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Macro-social stressors, perceived stress, psychiatric symptoms, and self-esteem in adolescents and the feasibility of an internet-based mindfulness intervention

CARL ANTONSON | FACULTY OF MEDICINE | LUND UNIVERSITY





Photo: Frida Thorsén

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Macro-social stressors,
perceived stress, psychiatric
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adolescents and the feasibility
of an internet-based
mindfulness intervention

Carl Antonson



LUND
UNIVERSITY

DOCTORAL DISSERTATION

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MADE IN SWEDEN 

To my fabulous family

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Abstract

Introduction: Governance, school proficiency and urbanicity can be macro-social stressors. Self-esteem is a resilience factor that can buffer stress (the stress-buffer hypothesis); it can be decreased by stress (scar-hypothesis). Mindfulness is an intervention against stress and psychiatric symptoms. Internet-based Mindfulness-Based Interventions (iMBI) has not been studied among adolescents.

Aims: To analyse adolescent macro-social stressors in relation to self-esteem, perceived stress and psychiatric symptoms and feasibility of iMBI among adolescents.

Material & Methods: The Governance project analysed self-esteem in adolescents with the 'I Think I Am'-questionnaire (ITIA) in Sweden and Bulgaria before the fall of the Berlin Wall (T1) cross-sectionally and 25 years later (T2) in a time-lag study.

The CHAMPS project analysed perceived stress, psychiatric symptoms, sleep quality, and Neuroticism/Extraversion in Swedish adolescents in two upper secondary schools, (urban/high academic proficiency, rural/average proficiency). The participants were randomised into 8-week intervention arms: iMBI, active controls or waiting-list.

Results:

Governance project: At T1 the Swedes scored significantly higher in ITIA-scale global than the Bulgarians partly due to higher '*Relations with others*'. Sweden also had larger sex-differences. At T2 the sex-differences in Sweden had decreased. There were interactions between country and time. CHAMPS project: There were no differences in the outcomes between the two schools and the compliance was low.

Conclusions:

Bulgarians had lower global self-esteem partly due to lower self-esteem in relation to others, which equalised 25 years later, possibly due to reduction in macro-social stressors related to governance. A vicious circle of allostatic load, the scar- and stress-buffer hypotheses proposes how stress-resilience may relate to macro-social stressors and where mindfulness could influence.

Stress and psychiatric symptoms were not correlated to urbanicity or academic proficiency. The effect of iMBI could not be evaluated due to low compliance. iMBI compliance could perhaps be addressed via school curriculum.

List of Papers

This thesis is based on the following Papers, which will be referred to in the text by the respective Roman numeral.

I. **Antonson, Carl**; Thorsén, Frida; Berg, Rada; Palmér, Karolina; Sundquist, Jan; Sundquist, Kristina “Democracy, Dictatorship, and Adolescent Self-Esteem: a Cross-sectional Comparison across the Iron Curtain”, *Journal of Educational and Developmental Psychology* (in print)

II. **Antonson, Carl**; Thorsén, Frida; Berg, Rada; Palmér, Karolina; Mutafchieva, Milena, Koltcheva, Nadia ; Sundquist, Jan; Sundquist, Kristina “The Influence of Democracy and Dictatorship on Self-Esteem in Adolescents; a Time-Lag Study across the Iron curtain.” Manuscript

III. **Antonson, Carl**; Thorsén, Frida; Sundquist, Kristina; Sundquist, Jan “Stress-Related Symptoms in Swedish Adolescents: A Study in Two Upper Secondary Schools” *Journal of Educational and Developmental Psychology*, 2014, 4(2) pp. 65-73

IV. **Antonson, Carl**; Thorsén, Frida; Sundquist, Jan; Sundquist, Kristina “Upper secondary school students’ compliance with two Internet-based self-help programmes: a randomised controlled trial” *European Child & Adolescent Psychiatry*, 2018, 27(2) pp. 191-200

Abbreviations

ACT – Acceptance and Commitment Therapy
ANOVA - Analysis of Variance
CBT - Cognitive Behavioural Therapy
CHAMPS - Cognition and Health in Adolescents, Mindfulness as
Prevention of Stress
CONSORT - Consolidated Standards Of Reporting Trials
EPI - Eysenck Personality Index
GAS - General Adaptation Syndrome
GC - Glucocorticoids
GSI - Global Severity Index
HPA - Hypothalamic-Pituitary-Adrenal
iCBT - Internet-based Cognitive Behavioural Therapy
ICCS - International Civic and Citizenship Education Study
iMBI - Internet-based Mindfulness Based Intervention
iMT -Internet-based Music Therapy
ITIA - ‘I Think I Am’-scale
IPT - Internet-based Psycho Therapy
MBI - Mindfulness Based Intervention
MBCT - Mindfulness Based Cognitive Therapy
MBSR - Mindfulness Based Stress Reduction
PSQI - Pittsburgh Sleep Quality Index
PSS - Perceived Stress Scale 14
RCT - Randomised Controlled Trial
SCL-90 - Symptoms Check List 90
SD - Standard Deviation
SOC - Sense of Coherence
T1 - First time-point
T2 - Second time-point

Introduction

‘If I have seen longer it is by standing on the shoulders of Giants.’

- Isaac Newton, *‘Letter to Robert Hooke’*, 1675



Photo: The author.

Stress

The term 'Stress'

'The beginning of wisdom is to call things by their proper name.'

- *Confucius*

The term *stress* comes originally from the engineering sciences and is defined as the internal forces that neighbouring particles of a continuous material exert on each other. It has been used since the 14th century to denote hardship (Lazarus & Folkman, 1984).

A brief history of stress research

'Complete freedom from stress is death'

- *Hans Selye (attributed to)*

The first scientific publication on stress is the now classic article from 1936 named 'A Syndrome Produced by Diverse Nocuous Agents'. In this article the author, Hans Selye, an Austro-Hungarian endocrinologist working in Canada, summed up his conclusion that no matter how you mistreat a rat (he used sublethal doses of toxins, cold, surgical injury, excessive exercise etc.) it still ends up with a syndrome with the pathologic triad of an enlarged adrenal cortex, shrunken thymus and lymphatic tissue, and gastric and duodenal ulcers (Selye, 1936). He named the syndrome the 'General Alarm Reaction' later renamed General Adaptation Syndrome (GAS) (Selye, 1976). He did not yet use the term stress in this first publication, but he used it colloquially when referring to the syndrome (Selye, 1976).

However, just like all scientists, he stood on the shoulders of previous colleagues. Selye himself claimed that his work was mainly dependent on two persons (Jackson, 2014); Claude Bernard, also referred to as the father of modern physiology, and Walter Cannon. Bernard theorised that all living organisms that lived independent of the surroundings had to sustain a stable 'milieu interior' (Jackson, 2014). Cannon built on Bernard's theories and developed the theory of homeostasis (Greek *homois*=same, similar and *stasis*=steady, stop) where organisms, mainly animals, are keeping a constant state internally when the external condition varies, i.e. blood sugar, body temperature, pH etc. This is, in humans, done by neuroendocrine systems and Cannon noticed the balancing function of the two parts of the autonomic nervous system: the sympathetic and the parasympathetic nervous

systems that work antagonistically on their target organs. Cannon named and described 'the fight or flight response' where man reacts to external stimuli with emotional reactions such as fear or anger and neuroendocrine reactions such as adrenalin release from the adrenals and release of glucose from the liver in order to be able to conduct instinctive powerful reactions in response to the emotions. He thus connected emotions, via neuroendocrine signalling, to the instinctive reactions; fear to flight, and anger to fighting (Cannon, 1914).

Selye also presented in his original article that the pathologic triad in GAS came in three stages and that the animals in the third stage, appearing after two to three months depending on the noxious agent, would either recover or lose their resistance towards the noxious agents and succumb in a wasting reaction similar to the first of the two stages (Selye, 1936). The three stages that comprise GAS are still in use today, for example in describing the Burn-out syndrome, are: 1.) The Alarm Reaction, 2.) The Stage of Resistance, and 3.) The Stage of Exhaustion (Selye, 1976). This last stage of resistance added a new factor to stress research - chronicity (Jackson, 2014). Selye also defined *stressor* as the causative agent for *stress* as the resulting condition after a sarcastic remark in the British Medical Journal that stress was its own cause. The GAS is the general reaction to any stressor, or causal agent, and should be understood as what remains when the specific reactions to the causal agent are subtracted (Selye, 1976).

Another concept Selye founded was the outcome-oriented definitions of eustress and distress, where eustress is the amount of stress that makes a person flourish and deliver results that prides them, what Selye refers to as 'to enjoy the eustress of fulfilment' whereas distress (dis-stress) is an amount of stress which is bound to lead to illness (Selye, 1976).

Selye, being an endocrinologist specialising in steroid hormones also added the steroid hormones of the adrenal cortex into his stress theories; Cannon had only included adrenaline and noradrenaline from the adrenal medulla to his research on homeostasis. In his textbook of endocrinology in 1949, Selye stated that the cortical steroid hormones was vital for the body's capacity of adapting to the stress of life (Jackson, 2014). The Second World War also contributed to reinforce Selye's theories on stress as the stress of combat was seen to follow his three-stage pattern. For instance, the prevalence of gastric ulcers increased in the severely bombed cities of England, which Selye acknowledged and attributed to an elevated level of adrenal cortical hormones, as seen in lab animals under stress (Selye, 1943).

Stress appraisal and coping

‘Det är inte hur man har’t, utan hur man tar’t’

(‘It’s not how it is, it’s how you take it’)

-Proverb from the Swedish county of Östergötland

The influence of the environment was already emphasised by Selye and his forbearers, but the way how the environment was assessed was still uncharted territory in the domain of stress until 1984 when the psychologists Richard Lazarus and Susan Folkman presented their theory about stress appraisal and coping (Lazarus & Folkman, 1984). The theory dictated that how a person sees and perceives an event generated physiological consequences; the mental events had biological outcomes. Their definition of stress emphasised the relation between the person and the environment, which takes into account both characteristics of the individual and the nature of the environment. They thereby stated the bidirectionality of the relationship and that the environment is appraised by the individual as an overload of the person’s resources and harming of the person’s well-being.

According to Lazarus and Folkman appraisal of stress is a cognitive process, although not necessarily conscious, that takes place in three stages: a primary appraisal that judges the event to be irrelevant or stressful. The stressful events are subdivided into *harm* that has already happened, *threat*, which is a possible future harm or loss and *challenge* that holds the possibility of gain or mastery (Lazarus & Folkman, 1984). The secondary appraisal is judgement whether if coping can be done and whether it might have a positive outcome. The third, reappraisal, is a change in appraisal built on new information from either the environment or the person. Vulnerability is of importance, as a vulnerable person is someone whose coping resources are insufficient in relation to the stressors. The person’s commitments and beliefs are important in appraisal as is the novelty, predictability, and uncertainty as well as the timing of the potentially stressful event. The duration of the stressor is of vital importance and builds on Selye’s concept of GAS. According to Lazarus and Folkman coping is cognitive and behavioural efforts to manage demands that are appraised as taxing or overloading the individual serving to managing or altering the environmental problem causing distress and regulating the emotional response to the problem (Lazarus & Folkman, 1984). They had also new approaches on a sociological level that will be discussed later in this thesis.

Hormesis

‘Stress is the salt of life’

- Hans Selye (attributed to)

Although there’s no evidence of the reverse, i.e. that stress actually increase the intake of sodium (Torres, Turneer, & Nowson, 2010), the classic quotation of Selye’s is a way of expressing that there is a goldilocks zone of stress where stress, either above or below the two threshold levels of the goldilocks zone, decreases happiness, meaning, productivity, and well-being. Being in this zone is what Selye described as eustress (Selye, 1976). This phenomenon, common in psychological and toxicological research, that the dose-response correlation has an inverted u-shaped is referred to as hormesis (Calabrese & Baldwin, 2002). It is an important concept as it states that there should be an optimal amount of stress. It is also methodologically important as a single measurement of stress, or a stress-induced variable, could be either on a positive or negative derivative to the stress-curve. This bell-shaped curve of response is also reported in stress and the response in tissues to glucose-corticoids, i.e. in blood-vessel constriction due to a haemorrhage stressor (R. M. Sapolsky, Romero, & Munck, 2000)

Allostasis, Allostatic load, and Allostatic overload

‘Gutta cavat lapidem, non vi sed saepe cadendo’

(‘A water drop hollows a stone, not by force but by falling often’)

- Ovidius, *Epsitulae ex Ponto*

The next stepping stone in the theoretical development of stress is the important concept of allostasis that the neurobiologist Peter Sterling and the epidemiologist Joseph Eyer invented in the 1980’s. They developed a model where complexity of several systems were integrated into a homeostasis-model and derived that the brain had a governing function in all homeostasis. The overall aim for allostasis is to eventually optimise the internal milieu for the brain, sometimes at the cost of other, more expendable organs. This is attained by varying the set-points of the different homeostatic systems for the overall aim of the brain, through feedback loops, in order to adapt to external demands (Sterling & Eyer, 1981). Allostasis literally means ‘achieving stability through change’ (McEwen, 2008). Sterling and Eyer also hypothesised that this system with a highly energy-consuming organ such as the brain is an example of Darwinian development. Due to the efficiency of having a governing organ as the brain in itself, where also higher cortical functions are

included in the allostatic regulation, the brain manages to protect itself and the rest of the body by being able to mitigate the complexity of a taxing situation through regulating all possible systems. The fact that this evolution of the expensive brain has taken place, particularly so in humans, is a token of the efficiency of the system (Sterling, 2012). This model also states the bidirectionality of the environment and the individual in how the brain sets the new allostatic set-points where prediction of future changes are also incorporated, which includes physiological changes as well as behavioural changes thereby linking stress, cognition, physiology, behaviour, and even social behaviour together (Sterling, 2012). Sterling and Eyer also from the start acknowledged the importance of how the demands, or stressors, are perceived in order to get an allostatic adaptation (Sterling & Eyer, 1981).

Bruce McEwen and Eliot Stellar evolved the allostasis concept in including stress into the joint concept of allostatic load (McEwen & Stellar, 1993) defined as 'the impact of wear and tear on a number of organs and tissues (that) can dispose the organism to disease' (McEwen, 2008). They note that the ranges of possible allostatic changes are greater in health than in disease and that by pushing oneself beyond this physiological range there is an imminent risk of pathology. They improve the allostasis model by incorporating long-term results of allostatic changes and the physiological expenses for it; although a short-term allostatic change may be adequate it may become disadvantageous in a longer scope. The state of the strain of allostatic changes on a number of organs and tissues over time was defined as allostatic load (McEwen & Stellar, 1993). Like Sterling and Eyer, they also include the appraisal of stressors into their model, thus incorporating the works of Folkman and Lazarus. Furthermore, they describe the pathology correlated to allostatic load, i.e. asthma, diabetes, autoimmunity, and myocardial infarctions, as well as describing potential mechanisms. These include behavioural changes, excess of sympathetic reactivity, endocrine imbalances, neuronal damage, and regulation of immune function. An example of allostatic overload would be hypertension due to increased corticoid and adrenergic stimulation of the vessel walls and heart due to prolonged stress (Sterling & Eyer, 1981) where the hypertension together with changed food habits towards overeating junk food and (Garg, Wansink, & Inman, 2007) greater snacking in response to daily stressors (Yau & Potenza, 2013) eventually leads to atherosclerosis and cardiovascular diseases such as myocardial infarction and stroke.

McEwen also coined the term allostatic overload as a term defining chronically challenged or dysregulated allostasis, which causes wear and tear, might eventually lead to pathophysiological changes (McEwen, 2008).

Interestingly the concept of allostatic overload, when conceptually condensed, 'the impact of wear and tear on a number of organs and tissues (that) can dispose the organism to disease' (McEwen, 2008) is not far from Selye's 'stress is essentially

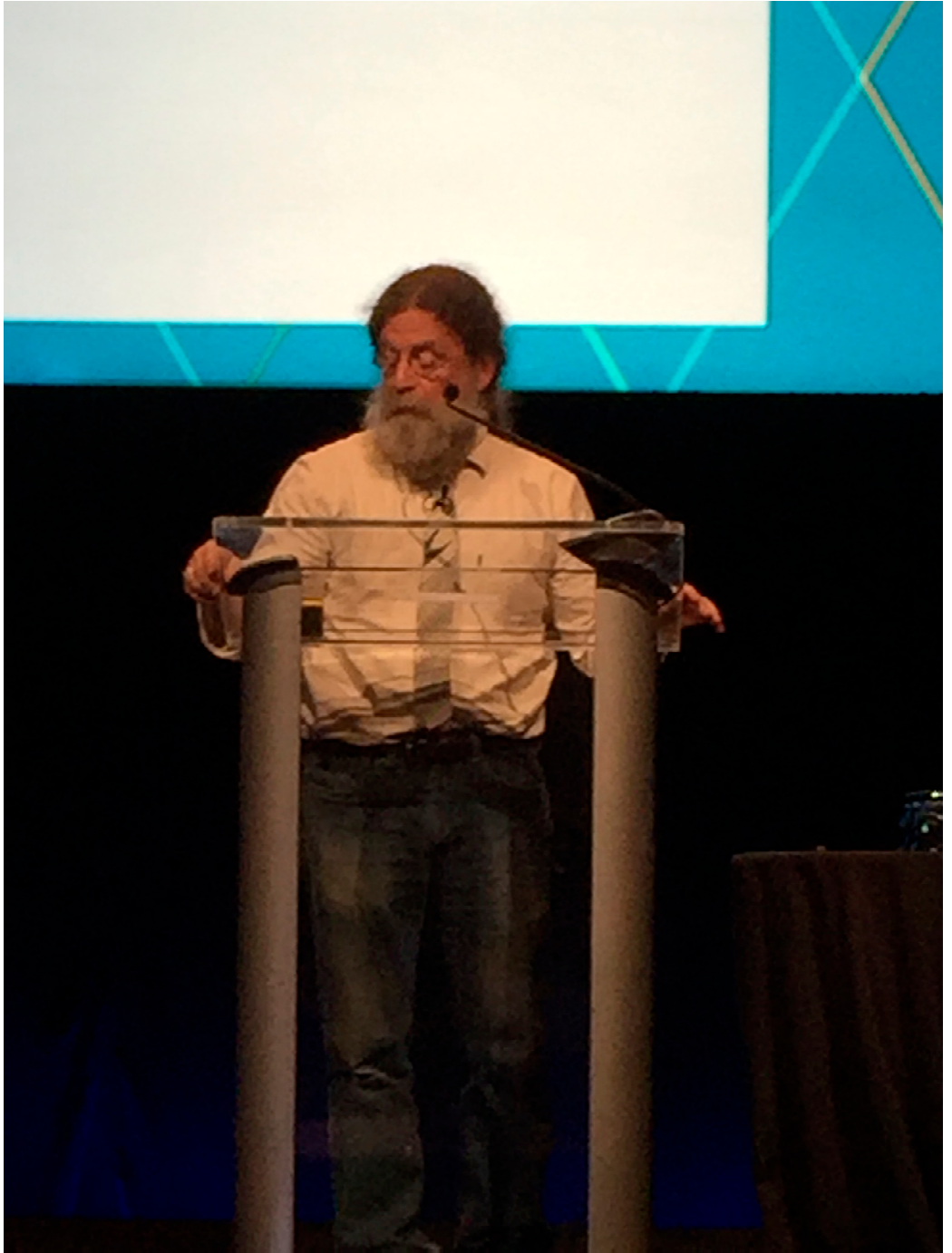
the rate of wear and tear in the body' (Selye, 1976). Allostatic overload can also refer to not turning on adequate responses to the stressor at once or even habituating to recurring stressors in a maladaptive way (McEwen, 2008)

Neuroendocrinological basis for stress

‘The internal machinery of life, the chemistry of the parts, is something beautiful.
And it turns out that all life is interconnected with all other life.’

