.29; Z = -1.78; p = .075; β = -.08) were non-significant and that pathway was removed. The effects of team stressor on rumination (b = .27; SEb = .14; Z = 1.85; p = .064; β = .09) were non-significant. This pathway was eliminated and the final model is presented in Figure 1. The model presents a good fit [$\chi^2_{(9)}$ = 41.147, p < .001; GFI = .985; TLI = .918; CFI = .974; RMSEA = .074 (95% CI . 052 - .098), p = .037].

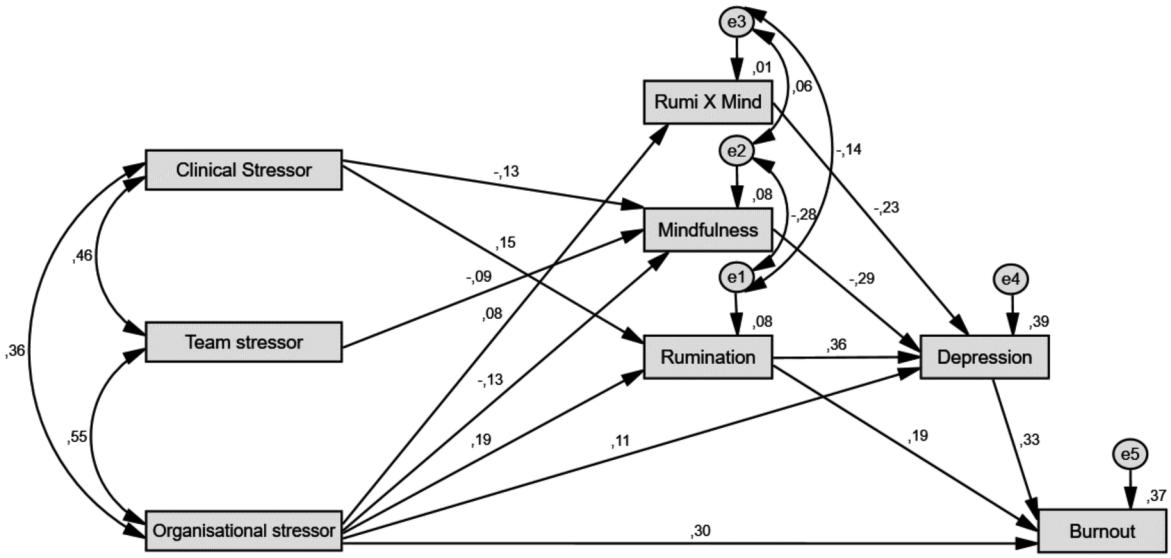

Figure 1. Path analysis model showing the relationships among clinical, team and organizational stressors, mindfulness, rumination, depression and burnout (N = 651). The figure shows standardized estimates, square multiple correlations.

The tested model accounted for 37% of the variance of burnout. Also, results indicated that the model accounted 8% of both rumination and mindfulness, and 39% of depression.

Clinical and organisational stressors presented a direct effect on rumination, with an effect of .15 (b = .42; SEb = .12; Z = 3.65; p < .001), and .19 (b = .61; SEb = .13; Z = 4.79; p < .001) respectively. Moreover, in a negative direction, clinical, team and organisational stressors presented a direct effect on mindfulness, with an effect of -.13 (b = -1.01; SEb = .34; Z = -2.94; p = .003), -.09 (b = -.77; SEb = .39; Z = -1.98; p = .048), and -.13 (b = -1.16; SEb = .40; Z = -2.94; p = .003) respectively. Rumination presented a positive association with depression, with an effect of .36 (b = .22; SEb = .02; Z = 10.76; p < .001). Furthermore, more mindfulness were associated with lower depression, with an effect of -.29 (b = -.06; SEb = .01; Z = -8.71, p < .001). Depression presented a positive association with burnout, with an effect of .33 (b = 1.01; SEb = .11; Z = 9.07; p < .001).

Moreover, clinical stressor presented an indirect effect on burnout of .06 (95% CI = .03 to .09, p = .001) mediated by mindfulness and depression, rumination and depression, and only rumination. Likewise, team stressor presented an indirect effect on burnout of .01 (95% CI = .00 to .02, p = .033) mediated by mindfulness and depression. Also, organisational stressors presented a total effect of .40 on burnout, with a direct effect of .30 (b = 1.82; SEb = .19; Z = 9.42; p < .001) and an indirect effect of .10 (95% CI = .07 to .14, p = .001), explained through rumination and depression, mindfulness and depression, interaction term and depression, only rumination, and only depression.

Moderated mediation

A moderated mediation was performed to examine if the mediation relation between rumination and depression is contingent on the level of mindfulness.

There is a significant indirect effect of rumination on burnout through depression of .12 (95% CI = .09 to .16, p < .001). The interaction term between rumination and mindfulness was significant (b = -.01; SEb = .00; Z = -7.47; p < .001; β = -.23) and indicates that the effect of rumination on depression depends on mindfulness. A visual representation of the moderator effect of mindfulness (low: M - SD; Medium: M; High: M + SD) on the association between and depression was produced (Figure 2) and demonstrates that anaesthetists who engage in rumination more frequently report higher depressive symptoms. Nevertheless, those with higher mindfulness trait present lower

levels of depressive symptoms, even when engaging in high rumination, compared to anaesthetists with medium and low mindfulness trait.

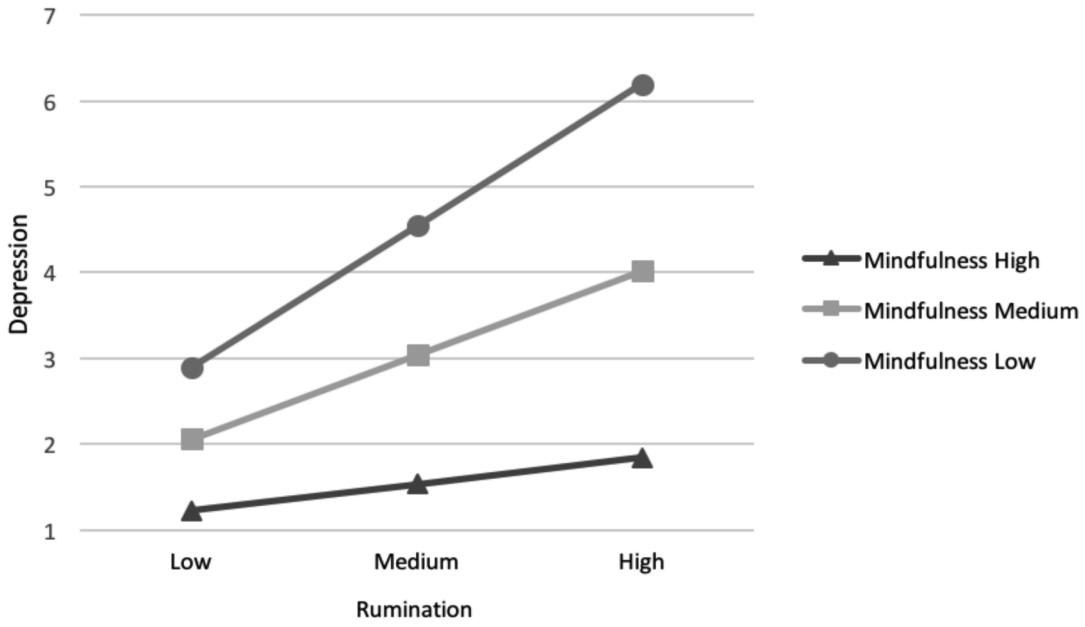

Figure 2. Effect of rumination on depression in three levels of mindfulness.

DISCUSSION

Our study used a comprehensive transdiagnostic model to test the hypotheses that job-related stressors impact on burnout through rumination and depression, and that mindfulness is a significant moderator of the association between rumination and depression and, in this way, in burnout.

The rationale guiding this study is based on the following empirical evidence: a) burnout yields negative consequences both for the professional and for the organization and is influenced by job-related stressors;[9,10] b) emotional regulation skills seem to be involved in the development of burnout, either increasing the chances of developing it (i.e. rumination), or decreasing it (i.e. mindfulness); c) rumination is a well-known psychological process that leads to depression and depression relapse;[39] d) mindfulness seems to be beneficial in reducing rumination and preventing depression relapse.[40] Also, we chose to put depression prior to burnout given some studies suggesting the predictive effect of depression on burnout.[32] Nevertheless, to our knowledge, the relationship between these variables has never been explored, particularly the mediating

role of rumination and depression in developing burnout, and the underlying moderating effect of mindfulness between rumination and depression.

Our results from the path analysis showed that job-related stressors are associated with burnout in Anaesthesiologists through rumination and depression. Specifically, our findings suggest that is not the job-stressors themselves that directly impact on burnout, but rather the fact that anaesthesiologists get caught up in repetitive negative thinking patterns (rumination) that lead to depression and, in turn, increases burnout. Needing particular attention is the fact that organisational stress impacted on burnout beyond rumination and depression. This might suggest that when stressors are related to the organisation, this has a particularly nefarious impact on burnout that does not involve the psychological processes here studied. This is in line with previous studies that suggest the importance of emotional regulation abilities when facing stressful environmental contingencies.[20,21]

It is also worth noting that although job-stressors impact on burnout in a sequential mediation that occurs through rumination and depression, rumination itself is a mediator between stressors and burnout, beyond its impact on depression. One the one hand, these results echo the existing literature on the relationship between rumination and depression,[27] but they expand it by suggesting that when it comes to burnout, rumination has a nefarious impact that is not explained by depression.

We also found that team stressors were not significantly associated with burnout, at least when clinical and organizational stressors are present. We hypothesize that, in three stressors presence, possibly of organizational and clinical dimensions are more preponderant than team dimension in our sample of anaesthesiologists. Contrarily, in a qualitative study in Portuguese anaesthesiologists, the authors pointed professional relationships as a major source of stress.[51]

Finally, results suggest that mindfulness, conceptualized and measured as a trait, is a significant moderator of the relationship between rumination and depression. Specifically, results showed that for those participants who ruminate the most, those who had a higher level of mindfulness trait presented lower levels of depression symptoms. In contrast, those who had lower levels of mindfulness trait presented higher levels of depression symptoms. These results are aligned with previous evidence on the

effectiveness of mindfulness-based interventions for depression relapse prevention.[39] One way of making sense of these results is through the definition itself of mindfulness and the skills that it entails: mindfulness, by promoting a self-regulatory attention awareness focused on the present moment in a purposeful and accepting manner, decreases or even blocks the ongoing pattern of repetitive negative thinking that characterizes rumination. In other words, mindfulness seems to function as a buffering process that mitigates the impact of rumination on depression.

The results of depressive symptoms and burnout found in this study are different than expected by authors given the personal feedback we obtained when collected the sample. The physicians verbally reported higher levels of stress and depression. A possible interpretation for this discrepancy could be the possibility of some clinicians had answered to questionnaire with social desirability. The lower levels of depression and burnout scores could influence the fact of the explanation of the model was not higher.

Some limitations should be considered before interpreting these results. Firstly, it is a cross-sectional study and strong evidence needs a longitudinal design in order to explore how much changes in one variable influence the others. Secondly, the sample was not a formal randomized sample. Nevertheless, the study was conducted in a large sample size and to our knowledge, it is the first to test in a robust comprehensive model the underlying psychological processes involved in how job-stressors impact on burnout in anaesthetists.

Finally, we expect that this study highlight the importance to study the psychological mechanisms underlying burnout in medical doctors. Relationships between stressors, mindfulness, rumination, depression and burnout are now clearer concerning anaesthesiologists.

Concerning clinical implications, interventions that promote mindfulness trait may help anesthesiologists dealing with negative effects of rumination on depression and burnout. Thus, mindfulness-based interventions may be important to prevent and treat burnout in anaesthesiologists.

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Chapter 4 - General Discussion

Modern physicians face specific professional stressors. As detailed in the theoretical framework, physicians have to cope with suffering patients, witness patients' stress, and act to support patients and their families. In addition, the modern world of healthcare and tightening budgets result in additional work-related stressors, such as barriers to providing optimal care, increasingly complex needs of patients, the need to increase knowledge of ever-changing technology, a shortage of physicians, long work hours, and limited resources. All these stressors put physicians at increased risk for physical and mental illnesses, such as depression, anxiety and burnout (Shanafelt, 2009; Shanafelt et al., 2012).

Burnout syndrome has been defined as a prolonged response to chronic job-related stressors and it is a dysfunctional consequence for physicians and for healthcare organizations. The central aspect of burnout is emotional exhaustion, characterized by a depletion of personal resources in meeting demanding situations (Schaufeli, Maslach, & Marek, 1993).

Thus, being exposed to high levels of negative emotions in stressful environments, health care professionals can develop serious emotional exhaustion (Figley, 2011) which can hinder the delivery of quality medical care as well as lead to an increased risk of errors. In a meta-analysis, which comprised 82 studies, including 210,660 healthcare providers (Salyers et al., 2017), burnout was shown to have consistent negative relationships with the perceived quality of care, quality indicators and safety perception. Nonetheless, not all professionals are equally affected by the stressors they face in their professional activity, which indicates that important psychological resources may play a protective role in this context. Clarifying the mechanisms involved in the pathways between professional stressors and burnout is thus essential.

Moreover, burnout and stress are likely to have implications further than that of the individual physician; stress reduces capability regarding choice and decision-making. A stressed healthcare staff member inevitably results in higher costs due to practitioner burnout, as well as causing a higher staff turnover, clinical error and generally lower quality of care for patients and poor outcomes (de Oliveira Jr et al., 2013; Halbesleben & Rathert, 2008; Ruff & Mackenzie, 2009).

Managing the effects of stress in the professional environment can occur through two pathways (Hyman et al., 2011; Maslach et al., 2001). One is by limiting exposure to work-

related stressors, and this may include the improvement of organizational factors (Kluger, Townend, & Laidlaw, 2003; Shanafelt, 2011). A recent Cochrane review (Ruotsalainen, Verbeek, Mariné, & Serra, 2015) concluded that implementing change required attention to the reduction of specific stressors. However, adequate and validated tools to evaluate specific stressors do not exist and are not available. Additionally, although the importance of organizational factors in the development of burnout has been known for many years, these factors are very difficult to change. Even when they are modifiable factors, the measures to modify them can take a long time.

A logical alternative is to support professionals to change the relationship they have with the stressors they inevitability face, through the adoption of adaptive emotion regulation strategies. Multiple studies demonstrate that the effects of a stressor on psychopathological symptoms development are mediated by emotion regulation skills (Sim & Zeman, 2005).

Maladaptive emotion regulation skills have been found through extensive research to be crucial in the development, maintenance, and treatment of a range of mental disorders (Berking & Wupperman, 2012), including depression, anxiety (Desrosiers, Vine, Klemanski, & Nolen-Hoeksema, 2013) and burnout (Brackett, Palomera, Mojsa-Kaja, Reyes, & Salovey, 2010).

Despite this, the existing literature in the field of physicians practice does not sufficiently cover this topic. The current dissertation aimed at contributing to fill this caveat in research of burnout and psychopathology symptoms in anaesthesiologists.

The main aim of the present thesis was to study the emotion regulation constructs in anaesthesiologists and investigate how mindfulness trait is associated with burnout and psychopathology symptoms (stress, anxiety and depression), in order to propose well-being enhancing and burnout preventive strategies. In the first part, we discuss the results of the study of burnout, stress, depression and anxiety in the population of Portuguese anaesthesiologists, anaesthesia residents and physicians from other specialities.

In the second part, we discuss the results of the studies conducted only with anaesthesiologists and anaesthesia residents.

First, we analysed and characterized a large sample of professionals, composed of 1358 Portuguese physicians of different specialities from public and private hospitals, namely anaesthesiologists, anaesthesia residents and physicians of other specialities. The necessary

descriptive analysis provided an insight of general characteristics of this population. Some of our findings are potentially relevant to subsequent interpretations of our results:

The number of women was greater than men, in all three samples of physicians.
There were significant differences in sex, marital status, and number of children between anaesthesia specialists, physicians of other specialities, and anaesthesia residents. As expected, residents are more frequently single and specialists are more frequently married and/or living in common law.

Regarding work-related data, the majority of physicians of other specialities, anaesthesiologists and anaesthesia residents work between 41 to 60 hours per week. As expected, residents work almost exclusively in public institutions, but specialists accumulate more frequently work in public and private institutions. This is in line with the Portuguese anaesthesiology census of 2014, in which 200 anaesthesiologists from a total of 1254 were working in the private system (Lemos et al., 2015).

Anaesthesiologists and residents have more night shifts than physicians of other specialities, and according to (Ferreira & Lucca, 2015), the structure of the schedule, with night work shifts can contribute to the physical, cognitive and emotional overload of health professionals. Anaesthesia residents work more frequently in emergency medicine than other specialists.

In proportion, anaesthesiologists have more senior graduate assistants than physicians from other specialities and more than 50% have more than ten years of experience. In our sample 14% were senior graduate assistant which was a higher percentage than one found in the Portuguese anaesthesiology census 2014, which was less than 10%. Additionally, regarding the number of anaesthesia hospital assistants we found a similar result (48.3%) as the Portuguese anaesthesiology census 2014, that shown that almost half of the sample was in the beginning of his/her career.

Non-anaesthesia specialists are more frequently involved in medical education. Also, anaesthesiologists work more frequently with paediatric patients but there are no differences with respect to work with chronic pain patients and with intensive care patients.
As expected, residents do more physical activities and have more continuous education activities. All specialists (anaesthesia and other specialities) have fewer education activities. Interestingly, anaesthesiologists and anaesthesia residents are more frequently dedicated to charity activities, than specialists from other areas.

Anaesthesia specialists have more leisure activities than specialists from other specialities. Concerning alcohol consumption, smoking, meditation experience and religious practice there were no differences.

Development and examination of a global index for burnout syndrome evaluation in physicians

The tool most commonly used to evaluate burnout is the Maslach Burnout Inventory (MBI) (Maslach, Jackson, & Leiter, 1986), a three-factor questionnaire that assesses emotional exhaustion, depersonalization and low sense of personal accomplishment, which has become the gold standard metric of burnout. Several criticisms have been raised concerning this instrument. In order to tackle these limitations, another measure of burnout was developed. The Copenhagen Burnout Inventory (CBI) (Kristensen et al., 2005) is an open source tool developed to assess burnout in a less complex manner. CBI differentiates three life domains from which emotional exhaustion may arise: personal, work-related and patient-related. Personal burnout is the extent of physical and psychological exhaustion felt by a person, their occupation notwithstanding. Work-related burnout is the degree of physical and psychological exhaustion that is perceived by the person in relation to their work. Client-related burnout is the degree of physical and psychological exhaustion felt by the person regarding their work with clients (Kristensen et al., 2005). In sum, CBI has been described as a more straightforward measure (Yeh, Cheng, Chen, Hu, & Kristensen, 2007), with two advantages comparing to MBI: it assesses the same overall construct (burnout) in different contexts, discriminating between three dimensions of burnout rather than its consequences which could lead to erroneous interpretation of results.

Although CBI had characteristics to be a suitable measure for assessing burnout as an underlying construct of emotional exhaustion (Marôco & Bonini Campos, 2012; Milfont, Denny, Ameratunga, Robinson, & Merry, 2008), a global burnout index derived from the whole questionnaire was never validated through a robust statistical procedure.

Our study provided evidence for the viability of using CBI as a 1-factor measure, which allows clinicians and researchers to attain a single straightforward global burnout index. Additionally, our results provided evidence for the validity of CBI as a robust measure of burnout related to the physician, the work itself and the patient. Even though an assessment of different areas in which burnout arise (personal, work, patient) provides an understanding of the different routes that lead to burnout, a one factor index, allows us the best of both worlds. The use of a global measure provides a clear and easily obtainable assessment of the

degree of the professional burnout. This global index can then be further analysed in detail through the three dimensions, and specific strategies to prevent further burnout can be implemented according to the more salient dimension.

Burnout, *psychopathological symptoms*, satisfaction with life and disability in Portuguese anaesthesiologists, anaesthesia residents and physicians from other specialities

Another secondary aim was to explore burnout, stress, depression, anxiety, satisfaction with life and disability in Portuguese anaesthesiologists, residents and physicians from other specialities.

In this study, anaesthesiologists showed the lowest prevalence of all types of burnout, with 38.3% having personal burnout, 32.2% having work-related burnout, 9.0% having client-related burnout and 17.1% suffering from total burnout. With respect to lower levels of patient-related burnout in anaesthesiologists, is possible that it is due to some characteristics of the speciality, as sometimes anaesthesiologists are involved in a non-reciprocal relationship with the patients, with little contact or follow-up after leaving the operating room. Due to this fact, the percentage of total burnout in anaesthesiologists may be smaller (17.1%) than other specialities.

Considering **personal burnout**, diagnostic specialities had the highest prevalence. This is an interesting find, and is consistent with findings of Shanafelt study (Shanafelt et al., 2015) in which radiology appears as one of the specialities most affected by burnout, shortly after emergency medicine and family medicine. Is possible that high levels of burnout may be related to specific characteristics of radiology physicians with frequent isolation. It is also possible that radiologists will often ruminate over the reports they have made, and whose images are available for later reassessment.

Anaesthesiology residents had a significantly higher percentage of personal burnout (54.1%) when compared to medical specialities (46.7%) and family and occupational medicine (48.7%), but also when compared with anaesthesia specialists (38.3%). This difference may be explained because older anaesthetists are more capable to deal with their physical and psychological exhaustion than younger ones.