- *Richard Feynman*

As Selye found, the secretion of glucocorticoids (GCs) is a classic endocrine response to stress (Selye, 1976). In an excellent overview on glucocorticoid action, Sapolsky et al showed that GCs can help mediate the ongoing or coming stress response, either via basal levels of GCs permitting stress response facets to emerge more efficient, and/or by stress levels of GCs directly stimulating the stress response (R. M. Sapolsky et al., 2000). Another viewpoint, dubbed the revisionist viewpoint, states that GCs suppress the stress response, preventing it from being pathologically overshooting as in the ‘glucocorticoid cascade hypothesis’ where feedback loops for GCs on the hippocampus have deleterious effects (R. Sapolsky, Krey, & McEwen, 1986). GCs are well known for inhibiting glucose transport both in peripheral and brain tissue. GCs inhibit local cerebral glucose use in different parts of the brain and inhibit glucose transport in various cell types (neurons, glia, and possibly endothelial cells) thus reducing its activity (R. Sapolsky, 1993; R. Sapolsky et al., 1986). A behavioural change could also impose changes to how the brain reacts on stress as a shift in appraisal or focus can change which nuclei that are mainly active in the stress response. A shift in behavioural task will change the brain nuclei involved in performing the task. The new nuclei has another set of dose-response relationships between hormones/neurotransmitters and cellular receptors caused by the changes in the expression of the kinds of corticoid receptors and the cell- and tissue specific factors in the new brain area (Joëls, 2006). This clears a path for cognitive behavioural psychotherapeutic interventions for stress that alters the activity between different nuclei in the brain. The cognitive anticipatory competence of humans also makes it possible for humans to have increased GC-levels in preparation for a possible stressor. This heightened state of anticipatory stress is normally referred to as anxiety (R. M. Sapolsky et al., 2000).



Prof Robert Sapolsky at the IFM Annual Conference in San Antonio, Texas, June 2019. Photo: The Author.

Social stress

‘The study of why some people swim well and others drown when tossed into a river displaces study of who is tossing whom into the current —and what else might be in the water.’

- Aaron Antonovsky

Like all primates, humans are social beings greatly affected by their context (Aronson & Aronson, 2012). Two implications drawn from the allostatic load hypothesis are that psychosocial stressors can be directly pathogenic, i.e. with a biomedical mechanism and not only by correlation, and that the long-term effects of both long-term and short-term stressors might be life-long from foetal-life and onwards (Krieger, 2001). For example, among social species as humans and other primates, a change in social context rank will typically alter the biomedical adrenocortical function. In stable dominance hierarchies, the social subordination is typically associated with elevated glucocorticoid secretion on a neuroendocrinological level (R. Sapolsky, 1993). Social stress is based on the stress-appraisal theory and arises when a person evaluates a situation as relevant and stressful (in terms of harm, threat, or challenge) and perceives that resources to cope or handle the specific situation are insufficient (Lazarus & Folkman, 1984), as opposed to physical stressors, i.e. electric shocks or cold-exposure.

The theoretical literature states that two conditions release strong GC secretion to a social stressor: the social-evaluative threat and uncontrollability. Social-evaluative stress is present when an aspect of the self is (harm), or could be (threat), negatively judged by others (Dickerson & Kemeny, 2004; Lazarus & Folkman, 1984). Individuals are very motivated to preserve the social self and self-esteem (Rosenberg, 1995). The social self and self-esteem are threatened in situations where lack of a valued attribute or possession of an undesired quality could be revealed, leading to the loss of social esteem, respect, or social status (Dickerson & Kemeny, 2004). The threat of social evaluation, often modelled in studies in forms of a social stressor, i.e. public speaking or verbal interaction tasks, and with the social-evaluative threat either with as documenting the performance on media, an evaluative audience (at least one more person besides the experimenter), or presence of a negative social comparison (real or potential out-performance by a confederate or other participant). The other component, uncontrollability, is defined as when behavioural responses cannot affect outcomes and when outcomes do not seem to be contingent on the behaviour of the participants as exemplified by an audience that is a part of the an experiment to always give negative feedback notwithstanding the performance of the speaker being experimented on (Dickerson & Kemeny, 2004). Dickerson and Kemeny show in their meta-analysis on 208 studies and 6153

participants that the combination of the two elicits the highest cortisol increases as an objective measurement of stress (Dickerson & Kemeny, 2004).

Karasek and Theorell presented in 1990 the demand-control-support hypothesis stipulating that stress increases with increasing pathology when the work demands and the lack of decision latitude are high and the social support is low. Lack of decision latitude is defined as a constraint to freedom to take action in a stressful situation due to skills, both having the adequate skills and being able to use them, and social authority over taking decisions (Karasek, 1990). Both lack of decision latitude and low social support are social stressors and exert psychopathological adverse effects.

Another important theoretical basis is Sense of Coherence (SOC) as put forward by Antonovsky (Antonovsky, 1987). He proposed the salutogenic hypothesis suggesting that some salutogenic factors lead to health, rather than the opposing pathological perspective where pathologic factors lead to disease. This was mainly based on the findings of a group of holocaust survivors that, in spite of previous monumental hardships, could lead a good life and maintain good health. He found that the key explanatory factors for this was Sense of Coherence subdivided into its key components: comprehensibility, i.e. that the person finds life understandable and is understood by others (cognitive component), manageability, i.e. that a life situation is appraised as manageable (behavioural component), and meaningfulness, i.e. life is meaningful enough to motivate to continue to live (motivational component). The concept of salutogenesis and SOC is adopted into other constructs, such as resilience, and can be seen as a common framework (Lindström & Eriksson, 2006).

Macro-social stressors

‘Medicine is a social science, and politics nothing but medicine at a larger scale’

Rudolf Virchow, ‘the father of modern pathology’

Macro-social level

‘Jag sträcker ut mig från mitt körsbärsblad och spanar mot evigheten: evigheten är alldeles för stor idag, alldeles för blå och tusenmila. Jag tror jag stannar på mitt körsbärsblad och mäter upp mitt körsbärsblad.’

(‘I stretch out from my cherry-leaf and gaze at the eternity: The eternity is too big today, all too blue and too far-stretched. I think I stay on my cherry-leaf and measure my cherry-leaf’)

- Werner Aspenström, ‘Mätarlärven’, Litania (1952)

The human ability to abstract thinking makes us able to evaluate events, such as stress, on different scales. Stress can be assessed from the molecular level of biochemistry to cells and organs in the organism on a micro level, but also from the organism to groups and whole societies and cultures on a macro level. The different levels also interact. For example, among social species as humans and other primates a change in social rank will typically alter adrenocortical function. In stable dominance hierarchies, subordination is typically associated with elevated glucocorticoid secretion at a neuroendocrinological level (R. Sapolsky, 1993).

Krieger proposes an ‘eco-social theory’ in order to include both biological and psycho-social context and uses the metaphor of a fractal bush intertwined at every scale (from micro to macro) with the scaffolding of society that different social groups are influencing, either reinforcing or altering. Krieger uses the term ecology as it is the study of evolving interactions between inanimate matter, living organisms, and energy over time and space and specifically stresses the importance of studying the micro to macro scale on each level of organisation (biological, social, and ecological) (Krieger, 2001). Levins and Lopez reports that the inclusion of the whole scale will lead to including new areas outside the traditional boundaries but have effect on us and also include the strong correlations among diseases that are not related in a strict medical way, such as different geography, societies, social indicators, and over time when conditions change rapidly. They also suggest that an eco-social perspective can lead to improving our resistance against diseases (Levins & Lopez, 1999), in other terms, improving resilience.

A social macro scale could possibly go from all humanity, to an intergovernmental level like the soviet-bloc or the European Union, to separate nations, to counties, cities, boroughs, and in the case of adolescents, school, class and group of peers or family. A human capable of abstract thinking can and will be influenced by all these macro levels.

The person-environment stress

‘We live well enough to have the luxury to get ourselves sick with purely social, psychological stress’

- Robert Sapolsky *‘A Primate’s Memoire: A Neuroscientist’s Unconventional Life Among the Baboons’* (2001)

According to Lazarus & Folkman, the opinion that it is the individual coping that is the problem when a person cannot adapt to the social system is a conservative way of looking at coping with stress (Lazarus & Folkman, 1984). This approach normally focuses on changing coping strategies rather than the opposite approach where inadequate coping strategies are the fault of society, calling for a change in the social system rather than individual changes. Both stances do have merits but it might be more fruitful to avoid polarisation and encourage whatever approach seems most suitable to approach the individual problem and make the relationship between society and the individual, the person-environment mismatch the matter of concern (Lazarus & Folkman, 1984).

Lazarus and Folkman (Lazarus & Folkman, 1984) relate to psychological stress as a disturbance in the person-environment relationship mediated cognitively through appraisal and generating adaptational efforts (coping). They further state three critical factors that make a social demand creating stress: *conflict*, *ambiguity*, and *overload*. *Conflict* becomes a stressor when satisfying a normally benign social demand violates a strongly held value or when the requirement of one role must suffer in order to satisfy another role, sometimes also related to as ‘ethical stress’. Role *ambiguity* is a stressor as the individual is unclear to what is expected. This creates problems to plan effectively and/or to behave in a directed manner towards a certain goal. If social demands are too high on a person that it causes an *overload* of the individual’s resources, it also becomes a stressor.

This thesis focus on a few, selected macro-social stressors that, based on previous research, could be hypothesised to have a significant influence on perceived stress and psychiatric symptoms or the resilience factor of self-esteem in adolescents; Urbanicity, School proficiency, and Governance. There are naturally interconnections between these macro-social stressors, i.e. the government dictates the curriculum that governs how and what the schools are supposed to do and

urbanicity can be regulated by laws, as in communistic Bulgaria where moving inside the country was severely restricted (Beleva, 2001).

Urbanicity

‘Il pleure dans mon coeur / Comme il pleut sur la ville’

(‘It is crying in my heart as it is raining over the city’)

- Paul Verlaine, *‘Il pleure dans mon coeur’*, *Romances sans paroles*

Urbanicity is a potential macro-social stressor. Bremberg has stated that the majority of young Swedish people report that they think that living in a city has a large impact on perceived stress. They believe that closeness to nature means that you are not experiencing the same stress as in a bigger city. The larger amount of sensory information, and the processing thereof, in bigger cities are believed to explain higher stress levels in their inhabitants (Bremberg, 2006). One Swedish study done on this subject states that high levels of urbanization were correlated with high incidences of psychosis and depression in the total adult Swedish population aged 25-64 (4.4 million individuals) (K. Sundquist, Frank, & Sundquist, 2004). Psychiatric disorders in the mood and anxiety spectra, as well as overall psychiatric disorder prevalence, have been shown to be more common/higher in urban areas (Peen, Schoevers, Beekman, & Dekker, 2010). Different geographical dwellings might also have different socioeconomic status. There are indications, however, that the socioeconomic position of destination seems to be of more importance than the socioeconomic position of origin in adolescents, where health overall seems to equalise in relation to socioeconomic position, i.e. a young adult from a poor home (origin) studying to become a professional with a high status (destination) will attain more of the destination status (C. E. I. Hagquist, 2007).

School proficiency

‘Training is everything. The peach was once a bitter almond; cauliflower is nothing but cabbage with a college education.’

- Mark Twain

There has been some speculation concerning whether students attending upper secondary schools with high academic proficiencies are more ‘stressed out’ than students at schools with lower proficiency. While there is no Swedish evidence for this hypothesis, Suldo et al suggested that students following the high achieving

International Baccalaureate curriculum in USA perceived more stress than students in the general education curriculum due to higher academic demands, but this higher perceived stress did not reduce academic performance. Adaptive coping strategies were suggested to be the reason for the absence of reduction in performance (Suldo, Shaunessy, & Hardesty, 2008). The research on this point is somewhat contradictory as Kaplan et al state that for students in high-stress school environments in the USA an increase in academic expectations may serve to increase school-related stress and reduce academic performance (Kaplan, Liu, & Kaplan, 2005). Bremberg stated that Swedish adolescents believe that those attending theoretical programs are more stressed than those attending vocational programs, regardless of whether they attend a theoretical or vocational program and the Swedish adolescents reported that school is the most important stressor (Bremberg, 2006). According to Ollfors and Andersson, most of adolescents' stress appears to be connected with their schoolwork. Regression analysis showed that stress contributed 4% to final grades (Ollfors & Andersson, 2007). Chronic perceived stress was associated with lower final grades in two highly ranked high schools in the urban Stockholm area (Schraml, Perski, Grossi, & Makower, 2012).

Governance

‘The fault, dear Brutus, is not in our stars, but in ourselves, that we are underlings.’

- *William Shakespeare, Julius Caesar*

The society forms its compatriots as the compatriots form the society, and amongst those children are the most plastic. As a result, two different societies, with different governance, would presumably form different citizens. And as humans are social beings and can only be understood in a social context, one has to look upon society in order to grasp a whole picture of an individual (Aronson & Aronson, 2012). In the same way that a newborn baby arrives to a social context, a society will form citizens of a certain psychological profile (Moghaddam, 2013). One of the ways a government controls the development of the nation's children is through the educational system and the school curriculum.

Democracy and Dictatorship

‘Quand nous serons tous coupables, ce sera la démocratie.’

(‘When we’re all guilty, that will be democracy.’)

- Albert Camus, *‘La Chute’*

Different forms of governance, i.e. dictatorship or democracy, form different compatriots (Bronfenbrenner, 1976) (Aronson & Aronson, 2012; Kharkordin, 1999; Moghaddam, 2013) and how dictatorship impacts the well-being in its citizens has been discussed since the ancient Greeks (de la Boétie, 1567). Despite this, few studies have been conducted on the psychological impact of governance. This scarcity of studies is at least partially related to the difficulties of getting permission to examine an autocratic state, as the dictators fear criticism and opposition (Moghaddam, 2013).

Socialisation of the children is often conducted in order to form persons that hold the same views that are found to be important by the leaders of the society and is, as mentioned, often reinforced by the school curriculum. For example, will the views of the party and/or the supreme dictator in a dictatorship become something virtually sacred (Moghaddam, 2013). Education in a Soviet-bloc dictatorship was seen both as a crucial step in both forming a ‘new revolutionary personality’ as well as the emancipation of women and, at a later stage, giving the prospective parents the possibility to educate their offspring in a socialistic manner (Kalling-Kant, 1948; Kharkordin, 1999; Makarenko, 1979; Molyneux, 1981). In a democracy, on the other hand, democratic views are normally the only normative viewpoint that the curriculum states should be enforced, i.e. in the Swedish curriculum for primary school, LGR 80 (Skolöverstyrelsen, 1980).

No simple, clear-cut definition of democracy has been proposed; there is a fine line between a too narrow definition being too exclusive and a too general definition being too inclusive. A vague definition may lead to conceptual stretching to the point of being useless and a too specific definition might exclude *de facto* democratic states that would be included in a wider definition (Collier & Levitsky, 1997; Storm, 2008). One explanation for the lack of a simple definition is that there has been a tendency to concentrate too much on the exact legal and institutional aspects (Kimber, 1989) and that other aspects are of importance. An approach for addressing the problem of avoiding conceptual stretching, given a definition which too often is found to be too idealistic and at the same time providing a high degree of differentiation, is to add a describing adjective to democracy further specifying the underlying benchmarks of a regime (Collier & Levitsky, 1997; Storm, 2008). A democracy is a regime type, just like the totalitarianism of the communistic

dictatorship, specifying the underlying general principles rather than any detailed institutional practices (Kimber, 1989). Research based on general principles of democracy has been reported to be focusing on generating knowledge rather than simply categorising regimes and reduces the need of constructing diminished subtypes (Storm, 2008).

According to Kimber, a regime is the set of rules, norms, and conventions that govern the operation of the political process. The three fundamental principles in democracy are:

- 1.) The authority structure is an ‘upward control’ where the ultimate sovereignty lies at the lowest of the authority structure,
- 2.) The value of political equality, and
- 3.) The individuals’ norm-governed behaviour where individual and institutional behaviour is limited in accordance with the two previous principles institutionalised through law but also at a level of meta-rule as in breaking laws that produces anti-democratic results.

Built on these principles, democracy can be defined as a ‘type of regime in which the demos, as defined, exercises control over collective decisions in the sense that a given set of freely expressed individual preferences, together with a given mechanism for producing a collective decision from them, entail the outcome, which is then applied, where relevant, to all members of the demos’ (Kimber, 1989).

Democracy and autocracy (dictatorship) are forms of government that could either be seen as a diametrically opposed dichotomy or the opposite poles on a continuum where nations can move in either direction (Storm, 2008). One definition of an authoritarian regime is one that completely lacks the three core values of democracy (one definition of democracy), which Collier and Levitsky as well as Storm defines as having (Collier & Levitsky, 1997; Storm, 2008):

- 1.) Reasonably competitive elections, devoid of massive fraud with broad suffrage
- 2.) Basic civil liberties: freedom of speech, assembly, and association
- 3.) Elected governments that have effective power to govern.

Also, a fourth additional core value is the vaguely defined ‘additional political, economic, and social features associated with industrial democracy’. Storm moves away from Collier and Levitsky’s model in that she abstains from having an internal order of the core values but rather sees them as building blocks that could be combined in different combinations, each giving an extra dimension to democracy (Storm, 2008).

Another definition of dictatorship from the psychological literature, rather than the political, can be defined as a governance where the country is ruled by a single

leader or a clique, where the vast majority of the people has no voice and the mechanism of control is thus brute force rather than identity and emotional attachment. A democracy, on the other hand, can be defined as a country where (Moghaddam, 2013):

- 1.) Citizens can speak out freely without fear of retribution from the society.
- 2.) The leader(s) can be voted out of office by the citizens in fair elections.
- 3.) Minorities are protected.
- 4.) Courts are independent of the government.

The two blocs of the Cold War

‘From Stettin in the Baltic to Trieste in the Adriatic, an iron curtain has descended across the Continent. Behind that line lie all the capitals of the ancient states of Central and Eastern Europe. Warsaw, Berlin, Prague, Vienna, Budapest, Belgrade, Bucharest and Sofia, all these famous cities and the populations around them lie in what I must call the Soviet sphere, and all are subject in one form or another, not only to Soviet influence but to a very high and, in many cases, increasing measure of control from Moscow.’

- Winston Churchill, *‘The Sinews of Peace’*

As Churchill pointed out in his famous ‘The Sinews of Peace’-speech (Churchill, 1946) in early 1946 the political changes in Europe during and after the Second World War were immense. At the Yalta-Conference in February 1945 Stalin, Roosevelt and Churchill divided the continent in terms of interest-spheres in order to reorganise post-war Europe. This division of Europe meant that Bulgaria, one of the two countries included in the present study, came under Soviet influence and became the communistic dictatorship known as the People’s Republic of Bulgaria. By contrast, Sweden, was neutral during the Second World War and remained neutral after the war. Sweden had, however, a clear leaning towards the democracies of Europe and the U.S. and represented a parliamentary democracy on the other side of the *Iron Curtain*.

A wave of democratic changes swept over Europe in the early 1990’s after the fall of the Berlin wall in 1989 and the collapse of the Soviet Union in 1991. These changes cleared a way for the formation or restoration of liberal democratic institutions in Europe, as well as elsewhere in the world (Schenkkan & Repucci, 2019).

A comparison of pedagogical principles in the 1980's between the Soviet bloc and Sweden

Bulgaria

‘The design of a person as a product of education should be made according to the order of the society.’

- Anton Makarenko, *‘The Pedagogical Poem’*

The main pedagogical theorist in the Soviet-bloc countries, who has even been described as ‘canonized’ by the Soviet-bloc authorities (Bronfenbrenner, 1976; Kharkordin, 1999), was the Soviet teacher Anton Makarenko (1888-1939). His theories were based on Marxism-Leninism and were formed through organising institutions for child delinquents, which were orphaned during the tumultuous years surrounding the Russian revolution (Makarenko, 1979). The Bolshevik ideology, on which the Soviet educational system was built, gave a number of characteristics into which the educational system normatively should form the children (Kalling-Kant, 1948; Kharkordin, 1999): anti-religiousness, suspiciousness towards non-socialistic values, class-consciousness, hardness towards strong emotions and a following contempt of weakness in order to be able to fight the ever-present enemies of communism, an ever-present competition between groups at all levels of the hierarchy to achieve more and better, and finally to fight ‘false’ *kollektivs*, defined as groups not oriented towards the production. Makarenko’s pedagogical theories were infused with a militaristic based discipline where the individual’s needs were irrelevant. This model was used in other socialistic states, i.e. Bulgaria (Socialist Party of Bulgaria, 1987). This formation of the school-children was achieved mainly through punishment of any member in the *kollektiv* who did not adhere to the norm or achieve well enough within the group itself, but also rewards, which made the group shame those that did not deserve the reward. According to Bronfenbrenner, the children themselves exerted the power of punishment in the form of comrades’ courts (Bronfenbrenner, 1976) and sentenced punishments, both corporal and psychological, through shaming and ostracizing the delinquent (Kharkordin, 1999). This is well-described in Makarenko’s own work (Makarenko, 1979).

When evaluating Makarenko’s work it is important to do so with a historical perspective. Makarenko developed his theories during the chaotic turmoil in the aftermath of the Russian Revolution where enormous amounts of people were forced out in the streets. Makarenko was put in charge of a detachment of young orphaned delinquents that he tried to educate in a militaristic style with shaming and punishment being important concepts, as well as building a sense of pride in the

group and developing a new Soviet man (Makarenko, 1979). His theories were well in-line with Soviet doctrine and his main protector and the organisation helping him implementing his pedagogical theories were the Cheka, the Soviet secret police (Makarenko, 1979). The pedagogics in the western democracies were not less punitive and shaming at the time and parts of his theories can well be seen as a progressive development of pedagogics. The theories did however stagnate and became a Soviet dogma that never developed further when pedagogical and psychological theories continued to develop abroad. The system remained intact even though the proposed benefits of shaming, ostracising and punishment became falsified and obsolete and the results in relatively recent studies comparing Israeli and ex-Soviet pupils in Israel showed high rates of conduct disorder, violence, antisocial behaviour, and a higher alcohol consumption, amongst other problems, in the ex-Soviets (Finzi-Dottan, 2011; Shor, 2000).

Sweden

‘Att väcka respekt för sanning och rätt, för människans egenvärde, för människolivets okränkbarhet och därmed för rätten till personlig integritet är en huvuduppgift för skolan.’

(‘To arouse respect for truth and right, for man’s own worth, for the inviolability of human life and therefore the right to personal integrity is the main task for the school.’)

- *Skolöverstyrelsen, Läroplan för grundskolan (LGR 80)*
(*Swedish National Board of Education, curriculum for primary school*)

In Sweden, the compulsory school’s main goal, as stated in the National curriculum in 1980 (*Läroplan för grundskolan 1980*) (Skolöverstyrelsen, 1980), with respect to politics, was to remain neutral in all aspects apart from democratic values and respect for human rights, which was to be imposed in all pupils as an intrinsic good. The Swedish school should also strive to let the children express their individualism and personal integrity, to strive for gender equality and to take an extra responsibility for minorities and those with extra needs. The Swedish pupil should also be educated to oppose oppression and to help others in need. This should be done by educating and encouraging the children to be free and independent citizens, partly by rationally analysing topics and ethical values that could be a matter of conflict, although with the exception of democratic ideals where the school should be adamantly pro-democratic. Conflicts should be solved via peaceful means and ethical discussions. Journalism without interference and censorship of free speech is also applied as a work method of shaping a child with democratic norms and values. Critical analysis and empiricism are also put forward as important methods both in groups and individually, where individualisation is encouraged together with

understanding of the importance of cooperation. The curriculum also states that the pupils, through collective work, should oppose tendencies towards bullying and xenophobia. The National Swedish curriculum also points out the personality characteristic self-esteem as one important personality trait in students that could be increased through cooperation.

The curricula in Bulgaria and Sweden 25 years later are looking much more alike than before the fall of the Berlin wall (Kerr, Sturman, Schulz, & Burge, 2010) reflecting in the change towards democracy in Bulgaria and the common factor of EU membership.

Table A: An non-comprehensive overview of differences and similarities between the Swedish and the Soviet-bloc pedagogics by the author.

Item	Makarenko pedagogics	Swedish curriculum LGR-80
Validation	Like their leader without the leader responding emotionally	Striving to improve self-esteem by showing the pupils strengths
Democracy	Autocratic communism main goal	Adamantly pro-democratic
Work	Main goal is productivity and work is idealised. Workshops in schools are important means.	Work is important and the pupil is taught labour skills both in school and in work-places
Individualism	The individual is always secondary to the collective and its production.	The individual and personal integrity is the most important and individualisation should lead to understanding the importance of cooperation
Discipline	Militaristic discipline teaches to follow and obedience.	Discipline is taught by discussing and imposing democratic ethical values and through cooperation
Punishment	Punishment is enforced by the collective of children on an individual level.	Punishment is absent, instead the teachers and peers should be helping the individual pupil.
Forming	Stamping out the personality by force in an industrial way.	Forming the individual according to its needs through democratic values.
Family school vs.	Varying, but always secondary to the state.	The family always has the main responsibility for rearing the child.
Weakness	Is frowned upon as it weakens the collective.	Weaker individuals should be helped by a range of means so that they can achieve their full potential.
Normative	Should always follow the socialistic party's views and be enforced.	Should be discussed and rationally analysed from individual ethics but always pro-democratic.
Gender equality	Is important.	Is important.
Rewards	Almost always on the group level	Individually.

The comparison above in Table A should be viewed in the light of that we are ourselves a product of being a part of a democratic society and therefore we are biased and prone to prefer our own system.

Other comparisons between Sweden and Bulgaria

Despite the difference in governance and pedagogics over time between the two countries, they are also similar in several other aspects, i.e. both countries are located in Europe, have a Christian past and a language that is almost exclusively spoken within the country. Both are relatively secular and the two countries joined the European Union between the time-points of measurement. The primary school completion rate in 1990 was 99.5% in Bulgaria and 96.5% in Sweden (The World Bank, 2016), data for 2016 were 94.6% for Bulgaria and 105.2.% for Sweden. The populations of Bulgaria and Sweden in 1990 were also comparable; 8.821 and 8.559 million inhabitants respectively (United Nations Secretariat, 2012) with the data from 2016 being more divided with Sweden having 9.923 and Bulgaria 7.128 million inhabitants respectively, with the decrease in population being a common trend in the ex-communistic states (The World Bank, 2016).

The ICCS (International Civic and Citizenship Education Study) report in 2009 clearly specifies that Sweden and Bulgaria both incorporate Civics and Citizen education cross-curricularly and integrated into several subjects in lower secondary school. Both countries also had very similar approaches to civic and citizenship education teaching, teacher training, student assessment, and school evaluation (Kerr et al., 2010). During the time of the first data collection, both countries were also known for their industrial high-technological competence with Bulgaria producing a large percentage of the electronics in the Soviet-bloc and Sweden having several high-technological companies, such as Ericsson and ABB, that were considered leaders in their fields.

Self-esteem

‘Now I know I’m being used / That’s okay because I like the abuse / I know she’s
playing with me / That’s okay ‘cause I’ve got no self-esteem’

- *The Offspring, ‘Self-Esteem’, Smash (1994)*

Self-esteem is likely to be influenced by the political system in the society and/or other macro-social contexts and is often defined as a personality characteristic that mirrors the level of global regard that one has for oneself as a person (Harter, 1993; Kling, Hyde, Showers, & Buswell, 1999) and is one of the most widely studied topics in psychology. It is widely recognised that self-esteem is strongly and closely related to psychopathology in adolescents where low levels of self-esteem are correlated with a higher degree of depression, anxiety and eating- and disrupting disorders (Birgerstam, 2013; Bos, Huijding, Muris, Vogel, & Biesheuvel, 2010;

Kling et al., 1999). Self-esteem is also part of the diagnostic criteria for many common psychiatric disorders (Zeigler-Hill, 2011). From an intercultural perspective, global self-esteem has also shown good correlation with neuroticism (negatively) and extraversion (positively) in a cross-cultural study with participants from 53 different countries (Schmitt & Allik, 2005). Although self-esteem is found to be a relatively static construct in adults, it is dynamic through adolescence (Baldwin & Hoffmann, 2002). Global self-esteem is often lower in females than in males and this difference is particularly high in late adolescence (Baldwin & Hoffmann, 2002; Birgerstam, 2013; Kling et al., 1999). Several hypotheses have been proposed in an attempt to explain this difference; gender roles where masculinity scores are positively correlated to self-esteem, gender stereotypes in peer interaction, interaction with teachers, cultural emphasis on female physical appearance, violence against women and differing athletic participation between sexes in adolescence. Furthermore, the body maturation during puberty differs between the sexes; this difference may lead to lower self-esteem in the girls compared to the boys. The boys generally want to become stronger and gain muscle mass while girls want to become thinner but gain body fat (Kling et al., 1999).

The stress-buffering hypothesis of self-esteem

‘Being healthy consists of having the same disease as everyone else’

- *Robert Sapolsky*

There are many connections between self-esteem and stress-resilience, which is ‘the ability of an organism to withstand environmental challenges to normal function’ (Karatoreos & McEwen, 2013). In fact, self-esteem has even been used as an outcome component of the construct of resilience (Tiêt & Huizinga, 2002). One theory of resilience is the stress-buffering hypothesis stating that self-esteem and stress might interact in psychopathology as high global self-esteem buffers individuals from the negative outcomes of stress whereas low self-esteem individuals will increase the likelihood of negative outcomes of allostatic overload (Brown, 2010; Cast & Burke, 2002; Zeigler-Hill, 2011). Self-esteem seems to work as a personal resource that protects individuals from disruptive or threatening experiences, particularly when the self-verification is disrupted (Cast & Burke, 2002). Those with a high self-esteem are stable both emotionally and in sense of self and are better at taking negative feedback without feeling distress as they feel bad about the particular issue but do not generalise it as people with low self-esteem do; they do not take failure personally (Brown, 2010). It can be seen as a sort of ‘energy’ that can be used in stressful times, a resource that can be both built up and depleted like a rechargeable battery (Cast & Burke, 2002).

The scar hypothesis of self-esteem

‘I wear this crown of thorns / Upon my liar’s chair
Full of broken thoughts / I cannot repair’

- Johnny Cash, ‘Hurt’, *American IV: The Man Comes Around*, 2002

The scar model suggests that low self-esteem is caused by psychopathology rather than being one of its causes. According to this model, psychological disorders tend to erode psychological resources and leave ‘scars’ on their self-worth distorting how individuals feel about themselves (Zeigler-Hill, 2011). One mechanism of this might in depression is the cognitive filters it puts on the patient who mainly see things that are negative when they process self-relevant information. The stigma of psychiatric disorders may lead others to convey less relational value than if the stigma was not present, which in turn might lower self-esteem. Both the scar hypothesis and the stress-buffer hypothesis have been suggested to contribute to psychopathology in the same person (Harter, 1999; Zeigler-Hill, 2011). Most studies on self-esteem and psychopathology are correlational studies, mainly cross-sectional, which has led to confusion about causality notwithstanding the manifold of other factors (i.e. family dysfunction, abuse, socioeconomic status etc.) uncorrelated for in most studies (Zeigler-Hill, 2011).

Resilience

‘You, me, or nobody is gonna hit as hard as life. But it ain’t how hard you can hit
it’s about how hard you can get hit, and keep moving forward’

- Sylvester Stallone as ‘Rocky Balboa’ in the movie *Rocky Balboa*

Psychological resilience has been defined as ‘the process of positive adjustment to adverse events’ (Walker, Pflingst, Carnevali, Sgoifo, & Nalivaiko, 2017) or the ‘tendency to overcome factors that place one at risk for psychological dysfunction and to adjust positively in the aftermath of a potentially traumatic event’ (Thompson, Arnkoff, & Glass, 2011). After exposure to potentially traumatic events, resilience would thus be an indicator for absence of post-traumatic psychopathology. The concept of ‘resilience’ could be traced back ‘ego strength’ in Sigmund Freud’s theory of personality (Walker et al., 2017). Lazarus and Folkman discuss vulnerability in their stress appraisal theory where vulnerability is defined as coping resources insufficient in relation to the stressors (Lazarus & Folkman, 1984). Resilience refers to avoiding the problems associated with being vulnerable, i.e. by coping strategies (Fergus & Zimmerman, 2005). Coping strategies are,

according to Lazarus and Folkman, as stated earlier, cognitive and behavioural efforts to manage demands that are appraised as taxing or overloading the individual where coping strives to serve to manage or alter the environmental problem causing the distress and by regulating the emotional response to the problem (Lazarus & Folkman, 1984).

Resilience can be depicted in a two-by-two table depicting risk and outcome, Table B (after (Fergus & Zimmerman, 2005; Tiêt & Huizinga, 2002)). The adolescents with the high risk and positive outcome are resilient whereas the adolescents with the negative outcomes are vulnerable. A resilience factor is an asset that can change the outcome into a positive one. Self-esteem is the example *par excellence* where a high self-esteem can protect an adolescent from negative outcomes related to risk exposure and a low self-esteem increases the risk for an adolescent to develop undesirable outcomes. The relation between risk-factor and outcome can be linear or curvilinear, where the latter represents a risk where an adequate exposure reduces the risk for a negative outcome as opposed to too much or too little exposure (Fergus & Zimmerman, 2005). Stressors are of the latter curvilinear kind, as described earlier.

Table B. Resilience seen in a population of adolescents.

Outcome	Risk	
	Low	High
Positive	Normative development	Resilience theory
Negative	Inadequate risk assessment	Risk models

Karatoreos and McEwen discuss resilience from an allostatic neurophysiological perspective (Karatoreos & McEwen, 2013). They define resilience as ‘the ability of an organism to withstand environmental challenges to normal function’ and allostatic responses contribute to resilience by providing stability in a changing environment. This definition of an allostatic resilience, which will be used in this thesis unless otherwise specified, merges psychological and physiological resilience into one concept. They also conceptualise resilience in short-term changes for acute challenges and long-term resilience for outdrawn changes. The latter could constitute the ability to adapt and flourish in adolescence or adulthood in spite of adverse child experiences, psychological challenges at sensitive periods, or even epigenetic changes. They also conclude that the changing world with increasing stress makes human need to adapt to these new stressors, be they fast-food fats, a constantly ‘on’-society or modern warfare and recommend trying to find the warning signs during development and intervene by means of cognitive, behavioural psychotherapy and mentions mindfulness as a way of improving resilience towards high allostatic loads in adjunct to pharmacological and structural societal changes (Karatoreos & McEwen, 2013). Fig A shows a model for allostatic resilience.

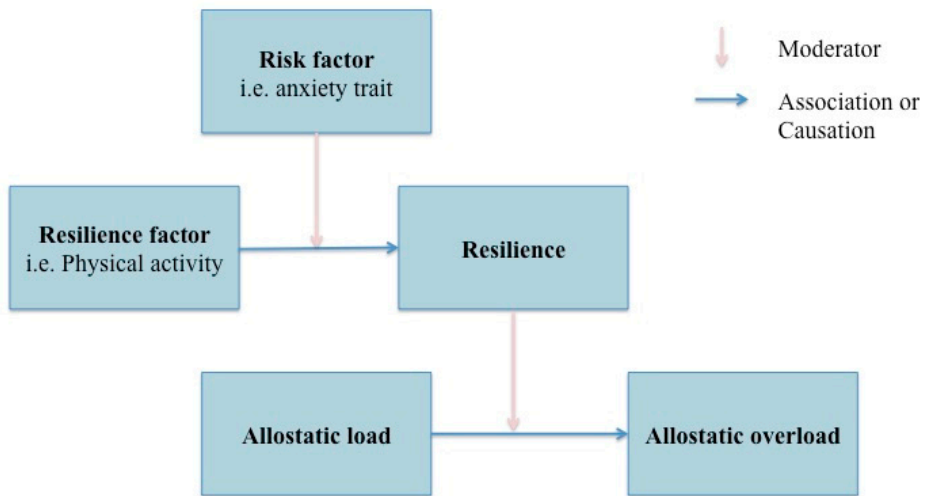


Figure A model of resilience based on Hegberg and Tone's model (Hegberg & Tone, 2015), adapted to allostatic resilience by the author.