Considering **work-related burnout,** other specialities (59.3%) had the highest prevalence, whereas anaesthesiologists and anaesthesia residents scored below the mean for burnout. Family and occupational medicine had the highest prevalence of client-related burnout (25.4%), while anaesthesia residents scored below the mean for burnout, as well as anaesthesiologists. Studies have reported that working in the community is stressful, and that general practitioners have higher burnout levels, as they work in front line of access to care (Shanafelt et al., 2015; Soler et al., 2008).

A study comparing the burnout risk of the German working population with anaesthesiologists found that despite 40.1% of anaesthesiologists being at high risk of burnout, the risk of burnout among anaesthesiologists was not higher than in other occupational groups in Germany. In a study with Portuguese anaesthesiologists (Morais et al., 2006), authors reported 57,9% professionals with emotional exhaustion. However, comparing the prevalence of burnout is challenging because the definitions and measurement instruments vary from study to study, and in Morais et al. (2006) study the measuring instrument was MBI.

The present study found that for the overall sample (N=1358), 293 (21.7%) participants suffered from some burnout symptoms or serious burnout symptoms. In Portugal, the prevalence of burnout has been higher, with 44% of physicians presenting high levels of burnout (Marôco et al., 2016). Although the study of Marôco et al. (2016) used the MBI to accesses burnout, it seems that burnout amongst Portuguese physicians is shown to be a seriously worrying area.

Burnout is not only restricted to Portugal but is an international phenomenon in physicians. Shanafelt, Bradley, Wipf, & Back (2002) found that more than 75% of participants in their study matched the criteria for having burnout. Another recent study from the same author (Shanafelt et al., 2015) reported that the levels of burnout in physicians were high and its prevalence had risen by about 10% since 2011.

Our findings extended current research by clarifying the prevalence of burnout in anaesthesiologists and other specialities.

Anxiety in anaesthesia specialists was significantly lower than anaesthesia residents. In fact, residents are more overwhelmed with work and are continuously being evaluated. Regarding stress and depression there were no differences. For Satisfaction with life, there was not a statistically significant difference between doctors. Physicians have generally high degrees of

satisfaction with their career choice but experience high degrees of dissatisfaction with work-life integration (Shanafelt, 2009; Shanafelt et al., 2012, 2015).

Disability in work, social life, and affective life in anaesthesia specialists was significantly lower than in physicians from other specialities and anaesthesia residents. Additionally, affective life disability in physicians of other specialities was significantly lower than in anaesthesia residents. It could be interesting to study the impact of work in anaesthesia in home/family life. Conflicts between home and work have previously been pointed out concerning anaesthesiologists as being a major source of stress (Linkman, 1995), and, according to Lindfors et al. (2007), family life seems to play a larger role in the well-being of female anaesthesiologists.

Next, we discuss the results of the studies conducted with only anaesthesiologists and anaesthesia residents.
When reviewing the literature on the stress factors in anaesthesiologists we found that there was a lack of a reliable instrument to access stressors in this population. Therefore, we developed a self-report measure assessing different stressors.

Stressors in Anaesthesiologists and anaesthesia residents

The Stress Questionnaire in Anaesthesiologists (SQA) is a 10-item self-rating scale designed to assess specific stressors in anaesthesia physicians, and can be used to identify problems in the working conditions of anaesthesia physicians to encourage and improve the development of 'wellness'.
Results from the internal consistency analysis suggest that the SQA is a reliable instrument for measuring stressors in anaesthesiologists, and the CFA showed that its three-factor (clinical, team and organizational stress) structure presents a good fit. Thus, this study shows that the SQA is a robust and reliable measure. Respondents' feedback indicated that the scale was easy to use and that it might support anaesthesia physicians' understanding of the different stress factors. As the instrument only contains 10 items, the questionnaire can be integrated into everyday hospital activity.

In our sample, younger and less experienced anaesthesiologists show higher team and organisational stressors; women and physicians with less workload also showed higher clinical stress. Globally, the team stressors have lower levels than the other stressors, and organizational stressors are the major inducers of stress (note that team stressors, although

formally can also be considered as "organizational" are not included in what we name "organizational stressors").

Anaesthesia is a profession which demands that one adapts to team work and problems among team members are common and this atmosphere can lead to tension and conflict (Gurman, Klein, & Weksler, 2012). In our study team stressors showed the lowest levels when compared to other stressors. The lower levels of team stressors in our sample is an interesting result in that other studies pointed professional relationships as major source of stress (Morais et al., 2006).
In our study organisation stressors showed the highest levels when compared with the other two stressors. The importance of organizational stressors has already been well documented (Nyssen, Hansez, Baele, Lamy, & De Keyser, 2003) in anaesthesiologists. In a study with Portuguese anaesthesiologists (Morais et al., 2006), the authors found that the main stress factors were professional relationships especially with surgeons, excessive work, unskilled leadership, inadequate working conditions or facilities and technically difficult situations of work. However, this study used an open question format instead of a validated measure of stressors and thus results should be compared with caution.

We also found that levels of team and organizational stressors diminish with age and were higher in those who work in emergency medicine. Team and organizational stress were lower in professionals with more than 20 years of experience.

Professionals practicing physical activity had less clinical stress and those engaged in leisure activities had less organizational stress. A longitudinal study (Toker & Biron, 2012) reported the importance of physical activity showing that the increase in job burnout and depression was strongest among professionals who did not engage in physical activity and weakest to the point of non significance among those engaging in high physical activity. Professionals who has regular religious practice had more clinical stress compared to those without religious practice. Also, there were higher levels of clinical stress in the Portuguese centre and islands regions when compared to the remaining territory.

Although small in magnitude, correlation analysis showed that the SQA was positively associated with burnout, anxiety, depression, stress symptoms in general and overall impairment in function. Additionally, the SQA showed a positive association with rumination, which has been identified as an important psychological factor in the development and maintenance of symptoms of depression (Nolen-hoeksema & Morrow, 1993). The SQA was shown to correlate negatively with satisfaction with life and positively with disability.

It is important for individual anaesthesiologists and clinical teams to be more aware of stressors and ways of addressing them. Health care organizations need to evaluate, recognize and address them. We consider that the SQA could be an important tool in the identification of anaesthesiologists at risk of developing stress-related difficulties. As a result, by exploring and understanding stressors, more effective preventive measures for anaesthesiologists can be introduced.
The SQA showed promise as a measure of stressors in anaesthesiologists, and might be a valuable tool for the study of the impact of stress in this professional group.

Burnout and Psychopathological Symptoms in anaesthesiologists and anaesthesia residents

The exploration of burnout and psychopathological symptoms in anaesthesiologists and anaesthesia residents will be discussed in this topic.

Burnout Syndrome
In general, personal burnout had the highest values when compared to work and patient related burnout in both groups.
Regarding age, we found that physicians under 40 years old had on average levels of global burnout greater than those older than 40. This finding is in accordance with other studies that reported that higher burnout levels have been found among younger physicians (Ogundipe, Olagunju, Lasebikan, & Coker, 2014; Z. Wang et al., 2014). In a study with Portuguese doctors and nurses it was also found that younger professionals were more affected by burnout (Marôco et al., 2016). One explanation may be that older and experienced professionals are more emotionally and professionally mature, and thus may more quickly adapt to clinical conditions compared with younger physicians.

With respect to gender, women had more personal and work-related burnout and men had more patient related burnout. This is an interesting fact showing that in women the work-related stressors are superior and in men relationship with patients are more stress inductors. However, male and female had similar levels of total burnout which is consistent with the findings of another Portuguese study with physicians and nurses (Marôco et al., 2016).

There were no differences in burnout with respect to marital status, in our samples.
Anaesthesiologists with children have less burnout. This may be explained by a study (Keeton, Fenner, Johnson, & Hayward, 2007) that have shown that female having more children at home were associated with higher levels of career satisfaction.

We did not find an association between workload and burnout, as well as with the type of institution (public, private or both) and region of work.
Night shifts did not also relate with burnout. However, other studies showed evidence that working excessive hours coupled to night work does not allow sufficient time to recover from work (Shanafelt et al., 2012). With respect to sleep hours, professionals that slept less than six hours per night, had more personal and work-related burnout.

Professionals who work in emergency (intra and extra-hospital) develop more personal and total burnout. Only those working in intra-hospital emergency have more work and client related burnout. These results make sense given that work in extra-hospital emergency involves limited contact with the patients when compared to intra-hospital work. In multiple studies, working in emergency is related to higher levels of burnout (Shanafelt et al., 2012, 2015) as emergency is at the front line of access to care, requiring a rapid and effective response.

In general, we found that senior graduate assistants had less burnout when compared to residents and assistants. Additionally, results showed that anaesthesia specialists with 4 to 10 years of experience had higher burnout than those with 3 or less years of experience and those with more than 10 years of experience. Other studies reported highest rate of burnout amongst mid-career physicians (Dyrbye et al., 2013). Also, in a study with Portuguese anaesthesiologists, the authors found that anaesthesiologists with more years of experience had less emotional exhaustion compared to the younger ones (Morais et al., 2006). These authors argue that older anaesthesiologists develop coping mechanisms throughout the years. Additionally, this finding may be explained by the fact that physicians with more experience may develop higher confidence to perform their tasks, and may have developed relationships at work that are more meaningful which may be a buffer against the development of burnout. One possible explanation for the lower levels of burnout in recent specialist is that they are more enthusiastic and motivated to perform the assigned tasks.

Additionally, comparing residents with anaesthesia specialists, residents have more burnout types except for client-related burnout. This is an interesting finding because residents have more workload and are constantly being evaluated by specialists which can explain why they develop more personal and work-related burnout. However, at the same time, residents have less patient-related burnout which can be explained by their inexperience, relative work naivety and lower levels of responsibility, meaning that they are not as overwhelmed as those doctors who have seen the prolonged suffering of patients over a longer term throughout their careers. The greater levels of engagement that experienced physicians bring to their

patients, which leads to improved outcomes for patients, at the same time leads to greater levels of exhaustion for those doctors, as they draw on their personal resources of energy, compassion and experience in order to do their best for their patients.
Residents' burnout has been associated with problematic patient care in other medical specialities and a study (Shanafelt et al., 2002) in internal medicine residents demonstrated that burnout was associated with suboptimal patient care practices.

Our findings suggest that anaesthesiologists with management position experienced lower levels of burnout. This is in line with other studies that found less burnout in management positions (Queiros, Carlotto, Kaiseler, Dias, & Pereira, 2013) and in a study with Portuguese anaesthesiologists (Morais et al., 2006). This may mean that they are more satisfied with their working conditions.

As expected, professionals that partake in leisure activities have less personal and total burnout.