Children that experience more stress will likely become more reactive to stress, possibly through epigenetic regulation, and more vulnerable to depression later in life (Provençal & Binder, 2015). A child that has experienced a more stressful childhood will also adapt to function in a more stressful environment. This has been suggested to indicate that a social ladder is also present epigenetically (R. P. Wilkinson, Kate, 2018).

Everyday resilience factors

‘L’art de médecine consiste á distraire le malade pendant que la nature le guérit’

(‘The art of medicine consists of distracting the patient while nature heals him’)

- *Jean-Marie d’Arouet le jeune, a.k.a. Voltaire*

Stress-related disorders, and resilience to them, can be considered products of the coordinated activity of the brain and numerous bodily systems (Pfau & Russo, 2015). Studies have shown that there are several factors that can modify stress in everyday life being resilience factors. Several are hormetic (i.e. curvilinear) in their nature as they can increase allostatic load if at an inappropriate level, i.e. becoming stressors at these too high or too low levels, and decrease stress if at adequate levels as they then increase resilience.

Sleep

‘If only tonight we could sleep / In a bed made of flowers / If only tonight we could fall / In a deathless spell / If only tonight we could slide / Into deep black water / And breathe / And breathe / Then an angel would come / With burning eyes like stars / And bury us deep / In his velvet arms’

- *The Cure ‘If only tonight we could sleep’, Kiss Me, Kiss Me, Kiss Me, 1987*

Getting an adequate dose of sleep is one important resilience factor and there is a well-known close relation between sleep and stress (Torbjörn Åkerstedt, 2006). Sleep has been found to be an important resilience factor also in healthy children and adolescents, and a reduced sleep results in a reduced resilience if no other potential resilience factors are bolstering the resilience, which is a multilevel factor (Chatburn, Coussens, & Kohler, 2013). A potential mechanism for this is an increased rate of neuronal development in the brain caused by sleep in the resilient individual that protects them from damage caused by environmental stressors, thereby helping the resilient individual to avoid psychopathology (Cicchetti, 2013). Ruminating thoughts at bedtime, i.e. problems related to work demands and particularly anticipated such, are associated with sleep disturbances (T. Åkerstedt, Kecklund, & Axelsson, 2007), which decreases resilience. Disturbed sleep also gives similar physiological changes as does (psychological) stress (Torbjörn Åkerstedt, 2006). Insomnia is believed to depend on three factors (Harvey, Gehrman, & Espie, 2014): predisposing, precipitating, and perpetuating factors. Stress is predisposing as it heightens arousability, it precipitates as stressors before night-time increases risk for insomnia and it perpetuates as in the vicious circle of

increasing stress giving increased insomnia (T. Åkerstedt et al., 2007). On the other hand, stress is known to cause hypersomnia, defined as sleeping too long and feeling tired. Hypersomnia can be a function of tiredness and fatigue due to allostatic (overload) but is also a well-known avoidance pattern in clinical cognitive behavioural therapy (CBT) that leads to relief from aversive symptoms on a short horizon but narrows the repertoire of behaviour in a negative and psychopathologically predisposing way in the longer run (Jacobson, Martell, & Dimidjian, 2001).

Nutrition

‘If it came from a plant, eat it; if it was made in a plant, don’t.’

- Michael Pollan, *In defence of food: An Eater’s Manifesto*

Stress has been shown to increase inflammation and leaky gut, a condition that is found to be caused and permeated by food (Maes & Leunis, 2008) and is a recognised internal stressor (Pfau & Russo, 2015). Certain foods increase inflammation, whereas other foods dampen inflammation. Dampening of inflammation by anti-inflammatory agents has been proposed as a method for improving resilience (Pfau & Russo, 2015). Nutritional aspects for increasing resilience, but also for decreasing demands on the allostasis model, was recognised already by Sterling and Eyer (Sterling & Eyer, 1981). Geiker et al reports that nutritional deficiencies in vitamin D, niacin, folate, vitamin B6, Vitamin B12 and omega-3 fatty acids increase the susceptibility to stress and depression and that nutritional increases in non-malnourished populations with omega 3 fatty acids, B-vitamins, calcium, magnesium, and the amino-acid tryptophan are resilience factors, the latter likely mediated by serotonergic systems. They further report a wide therapeutic window and a likely high efficiency in a large part of the population (Geiker et al., 2018).

Eating behaviour changes with stress. It has been proposed that emotional allostatic load can be easier to cope with on certain diets (i.e. high-fat) (van Dijk & Buwalda, 2008; Yau & Potenza, 2013) indicating nutrition’s resilience increasing values. This might however become a problem if the environment does not permit an active coping strategy (fight/flight or hunt), as is the case in inescapable psychosocial stress. In this case, emotional and metabolic allostatic loads start adding on to each other, which eventually will lead to all characteristics of the metabolic syndrome, including deterioration of mood. The mechanism is thought to be due to intracellular wear and tear of metabolic machinery (van Dijk & Buwalda, 2008).

Individual differences in food intake are reported where approximately 40% increase and 40% decrease their caloric intake under high allostatic load and 20% remains unchanged (Yau & Potenza, 2013). These varying results may relate to the specific

type of stressor, i.e. mild stressors could induce hyperphagia, while more severe stressor, hypophagia (Pecoraro, Reyes, Gomez, Bhargava, & Dallman, 2004).

Hyperpalatable foods, i.e. 'junk food' such as chips, high sugar content beverages and fast-food, may serve as 'comfort food', that act as a form of self-medication to dispel unwanted distress. Individuals in states of negative affective have been shown to favour the consumption of such rewarding foods while nutritional intake during happy states was shown to favour less palatable dried fruit (Garg et al., 2007). People with high cortisol reactivity in naturalistic settings also report greater snacking in response to daily stressors (Yau & Potenza, 2013).

Thus consumption of hyperpalatable food is reported both as following increasing stress (Yau & Potenza, 2013) as well as increasing allostatic load (van Dijk & Buwalda, 2008) Stress also is found to result in a too high or too low caloric intake, depending on stressor, and thereby giving an allostatic overload.

Physical activity

'Run to the hills, run for your life'

- Iron Maiden, 'Run to the hills', *The Number of the Beast*, 1982

Hegberg and Tone analysed physical activity as a resilience factor for increasing resilience and providing protection against stress-related mental-health (Hegberg & Tone, 2015) and found evidence that the trait anxiety moderates the association between physical activity and resilience. They suggest the Cross Stressor Adaptation hypothesis as the mechanism for the increased resilience. This model suggests that the increased stress of regular physical activity induces physiological changes that augments the responses to physical activity (allostatic load), which leads to a general adaptation to a wide range of stressors, both physiological and psychological. The nature of dose-response association is still unclear.

Physical activity has been shown to reduce stress and anxiety. A meta-analysis on the subject by Stubbs et al in 2017 including six RCTs showed a moderate effect size (Standardized Mean Difference) of -0.58 (Stubbs et al., 2017). There is evidence for a positive effect of physical exercise on stress and anxiety disorders although no conclusive evidence is found on dose-response (Alderman, Brush, & Ehmann, 2019). However, there is a large individual variation and as individuals may be hyper- as well as hypo-responsive both to the stressors as well as to physical exercise (Alderman et al., 2019). This might be due to a u-shaped effect curve as is presented on the effect of running on mortality rates in a Danish study where they concluded that an upper limit of exercise dosing for optimal health benefits (Schnohr, O'Keefe, Marott, Lange, & Jensen, 2015).

Intellectual stimulation

‘They sentenced me to twenty years of boredom for trying to change the system from within.’

- Leonard Cohen, *‘First we take Manhattan’*

Hard cognitive tasks are used as stressors in psychological tests and allostatic load decreases cognitive functioning over a certain level, being a curvilinear function. Cognitive training under stressful situations has been shown to increase cognitive resilience and has been extensively studied in late adolescents in military settings. Complex technological and operational systems might influence the cognitive performance (Staal, Bolton, Yaroush, & Bourne, 2008).

Intellectual stimulation has also been found to correlate well and significantly to mattering, i.e. how much individuals are important to others. Positive mattering has been shown to be indicative of lessened illness (Myers & Bechtel, 2004). Knowledge and intellectual stimulation have been shown to be a key resource for resilience of cognition throughout the lifespan and can buffer cognitive decline. The main mechanisms proposed for this effect are capacity to adapt to both internal and external factors, such as stress, and the agency in sustaining a constellation of resources. Formal education early in the lifespan has been proposed to give a ‘cognitive reserve’ (Hayslip & Smith, 2012).

Important relations

‘All sentient beings developed through natural selection in such a way that pleasant sensations serve as their guide, and especially the pleasure derived from sociability and from loving our families.’

- Charles Darwin, *‘The Autobiography of Charles Darwin’*

Social support is extremely important for maintaining both physical, as well as mental, health in all primates, including humans (Antonovsky, 1987; Aronson & Aronson, 2012; Ozbay et al., 2007; R. Sapolsky, 1993). The harmful effects of low social support as well as the protective effect of high social support are well documented and may moderate genetic as well as environmental vulnerability and provide resilience to stress (Ozbay et al., 2007). The mechanisms for resilience conferred by social support of high quality are related to changes in the hypothalamic-pituitary-adrenal axis (HPA-axis) and the Sympathetic Nervous System making stressors exert less effect on those systems for a shorter period.

Social support can be divided into a structural dimension, including network size and frequency of social interactions, and a functional dimension divided into

emotional components (i.e. receiving love and empathy) and instrumental components (i.e. practical help). Quality of relationships (functional dimension) has been found to be a better predictor of good health than quantity of relationships (structural dimension), although both are important (Ozbay et al., 2007). This is also reflected in Sense of Coherence where one part of the cognitive component is being understood by others (Antonovsky, 1987). SOC is also found to decrease with decreased social support, to be a buffer to stress and possibly to be a causal link between psychological stress and health in adolescents (Nielsen & Hansson, 2007).

Meaning

‘Ma vie n’est rien. Ce qui compte, ce sont les raisons de ma vie.
Je ne suis pas un chien.’

(‘My life is nothing. What counts is the meaning of my life. I’m not a dog’)

- *Albert Camus, ‘L’État de siège’, 1948*

Another component of SOC is meaningfulness. It predicted the possibility to lead a good life and maintain good health after the horrendous allostatic load of being in a Nazi concentration camp (Antonovsky, 1987). Another tribute to the literature on resilience, although the term was not yet coined, on the topic of meaning emanating from the terrors of holocaust is Viktor Frankl’s reports on meaning and holocaust survival from 1946 (Frankl, 2004). He describes how ‘the last of human freedoms – to choose one’s attitude in any given set of circumstances’ leads people to take decisions, despite the stressors of the camps, and that this eventually results in who a person becomes and whether he can retain his dignity, which makes life meaningful and purposeful. The people succumbing to hopelessness due to lack of meaning also succumbed in the concentration camps as their resistance to infections, suicide, and other stressors decreased.

Mindfulness

Definition of mindfulness

‘Be where you are, otherwise you will miss your life’

-*Buddha*

Mindfulness can decrease stress (Chiesa & Serretti, 2009) and increase resilience (Thompson et al., 2011). There is a classic definition of mindfulness in modern medicine and psychology proposed by Dr Jon Kabat-Zinn. Kabat-Zinn who, in his own words, ‘took Dharma into medicine’, by undertaking the challenge of evaluating mindfulness meditations from a scientific viewpoint in publishing the first peer-reviewed scientific article on mindfulness in medicine (on the subject of pain reduction) (Kabat-Zinn, 1982). This definition of mindfulness is ‘paying attention in a particular way: on purpose, in the present, and nonjudgementally’ (Kabat-Zinn, 1994). This is in itself a wonderfully simple definition of something very complex just as it is reported that ‘While it may be simple to practice mindfulness, it is not necessarily easy’ (Kabat-Zinn, 1994).

Mindfulness originally comes from the classic buddhistic *vipassana* (Pali: *Vi* prefix denoting (into) a special way and, *Passana* seeing or perceiving) meditation tradition, which is a mental training that teaches how to truly experience what is *de facto* happening, without the experience passing through any cognitive filters (Gunarantana, 2002). This is the ‘paying attention in a particular way’ in the definition. The ‘on purpose’ part of the definition states that this is a conscious attitude. The ‘in the present’ part of mindfulness is to stop doing anything with an intention of what is to happen and being present in the now, sometimes described as going from ‘doing’ to ‘being’ (Kabat-Zinn, 1994). ‘Nonjudgmentally’ is the part of the definition that separates the mindfulness meditation from other forms of concentration meditations in the striving not to evaluate or label anything but rather nurture the attitude of acceptance. Acceptance in this sense is not a sign of resignation, it is an acknowledgment what is *de facto* happening. It is an understanding of the moment, and after understanding you can choose what to do more clearly (Kabat-Zinn, 1994).

Mindfulness meditation is also supposed to be the only intentional systematic human activity, which is not about trying to improve anything, either oneself or something else, or to get anywhere else, but simple to realise where one already is (Kabat-Zinn, 1994). It is also an inherently experiential activity, not a theoretical one (Gunarantana, 2002), and must be learnt by personal experience as it is virtually impossible to understand without the insights of own meditational experience

(Williams et al., 2014). Meditation is a part of all world-religion but mindfulness mediation is, per se, a non-religious activity (Gunarantana, 2002).

How to meditate

‘Skäms inte för att du är människa, var stolt! / Inne I dig öppnar sig valv bakom
valv oändligt. / Du blir aldrig färdig, och det är som det skall.’

(‘Don’t be ashamed to be a human, be proud! / Within you opens arch beyond arch
endlessly. / You’ll never be complete, and it is as it should be.’)

- *Tomas Tranströmer, ‘Romanska bågar’, För levande och döda (1989)*

As meditation is defined as a mental activity - paying attention (...) on purpose - it is clearly a voluntary act, taking place in the brain. The first programme of teaching mindfulness in a medical setting was the Mindfulness Based Stress Reduction (MBSR) programme designed by Kabat-Zinn (Kabat-Zinn, 1982). The MBSR-curriculum is an eight week programme with one lesson a week, a day of retreat and daily practice in the form of guided meditations of approximately 45 minutes of length and informal practice in doing everyday activities (like tooth-brushing) mindfully (Baer, 2003; Kabat-Zinn, 2013).

Guided meditations consist of a voice guiding the meditator on where to focus. There are several different forms of meditation; breathing-meditation where focus is on the breath, hatha-yoga with a body-sensation and movement-oriented meditation, sitting meditation with focus on sensations, emotions and thoughts, walking meditation where the focus is on a purposefully slow walk focussing on every part of the step etc. (Kabat-Zinn, 1982, 1994, 2013; Williams et al., 2014). An important part is the validation that it is a part of the meditation to lose focus and that re-focusing is part of the meditation and also a part of being non-judgmental towards oneself. Some forms of loving-kindness meditation, or self-compassion meditation, focusing both on the meditator and on others by projecting thoughts of love and kindness, normally in the form of affirmations, is a part of mindfulness as a prolongation of ‘non-judgmentalness’ which is a core component of mindfulness according to Jon Kabat-Zinn (Kabat-Zinn, 2013). This has also been proposed to be a treatment of low self-esteem. Sometimes the self-compassion meditation is proposed to be a separate form of meditation, but it is an integrated part of mindfulness tradition (Kabat-Zinn, 1994).

Several meditation-based interventions that combine Cognitive Behavioural Therapy (CBT) with meditation have been developed after MBSR and are generally referred to as the third wave of CBT with Dialectical Behavioural Therapy for treatment of Emotionally Unstable Personality Disorder (or Borderline personality

disorder) and Mindfulness Based Cognitive Therapy (MBCT) for treating depression and Acceptance and Commitment Therapy (ACT) being the most evaluated and successful.

How mindfulness works

‘Pain is inevitable, suffering is optional’

- Haruki Murakami, *‘What I Talk About When I Talk About Running’* (2009)

The non-judgmental approach on noticing evaluation while meditating, and eventually in everyday life, is a modus of appraising thoughts as mental activities or events that will pass and not necessarily an accurate reflection of reality. Changes in thought pattern is a part of meditation where the meditator notices the thoughts that are spontaneously generated during a sitting meditation, sometimes referred to as meta-cognition, might also lead to a sound emotional detachedness from thoughts through cognitively contravening ruminative thought patterns. This is one of the ways mindfulness has been proposed to intervene on depression (Baer, 2003; Williams et al., 2014).

Another potential mechanism is exposure, as in traditional CBT. In the first MBSR-article Kabat-Zinn (Kabat-Zinn, 1982) exposed the participants to experience their pain and to re-evaluate their experience of while having in mind the absence of catastrophic thoughts and thereby detaching the emotional distress thoughts associated with the pain. This eventually leads to that even if the pain *per se* is not reduced, the suffering and distress related to the pain might be (Baer, 2003; Kabat-Zinn, 1982). Panic attacks and anxiety that might occur during meditation are assessed in the same way through exposure (Baer, 2003). The tendency to remain active in present moment experience may also promote exposure to trauma-related stimuli (Thompson et al., 2011).

The range of coping skills have also been reported to increase through mindfulness training including skills not taught in the mindfulness programmes per se (Baer, 2003; Kabat-Zinn, 1982). The increased awareness being practiced in formal mindfulness meditations gives rise to an increased awareness of thoughts and emotions in everyday life including early signs of relapse into disease, i.e. depression (Baer, 2003; Williams et al., 2014).

Another way mindfulness works that has been suggested is the ability of mindfulness to increase acceptance (Kabat-Zinn, 2013; Thompson et al., 2011). Acceptance in combination with being non-judgmental fosters emotion-regulation and trauma can be more neutrally assessed and has been reported to increase resilience in the aftermath of trauma (Thompson et al., 2011).

Scientific evaluation of mindfulness

‘Je réputais presque pour faux tout ce qui n'était que vraisemblable’

(‘I deem almost all as false that was only likely.’)