Depression, anxiety and stress
Our results suggest that 2.3% of anaesthesiologists and anaesthesia residents had severe depressive symptoms, 3.7% had severe anxiety symptoms and 5.3% had severe stress symptoms. Additionally, 2.9% have extremely severe anxiety. These results suggest that the majority of physicians in our sample do not present clinical levels of psychopathological symptoms. These results are different from other studies (Rose & Brown, 2010) that report affective disorders such as depression a common problem in medical professionals, including anaesthesiologists. It is possible that our results may be related to high social desirability in anaesthesiologists, given the negative social load usually attributed to psychopathology.

In anaesthesiologists, the professional burden comprising elements such as a stressful working atmosphere, heavy professional demands, long working hours, being on call, little vacation time, and conflicts between work and personal life may lead to social isolation, drug abuse, depression and even suicide (Kuhn & Flanagan, 2017; Rose & Brown, 2010; Schernhammer, 2005). Depression is most often described as having social isolation and a reduction of social connectedness (Wade & Kendler, 2000). According to Hampton (2005), physicians often fail to adequately diagnose depression in themselves, and sometimes although they realize the problem, they do not seek help.

Also with respect to depression, there were no differences between age groups. However, we found that stress was higher in younger physicians. Women had greater levels of stress, but

had no differences in relation to depression and anxiety. In general, stress, depression and anxiety were lower in those physicians with a greater number of children.

Anaesthesiologists that had leisure activities have less stress, depression and anxiety, which show the importance to perform extra-activities to improving well-being.

Professionals that work exclusively in public sector had higher levels of stress, depression and anxiety, when compared with professionals who only work in private and public plus private. These associations were similar for burnout and we hypothesize that those physicians who work exclusively within the public sector find that their income is unrelated to their performance and productivity. Moreover, they are confined to their fixed professional environment, viz the bureaucracy of the system and organizational traits, the lack of variety in the colleagues with which they work and the same environment day after day. This is not true of those physicians who work in both public and private sectors.

Professionals working in emergency had more stress, anxiety and depression. These results make sense given the unpredictability of emergency working and also working under pressure.

Residents had more stress and anxiety, but there were no differences in depression when compared with specialists. Contrarily, other studies found that depression has been shown to be very common during medical training years (Goebert et al., 2009). When severe, depression can be a life-threatening disease, especially if unrecognised and untreated (Sakinofsky, 2007). Depression also impairs cognitive ability; therefore, it is conceivable that professionals with depression may negatively impact patient care and safety.

The impact of stress on decision making and choice is clear; the more severe the stress the lower the capacity for making the best choices. Any workforce, especially those in a healthcare environment, will lead to higher associated costs related to practitioner burnout, a higher staff turnover, clinical error and a lower level of care quality for patients (Ruff & Mackenzie, 2009).

As expected, our results showed that higher levels of burnout, stress, depression and anxiety were negatively correlated with satisfaction with life. Moreover, positive correlations were found between burnout, stress, depression and anxiety and disability and stressors.

Emotion regulation processes

In this dissertation, the adaptive emotion regulation processes addressed were mindfulness and self-compassion and maladaptive mechanisms were rumination and psychological inflexibility.

With respect to mindfulness, results showed that anaesthesia specialists presented significantly higher mindfulness trait in comparison with physicians of other specialities and anaesthesia residents. When analysing the five facets of mindfulness separately, our results showed that there were only significant differences regarding the observing facet, with anaesthesia specialists having higher levels of observing than the other two groups. Our study also revealed that total self-compassion and the mindfulness dimension were significantly higher for anaesthesia specialists when compared to anaesthesia residents. These results show that anaesthesia specialists are more aware of their experiences and more compassionate towards themselves.

Additionally, our results revealed that psychological inflexibility in anaesthesia specialists was significantly lower than in anaesthesia residents. These result is understandable, since age and experience of specialists may be related to more acceptance and adaptability to aversive experiences.

With respect to rumination, there were no differences between the three groups of physicians.

We also analysed the association between emotion regulation processes and burnout and psychopathological symptoms.

Our results showed that professionals with higher levels of psychological inflexibility, rumination, negative dimensions of self-compassion (self-judgement, isolation and over-identification), and all stressors were positively related to higher burnout levels. Contrarily, higher levels of mindfulness dimensions (except for observing), and positive dimensions of self-compassion (self-kindness, common humanity, mindfulness) and total self-compassion were associated with lower levels of burnout. Positive dimensions of self-compassion and total self-compassion were associated with lower levels of stress, depression and anxiety. Moreover, positive correlation were found between psychological inflexibility, rumination and negative dimensions of self-compassion and psychopathological symptoms. These results seem to corroborate the importance of adaptive emotion regulation strategies (mindfulness and

self-compassion) for well-being. Conversely, maladaptive mechanisms (rumination and psychological inflexibility) were related with burnout and psychopathology.

Predictors of Burnout and Psychopathological symptoms

In a subsequent study, we explored which socio-demographic, work-related, socio-cultural and psychological variables predicted burnout and psychopathological symptoms.

Regarding **personal burnout**, we found that vulnerability factors were being a woman, higher organizational stressors levels, psychological inflexibility, depression and self-judgement. Surprisingly, the mindfulness facet that involves the ability to describe the experience of the current moment was found to be associated with increased personal burnout. This result needs to be further explored in future research, but it may indicate that this facet may translate into a greater awareness of one's current experience of burnout.

We also found that protective factors were being older, working less than 80 hours per week, higher levels of acting with awareness and non-reactivity mindfulness facets.

Protective factors were workload less than 60 hours per week, having meditation experience and higher levels of acting with awareness. These results corroborate our hypotheses and the extended existent literature that consistently shown that mindfulness is associated with psychological adjustment (K. W. Brown & Cordon, 2009) and protects against professional burnout (Duarte & Pinto-Gouveia, 2016; Escuriex & Labbé, 2011).

Regarding vulnerability factors of **patient-related burnout** were working in the North region of Portugal, and having more organizational stressors, depression and psychological inflexibility.
Protective factors were being a woman, having a workload of less than 80 hours per week and higher levels of acting with awareness and having 2 or more children. In fact, marital and parenthood status has been found to be an effective family support system, which can have protective effects against psychological distress (de Oliveira Jr et al., 2013; Hollon & Ponniah, 2010).

In regard to **total burnout,** vulnerability factors were working in the North region, higher levels of organizational stressors, depression, anxiety and rumination. Consistently with prior results in this work, psychological inflexibility also emerged as a significant predictor of burnout. Theoretical indications and empirical evidence highlight psychological inflexibility as

being at the core of psychological maladjustment and emotional difficulties (S. C. Hayes et al., 2006). Our results extend current evidence by showing that psychological inflexibility may also play a major role in healthcare-related work settings, predicting burnout in general and in particular affecting the practitioner in terms of personal exhaustion, difficulties in managing work-related problems and in his/her ability to maintain a positive practitioner-patient relationship. Working in the North region seems to be a vulnerability factor for burnout which was also found by Marôco et al (2016).

Protective factors were age, non-smoker, workload less than 80 hours per week and having more acting with awareness and non-reactivity. Younger professionals, which have fewer years of experience, have been pointed out as a predictor of burnout in other studies (Marôco et al., 2016; Morais et al., 2006) and there are those who justify the fact that individuals with less professional experience do not yet have enough time to develop effective coping strategies to deal with stress and for this reason are more vulnerable to develop burnout (Bilge, 2006; van der Wal et al., 2016).

The importance of organizational factors as a predictor of burnout is well-known and have been highlighted in multiple studies (Bilge, 2006; Ferreira & Lucca, 2015). Also in a study of Portuguese healthcare professionals, poor perception of working conditions was the main predictor of burnout (Marôco et al., 2016). In Portuguese anaesthesiologists, a study (Morais et al., 2006) reported that when organizational satisfaction is low, emotional exhaustion is more likely.

Regarding **psychopathological symptoms**, vulnerability factors of **stress** included consuming more than 5 alcoholic drinks per week, higher levels of personal burnout, rumination, psychological inflexibility and over-identification. These results are in line with prior research that revealed that rates of substance abuse of anaesthesiology residents are higher than that of other health care providers (Booth et al., 2002) and is well-known the relationship between substance abuse and psychopathological symptoms (S. D. Brown, Goske, & Johnson, 2009).

Specifically, a previous study by de Oliveira Jr et al. (2013) observed that residents who were at high risk of burnout or depression had a higher weekly alcohol consumption and were more frequent smokers than residents who were neither burned out nor depressed. Our findings highlight that helping physicians manage stress and other difficult emotions may have an important impact on reducing substance abuse and burnout.

Moreover, rumination and the tendency to over-identify with one's negative internal states and the difficulty to accept them emerged again as significant predictors of stress symptoms in physicians.

Potential protective factors for stress were working in the South region of Portugal, having more mindfulness, the ability to act with awareness and working less than 40 hours per week. In fact, higher workload is a predictor of burnout and psychopathology. These results are supported by previous studies on burnout in anaesthesia residents (de Oliveira Jr et al., 2013) and other health care providers (Balch et al., 2010). It has been suggested that by reducing working hours and on-call frequency, the incidence of burnout among anaesthesiology trainees may be reduced (de Oliveira Jr et al., 2013). Therefore, it is important to achieve a balance between anaesthesiology resident necessary clinical training and their well-being.

Regarding **depression,** significant vulnerability factors were consuming more than 5 alcoholic drinks per week, having no religion and higher levels of psychological inflexibility, personal burnout and isolation. Depression is typically characterized by social isolation and reduced social connectedness (Wade & Kendler, 2000). Social support seems to be crucial to the maintenance of psychological well-being and should not be neglected in physicians' psychological adjustment.

Regarding **anxiety**, results showed that being a resident physician may pose an increased risk, as this population is under constant evaluation and usually have a higher workload. As in prior results, personal burnout also emerged as a significant predictor of anxiety symptoms. Also, as expected, psychological inflexibility was found to be significantly associated with increased anxiety symptoms.
A protective factor identified in this study was the ability to act with awareness.

The role of (mal)adaptive emotion regulation strategies

In the present study, psychological inflexibility and rumination, in one hand, and compassion and mindfulness, on the other hand, were consistent predictors of psychopathological symptoms and burnout.

Psychological inflexibility was associated with depression, anxiety and stress, but also with all types of burnout. These results suggest that psychological inflexibility may be a risk factor to develop those outcomes. Anaesthesiologists who are unwilling to experience internal

aversive experiences tend to present more psychological distress. This relationship was already corroborated by other studies with health care professionals (Duarte & Pinto-Gouveia, 2016; Iglesias, Vallejo, & Fuentes, 2010).