- René Descartes, *‘Discours de la méthode’*, 1637

There has been ample scientific investigation of the effect of mindfulness on a plethora of outcome variables, thereof many meta-analyses stating that there is empirical basis for mindfulness based therapy. A recent meta-analysis from 2018 on 142 samples and 12,005 participants stated that mindfulness treatments were shown to generally be of similar potency with first-line psychological (and psychiatric) interventions when compared directly. It was, furthermore, superior to other active comparison conditions (as well as waitlist control conditions), with relatively little variation across disorders (Goldberg, 2018). Chiesa and Serretti showed already in 2009 in a meta-analysis that MBIs had the ability to reduce stress in healthy individuals (Chiesa & Serretti, 2009). Another meta-analysis on MBIs and reduction in symptoms of depression on 11 studies showed a mean reduction in Beck’s Depression Index of 8.73 and the large effect size (Cohen’s d) of 0.83 (McCarney, Schulz, & Grey, 2012). Another meta-analysis on treating anxiety (generalized anxiety disorder, panic disorder, and social anxiety disorder) with MBIs showed substantial reduction in symptoms of anxiety and in comorbid depressive symptoms (Vøllestad, Nielsen, & Nielsen, 2012). A Swedish study conducted in Skåne showed that the mindfulness-based group therapy was non-inferior to treatment as usual by CBT for patients with depressive, anxiety or stress and adjustment disorders in a clinical setting in primary healthcare, indicating that it works well also in a real clinical setting outside of the laboratories (J. Sundquist et al., 2015).

Mindfulness and Adolescents

‘It’s interesting to look at your children as live-in Zen masters who can put their finger on places where you’re resistant, or thinking narrowly, in ways no one else can.’

- Jon Kabat-Zinn, *Interview with Sarah van Gelder (1998)*

There is also evidence that mindfulness works well in a child and adolescent population. A meta-analysis on mindfulness programmes in schools made by Zenner et al in 2014, which incorporated 19 studies with 1348 participants from first grade in primary school to last grade in upper secondary school, showed a

significant medium sized effect on cognitive performance, third person ratings, stress and coping, emotional problems, and resilience (whereof four had self-esteem as an outcome for resilience). Acceptability of the intervention was high and a good correlation between time spent in meditations and effect size was found (Zenner, Herrnleben-Kurz, & Walach, 2014). Brief mindfulness training of four days has also previously been shown to significantly improve cognitive performance (visuospatial processing, working memory, and executive functioning) indicating that meditation training can enhance the ability to sustain attention in university students (Zeidan, Johnson, Diamond, David, & Goolkasian, 2010). Felver et al noticed in a systematic review of 28 studies and 3414 participants that MBIs in schools are feasible, acceptable and might also be advantageous on educational outcomes besides the psychosocial outcomes (Felver, Celis-de Hoyos, Tezanos, & Singh, 2016).

-Scapes in mindfulness

‘Away ye gay landscapes, ye gardens of roses! / In you let the minions of luxury
rove; / Restore me the rocks, where the snow-flake reposes, / Though still they are
sacred to freedom and love’

- Lord Byron, *‘Lachin y Gair’*, 1807

By combining a word with the suffix -scape, abstracted from landscape, a new word is formed denoting form, formation, shape, or a specific type of space. This terminology is often used in mindfulness as an analogy to denote a certain theoretical focus point. Kabat-Zinn uses several -scapes to name different meditations, like breathscape, bodyscape, and nowscape (Kabat-Zinn, 2005). The -scape infers a mental abstraction that is purposefully focused upon and constitutes of the different inputs from that -scape, be it thoughts, sensations, or emotions. A way of looking purposefully and emotionally detached on all the stressors exerting allostatic load on a person would be to denote it a ‘stresscape’.

Internet-based psychotherapy

‘Any doctor who can be replaced by a computer deserves to be replaced by a computer.’

- *Dr Warner B. Slack*

Internet-based psychotherapy (iPT) has been described as a promising treatment alternative in targeting psychiatric health problems. The definition is still a bit vague and can constitute of the internet as a means of communication between two persons in a dialogue (i.e. e-mail) or a monologue (information web-page) or of a platform with an interactive program that requires no input from a clinician. It can also be a combination of those three (G. Andersson, 2009). Guided internet-delivered treatment is the approach where treatment is in the form of a structured self-help material presented via internet in an accessible fashion and with a clinician providing support, encouragement and, if needed, psychotherapeutic interventions via e-mail or other means of communication (i.e. chat or phone) (G. Andersson, 2009). Programmes without guidance or an interactive computer programme are often referred to as ‘self-help programmes’, ‘unguided programmes’, or ‘online bibliotherapy’ (even if audio and video clips often are involved) (Gerhard Andersson, Cuijpers, Carlbring, Riper, & Hedman, 2014). Most iPTs are internet-based Cognitive Behavioural Therapy (iCBT), including third wave CBT as mindfulness and ACT, although psychodynamic psychotherapy as well as physical exercise programmes have been developed and analysed scientifically (Gerhard Andersson et al., 2014).

The reason for using iPTs are that they are relatively easy to access to many people at a low cost (G. Andersson, 2009) and that the supply of psychotherapy is limited due to shortage of providers. It can also help people that tend to refrain from seeking help in regular health care due to fear of stigmatisation or fear of opening up to a stranger, like many adolescents have been reported to do (Hoek, Schuurmans, Cuijpers, & Koot, 2009). It also provides the possibility for anonymity. The lack of waiting-lists and around the clock availability are also key strengths (Spijkerman, Pots W., & Bohlmeijer, 2016).

The effect of iCBTs compared with face-to-face CBT in adults have shown that the forms of intervention are comparable with no significant differences in outcome in two meta-analyses on depression and anxiety disorders (Gerhard Andersson et al., 2014; Cuijpers, Donker, van Straten, Li, & Andersson, 2010). The responses to iCBTs in patients are mixed and studies show disparate results in acceptance to iPTs versus face-to-face psychotherapy (Gerhard Andersson et al., 2014). Adolescents, however, have been reported to have a positive acceptance to using the internet as a medium for seeking help (Hoek et al., 2009). The advent of iPTs in apps in smartphones and tablets has been reported to overcome financial, geographical, and social barriers to access (Cavanagh, Strauss, Forder, & Jones, 2014).

Internet-based Mindfulness Based Interventions (iMBI)

‘You can’t stop the waves, but you can learn how to surf.’

- Jon Kabat-Zinn, *‘Wherever You Go, There You Are: Mindfulness Meditation in Everyday Life’* (2005)

The structured format of MBSR (Kabat-Zinn, 2013) makes it relatively easy to adapt to a self-help programme. As there is a known shortage of qualified mindfulness teachers, particularly in school settings (Crane, Kuyken, Hastings, Rothwell, & Williams, 2010), an iMBI could provide adolescents in schools with highly qualified mindfulness teachers that can provide intervention for many more than in face-to-face form (Cavanagh et al., 2014). An Australian study has also reported that adolescents found iMBIs desirable.

Spijkerman et al show in their meta-analysis from 2016 that in the 15 RCTs with 1211 participants in the experimental conditions using iMBIs to evaluate its effect on mental health subdivided on anxiety, depression, well-being, mindfulness, and stress where it found small effect sizes on all subgroups of mental health apart from stress where it reported a medium effect size of 0.51 (Spijkerman et al., 2016). The population was adult although a few adolescents were included. They concluded that iMBIs seem to have best result on stress but that face-to-face mindfulness still seems to have higher effect sizes. They found adherence rates between 35-92% and propose guidance for higher compliance. We have found no RCT on iMBIs being conducted on adolescents, apart from our own feasibility study in Paper IV (Carl Antonson, Thorsén, Sundquist, & Sundquist, 2017).

Aims of the thesis

Overall aim

The overall aim with this thesis was to analyse macro-social stressors in adolescents and their relation to self-esteem, perceived stress and psychiatric symptoms and possible ways to reduce the impacts of these stressors.

The author hypothesised that:

1. The macro-social stressors of governance, school proficiency and urbanicity could have an impact on perceived stress and psychiatric symptoms on an individual level directly.
2. The macro-social stressors of governance could affect stress indirectly by decreasing the well-known resilience factor self-esteem.
3. Perceived stress and psychological well-being could be reduced by an internet-based Mindfulness Based Intervention (iMBI) and increase resilience in the individual.

Specific Aims

Paper I

The specific aims in this study were to: compare self-esteem between Swedish and Bulgarian adolescents; examine sex differences; and investigate potential interactions between country and sex; i.e. whether country modifies the potential sex differences.

Paper II

Our first aim was to analyse the difference in self-esteem in adolescents (girls and boys separately) in Sweden and Bulgaria between time-point 1 (1988-1991) and time-point 2 (2015-2016).

Our second aim was to analyse the difference in self-esteem (girls and boys separately) between Sweden and Bulgaria at time-point 1 and time-point 2.

Our third aim was to analyse potential effect modifications (girls and boys separately), that is, whether the change over time was significantly different between the two countries, or similar, whether the difference between the two countries significantly changed over time. We also aimed to analyse interactions between sex and time in both countries.

Paper III

The first aim of this part of the study was to determine whether perceived stress and psychiatric symptoms, sleep quality and personality traits differ between students in a school with high academic proficiency located in an urban area and a school of average academic proficiency located in a medium-sized town. We hypothesized that a combination of two potential stressors in one of the schools (i.e. high academic proficiency and high urbanicity) would be related to increased stress levels and stress-related psychiatric symptoms. The second aim was to evaluate correlations between perceived stress and psychiatric symptoms, sleep quality and personality traits.

Paper IV

The first aim of this study was to investigate whether there is an effect of iMBI, delivered as an Internet-based self-help programme, on psychiatric and stress-related symptoms in adolescents. The second aim was to investigate the feasibility,

in terms of compliance, of the intervention. The third aim was to investigate whether there is any association between psychiatric and stress-related symptoms at baseline and compliance to the intervention in the adolescents.

Material and Methods

The two projects in the thesis

The Governance Project

Paper I & II were produced as a part of a study commenced in 1988 by Dr Rada Berg in order to compare a Western democracy (Sweden) with a Communistic Dictatorship (Bulgaria) in terms of personality development. Data were collected in the first wave between 1988 and 1991. During the work with this thesis, the author was presented with the data collected by Dr Berg. These already collected data were found to be valuable, not the least by being the only known material to compare personality development with valid and reliable scales in both a democracy and a dictatorship. The data were scanned and safely stored in digital format and were completed by a second wave of data collection in order to analyse the change over time as a reflection of the change in governance. A new ethical consideration was done by the author in cooperation with Frida Thorsén, Rada Berg, Jan Sundquist and Kristina Sundquist. We acquired the legally required permission for the new studies from the local ethics committee (*Etikprövningsnämnden*) in Lund, Sweden. Two researchers in Sofia, Bulgaria, Milena Mutafchieva and Nadia Koltcheva, aided Dr Berg in collecting data in Bulgaria at the second time-point. All Swedish data were collected by Dr Berg alone at the second time-point.

The CHAMPS-Project

(Cognition and Health in Adolescents, Mindfulness as Prevention of Stress)

Paper III and IV are parts of the CHAMPS-study that were commenced in a planning stage by the author and Dr Frida Thorsén in 2011-12. Our view from a clinical standpoint was that although we worked as General Practitioners in relatively affluent areas of the metropolitan Malmö area, we saw a great deal of psychiatric health problems that we attributed to stress. Not the least in adolescents and young adults. Living in the parts of the city with the highest socioeconomic status obviously did not prevent people from suffering stress-related illness. In order to try to approach this problem we had enrolled in a mindfulness instructor training course and tried ourselves to live mindfully and as both our own experience and the literature pointed out that it had a certain effect on stress. We therefore wanted see if we, in a study, could evaluate both the stress-levels and the psychiatric symptoms most affiliated to stress and make an intervention against stress-related illness in a population that could profit from the intervention. We theorised that a population of adolescents would be able to cognitively understand the interventions, could profit well from them, and had many years of possible good psychiatric health in front of them given a positive outcome of the intervention. We chose psychometric scales for general psychiatric health (Symptoms Check List 90 - SCL-90), sleep quality (Pittsburgh Sleep Quality Index - PSQI), personality (Eysenck Personality Index - EPI) and perceived stress (Perceived Stress Scale - PSS-14), and two appropriate cognitive tests to evaluate possible cognitive impairment caused by stress; Trailmaking Test A & B and Symbol-Digit. We designed the CHAMPS-project as a Randomised Controlled Trial (RCT) with three arms; one interventional group (internet-based Mindfulness-Based intervention), one active control group (internet-based Musical Therapy) and one waiting-list group.

Overview of the material and methods

Table C. Overview of the materials and methods in the four Papers.

	Paper I	Paper II	Paper III	Paper IV
Project	Governance	Governance	CHAMPS	CHAMPS
Sample size	203	203/632	283	See
Male	109	109/424	50	CONSORT
Female	94	94/199	142	Flow Chart
Not specified	n/a	n/a	10	
Age	15-16	15-16	15-19	15-19
Primary Outcome	ITIA	ITIA	SCL-90	SCL-90
Secondary Outcomes	Not applicable	Not applicable	PSS PSQI EPI	PSS PSQI Compliance rate
Study Design	Cross-sectional	Time-lag study	Cross-sectional	RCT
Country	Sweden /Bulgaria	Sweden /Bulgaria	Sweden	Sweden
Macro-social stressor	Governance, curriculum	Governance, curriculum	Academic proficiency, urbanicity	N/A
Statistical model	Linear regression using generalised estimating equations	Linear regression using generalised estimating equations	Wilcoxon rank-sum, t-test, Spearman's rank correlation	t-test, Fisher's exact test, Wilcoxon rank-sum

EPI - Eysenck Personality Index, ITIA - 'I Think I Am'-scale, PSS - Perceived Stress Scale, PSQI - Pittsburgh Sleep Quality Index, SCL-90 - Symptoms CheckList 90.

Study Population in Paper I and II

Data were first collected in the autumn terms 1988 and 1989 in Bulgaria, before the fall of the Berlin wall on November 9th 1989, and in Sweden during the spring terms 1989 and 1991. The study-population at the first time-point consisted of 111 adolescents (65 boys and 46 girls) from Sweden and 92 adolescents (44 boys and 48 girls) from Bulgaria. Of those adolescents, 100 Swedish (58 boys and 42 girls) and 88 Bulgarian (41 boys and 47 girls) were included in the analyses.

The study population at the second time-point consisted of 632 adolescents in total, 165 from Sweden and 467 from Bulgaria. Data were collected from October 2015 to February 2016 in Bulgaria and in Sweden during the autumn term 2016.

The Bulgarian schools in the first data-collection represented a sample of almost all upper secondary schools in Sofia that attended practical lessons at the Practical Technical Centre for upper secondary school students in Sofia. The two Swedish schools were situated in Västerås in two socioeconomically different areas of the city verified through a prior study on socioeconomic status of the boroughs of Västerås (Edlund, 1990).

The second data-collection was constructed to be as similar as possible to the first data-collection. The locations were therefore three schools in Västerås. The Practical Technical Centre in Sofia did no longer exist and the data was therefore collected in six upper secondary schools chosen with regard to a spread in socio-economic status to follow the original data-collection as close as possible.

The Swedish participation rate at the first data-collection varied slightly between classes (range 63-79%) and of 155 Swedish students, 111 participated (72%). Reasons for non-response were refusal from the parents to participate, illness, absenteeism or fulfilling some of the exclusion criteria mentioned above. In Bulgaria, the non-response rate was unknown at the first data-collection, but no flu epidemic was reported during the data collection. Non-response was therefore deemed to be low in Bulgaria. The number of participants in Bulgaria in 1988-89 was 92. At T2 the participation rate for the Swedish adolescents was 70%, which is close to the 72% at T1. In Bulgaria there was a participation rate of 77% at T2.

No remuneration was given to any participant.

Study Population in Paper III and IV

Paper III and IV were produced as a part of a study aimed to evaluate stress in Swedish upper secondary school adolescents and to analyse the feasibility of an iMBI in this population.

The study population was selected from two upper secondary schools in Sweden that differed in terms of both urbanicity and academic proficiency. The schools that agreed to participate were Gymnasieskolan Spyken in Lund with 1018 students and Bergska skolan in Finspång with 385 students. The schools' academic proficiencies were assessed in terms of grades at graduation. Bergska skolan is the only upper secondary school in the medium-sized town of Finspång with the standardised national study programs and is considered average with respect to academic results. Spyken is one of four larger upper secondary schools with national study programs in the traditional university city of Lund (110 488 inhabitants in 2010) and is considered a top-end school concerning academic results.

All Swedish-speaking students enrolled at the schools (adolescents aged 15–19 years) received information, initially through personal letters sent to their home addresses, and thereafter lectures in the schools. We had three inclusion criteria: to be able to read and understand Swedish, to have an e-mail address, and to be willing to participate in an 8-week Internet-based self-help programme. A total of 1404 students were attending the two schools during the study period. The Swedish-speaking inclusion criterion excluded one subject, leaving 1403 possible participants. The second inclusion criterion did not lead to exclusion of any potential participants and the third criterion, willingness to participate in a stress reduction intervention, left 283 individuals all of whom gave written informed consent.

The 283 participants were randomised to the three treatment groups; iMBI, Internet-based music therapy (iMT), and waiting list. Of the 283 participants who gave written consent, 202 students - 142 female, 50 male, and 10 where the information on sex and/or school was missing - answered the web-based questionnaires. Bergska skolan provided 45 students and the remaining 147 participants came from Spyken. The mean age was 16.9 years and the median age 17 years (range 15–19 years).

There was a tendency towards a higher percentage of female subjects at Spyken (77%) compared to Bergska skolan (64%), although the difference was non-significant.

The intervention groups were two eight-week Internet-based self-help programmes and the coordinator at the institution handled all contact with the study subjects. This was to preserve the single-blindness of the intervention to the researchers. The participants were allowed by the schools to do a 10-min daily intervention during lesson time and were asked to do at least one intervention each school day. There

were no reminders given to the students, i.e. they had to participate in their appointed intervention on their own incentive. The participants could, via e-mail, contact two of the co-authors of this study (CA or FT), who are also physicians, if they felt that their psychiatric health deteriorated during the interventions.

For a thorough picture of participant compliance during the different steps of the study, please see the CONSORT flow-chart in the results section (Figure 4.1)

No remuneration was given to any participant.