In a viscous cycle, psychological inflexibility is characterized by the dominance of thoughts and emotions which limit or prevent people living in the way they wish, as well as being unwilling to encounter negative experience, and prevents individuals from being in the present moment. This dissertation corroborates prior evidence that this process is associated with burnout (S. C. Hayes et al., 2006; S. C. Hayes & Smith, 2005; Iglesias et al., 2010; Vilardaga et al., 2011). Additionally, psychological inflexibility has been linked to depression and anxiety and a reduction in work-related performance (Kingston, Clarke, & Remington, 2010). Also, a study with Spanish critical care nurses demonstrates a relationship between experiential avoidance and burnout syndrome (Iglesias et al., 2010). Contrarily, acceptance is associated positively with satisfaction at work and work-related autonomy, and negatively with poor mental health.

Despite further prospective studies, larger samples are needed to support these results. Our findings offer evidence that developing skills of acceptance and flexibility may be useful in preventing and decreasing symptoms of burnout. Acceptance-based interventions that promote the development of psychological flexibility have been found to be effective in reducing psychopathological symptoms and promoting psychological adjustment in several conditions (S. C. Hayes et al., 1999). Our results suggest that such interventions may also have positive consequences for the reduction of occupational burnout and in the improvement of psychological well-being in this population.

In our studies, **rumination** seems to be a predictor of stress and total burnout, in which anaesthetists with higher levels of rumination tend to present higher levels of stress and burnout. The fixation on their own problems and on their internal feelings by people who are ruminating is the key hurdle, more than the internal events per se (Nolen-Hoeksema et al., 2008). As rumination signifies the physicians overly contemplating stressors, rumination was hypothesized as playing a possible mediating role on the association between physician's stress and burnout. Despite these results, was expected that rumination would be a significant predictor, given the well-known role of rumination as an important psychological process related to depression (Lyubomirsky & Nolen-Hoeksema, 1993).

Negative dimensions of **self-compassion** (self-judgement, over-identification and isolation) and mindfulness positive dimension were associated with psychological symptoms and burnout.
Despite the proven benefits of compassion for self and others, there were no studies to our knowledge exploring self-compassion in physicians. These results extend findings from a recent study that found that self-compassion may play an important role in regulating empathic feelings in a way that may prevent the development of burnout (Duarte & Pinto-Gouveia, 2016).

It is now widely accepted that self-compassion has numerous benefits for individuals' well-being; for a review see meta-analyses by MacBeth & Gumley, 2012; Zessin, Dickhäuser, & Garbade (2015).

The literature has found that self-compassion plays a role in self-regulation and coping with stress (A. B. Allen & Leary, 2010; Neff et al., 2005) and that more self-compassionate people respond better to adverse feelings, with a more open and kinder approach. The attitude that such imperfections are part of the human condition might therefore promote proactive methods of dealing with stress and accentuating positive affect (Arimitsu & Hofmann, 2015; Diedrich, Grant, Hofmann, Hiller, & Berking, 2014). The suggestion therefore is that self-compassion is a vital skill for anaesthesiologists; by maintaining a self-compassionate attitude and allowing the forgiveness of oneself when situations go poorly because of lack of resources, understandable human error or whatever, can allow and engender a more balanced emotional and mental state. Given the protective factor of self-compassion for stress and burnout development, it is important to apply interventions with a self-compassion approach. In this manner, mindfulness-based interventions may be helpful because have been shown to increase self-compassion (Birnie, Speca, & Carlson, 2010; Boellinghaus et al., 2014) and to decrease burnout (Mackenzie, Poulin, & Seidman-Carlson, 2006).

The **mindfulness** facet acting with awareness was a protective predictor of stress, anxiety and all types of burnout. In fact, anaesthetists with higher levels of acting with awareness tend to be aware of internal experiences, in the present moment, rather than being on "autopilot". This is consistent with the literature, in which emphasize that acting with awareness is an important component for well-being (D. B. Brown, Bravo, Roos, & Pearson, 2015; Pearson, Brown, Bravo, & Witkiewitz, 2015).
In other studies, mindfulness has been associated with stress and burnout (Di Benedetto & Swadling, 2014) and mindfulness training can potentially reduce burnout and stress amongst healthcare professionals (Escuriex & Labbé, 2011). The assumption of a posture of greater

awareness and attention to the present moment and the cultivation of the capacity to accept with serenity both the positive and negative moments of life seems to positively influence the way the individual perceives himself at work.

Also, our results show that meditation experience was a predictor of observing, describing, non-reactivity and total mindfulness. These findings suggest that anaesthetists who had meditation experience had more tendency to note internal and external experiences, labelling it with words and to allow those internal and external experiences to come and go without caught up in them. Also, anaesthetists who had meditation experience tend to be less work-related burnout, which means that meditation skills may help individuals to cope with physical and psychological exhaustion related to work. Therefore, Mindfulness and acceptance-based approaches may help in the reduction of depression, anxiety, stress and burnout among anaesthetists. Importantly, the frequency was not evaluated, nor the intensity and duration of meditation experience and if they were currently practicing meditation. So we should be cautious in interpreting and generalizing these findings.

The main aim of the present study was to analyse the emotion regulation constructs in anaesthesiologists and investigate how mindfulness trait is associated with burnout and psychopathology (stress, anxiety and depression). Thus, we explored mindfulness trait in a more detailed way.

The protective role of Mindfulness trait in Burnout Syndrome and Psychopathologic symptoms

Firstly, we analysed how mindfulness trait was related to several socio-demographic variables. Results showed that professionals younger than 40 years old had lower levels of observing, act with awareness and total mindfulness, compared with professionals older than 50 years old. We also found that women had higher levels of observing and lower levels of non-judging. Additionally, professionals working in emergency had lower levels of total mindfulness, but not individual mindfulness facets.

Residents showed the lowest levels of total mindfulness while professionals with more than 11 years of experience showing the highest levels. Regarding mindfulness facets, residents had lower levels of observing, describing, acting with awareness and total mindfulness, when compared to specialists. We also found that physicians who practice physical activities had higher levels of describing and total mindfulness.

Also, professionals that undertake leisure activities had higher total mindfulness trait. Finally, physicians practicing meditation had higher levels of observing, describing, non-reactivity and total mindfulness and lower levels of non-judgement.

In general, a study of the factors that predicted more mindfulness in our study were higher levels of self-kindness and common humanity, having meditation experience, being older and being single.

In contrast, smoking, higher levels of psychological inflexibility, clinical stressors, over-identification, client-related burnout and stress, were associated with lower levels of mindfulness.

The most useful way to view mindful is an internal approach for emotional situations by focusing on the current experience (Bishop et al., 2004) which allows mindfulness to have an emotion-regulating effect in day to day emotional challenges. Thus, we were also interested in exploring how mindfulness relates to other psychological processes, namely self-compassion, psychological inflexibility and rumination.

Results from correlational analyses suggested that mindfulness dimensions (except for observing) were negatively correlated with psychological inflexibility, rumination and the negative dimensions of self-compassion (self-judgement, isolation, over-identification). In contrast, there were positive correlations between mindfulness (except for observing), and positive dimensions of self-compassion (self-kindness, common humanity, mindfulness) and total self-compassion. Regarding the observing dimension of mindfulness, there were positive correlations between this dimension and psychological inflexibility, rumination and all dimensions of self-compassion. In previous studies, observing dimension has been found to have poor psychometric properties (de Bruin, Topper, Muskens, Bogels, & Kamphuis, 2012). However, this finding can be possibly explained by the existence of maladaptive mechanisms, such as rumination, that are mediating the relationship between observing and the negative dimensions of self-compassion.

Finally, and in accordance with the main goal of the present study, we explored based on a comprehensive cross-sectional model, the psychological processes implicated in the relationship between stressors and burnout in anaesthesiologists. We hypothesize that the impact of the different stressors (clinical, team and organizational) on burnout symptoms have a sequential mediation by rumination and depressive symptoms and this mediation is moderated by mindfulness traits.

Results obtained from the model suggest that mindfulness, conceptualized and measured as a trait, is a significant moderator of the relationship between rumination and depression. Specifically, results showed that for those participants who ruminate the most, those who had a higher level of mindfulness trait presented lower levels of depression symptoms. In contrast, those who had lower levels of mindfulness trait presented higher levels of depression symptoms. These results are aligned with previous evidence on the effectiveness of mindfulness-based interventions for depression relapse prevention (Teasdale et al., 1995). One way of making sense of these results is through the definition itself of mindfulness and the skills that it entails: mindfulness, by promoting a self-regulatory attention awareness focused on the present moment in a purposeful and accepting manner, decreases or even blocks the ongoing pattern of repetitive negative thinking that characterizes rumination. In other words, mindfulness seems to function as a buffering process that mitigates the impact of rumination on depression.

In general, the results of this study provide evidence for the importance of emotion regulation processes on anaesthesiologists burnout and psychopathological symptoms. If anaesthesiologists have difficulties regulating their emotions, they may become emotionally drained over time. While significant attention in physicians and anaesthesiologists literature and research has been placed on the incidence and implications of stress and burnout, there are few studies exploring psychological or dispositional factors at the individual level. Additionally, there is little investigation with respect to individual strategies to prevent and reduce burnout.

Although comprehension of this need and this reality motivates the necessity of identifying interventions to help anaesthesiologists learning effective coping mechanisms to deal with work-related stress, thus leading to a reduction in burnout, an improvement in job satisfaction and patient care quality. This point is key due to the varied demographic and organizational factors which, because of their nature, do not change, such as age or sex. Moreover, work hours and patient quantity are beyond the control of the individual; psychological factors which can more easily be targeted in interventions should receive greater focus to reduce stress and burnout.

Special attention should be taken to ensure that anaesthesiologists are protected against such stressors; as the future of our speciality it is imperative to develop intervention programs as well as anaesthesiology societies recognize that burnout and depression are common problems in anaesthesiologists and it is required to prevent or treat these problems.

Chapter 5 - Limitations and Future perspectives

In general, results from the current study are promising, and may have important implications for research and practice.

Limitations of our studies have been reported in each individual study. Regarding our work, as a whole, some comments are needed further attention in future studies.

The cross-sectional design represents an important limitation of this study, which prevents causal conclusions. Although the cross-sectional nature does not allow the establishment of causal influences between variables, this type of design can contribute to understanding the possible associations between the variables and if these associations are consistent with the underlying theoretical models.

Emotion regulation in burnout and psychopathology could be aided by further future longitudinal studies as these would allow the observation of their cumulative effects. Thus, longitudinal and interventional studies are needed to better determine ways of action.

Additionally, because the study was based on physician's self-reported results, common method bias is another limitation that needs to be considered. The sole reliance on self-report measures is particularly relevant for several constructs, such as mindfulness. Also, several limitations have been identified for the mindfulness measures, including lack of external, objective criteria, potential confusion over semantic interpretation, and the introspection required to recollect mental states (Grossman, 2008). Therefore, future research should include different assessment methods other than self-reported questionnaires.

Another important limitation is related to the data collection, given that we used a non-probability sampling method. Regarding the specific characteristics of burnout and psychopathological symptoms, a positive sample bias should be assumed as it is probable that anaesthesiologists suffering from higher levels of both stress and burnout may have chosen not to collaborate with the study.