Methods in Paper I and II

The questionnaires were collected in an unidentified manner. Exclusion criteria at the first time-point (T1) were inability to read and write the national language and being a resident in the country for less than five years. In both countries, no student was excluded due to an inability to read and write the national language and very few participants were excluded due to recent immigration (both countries had a small proportion of immigrants during the time of the data collection). At the second time-point (T2) the five-year residency criterion was removed in order to get a representative picture of the changing societies and increase generalisability. Since very few participants were excluded at T1 and only in Sweden, we believe this change in criterion to be justified.

The Autocracy-Democracy index Polity IV

One country on either side of the *Iron curtain*, Sweden and Bulgaria, was included in the study because of their differences in autocracy/democracy. Data for Paper I were collected in 1988-1991 (time-point 1) and for the time-lag study, in Paper II, again in 2015-2016 (time-point 2). At the time point 1 in 1989/90 Bulgaria (the People's Republic of Bulgaria) was a communistic dictatorship, and Sweden was a parliamentary constitutional monarchy. The democracy score in 1989, i.e. the year when the Berlin wall fell, was 10 (Full Democracy) in Sweden and -7 (Autocracy) in Bulgaria according to the Polity IV index (range: -10 to +10) (Marshall, 2011), which is one of the currently most widely used indexes measuring democracy/autocracy (Hogstrom, 2013). The democracy score in 2016 was still 10 (Full Democracy) in Sweden but increased from -7 to 9 (Democracy) in Bulgaria with the major change from -7 to 8 between 1989 and 1990 after the fall of communism and the restoration of democratic institutions.

The psychometric questionnaire ‘I Think I Am’

The ‘I Think I Am’-scale (ITIA) is a self-reporting questionnaire measuring self-esteem (original Swedish name ‘Jag Tycker Jag Är’). The ITIA was developed by the Swedish psychologist Pirjo Birgerstam in 1981 and is validated for the age group 9-18 (Birgerstam, 2013). We used the MH-version of the scale, which was developed for the age group in our study population (Ouvinen-Birgerstam, 1985). The ITIA-scale global is a four-level, 72-item, Likert questionnaire (score for each item -2 to +2, without zero) divided into five sub-scales that includes items that previously have been shown to be central for self-esteem: ‘*Physical characteristics*’, ‘*Talents and skills*’, ‘*Psychological well-being*’, ‘*Relations with the family*’, and ‘*Relations with others*’. The questionnaire consists of both positive (i.e. ‘I have often good ideas’) and negative (i.e. ‘I don’t like my body’) items randomly ordered in order to avoid negative item bias in intercultural studies (Schmitt & Allik, 2005). A high score reflects a high self-esteem and a low score reflects a low self-esteem.

According to Birgerstam the reliability of the global scale has been analysed with Cronbach’s alpha with $\alpha=0.91$ to 0.93 on the ITIA-scale global. The sub-scales and individual items in the scale also have a good reliability and test-retest results show good reliability over time (Birgerstam, 2013).

The validity of the scale is high and was initially analysed through correlation tests between psychological interviews with children where the interviewer was blinded to the result of the questionnaire. A high correlation was also found between interviews with the schoolteachers and the ITIA-scale (Ouvinen-Birgerstam, 1984). Low scores on the ITIA-scale have been shown to be significantly correlated with psychiatric and somatic disabilities, as well as with a range of negative psychological traits (Birgerstam, 2013). Furthermore, the ITIA-scale has been evaluated with respect to correlation to other psychometric scales such as Becks Depression Inventory, Beck’s Anxiety Inventory, and Beck’s Youth Inventories (Birgerstam, 2013). The ITIA-scale has previously been used to investigate differences in self-esteem between cultures, i.e. between different immigrant groups in Sweden and ethnic Swedes (Ouvinen-Birgerstam, 1984). The scale has also been used in a study from Mexico City where children from ordinary schools were compared with children from orphanages and those living on the streets (Arvidsson, 1998). The questionnaire is the second most used scale, among all psychometric questionnaires, in terms of number of clinics using it in child and adolescent psychiatry assessments in the Stockholm County Council (Greater Stockholm area) (Dunerfeldt, 2010).

The bilingual Dr Rada Berg (see above), whose mother tongue is Bulgarian, made the translation of the questionnaire from Swedish into Bulgarian in 1988. Prof. Atchkova from the clinic of Children and Adolescent Psychiatry, Medical Academy, Sofia, aided in honing the fine nuances of the Bulgarian language used

in the translation. The Bulgarian translation was then re-translated back to Swedish by two bilingual physicians and the two translations were compared by Dr. Rada Berg and deemed to have good validity.

Time-Lag study

In order to analyse the possible influence of governance on self-esteem in adolescents we decided to use a time-lag study as time-lag studies separates age and cohort effects and are best at examining generational changes as historical events and cultural trends, which are found to have the greatest impact on the attitudes of adolescents (Twenge, 2012). We therefore decided on using the same questionnaire (self-esteem with the I Think I Am Scale) in the same location (schools in Sweden and Bulgaria, respectively) with the same age-group (adolescents aged 15-16) at two times (slightly before and a generation after the fall of the Iron curtain, respectively). In this study design Sweden, being a stable and unchanged democracy during two generations, will function as a control to Bulgaria where two generations have had opposed forms of governance. Thus if we see differences in the Bulgarians in scales where the scores of the Swedish adolescents are unchanged we can conclude that those changes are related to the country at the specific time and therefore possibly, as a proxy, to the form of governance. The time between the measurement is approximately one generation in order to both avoid the tumultuous after-effects of a revolution (Moghadam, 1995) and to evaluate the effects of the difference in country at times with stable forms of governance that impacts the development of its children.

Methods in Paper III and IV

We used four well-validated psychometric tests that had previously been used on adolescents: the Symptoms Checklist 90 (SCL-90), the Perceived Stress Scale (PSS-14), the Pittsburgh Sleep Quality Index (PSQI) and the Eysenck Personality Index (EPI). The combination of scales was chosen to give an insight into the students' perceived stress (PSS-14) and likely outcomes of that stress, expressed as low-quality sleep (PSQI), increased general mental illness (SCL-90), and the personality trait Neuroticism (EPI). The time required to fill in the questionnaires was measured to be less than 45 minutes. This was deemed appropriate to avoid questionnaire fatigue in order to have good test-retest reliability.

Symptoms Checklist 90 (SCL-90)

To measure general psychiatric symptoms, we used the 90-item SCL-90 (Derogatis, 1994), which uses a five-point Likert scale to assess overall psychiatric symptoms, including somatisation. The main outcome of the scale is the GSI, which is calculated as the total sum of the weights for each individual item divided by the total number of questions answered (with a minimum answer rate of 80%). The SCL-90 is commonly used in psychiatric evaluations and has a subscale measuring somatisation (Derogatis, 1994; Derogatis, Rickels, & Rock, 1976). The SCL-90 has satisfactory internal consistency reliability (Derogatis et al., 1976; Horowitz, Rosenberg, Baer, Ureño, & Villaseñor, 1988) and test–retest reliability over both a week (Derogatis, 1994) and 10 weeks (Horowitz et al., 1988). The latter study also showed a good test–retest reliability coefficient for the GSI. The validity of the scale has been confirmed with regard to internal structure, factorial invariance, and convergent–discriminant validity (Derogatis, 1994; Derogatis et al., 1976; Koeter, 1992; Wiznitzer, Verhulst, Van den Brink, & Koeter, 1992). Most validity and reliability studies on the SCL-90 date back 20 to 40 years; more recent studies are generally on subgroups. The ecological validity of the SCL-90 should be viewed from this perspective as it has been cited approximately 3500 times since its introduction in 1973. One recent Danish study showed good discriminant validity for the three SCL-90 subscales Depression, Anxiety and Interpersonal sensitivity, as confirmed by comparison with the corresponding ICD-10 diagnoses (depression, anxiety and unspecified personality disorder, respectively) (Bech, Bille, Møller, Hellström, & Ostergaard, 2014). Also, a Spanish study comparing pen-and-paper and online versions of the test showed good validity and test-retest reliability (Vallejo, Jordan, Diaz, Comeche, & Ortega, 2007).

Perceived Stress Scale (PSS-14)

For measurement of perceived stress, we used the widely accepted 14-item Perceived Stress Scale, constructed as a five-point Likert scale (Cohen, Janicki-Deverts, & Miller, 2007; Cohen, Kamarck, & Mermelstein, 1983). The PSS only focuses on the individual experiences of the stressors and not on their magnitude. The PSS-14 scale has been shown to have good internal consistency and reliability (Cronbach’s alpha 0.75–0.89), and to have good test–retest reliability over two days to four weeks. It has been empirically validated in college students (Lee, 2012). Measurements of perceived stress have been reported to have a higher ecological validity than physiological response parameters, self-report of psychiatric symptoms, and behavioural changes and stressors, such as major life changes (Lavoie & Douglas, 2012).

Pittsburgh Sleep Quality Index (PSQI)

To measure sleep quality we used the Pittsburgh Sleep Quality Index (PSQI) (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The index is an algorithm that calculates sleep quality based on nine parameters (one of which is divided into eight sub-items) and results in a numerical value with a cut-off level for low quality sleep of more than five points. The PSQI has been shown to have good test–retest reliability for both the global score and the sub-scores in both short-term (2 days) and long-term (1–2 months) follow-ups, with an overall Cronbach’s alpha of 0.87. The PSQI has also shown good correlations with sleep logs and lower, but significant, correlations with polysomnography, thus confirming its validity (Backhaus, Junghanns, Broocks, Hohagen, & Riemann, 2002).

Eysenck Personality Index (EPI)

To measure the personality dimensions Neuroticism and Extraversion, we used a 46-item version of the EPI, with the L-questions excluded. The EPI is a well-used personality trait questionnaire that was constructed in 1964, and that has since been widely used (Poropat, 2011). The personality dimensions are constructed as a scale with one extreme of the trait at one end and the other extreme diametrically opposite. Neuroticism measures emotional (in)stability and disposition towards anxiety. Extraversion is the disposition towards sociable, friendly, impulsive and risk-taking behaviour (Pervin & Cervone, 2010). Neuroticism is strongly linked to negative affect and Extraversion to positive affect. Neuroticism is strongly linked to multiple psychiatric diagnoses. Indeed, a high Neuroticism score has been shown to be at the core of almost all psychiatric diagnoses. It has been shown to partially account for the relationship between depression and stress, as well as that between social phobia and stress (Uliaszek et al., 2010). A low Extraversion value has strong relationships with dysthymia and social phobia (Kotov, Gamez, & Schmidt, 2010). Test-retest reliability in a study of computerized and pen and paper administration was comparable to the reliability values given in the EPI manual (Sanitioso & Reynolds, 1992).

Inquisite Survey System

The questionnaires were e-mailed to the address given by each student when signing the informed consent document. The students were able to answer the tests when it suited them during a window of ten consecutive days, and only one answer per student, test, and test period was possible. All questionnaires were copied from paper forms to the Internet-based survey program Inquisite Survey System (Inquisite Inc., Copenhagen, Denmark). Using the Inquisite Survey System allowed for the incoming answers to directly be transferred to the university department

database and further exported to statistical software without any human involvement at this stage, thus reducing errors due to data transfer. Data were stored unidentified to guarantee privacy and blinding.

Paper IV interventions

Interventions

The two active interventions were Internet-based self-help programmes that were completely computerised without any human interference. They were based on modules of approximately 10 min and contained both video and audio material, but the focus was on the latter. Both interventions logged compliance in terms of log-in identification, time at log-in, and fulfilment of the session. They were accessible by any device that connects to the Internet, such as computers, smartphones, and tablets. All groups, including the waiting list group, got access to both interventions after all post-intervention questionnaires were completed. No further follow-up was performed.

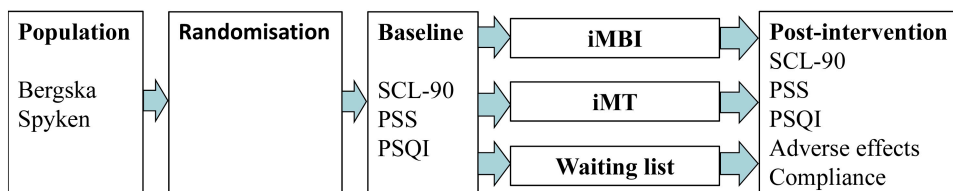


Figure B: The study design of the Randomised Controlled Trial in Paper IV.

iMBI – internet-based MindfulnessBased Intervention; iMT – internet-based Music Therapy; PSS - Perceived Stress Scale; PSQI-Pittsburgh Sleep Quality Index; RCT – Randomised Controlled Trial; SCL-90 – Symptoms Checklist 90

Mindfulness-based intervention (iMBI)

The iMBI (In Swedish: Mindfulness Grundkurs 2.0 from Mindfulnesscenter AB, Sweden) was designed by Dr. Ola Schenström, a G.P. and renowned national expert in Sweden on clinical mindfulness meditation. The programme is an 8-week course consisting of sessions of 10 min of mindfulness meditation twice daily, 6 days a week. The modules consist of standard mindfulness meditation techniques, such as body scan and mindfulness of breath, and other perceptions

(Kabat-Zinn, 1982), and could be defined as an intervention based on mindfulness training (Baer, 2003). The intervention incorporates elements from both MBSR (Kabat-Zinn, 2013) and more cognitively oriented parts from MBCT (Segal, Williams, & Teasdale, 2002). An iMBI, in a study on anxiety in adults, has used the same platform and guided meditations, but with cognitive material focused on anxiety (Boettcher et al., 2014). For our study, a complete intervention was defined as at least 40 sessions, which is lower than the original programme but was deemed appropriate by the constructor of the programme and more time than in other programmes (Flett, Hayne, Riordan, Thompson, & Conner, 2019).

Music therapy intervention (iMT)

We chose iMT as the active control to iMBI, as one meta-analysis on music therapy showed good effect in stress reduction from listening to music, both in itself, and in combination with music-assisted relaxation techniques. It concluded that the best effect of iMT is on adolescents (Pelletier, 2004). Listening to music is also something that adolescents are generally interested in and tend to do, of their own free will, when feeling stressed or emotionally challenged (Hendricks, Robinson, Bradley, & Davis, 1999). Furthermore, a small study on adolescents targeting depression with music therapy, which included active participation with instruments and interpretation in terms of painting, showed promising results (Hendricks et al., 1999). In addition, the partial similarity between the two Internet-based self-help programmes makes these two groups comparable. For the present study, a complete intervention was defined as at least 40 sessions to comply with the iMBI.

The iMT, Musikintervention, was designed with the aid of Professor Björn Ejdemo, MD and visiting professor of music at the Australian National University, who made a preliminary selection of pieces of music. Per Vegfors, MD, specialist in child and adolescent psychiatry, assessed the appropriateness of the music from an adolescent psychiatric perspective. A total of ten non-vocal classical music pieces accessible on YouTube were chosen that met the criteria of (1) accessibility, i.e. being relatively easy to listen to for an untrained ear, (2) being of approximately 10 min in duration, and (3) recognisable as being calming or soothing. The programme Musikintervention (Paxx Media AB, Sweden) used streamed music videos from YouTube. See appendix for list of music and interpretations.

Statistical analysis

All statistical analyses were done using Stata software (Stata Corp, Texas, USA).

Governance project

All analyses were repeated for the total score (ITIA-scale global) and for the five sub-scales. The number of individuals and sex distribution are presented as numbers and percentages and the scores are presented as means and SDs, stratified by country.

Data are being shown both unadjusted and adjusted, as well as stratified, for sex. The adjustment was made as there was a different proportion of boys and girls between the countries, and the norm data shows differences between the sexes (Birgerstam, 2013). The results were sex-adjusted with a linear regression model.

Paper I

To examine our primary aim, self-esteem in adolescents and differences between Sweden and Bulgaria, we used linear regression models; the first model was univariate and the second was adjusted for sex (Table 1:2).

We also examined whether there were any interactions between country and sex, i.e. whether the possible country differences in self-esteem differed by sex, or similarly, whether the possible sex differences in self-esteem differed by country. To examine this, we used linear regression models with an interaction term between country and sex (Table 1:3). Interactions tests are highly useful for the examination of whether a certain variable modifies the potential effect of another variable (i.e. effect modification).

Participants who had not responded to three or more items on the scales were counted as missing. In a sensitivity analysis, the mean number of points for the questions the students had responded to was used to impute values for the missing questions. We also examined whether influential observations and outliers affected our results.

We used a significance level of $p < 0.05$.

Paper II

We made a refinement in our statistical analysis in Paper II and took into account that data were clustered as the data-collection took place in classes. To account for

this clustering we used generalised estimating equations (GEE) in all regression models.

To examine our primary aims, self-esteem in adolescents and differences between Sweden and Bulgaria and differences over time, we used linear regression models; the first model was univariate and the second was adjusted for sex (Table 2:2 and Table 2:3).

Since we were interested in both differences between countries and over time, we also examined interactions. We did this by adding an interaction term between time and country, i.e. whether the possible country differences in self-esteem differed by time, or similarly, whether the possible time differences in self-esteem differed by country. We examined this for all individuals as well as stratified for sex (Figure 2:1). We also tested interactions between sex and time in both countries separately.

If a participant had less than 50% of the data missing from ITIA-scale global or any of the sub-scales the missing items were imputed with the mean of the non-missing items of that scale, if more than 50% of the items were missing the persons score for that scale was excluded from the study. We also examined whether influential observations and outliers affected our results.

We used a significance level of $p < 0.05$.

Paper III

Comparisons between pure Likert-scales were made with a non-parametric test, the Wilcoxon rank-sum test, because of the ordinal nature of the data. The global severity index (GSI), the global index from the SCL-90 questionnaire, and PSQI are Comparisons between calculated Likert-scales were made with the parametric Student's t-test

To calculate correlations, we used the Spearman's rank correlation coefficient as the data was ordinal.

Confidence intervals were calculated with a confidence level of 95%.

Paper IV

Power was calculated for the planned main outcome of the study, improvement in global severity index (GSI) (see below) with the conventional values for significance level of 0.05 (α), and for power of 0.80 (β). In the power calculation we used a one-way ANOVA pairwise two-sided equality calculation as we had three groups to compare.

To examine aim 1, i.e. to investigate whether there was a potential effect of the Internet-based self-help programmes on psychiatric and stress-related symptoms assessed before and after the intervention, we aimed to compare the scores of the different scales before and after the intervention among the active participants. We also used Student's t-test to investigate whether the three groups differed at baseline. These comparisons were performed to check whether the randomisation procedure was successful.