Replication of this study in different countries is also important and necessary in order to assure that our findings are reliable and valid and also to prompt new research questions.

Furthermore, we only studied few processes of emotion regulation which is a larger, complex and multidimensional construct, so in future studies, other emotion regulation strategies should be addressed to analyse their effect on burnout.

Future perspectives include two different fields. One is to continuously increasing our understanding of mechanisms of burnout. Another, more important one, is to transform this knowledge into practical measures in order to improve anaesthesiologists' well-being and patient safety.

Since one of the contributions of the present research has resulted in the development and validation of a Portuguese version instrument that evaluates the stressors in anaesthesiologists, future studies may develop an English version which would need validation in an Anglophone culture. Also, this questionnaire had a paper-based format that was costly in terms of the time required to read the data: the exact position of each mark had to be determined by hand. All this would change considerably with computerization. The rise of Internet-based research has led to a reduction in the practical drawbacks associated with the VAS, which has become a measurement device that is used widely. Future research should also consider validating the SQA using a VAS generator.

Additionally, our study tested the factor structure of Copenhagen Burnout Inventory in which a latent 2nd order factor was created, allowing to produce a global burnout index. This index must be tested in different populations.

Results from our study, suggest that psychological flexibility, mindfulness trait and self-compassion were related to less burnout and fewer psychopathological symptoms. Mindfulness-based interventions have been shown to increase both trait mindfulness and self-compassion (Gu, Strauss, Bond, & Cavanagh, 2015). Thus, this study provides support for the argument that programs that focus on cultivating mindfulness and self-compassion should be developed among anaesthesiologists to help reduce the risk of burnout and psychopathology.

The main recommendation for the future is the need for the long-term effects of mindfulness interventions in anaesthesiologists to be studied in high quality randomised control trials. Additionally, agreement is required on consistent outcome measures.

Future studies should test mindfulness-based interventions adapted to anaesthesiologists, with different delivery formats, namely on-line or mobile applications.

It is also important to understand how anaesthesiologists' burnout and psychopathology might impact the safe practice of anaesthesiology.
To explore mechanisms of change in mindfulness-based interventions is a challenge, but a crucial area in need of further research.

In future investigations, it will be important to include the study of physiological and biochemical markers as well as neuroimaging studies, to explore the mechanisms of mindfulness and self-compassion-based programs. Future studies should also focus on ways to assess the cost-effectiveness of programs. Additionally, it would be interesting to develop therapy genetics-based studies in order to understand the large inter-individual variations that exist with respect to the response to mindfulness programs.

By opening relevant new fields of research, we hope to motivate and interest other physicians and researchers to investigate the interesting area of study that is emotional regulation in physicians.

Chapter 6 - Conclusions

Our studies aimed to contribute to the knowledge of individual traits of emotion regulation, particularly mindfulness, and its relationship with burnout and psychopathological symptoms. Our multi-centre cross-sectional survey revealed that burnout scores were lower in anaesthesiologists when compared to other specialities, and that anaesthesia residents had higher levels of burnout than anaesthesia specialists. Also, our findings revealed that several socio-demographic and work-related variables predicted higher levels of burnout, namely being younger, higher workload and working in north region. Working in south region and less than 40 hours per week predicted lower levels of stress. Professionals with no religion tend to have more depression. Being an anaesthesia resident is related with higher levels of anxiety. Drinking more than 5 alcoholic drinks per week was a positive predictor of psychopathological symptoms and being a non-smoker is a predictor of lower levels of burnout.

Regarding stressors, our results showed that organizational stressors were the most important predictors of burnout. Regarding emotion regulation processes, we found that psychological flexibility, mindfulness trait, and self-compassion were related to less burnout and psychopathological symptoms.

A comprehensive transdiagnostic model showed that job-related stressors impact on burnout through rumination and depression, and that mindfulness is a significant moderator of the association between rumination and depression. This results suggest that mindfulness, by promoting a self-regulatory attention awareness focused on the present moment in a purposeful and accepting manner, decreases or even blocks the ongoing pattern of repetitive negative thinking that characterizes rumination. In other words, mindfulness seems to function as a buffering process that mitigates the impact of rumination on depression.

The findings of this study add to the corpus of knowledge and comprehension of the factors which potentially reduce the risk of burnout and psychopathology, namely anxiety and depression, among anaesthesiologists. Also, this study provide support for the argument that programs that focus on cultivating mindfulness and self-compassion should be developed among anaesthesiologists to help reduce the risk of burnout and psychopathology.

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Appendix

TÍTULO: ESTUDO DE FACTORES INDIVIDUAIS NO DESENVOLVIMENTO DE STRESS, BURNOUT E DEPRESSÃO EM ANESTESIOLOGISTAS

INVESTIGADOR PRINCIPAL

Teresa Alexandra Santos Carvalho Lapa

RESUMO

Os anestesiologistas trabalham num ambiente complexo, stressante e em mudança constante, estão permanentemente sob tensão e expostos a múltiplos cenários altamente imprevisíveis. A pressão para aumentar a produtividade a qualquer custo, tem crescido de forma notória.

Este problema interfere não só com a qualidade de trabalho assistencial mas também com o bem estar de cada profissional, que pode facilmente entrar numa situação de *stress*, fadiga e *burnout*, com implicações graves a nível pessoal e profissional.

Nem todos os anestesiologistas respondem de forma igual aos exigentes desafios com que diariamente se deparam, o que pode estar relacionado com mecanismos intrínsecos de regulação emocional.

Com este trabalho, os autores pretendem estudar alguns destes mecanismos de regulação emocional nos anestesistas e relacioná-los com o desenvolvimento de *stress*, ansiedade, depressão e *burnout*. Pretende-se também investigar quais as áreas da anestesiologia em que estes problemas são mais prevalentes.

A colaboração dos colegas no preenchimento deste inquérito é muito importante pois a partir das suas conclusões, ambiciona-se definir critérios que permitam que os serviços de anestesiologia se adaptem mais convenientemente às necessidades dos profissionais. Por outro lado perspectiva-se definir estratégias individuais que limitem o despoletar de situações de stress, fadiga e burnout nos anestesiologistas.

Os resultados obtidos neste estudo serão estritamente confidenciais e apenas serão utilizados para efeitos de investigação. Complete por favor todos os questionários. Não deixe, nenhuma questão por responder (dado que isso invalida todas as suas restantes respostas). Não existem respostas correctas ou erradas. Apenas pretendemos que responda da forma mais sincera e espontânea possível.

FORMULÁRIO DE CONSENTIMENTO INFORMADO

Eu, abaixo assinado(a) _____ aceito participar no trabalho "*ESTUDO DE FACTORES INDIVIDUAIS NO DESENVOLVIMENTO DE STRESS, BURNOUT E DEPRESSÃO EM ANESTESIOLOGISTAS*", que está a ser desenvolvido tendo como investigadora principal a Dra. Teresa Lapa, médica anestesista do Centro Hospitalar e Universitário de Coimbra e aluna do Doutoramento em Medicina da Faculdade de Ciências da Saúde da Universidade da Beira Interior (UBI).

Fui informado(a) de que este estudo tem como orientadores o Professor Joaquim da Silva Viana, daquela Universidade, e o Professor José Pinto Gouveia, da Faculdade de Psicologia da Universidade de Coimbra e que, nem a investigadora principal nem os orientadores ou qualquer outra pessoa tem interesses económicos pela execução deste estudo, recebe qualquer comparticipação financeira ou tem qualquer conflito de interesses a declarar.

Fui informado(a) que a participação no estudo é voluntária e que, mesmo depois deste consentimento estar assinado e caso o deseje, posso suspender a minha participação em qualquer momento. Fui também informado de que a minha participação consiste em responder a um conjunto de questionários, cujo preenchimento demora cerca de 30 minutos.

Foi-me fornecida uma explicação integral da natureza e objectivos do estudo e dada a possibilidade de colocar questões e esclarecer todos os aspectos que considerei pertinentes. Foi-me garantido que a minha identidade jamais será revelada e que os dados que fornecer serão tratados de forma anónima, permanecerão confidenciais e serão usados apenas no âmbito desta investigação.

Coimbra, ____ de _____ de 2014

A Investigadora Principal

_____

O / A Participante

_____

QUESTIONÁRIO SOCIO - DEMOGRÁFICO E LABORAL

A equipa de investigação que leva a cabo este trabalho muito agradece a sua colaboração no preenchimento e devolução do presente questionário.

Instruções:

Responda ou coloque uma cruz no quadrado correspondente à sua situação socio-demográfica e laboral:

1 – Idade : _____ anos

2 – Sexo:

☐ Feminino ☐ Masculino

3 – Estado Civil

☐ Solteira(o) ☐ Divorciada(o)

☐ Viúva(o) ☐ Casada(o) ou União de facto

4 – Número de filhos _____

5 – Carga horária semanal (inclui actividade pública e/ou privada)

☐ ≤ 40 horas/ semana

☐ > 40 - ≤ 60 horas/ semana

☐ > 60 - ≤ 80 horas/ semana

☐ > 80 horas/ semana

6 – Instituição em que trabalha

☐ apenas instituição pública

☐ instituição pública + privada

☐ apenas instituição privada

7 – Categoria profissional

☐ Assistente hospitalar

☐ Assistente graduado

☐ Assistente graduado sénior

8 – Número de anos de experiência em anestesiologia (não inclui internato)

☐ ≤ 3 anos

☐ > 3 - ≤ 5 anos

☐ > 5 - ≤ 10 anos

☐ > 10 - ≤ 20 anos

☐ > 20 anos

9 – Trabalho noturno

☐ Sim ☐ Não

10 – Situação Profissional

☐ Com vínculo contratual

☐ Sem vínculo contratual

11 – Envolvimento em cargos de gestão

☐ Sim ☐ Não

12 – Envolvimento ativo no ensino médico (ex. orientação de internos)

☐ Sim ☐ Não

13 – Número médio de horas de sono/dia

☐ ≤ 6 horas

☐ > 6 - ≤ 8 horas

☐ > 8 horas

14 – Região onde exerce anestesiologia

☐ Região Norte

☐ Região Centro

☐ Região Sul

☐ Açores

☐ Madeira

15 – Áreas em que trabalha regularmente (preencha todas aquelas em que trabalha)

☐ Anestesiologia

☐ Cirurgia geral

☐ Major

☐ Minor

☐ Cirurgia cardíaca

☐ Cirurgia vascular

☐ Cirurgia plástica

☐ Cirurgia torácica

☐ Urologia

☐ Ortopedia

☐ Ginecologia

☐ Obstetrícia

☐ Otorrinolaringologia

☐ Oftalmologia

☐ Anestesia fora do bloco operatório

☐ Unidade cuidados pós anestésicos

☐ Dor aguda

☐ Cirurgia de ambulatório

☐ Outra _____

☐ Medicina Intensiva

☐ Dor Crónica

☐ Emergência Médica

☐ Intra hospitalar

☐ Extra hospitalar

16 – Anestesia para pediatria

- ☐ Diariamente
- ☐ Regularmente
- ☐ Esporadicamente
- ☐ Nunca

17 – Tabagismo

- ☐ Não fuma
- ☐ Fuma ocasionalmente
- ☐ Fuma de forma regular

18 – Consumo de bebidas alcoólicas por semana

- ☐ ≤ 5 bebidas/ semana
- ☐ > 5 bebidas/ semana

19 – Prática de actividades extra laborais

- ☐ Desporto
- ☐ Solidariedade/Voluntariado
- ☐ Educação/Formação
- ☐ Lazer/Família

20 – Experiência em meditação, técnicas de relaxamento ou yoga

☐ Sim ☐ Não

21 – Prática religiosa

- ☐ Com prática religiosa regular
- ☐ Sem prática religiosa regular
- ☐ Sem religião

QUESTIONÁRIO DE STRESS EM ANESTESIOLOGISTAS

Instruções:

Para cada uma das seguintes afirmações, coloque por favor, um traço vertical (|) no local que considera mais apropriado, das escalas visuais analógicas.

Fatores que considera **como indutores de *stress*** na sua atividade profissional:

1) Doentes com classificação ASA com grau mais elevado

2) Intervenções cirúrgicas mais complexas

3) Antecipação de dificuldade na intubação orotraqueal

4) Trabalho fora do local habitual, com equipa e equipamento diferentes

5) Relação com Cirurgião

6) Relação com restante equipa anestésica

7) Falta de condições de trabalho

8) Incapacidade em manter-se atualizado em relação ao conhecimento teórico e à aplicação de novas tecnologias

9) Organização do serviço de Anestesiologia em que trabalha

10) Falta de tempo/ dificuldade em organizar o tempo

QUESTIONÁRIO RELATIVO À PRÁTICA CLÍNICA

Instruções:

Para cada uma das seguintes questões, indique por favor a sua conduta mais frequente, relativamente à prática diária em anestesiologia. Responda, apenas às questões que se aplicam às suas áreas de trabalho.

1 - Realiza visita pré-anestésica ao doente, na véspera da cirurgia

- ☐ Nunca
- ☐ Raramente
- ☐ Algumas vezes
- ☐ Frequentemente
- ☐ Sempre

2 - Pré-operatoriamente, verifica as análises do doente

- ☐ Nunca
- ☐ Raramente
- ☐ Algumas vezes
- ☐ Frequentemente
- ☐ Sempre

3 - Na véspera , vai rever temas relevantes para a anestesia que irá realizar (tipo de cirurgia e doenças associadas)

- ☐ Nunca
- ☐ Raramente
- ☐ Algumas vezes
- ☐ Frequentemente
- ☐ Sempre

4 - No início do dia, verifica o ventilador

- ☐ Nunca
- ☐ Raramente
- ☐ Algumas vezes
- ☐ Frequentemente
- ☐ Sempre

5 - Revê o material de abordagem da via aérea pré-operatoriamente

- ☐ Nunca
- ☐ Raramente
- ☐ Algumas vezes
- ☐ Frequentemente
- ☐ Sempre

6 - Verifica os acessos venosos/torneiras para viabilizar a correcta administração de fármacos

- ☐ Nunca
- ☐ Raramente
- ☐ Algumas vezes
- ☐ Frequentemente
- ☐ Sempre

7 – Confirma que os alarmes do monitor estão activos

- ☐ Nunca
- ☐ Raramente
- ☐ Algumas vezes
- ☐ Frequentemente
- ☐ Sempre

8 - Confirma localização do acto cirúrgico

- ☐ Nunca
- ☐ Raramente
- ☐ Algumas vezes
- ☐ Frequentemente
- ☐ Sempre

9 – Utiliza todos os acessórios (touca, máscara, bata e luvas esterilizadas) quando realiza bloqueio do neuro-eixo

- ☐ Nunca
- ☐ Raramente
- ☐ Algumas vezes
- ☐ Frequentemente
- ☐ Sempre

10 – Realiza Rx tórax após colocação de cateter venoso central

- ☐ Nunca
- ☐ Raramente
- ☐ Algumas vezes
- ☐ Frequentemente
- ☐ Sempre

11- Durante a intervenção cirúrgica sai da sala operatória

- ☐ Nunca
- ☐ Raramente
- ☐ Algumas vezes
- ☐ Frequentemente
- ☐ Sempre

12 – Realiza visita pós-anestésica

- ☐ Nunca
- ☐ Raramente
- ☐ Algumas vezes
- ☐ Frequentemente
- ☐ Sempre

13 – Utiliza a *checklist* para cada doente proposto para cirurgia

- ☐ Nunca
- ☐ Raramente
- ☐ Algumas vezes
- ☐ Frequentemente
- ☐ Sempre

QUESTIONÁRIO DE COPENHAGEN BURNOUT INVENTORY
PT (CBI – PT)

Instruções: Para cada uma das seguintes questões, indique por favor a sua situação.

	Sempre	**Frequente-mente**	**Às vezes**	**Rara-mente**	**Nunca/ Quase Nunca**
1 - Com que frequência se sente cansado/a?					
2 - Com que frequência se sente fisicamente exausto/a?					
3 - Com que frequência se sente emocionalmente exausto/a?					
4 - Com que frequência pensa: "Eu não aguento mais isto"?					
5 - Com que frequência se sente fatigado/a?					
6 - Com que frequência se sente frágil e susceptível a ficar doente?					
7 - Sente-se esgotado/a no final de um dia de trabalho?					
8 - Sente-se exausto/a de manhã ao pensar em mais um dia de trabalho?					
9 - Sente que cada hora de trabalho é cansativa para si?					
10 - Está cansado de trabalhar com utentes?					
11 - Alguma vez se questiona quanto tempo conseguirá continuar a trabalhar com doentes?					
	Muito	**Bastante**	**Assim Assim**	**Pouco**	**Muito Pouco**
12 - O seu trabalho é emocionalmente desgastante?					
13 - Sente-se esgotado por causa do seu trabalho?					
14 - O seu trabalho deixa-o/a frustrado/a?					
15 - Acha difícil trabalhar com doentes?					
16 - Acha frustrante trabalhar com doentes?					
17 - Trabalhar com doentes deixa-o/a sem energia?					
18 - Sente que dá mais do que recebe quando trabalha com doentes?					
	Nunca / Quase Nunca	**Rara-mente**	**Às vezes**	**Frequente -mente**	**Sempre**
19 - Tem energia suficiente para a família e os amigos durante o tempo de lazer?					

Questionário das Cinco Facetas de Mindfulness (FFMQ)

(Baer, R., et al, 2006)

(Tradução e Adaptação de Pinto Gouveia, J. e Gregório, S., 2007)

Instruções:

Por favor avalie cada uma das afirmações seguintes de acordo com a escala. Assinale com uma cruz o número que melhor descreve a sua opinião sobre o que considera ser geralmente verdadeiro para si.

Nunca ou muito raramente verdadeiro	Raramente verdadeiro	Algumas vezes verdadeiro	Frequentemente verdadeiro	Muito frequente-mente ou sempre verdadeiro
1	2	3	4	5

	1	2	3	4	5
1. Quando caminho presto deliberadamente atenção às sensações do meu corpo em movimento.					
2. Encontro facilmente as palavras para descrever os meus sentimentos.					
3. Critico-me por ter emoções irracionais ou inapropriadas.					
4. Apercebo-me dos meus sentimentos e emoções sem ter que lhes reagir.					
5. Quando estou a fazer qualquer coisa a minha mente vagueia e distraio-me facilmente.					
6. Quando tomo um duche ou banho fico atento(a) às sensações da água no meu corpo.					
7. Consigo traduzir facilmente as minhas crenças, opiniões e expectativas em palavras.					
8. Não presto atenção ao que estou a fazer porque estou a sonhar acordado(a), preocupado(a) ou distraído(a) com qualquer coisa.					
9. Observo os meus sentimentos sem me “perder” neles.					
10. Digo a mim próprio(a) que não devia sentir-me como me sinto.					
11. Noto como a comida e a bebida afectam os meus pensamentos, as minhas sensações corporais e emoções.					
12. Tenho dificuldade em encontrar palavras para descrever o que penso.					

	1	2	3	4	5
13. Distraio-me facilmente.					
14. Acredito que alguns dos meus pensamentos são anormais ou maus e que não devia pensar dessa forma.					
15. Presto atenção às sensações, tais como o vento no meu cabelo ou o sol no meu rosto.					
16. Tenho dificuldade em pensar nas palavras certas para exprimir o que sinto acerca das coisas.					
17. Faço julgamentos sobre se os meus pensamentos são bons ou maus.					
18. É-me difícil permanecer focado no que está a acontecer no presente.					
19. Quando tenho pensamentos ou imagens muito perturbadores distancio-me e torno-me consciente do pensamento ou imagem sem ser "apanhado" por este(a).					
20. Presto atenção a sons, tais como o bater do relógio, o chilrear dos pássaros ou os carros a passar.					
21. Em situações difíceis consigo parar e não reagir imediatamente.					
22. Quando tenho uma sensação no meu corpo é-me difícil descrevê-la porque não consigo encontrar as palavras certas.					
23. Parece que funciono em "piloto automático" sem muita consciência do que estou a fazer.					
24. Pouco tempo depois de ter pensamentos ou imagens perturbadoras, sinto-me calmo(a).					
25. Digo a mim próprio(a) que não devia pensar do modo como estou a pensar.					
26. Noto o cheiro e o aroma das coisas.					
27. Mesmo quando estou profundamente triste ou terrivelmente perturbado consigo encontrar uma forma de colocar isso em palavras.					
28. Faço as actividades sem estar realmente atento(a) às mesmas.					
29. Quando tenho pensamentos ou imagens perturbadores consigo aperceber-me deles sem reagir.					
30. Penso que algumas das minhas emoções são más e inapropriadas e que não as devia sentir.					
31. Noto elementos visuais na arte ou na natureza, tais como cores, formas, texturas ou padrões de luz e sombras.					

	1	2	3	4	5
32. A minha tendência natural é traduzir as minhas experiências em palavras.					
33. Quando tenho pensamentos e imagens perturbadores, apenas me apercebo deles e "deixo-os ir".					
34. Realizo trabalhos ou tarefas automaticamente sem estar atento ao que estou a fazer.					
35. Quando tenho pensamentos ou imagens perturbadores julgo-me como bom (boa) ou mau (má), em função desses pensamentos ou imagens.					
36. Presto atenção à forma como as minhas emoções influenciam o meu comportamento.					
37. Normalmente consigo descrever como me sinto no momento, com grande pormenor.					
38. Dou por mim a fazer coisas sem prestar atenção.					
39. Desaprovo-me quando tenho ideias irracionais.					