To examine aim 2, i.e. to investigate the feasibility in terms of compliance to the interventions with the two Internet-based self-help programmes, we used a CONSORT flowchart to display the dropout rates at the different steps of the study (Moher, Schulz, Altman, & Group*, 2001). The comparison in dropout rate between the two intervention groups (iMBI and iMT) was done using Fisher's two-tailed exact test calculated with the number of participants that were randomised to either intervention and the participants that finished at least one session of either intervention. The Fisher's two-tailed exact test was used as we intended to test the null hypothesis that the dropout rates were equal between iMBI and iMT.

To examine aim 3, i.e. to investigate whether there is any association between compliance to the intervention and psychiatric and stress-related symptoms at baseline, we compared the participants that logged in and completed at least one session and those who did not log into the self-help programme. We compared whether there was a difference in psychiatric and stress-related symptoms between those two groups, separately in each intervention group (iMBI and iMT). We used a scatter plot to check whether the distribution was skewed and used the non-parametric Wilcoxon rank-sum test if the distribution was skewed and the parametric Student's t-test if the data were normally distributed.

Ethics

Paper I and II

For the first data-collection we acquired the legally required permission for the study from the local ethics committee (*Etikprövningsnämnden*) in Lund, Sweden (reference no. LU 60-1989). The necessary authorisation and ethical permission for the Bulgarian part of the study was acquired from the Bulgarian Academy of Science. For the second data-collection an additional permission was acquired from the local ethics committee (*Etikprövningsnämnden*) in Lund, Sweden (reference no. 2014/429). All data were collected anonymously.

Paper III and IV

We acquired the legally required permission for the study from the local ethics committee (Etikprövningsnämnden) in Lund, Sweden (reference no. 2011/345). The study was registered at www.clinicaltrials.gov before it was started (reference no. NCT 01 457 222), and was designed and performed in accordance with the Declaration of Helsinki and Swedish law. The authors thus assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Declaration of Helsinki, as revised in 2008. Written informed consent was provided by each participant.

Results

Paper I

Table 1:1 shows the descriptive data and the mean score of the participants in the study in 1989-1991, divided by country and sex, with means and standard deviations on the ITIA-scale global and the five sub-scales.

Table 1:1. Descriptive data on participants and their mean scores on the 'I think I Am'-scale (ITIA) global and its sub-scales divided by country and sex.

	Sweden	Bulgaria
Included in the study, number (%)		
<i>All</i>	111	92
<i>Boys</i>	65 (58.6)	44 (47.8)
<i>Girls</i>	46 (41.4)	48 (52.2)
Included in the analysis ^a , number (%)		
<i>All</i>	100	88
<i>Boys</i>	58 (58.0)	41 (46.6)
<i>Girls</i>	42 (42.0)	47 (53.4)
ITIA-scale global, mean (SD)		
<i>All</i>	57.4 (27.8)	47.5 (23.6)
<i>Boys</i>	62.2 (29.2)	49.4 (23.3)
<i>Girls</i>	50.8 (24.0)	45.8 (24.0)
Physical characteristics, mean (SD)		
<i>All</i>	11.4 (8.2)	11.5 (6.5)
<i>Boys</i>	13.3 (8.3)	13.0 (6.4)
<i>Girls</i>	8.6 (7.4)	10.2 (6.3)
Talents and skills, mean (SD)		
<i>All</i>	9.0 (8.9)	8.5 (6.7)
<i>Boys</i>	10.4 (8.1)	7.2 (7.2)
<i>Girls</i>	7.0 (9.7)	9.6 (6.2)
Psychological well-being, mean (SD)		
<i>All</i>	12.2 (8.2)	10.1 (9.2)
<i>Boys</i>	14.2 (8.4)	12.8 (8.3)
<i>Girls</i>	9.4 (7.1)	7.7 (9.4)
Relations with the family, mean (SD)		
<i>All</i>	13.8 (8.4)	10.1 (7.3)
<i>Boys</i>	13.1 (9.0)	9.6 (6.8)
<i>Girls</i>	14.8 (7.5)	10.6 (7.8)
Relations with others, mean (SD)		
<i>All</i>	11.1 (6.9)	7.3 (7.8)
<i>Boys</i>	11.2 (7.4)	6.7 (7.6)
<i>Girls</i>	10.9 (6.2)	7.8 (7.9)

^aIf more than two missing answers on ITIA, the scale was set to missing

Table 1:2 shows the estimated mean differences between the Swedish and Bulgarian adolescents. Swedish adolescents had a nine points higher mean than the Bulgarians on the ITIA-scale global ($p=0.02$), after adjusting for sex. There were no significant differences between the two countries in the sub-scales ‘*Physical characteristics*’, ‘*Talents and skills*’, and ‘*Psychological well-being*’. The two sub-scales measuring relational self-esteem, i.e., ‘*Relations with the family*’ and ‘*Relations with others*’, both showed a 3.8 points higher score in the Swedish adolescents ($p=0.001$ and $p=0.0005$, respectively), after adjusting for sex.

Table 1:2. Estimated mean differences (β) between the Swedish and Bulgarian adolescents in the ‘I think I Am’-scale (ITIA) global and its sub-scales using linear regression models, unadjusted and adjusted for sex.

	Sweden - Bulgaria					
	Unadjusted			Adjusted for sex		
	β^a	p	95% CI	β^a	p	95% CI
ITIA-scale global	9.9	0.009	2.5; 17.4	9.0	0.02	1.6; 16.5
Physical characteristics	-0.2	0.87	-2.3; 2.0	-0.6	0.57	-2.7; 1.5
Talent and skills	0.5	0.68	-1.8; 2.8	0.4	0.73	-1.9; 2.7
Psychological well-being	2.1	0.09	-0.4; 4.6	1.6	0.20	-0.9; 4.0
Relations with the family	3.7	0.002	1.4; 6.0	3.8	0.001	1.5; 6.1
Relations with others	3.8	0.0005	1.7; 5.9	3.8	0.0005	1.7; 6.0

^a β denotes difference in score between Swedish and Bulgarian adolescents

Table 1:3 shows the estimated mean differences between the countries and sexes. The country differences are shown separately by sex and the sex differences are shown separately by country. Tests of interactions between country and sex are also shown.

Table 1:3. Estimated mean differences (β) between countries and sexes in 'I think I Am'-scale (ITIA) global and its sub-scales using linear regression models with an interaction between country and sex.

	Sweden - Bulgaria			Boys - Girls			Test of interaction between country and sex
	β^a	p	95% CI	β^b	p	95% CI	p
ITIA-scale global							0.31
Boys	12.7	0.02	2.4; 23.0				
Girls	5.0	0.36	-5.7; 15.7				
Sweden				11.3	0.03	1.1; 21.6	
Bulgaria				3.6	0.51	-7.2; 14.4	
Physical characteristics							0.40
Boys	0.3	0.86	-2.7; 3.2				
Girls	-1.5	0.32	-4.6; 1.5				
Sweden				4.7	0.002	1.8; 7.6	
Bulgaria				2.9	0.07	-0.2; 5.9	
Talents and skills							0.02
Boys	3.1	0.053	-0.04; 6.3				
Girls	-2.6	0.13	-5.9; 0.8				
Sweden				3.4	0.04	0.2; 6.5	
Bulgaria				-2.3	0.17	-5.6; 1.0	
Psychological well-being							0.87
Boys	1.4	0.42	-2.0; 4.7				
Girls	1.8	0.32	-1.7; 5.3				
Sweden				4.8	0.005	1.4; 8.1	
Bulgaria				5.2	0.004	1.6; 8.7	
Relations with the family							0.73
Boys	3.4	0.04	0.2; 6.6				
Girls	4.3	0.01	0.9; 7.6				
Sweden				-1.8	0.28	-4.9; 1.4	
Bulgaria				-0.9	0.58	-4.3; 2.4	
Relations with others							0.51
Boys	4.5	0.003	1.6; 7.5				
Girls	3.1	0.049	0.02; 6.2				
Sweden				0.3	0.85	-2.7; 3.2	
Bulgaria				-1.1	0.47	-4.2; 2.0	

^a β denotes difference in score between Swedish and Bulgarian adolescents

^b β denotes difference in score between boys and girls

The comparison between the countries and between boys and girls in terms of global self-esteem, measured with the ITIA-scale global, showed that the Swedish boys had a 12.7 points higher mean score than the Bulgarian boys ($p=0.02$) whereas the Swedish girls had a 5.0 points higher mean score than the Bulgarian girls on the ITIA-scale global. The difference between the girls, in contrast to the difference between the boys, was non-significant ($p=0.36$). No significant differences between the countries were seen in the sub-scales '*Physical characteristics*', '*Talents and skills*', and '*Psychological well-being*'. There were significant differences in the two relational self-esteem sub-scales, '*Relations with the family*' and '*Relations with others*', between the countries where both the Swedish girls and boys had higher scores than their Bulgarian counterparts.

The comparison between the sexes in the two respective countries showed that the Swedish boys had significantly higher scores than the Swedish girls on the ITIA-scale global as well as on the two scales '*Physical characteristics*', and '*Talents and skills*'. For '*Psychological well-being*', a significant sex difference was found in both Sweden and Bulgaria where '*Psychological well-being*' had higher scores in boys than girls in both countries.

There was a significant interaction between country and sex on the sub-scale '*Talents and skills*' where the differences between boys and girls went in different directions in the two countries. In Sweden, boys scored higher than girls, whereas in Bulgaria boys scored lower than girls.

We also made a sensitivity analysis with imputed values for the missing items, as described in the statistics section above, and found that the results were almost identical.

Paper II

Table 2:1 shows descriptive data and the mean scores of the participants on the 'I Think I Am' global self-esteem scale and its subscales divided on country, time period and sex.

Table 2:1. Descriptive data and the mean scores of the participants on the 'I Think I Am'-scale (ITIA) global and its subscales divided by country and sex in 1988-1991 (T1) and 2015-2016 (T2).

	Sweden		Bulgaria	
	T1	T2	T1	T2
Included in the study, number (%)				
<i>All</i>	111	165	92	467
<i>Boys</i>	65 (58.6)	96 (58.2)	44 (47.8)	328 (70.2)
<i>Girls</i>	46 (41.4)	67 (40.6)	48 (52.2)	132 (28.3)
ITIA-scale global ^a , mean (SD)				
<i>Number</i>	110	148	92	464
<i>All</i>	58.2 (27.3)	57.5 (37.0)	46.6 (24.1)	56.0 (30.1)
<i>Boys</i>	62.6 (28.9)	59.7 (38.0)	47.9 (24.1)	57.9 (29.5)
<i>Girls</i>	52.0 (24.0)	54.9 (36.0)	45.4 (24.2)	52.4 (31.1)
Subscales^b				
Physical characteristics, mean (SD)				
<i>Number</i>	110	151	92	463
<i>All</i>	11.7 (8.2)	11.8 (8.6)	11.4 (6.5)	12.0 (7.4)
<i>Boys</i>	13.4 (8.1)	12.7 (8.7)	12.7 (6.4)	12.3 (7.2)
<i>Girls</i>	9.4 (7.7)	10.7 (8.5)	10.2 (6.3)	11.2 (7.7)
Talent and skills, mean (SD)				
<i>Number</i>	110	153	92	461
<i>All</i>	8.9 (8.8)	8.7 (8.6)	8.4 (6.7)	8.3 (7.8)
<i>Boys</i>	10.2 (8.2)	9.2 (8.9)	7.1 (7.1)	8.1 (7.9)
<i>Girls</i>	7.0 (9.3)	8.0 (8.3)	9.6 (6.2)	9.0 (7.5)
Psychological well-being, mean (SD)				
<i>Number</i>	110	148	92	463
<i>All</i>	12.4 (8.1)	9.2 (11.5)	9.6 (9.3)	12.1 (10.0)
<i>Boys</i>	14.3 (8.3)	11.0 (11.2)	11.9 (8.8)	13.5 (9.1)
<i>Girls</i>	9.9 (7.0)	7.0 (11.6)	7.5 (9.4)	9.1 (11.4)
Relations with the family, mean (SD)				
<i>Number</i>	110	149	92	464
<i>All</i>	13.6 (8.5)	17.3 (9.5)	10.0 (7.5)	13.9 (8.1)
<i>Boys</i>	13.0 (9.0)	16.7 (9.6)	9.6 (7.0)	14.1 (7.9)
<i>Girls</i>	14.4 (7.9)	18.0 (9.6)	10.3 (8.0)	13.5 (8.8)
Relations with others, mean (SD)				
<i>Number</i>	110	148	92	459
<i>All</i>	11.5 (7.1)	10.5 (8.0)	7.2 (7.7)	9.6 (7.9)
<i>Boys</i>	11.6 (7.5)	10.1 (8.4)	6.6 (7.5)	9.8 (8.0)
<i>Girls</i>	11.3 (6.5)	11.0 (7.4)	7.9 (7.8)	9.8 (7.3)

^aIf more than 50% missing, the scale was set to missing. If less than or equal to 50% missing, the missing items were imputed with the mean of the non-missing items.

^bIf more than 50% missing on the subscale, the scale was set to missing. If less than or equal to 50% missing, the missing items were imputed with the mean of the non-missing items for each subscale.

T1 = Timepoint 1, i.e. 1988-89 in Bulgaria and 1989-91 in Sweden.

T2 = Timepoint 2, i.e. 2015 in Bulgaria and 2016 in Sweden.

Imputations had to be made both at time-point 1 and at time-point 2 due to missing data, the numbers needed to impute were higher at time-point 2. One male adolescent was excluded in the 1988-1991 and one from the 2015-2016 material, both Swedish, due to being extreme outliers that was deemed to influence the results too much.

Table 2:2 shows the estimated mean differences in the ITIA-scale global and its subscales between T2 and T1 using generalised estimation equations in each country. Whereas there were no significant differences in the ITIA-scale global between T1 and T2 in any of the strata in the Swedish material; there was a significant improvement in the Bulgarian adolescents both unadjusted (9.42 points, $p=0.004$) as well as adjusted (8.41, $p=0.007$) for sex. In Sweden, the sub-scale '*Relations with others*' had a non-significant slight decrease in scores whereas the Bulgarians significantly increased their scores. In the sub-scale '*Psychological well-being*' there was a decrease in the scores in all Swedish adolescents both unadjusted (-3.18, $p=0.005$) as well as adjusted (-3.08, $p=0.008$). In Bulgaria, the unadjusted score was increased by 2.49 points ($p=0.02$) but this was only borderline significant ($p=0.07$) when adjusted for sex and non-significant when stratified by sex. In the sub-scale '*Relations with the family*' both countries increased their scores by between 3.07 and 4.55 points. This increase was significant in all strata except for Bulgarian girls where it was borderline significant ($p=0.06$). Data are being shown both unadjusted and adjusted, as well as stratified, for sex. The adjustment was made as there was a different proportion of boys and girls between the countries, and the norm data shows differences between the sexes (Birgerstam, 2013).

Table 2:2. Estimated mean differences between 2015-2016 and 1988-91 for Sweden and Bulgaria in the 'I think I Am'-scale (ITIA) global and its subscales using generalised estimation equations, unadjusted and adjusted for sex as well as stratified by sex.

	2015-2016 vs 1988-1991					
	Sweden			Bulgaria		
	Diff.	p	95% CI	Diff.	p	95% CI
ITIA-scale global						
<i>All unadjusted</i>	-0.40	0.90	-7.00; 6.19	9.42	0.004	3.02; 15.8
<i>All adjusted for sex</i>	-0.24	0.94	-7.11; 6.62	8.41	0.007	2.25; 14.58
<i>Boys</i>	-3.18	0.55	-13.5; 7.18	9.29	0.08	-0.98; 19.6
<i>Girls</i>	3.13	0.59	-8.09; 14.3	6.95	0.07	-0.51; 14.4
Physical characteristics						
<i>All unadjusted</i>	-0.06	0.95	-1.95; 1.84	0.57	0.50	-1.07; 2.21
<i>All adjusted for sex</i>	0.05	0.96	-1.88; 1.97	0.31	0.71	-1.35; 1.97
<i>Boys</i>	-1.06	0.40	-3.51; 1.40	-0.68	0.62	-3.31; 1.96
<i>Girls</i>	1.33	0.37	-1.55; 4.21	0.70	0.12	-0.18; 1.58
Talent and skills						
<i>All unadjusted</i>	-0.30	0.63	-1.54; 0.94	-0.04	0.96	-1.53; 1.45
<i>All adjusted for sex</i>	-0.19	0.76	-1.42; 1.04	0.18	0.80	-1.26; 1.62
<i>Boys</i>	-1.09	0.42	-3.71; 1.54	1.22	0.27	-0.95; 3.38
<i>Girls</i>	1.55	0.27	-1.23; 4.34	-0.55	0.67	-3.08; 1.98
Psychological well-being						
<i>All unadjusted</i>	-3.18	0.005	-5.41; -0.95	2.49	0.02	0.39; 4.60
<i>All adjusted for sex</i>	-3.08	0.008	-5.36; -0.81	1.46	0.07	-0.12; 3.04
<i>Boys</i>	-3.30	0.052	-6.63; 0.03	1.55	0.29	-1.33; 4.42
<i>Girls</i>	-3.01	0.06	-6.16; 0.14	1.37	0.33	-1.40; 4.14
Relations with the family						
<i>All unadjusted</i>	3.75	0.0004	1.67; 5.83	3.95	< 0.0001	2.05; 5.85
<i>All adjusted for sex</i>	3.73	0.0003	1.72; 5.73	3.92	< 0.0001	2.01; 5.83
<i>Boys</i>	3.74	0.006	1.06; 6.42	4.55	0.0002	2.18; 6.92
<i>Girls</i>	3.62	0.01	0.83; 6.40	3.07	0.06	-0.07; 6.21
Relations with others						
<i>All unadjusted</i>	-1.05	0.31	-3.09; 0.99	2.36	0.04	0.15; 4.56
<i>All adjusted for sex</i>	-1.02	0.33	-3.06; 1.02	2.35	0.04	0.11; 4.58
<i>Boys</i>	-1.49	0.27	-4.14; 1.16	2.55	0.14	-0.80; 5.90
<i>Girls</i>	-0.45	0.77	-3.43; 2.54	1.68	0.02	0.31; 3.04