ESCALA DE INCAPACITAÇÃO DE SHEEHAN

(Sheehan, 1984)

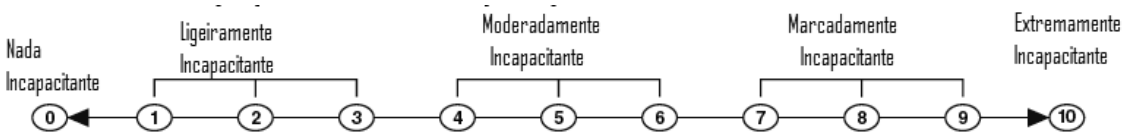
(tradução: Pinto-Gouveia, Cunha e Salvador, 1997)

Instruções:

Avalie de que forma, as suas dificuldades actuais, interferem na sua vida, utilizando a escala de 0 a 10:

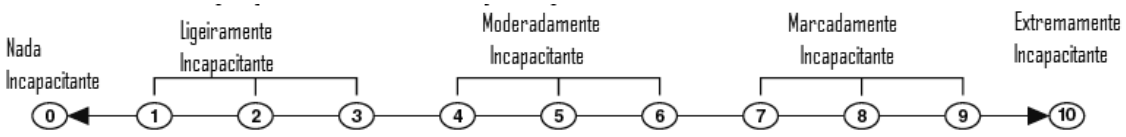
Trabalho

Neste momento, de que forma é que o seu trabalho é prejudicado pelo seu stress?



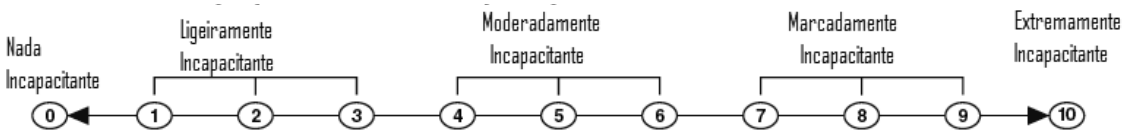
Vida Social/ Convívio com os amigos

Neste momento, de que forma é que a sua vida social/ convívio com os amigos são prejudicados pelo seu stress?



Vida afectiva

Neste momento, de que forma é que a sua vida afectiva é prejudicada pelo seu stress?



AAQ II – Questionário de Aceitação e Acção

(Bond, F., et al, 2007)

(Tradução e adaptação de Pinto Gouveia, J. e Gregório, S., 2007)

Instruções:

Em baixo encontra-se uma lista de afirmações. Por favor assinale a veracidade de cada uma, em função de como se aplica a si. Use a seguinte escala para fazer a sua escolha:

Nunca verdadeiro	Muito raramente verdadeiro	Pouco verdadeiro	Algumas vezes verdadeiro	Frequente-mente verdadeiro	Quase sempre verdadeiro	Sempre verdadeiro
1	2	3	4	5	6	7

	1	2	3	4	5	6	7
As minhas experiências e memórias dolorosas dificultam que eu viva uma vida que valorize.							
Tenho medo dos meus sentimentos.							
Não ser capaz de controlar as minhas preocupações e sentimentos é algo que me preocupa.							
As minhas memórias dolorosas impedem-me de ter uma vida em pleno.							
As emoções originam problemas na minha vida.							
Parece que a maior parte das pessoas gerem as suas vidas melhor do que eu.							
As minhas preocupações atravessam-se no caminho do meu sucesso.							

DASS-21

(Lovibond & Lovibond, 1995)

(Tradução e adaptação de Pais-Ribeiro, J., Honrado, A. e Leal, I., 2004)

Instruções:

Por favor leia cada uma das afirmações abaixo e assinale 0, 1, 2 ou 3 para indicar quanto cada afirmação se aplicou a si durante a semana passada. Não há respostas certas ou erradas. Não leve muito tempo a indicar a sua resposta em cada afirmação.

Não se aplicou nada a mim	Aplicou-se a mim algumas vezes	Aplicou-se a mim muitas vezes	Aplicou-se a mim a maior parte das vezes
0	1	2	3

	0	1	2	3
1. Tive dificuldades em me acalmar.				
2. Senti a minha boca seca.				
3. Não consegui sentir nenhum sentimento positivo.				
4. Senti dificuldades em respirar.				
5. Tive dificuldade em tomar a iniciativa para fazer coisas.				
6. Tive tendência a reagir em demasia em determinadas situações.				
7. Senti tremores (por exemplo, nas mãos).				
8. Senti que estava a utilizar muita energia nervosa.				
9. Preocupei-me com situações em que podia entrar em pânico e fazer figura ridícula.				
10. Senti que não tinha nada a esperar do futuro.				
11. Dei por mim a ficar agitado.				
12. Senti dificuldade em me relaxar.				
13. Senti-me desanimado e melancólico.				
14. Estive intolerante em relação a qualquer coisa que me impedisse de terminar aquilo que estava a fazer.				
15. Senti-me quase a entrar em pânico.				
16. Não fui capaz de ter entusiasmo por nada.				
17. Senti que não tinha muito valor como pessoa.				
18. Senti que, por vezes, estava sensível.				
19. Senti alterações no meu coração sem fazer exercício físico.				
20. Senti-me assustado sem ter tido uma boa razão para isso.				
21. Senti que a vida não tinha sentido.				

RRS - 10

(Treynor, W., Gonzales, R. & Nolen-Hoeksema, S., 2003)

(Tradução e Adaptação: Dinis, Pinto-Gouveia, Duarte, & Castro, 2011)

Instruções:

As pessoas pensam e fazem coisas muito diferentes quando se sentem tristes, deprimidas ou em baixo. De seguida está apresentada uma lista de possibilidades. Por favor leia cada um dos seguintes itens e indique, usando a escala abaixo, quando nunca, algumas vezes, frequentemente ou sempre pensa ou faz cada uma deles quando se sente em baixo, triste ou deprimida. Por favor indique o que geralmente faz e não o que julga que deveria fazer nessas situações.

Utilize por favor esta escala:

Quase nunca	Às vezes	Frequente mente	Quase sempre
0	1	2	3

Quando me sinto *em baixo*, triste ou deprimido (a):

	0	1	2	3
1. Penso: "O que é que eu fiz para merecer isto?".				
2. Analiso eventos recentes para tentar compreender porque é que estou deprimido.				
3. Penso "Porque é que eu reajo sempre deste modo?"				
4. Deixo-me levar pelo que sinto e penso no porquê de me sentir deste modo.				
5. Escrevo aquilo em que estou a pensar e de seguida analiso o que escrevi.				
6. Penso acerca de uma situação recente desejando que ela tivesse corrido melhor.				
7. Penso "porque é que eu tenho problemas que outras pessoas não têm?"				
8. Penso "Porque é que eu não consigo lidar melhor com as coisas?"				
9. Analiso a minha personalidade e tento compreender porque é que me sinto deprimido.				
10. Vou para algum sítio onde possa estar sozinho para pensar sobre os meus sentimentos.				

SELFCS

(Neff, K.D., 2003)

(Tradução e Adaptação: Pinto Gouveia, J. & Castilho, P, 2006)

Instruções:

Leia por favor cada afirmação com cuidado antes de responder. À direita de cada item indique qual a frequência com que se comporta, utilizando a seguinte escala:

Quase nunca	Raramente	Algumas vezes	Muitas vezes	Quase sempre
1	2	3	4	5

Como é que, habitualmente, me comporto em momentos difíceis?

	1	2	3	4	5
Desaprovo-me e faço julgamentos acerca dos meus erros e inadequações					
Quando me sinto em baixo tendo a fixar-me e a ficar obcecado(a) com tudo aquilo que está errado.					
Quando as coisas me correm mal vejo as dificuldades como fazendo parte da vida, e pelas quais toda a gente passa..					
Quando penso acerca das minhas inadequações e defeitos sinto-me mais separado(a) e desligado(a) do resto do mundo.					
Tento ser carinhoso(a) comigo próprio(a) quando estou a sofrer emocionalmente.					
Quando falho em alguma coisa que é importante para mim martirizo-me com sentimentos de inadequação.					
Quando estou em baixo lembro-me que existem muitas outras pessoas no mundo que se sentem como eu.					
Quando passo por tempos difíceis tendo a ser muito exigente e duro(a) comigo mesmo(a).					
Quando alguma coisa me aborrece ou entristece tento manter o meu equilíbrio emocional (controlo as minhas emoções).					
Quando me sinto inadequado(a) de alguma forma, tento lembrar-me que a maioria das pessoas, por vezes, também sente o mesmo.					
Sou intolerante e pouco paciente em relação aos aspectos da minha personalidade que não gosto.					
Quando atravesso um momento verdadeiramente difícil na minha vida dou a mim próprio(a) a ternura e afecto que necessito.					

	1	2	3	4	5
Quando me sinto em baixo tenho tendência para achar que a maioria das pessoas é, provavelmente, mais feliz do que eu.					
Quando alguma coisa dolorosa acontece tento ter uma visão equilibrada da situação.					
Tento ver os meus erros e falhas como parte da condição humana.					
Quando vejo aspectos de mim próprio(a) que não gosto fico muito muito em baixo.					
Quando eu falho em alguma coisa importante para mim tento manter as coisas em perspectiva (não dramatizo).					
Quando me sinto com muitas dificuldades tendo a pensar que para as outras pessoas as coisas são mais fáceis.					
Sou tolerante e afectuoso(a) comigo mesmo(a) quando experiencio sofrimento.					
Quando alguma coisa me aborrece ou entristece deixo-me levar pelos meus sentimentos.					
Posso ser bastante frio(a) e duro(a) comigo mesmo(a) quando experiencio sofrimento.					
Quando me sinto em baixo tento olhar para os meus sentimentos com curiosidade e abertura.					
Sou tolerante com os meus erros e inadequações.					
Quando alguma coisa dolorosa acontece tendo a exagerar a sua importância.					
Quando falho nalguma coisa importante para mim tendo a sentir-me sozinho(a) no meu fracasso.					
Tento ser compreensivo(a) e paciente em relação aos aspectos da minha personalidade de que não gosto.					

SWLS

(Diener, 1985)

(tradução e adaptação: Simões, 1992)

Instruções:

Esta escala compreende cinco frases com as quais poderá concordar ou discordar. Utilize a escala de 1 a 5 e marque uma X (cruz) no quadrado que melhor indica a sua resposta.

Discordo muito	Discordo um pouco	Nem concordo, nem discordo	Concordo um pouco	Concordo muito
1	2	3	4	5

	1	2	3	4	5
1. A minha vida parece-se, em quase tudo, com o que eu desejaria que ela fosse.					
2. As minhas condições de vida são muito boas.					
3. Estou satisfeito(a) com a minha vida.					
4. Até agora, tenho conseguido as coisas importantes da vida que eu desejaria.					
5. Se eu pudesse recomeçar a minha vida, não mudaria quase nada.					