Diff. denotes difference in score between 2015-16 and 1988-91

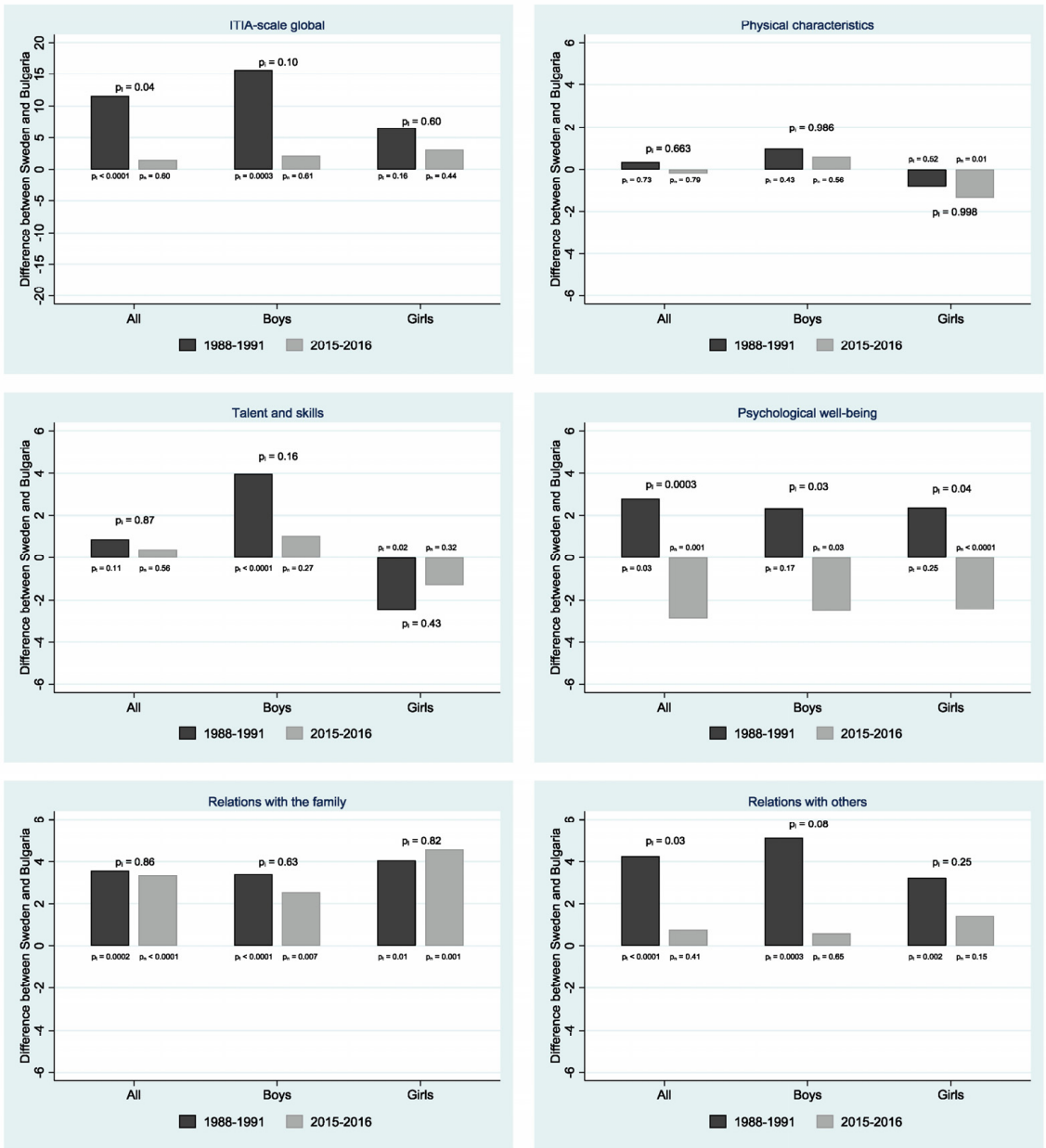
Table 2:3 shows the estimated mean differences in the ITIA-scale global and its subscales between Sweden and Bulgaria using generalised estimation equations at each time-point. Data are being shown both unadjusted and adjusted as well as stratified for sex. The large, significant differences between the countries in 1988-1991 in self-esteem measured by the ITIA-scale global in all adolescents, both unadjusted (11.5 points, $p < 0.0001$) and adjusted for sex (10.9 points, $p = 0.0002$) as well in the girls stratum, had levelled off in the recent material in all strata and no significant differences were seen in the second wave (1.51 points, $p = 0.60$, unadjusted). In the sub-scale '*Relations with others*', the Swedes at T1 had significantly higher scores than Bulgarians in all strata but this difference had levelled out in all strata in 2015-16. In '*Psychological well-being*' the Swedes had a previous higher result that was significant in the Swedish total, both adjusted and unadjusted for sex, but in T2 the Swedes had a significantly lower score in all strata compared to Bulgarians in a diametrically opposed shift. In the '*Relations with the family*' the Swedes have significantly higher scores in all strata compared to the Bulgarians at both time-points.

Table 2:3. Estimated mean differences between Sweden and Bulgaria for 1988-1991 and 2015-2016 in the 'I Think I Am'-scale (ITIA) global and its subscales using generalised estimation equations, unadjusted and adjusted for sex as well as stratified by sex.

	Sweden vs Bulgaria					
	1988-1991			2015-2016		
	Diff.	p	95% CI	Diff.	p	95% CI
ITIA-scale global						
<i>All unadjusted</i>	11.5	< 0.0001	6.02; 17.1	1.51	0.60	-4.10; 7.13
<i>All adjusted for sex</i>	10.9	0.0002	5.25; 16.6	2.21	0.43	-3.27; 7.69
<i>Boys</i>	15.7	0.0003	7.20; 24.2	2.17	0.61	-6.11; 10.5
<i>Girls</i>	6.53	0.16	-2.63; 15.7	3.10	0.44	-4.79; 11.0
Physical characteristics						
<i>All unadjusted</i>	0.35	0.73	-1.62; 2.33	-0.19	0.79	-1.58; 1.19
<i>All adjusted for sex</i>	0.008	0.99	-1.99; 2.01	-0.02	0.97	-1.43; 1.38
<i>Boys</i>	0.99	0.43	-1.45; 3.43	0.60	0.56	-1.44; 2.64
<i>Girls</i>	-0.84	0.52	-3.37; 1.69	-1.35	0.006	-2.32; -0.38
Talent and skills						
<i>All unadjusted</i>	0.87	0.11	-0.20; 1.94	0.37	0.56	-0.88; 1.63
<i>All adjusted for sex</i>	1.09	0.03	0.13; 2.05	0.32	0.62	-0.92; 1.55
<i>Boys</i>	3.98	< 0.0001	2.23; 5.73	1.03	0.27	-0.79; 2.85
<i>Girls</i>	-2.49	0.02	-4.61; -0.37	-1.30	0.32	-3.86; 1.27
Psychological well-being						
<i>All unadjusted</i>	2.82	0.03	0.28; 5.37	-2.88	0.001	-4.59; -1.16
<i>All adjusted for sex</i>	2.34	0.04	0.06; 4.63	-2.02	0.003	-3.33; -0.71
<i>Boys</i>	2.33	0.17	-0.98; 5.63	-2.51	0.03	-4.85; -0.18
<i>Girls</i>	2.36	0.25	-1.63; 6.36	-2.45	< 0.0001	-3.65; -1.26
Relations with the family						
<i>All unadjusted</i>	3.56	0.0002	1.66; 5.46	3.31	< 0.0001	1.67; 4.96
<i>All adjusted for sex</i>	3.67	0.0002	1.76; 5.58	3.28	0.0001	1.63; 4.94
<i>Boys</i>	3.39	< 0.0001	2.06; 4.73	2.53	0.01	0.50; 4.55
<i>Girls</i>	4.05	0.007	1.11; 7.00	4.57	0.001	1.80; 7.34
Relations with others						
<i>All unadjusted</i>	4.26	< 0.0001	2.27; 6.24	0.76	0.41	-1.04; 2.56
<i>All adjusted for sex</i>	4.31	< 0.0001	2.35; 6.27	0.78	0.40	-1.04; 2.61
<i>Boys</i>	5.12	0.0003	-2.36; 7.88	0.58	0.65	-1.91; 3.07
<i>Girls</i>	3.20	0.002	1.15; 5.26	1.43	0.15	-0.54; 3.41

Diff. denotes difference in score between Sweden and Bulgaria

From Table 2:2 and Table 2:3 we suspect that the differences between countries has changed over time, or similarly, that the time has affected the countries in different ways. In Figure 2:1 we wanted to examine this and added an interaction term in the regression models used in the tables to statistically test the differences. Figure 1 shows the difference in score between Sweden and Bulgaria separately for both time-points. The p-values under the bars are from the test between countries, and the p-value centred above the bars is from the interaction test, i.e. a test on whether the possible country differences in self-esteem differed by time. We found a significant interaction between Sweden and Bulgaria in the ITIA- scale global when both sexes were included but not when stratified by sex. The same pattern was found in *'Relations with others'* with a borderline significant interaction for the boys ($p=0.08$). Thus the time at measuring influenced the difference in global self-esteem between the countries. There was a significant interaction between all three groups in *'Psychological well-being'* meaning that the difference between countries in this sub-scale is modified by time.



p_i = p-value from interaction term between country and time (test in country differences between 2015-2016 and 1988-1991)
 p_1 = p-value from test between Sweden and Bulgaria 1988-1991
 p_n = p-value from test between Sweden and Bulgaria 2015-2016

Figure 2:1 Differences between Sweden and Bulgaria in the 'I Think I Am'-scale (ITIA) global and its subscales using generalised estimation equations, with an interaction between country and time, for all and separately for boys and girls.

No significant interaction between sex and time was found in Sweden or Bulgaria in either ITIA global or any of the sub-scales. However, the previous significant differences between boys and girls at T1 in Bulgaria in ‘Talents and skills’ were no longer significant at T2. The significantly lower scores found in Swedish girls at T1 in ITIA-global, ‘Physical characteristics’, and ‘Talents and skills’ were no longer significant at T2. The significant differences with lower scores in ‘Psychological well-being’ at T1 in girls compared to boys in both countries remained significant at T2 (data not shown in figures or tables).

Paper III

Table 3:1 shows the results for the different psychometric tests. Analysis of the SCL-90 data showed no difference between the schools in general mental health (GSI) or any of the subscales. No difference in PSS or total PSQI score between the schools was observed. Participants from Bergska skolan did, however, report higher values on the PSQI subscales ‘sleep duration’ and ‘habitual sleep efficiency’, indicating poorer sleep quality, compared to participants from Spyken.

Table 3:1. Comparison between the schools in terms of the main outcome variables

Variable	Spyken			Bergska			
	median	IQR	n	median	IQR	n	p-value
GSI	0.76	0.7	144	0.7	0.66	43	0.31
PSS	29	12	132	27	9	41	0.57
	mean (S.D.)	C.I.	n	mean (S.D.)	C.I.	n	
PSQI	6.49 (2.93)	5.99-6.99	134	7.19 (2.81)	6.31-8.07	42	0.088
Neuroticism	11.98 (4.76)	11.16-12.75	140	11.25 (5.47)	9.50-13.00	40	0.79
Extraversion	13.08 (3.84)	12.44-13.71	142	11.25 (5.47)	13.00-15.58	41	0.04

Results for the EPI showed that the students at Bergska skolan had a significantly higher score for Extraversion than those at Spyken. No difference in Neuroticism score was observed.

Table 3:2 shows correlations between perceived stress and other outcome variables for the two schools. There was a clear positive correlation between PSS score and GSI overall and, in each school, with highly significant p-values. Similar correlations were found for all the other outcome variables except for Extraversion, for which no correlation with PSS score was observed. PSS score was most strongly correlated with GSI, followed by Neuroticism and PSQI, in decreasing order.

Table 3:2. Correlation of perceived stress with the other outcome variables at the two schools

	PSS			GSI			E			N			PSQI		
	n	ρ	p	n	ρ	p	n	ρ	p	n	ρ	p	n	ρ	p
Bergska	39	0.56	<0.001	36	0.21	0.23	36	0.34	0.043	39	0.34	0.033			
Spyken	135	0.69	<0.001	131	-0.025	0.77	128	0.47	<0.001	124	0.34	0.0001			

Note. Spearman rank correlation coefficient (ρ). E, Extraversion; N, Neuroticism

Paper IV

No significant difference in any of the scales was found between those who logged in and completed at least one session and those who did not log into the self-help programmes.

Figure 4:1, the CONSORT Flow-chart, shows the compliance at different stages of the RCT. It shows that the compliance rates in the two Internet-based self-help programmes were very low in adolescents.

The only participant that did a complete intervention, defined as at least 40 sessions, performed 42 iMBI sessions and decreased the GSI by 31% (from 0.80 to 0.55). The same person decreased in PSQI from 8 to 7 and in PSS from 29 to 23. As regards the participants completing at least ten sessions (i.e. 25%), there were four in the iMBI group, three of whom answered the post-intervention questionnaires. In the iMT group, only one participant completed at least 25% of the sessions.

The iMBI group decreased their mean GSI from 0.85 to 0.63 (SD 0.13 and 0.19, respectively). Their PSS decreased from 29.0 to 26.3 (SD 6.0 and 5.8, respectively). PSQI decreased from 9 to 8 (SD 4.6 and 5.5, respectively). The only iMT participant fared worse, with GSI increasing from 0.68 to 0.90, PSQI increasing from 6 to 7, although with PSS decreasing from 26 to 24 (data not shown in figures or tables). None of the participants used the possibility to contact a physician via e-mail.

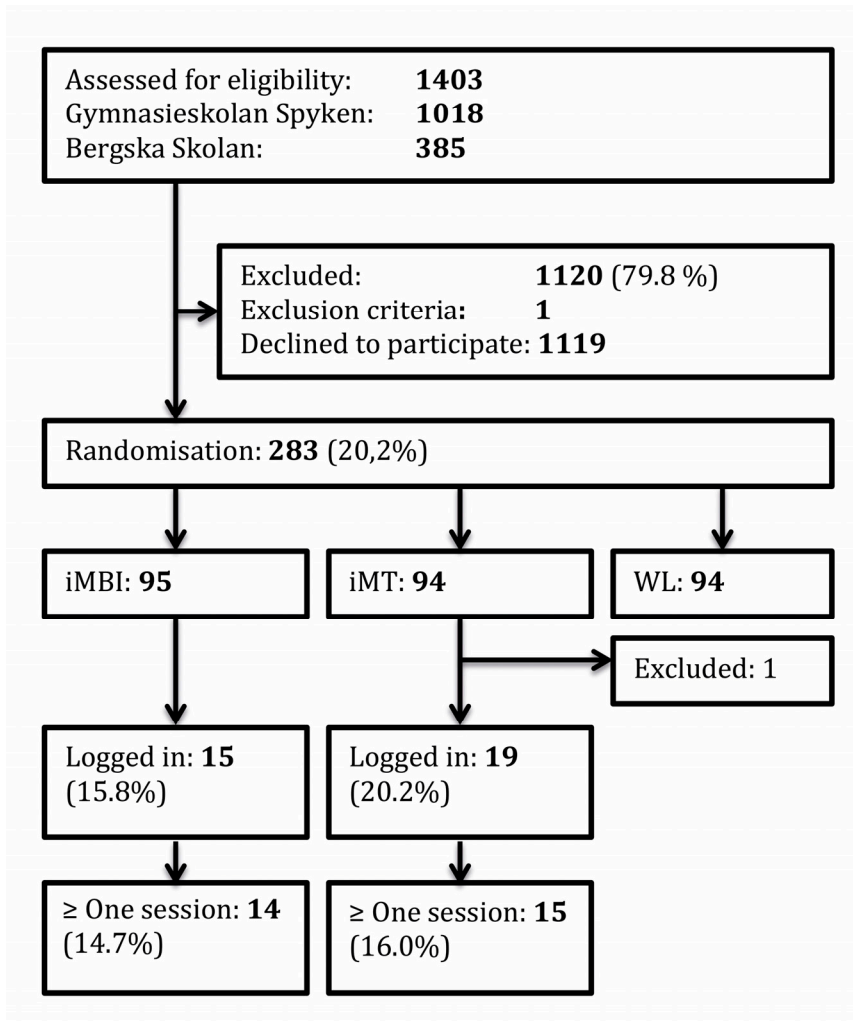


Figure 4:1 The CONSORT Flowchart of Paper IV.
 iMBI - internet-based MindfulnessBased Intervention
 iMT - internet-based Music Therapy
 WL - Waiting List

Discussion

‘Le but de la dispute ou de la discussion ne doit pas être la victoire, mais l’amélioration.’

(‘The aim of argument, or discussion, should not be victory, but progress’)

- *Joseph Joubert, ‘Pensées, essais, et maxims’ (1850)*

Paper I and II

The Governance-Project

In the study in Paper I, conducted 1988-1991, we found that the Swedish adolescents reported a significantly higher global self-esteem than the Bulgarian adolescents. The overall country difference was explained by the significantly higher reported scores in the Swedish males compared to the Bulgarian ones, whereas for the females this difference was lower and non-significant. The overall country difference in self-esteem was mainly driven by the higher scores in the two relational sub-scales ‘*Relations with the family*’ and ‘*Relations with others*’ where the Swedish adolescents of both sexes had significantly higher scores in the two relational sub-scales compared with the Bulgarian adolescents.

It is possible that the many macro-social stressors in the communistic dictatorship of Bulgaria resulted in a ‘Dictatorship damage’ that constitutes of a lowered self-esteem mainly in relations to others.

Our main finding in Paper II is that the significant differences in global self-esteem that existed between the communistic dictatorship Bulgaria and the Western democracy Sweden before the fall of the Berlin Wall in 1989 had disappeared when re-examined with the same method, in the same locations, and by one of the same investigators 25 years later. This was found to be mainly related to larger similarities between countries in the sub-scale ‘*Relations with others*’ where Bulgarian adolescents had significantly increased their score, whereas the Swedish scores decreased (non-significant) as well as the improvements in Bulgaria in

‘Psychological well-being’ over time. The score from the sub-scale, *‘Relations with others’*, was suggested in our previous study to be significantly lower in Bulgaria related to dictatorship governance (Carl Antonson et al., 2019). Both global self-esteem as well as *‘Psychological well-being’* and *‘Relations with others’* were found to have a significant interaction between time and country, indicating that the country differences in self-esteem were modified by time, i.e. our proxy for governance.

The difference in score between the countries in the sub-scale *‘Psychological well-being’* has changed, which also has affected the global self-esteem. The previous difference, where the Swedes had significantly higher results than the Bulgarians, has now changed to the diametrically opposed. The interactions between country and time in this sub-scale were significant in all strata. The significant difference between the sexes in global self-esteem, as well as the sub-scales *‘Physical characteristics’* and *‘Talents and skills’*, which existed in Sweden at T1 were no longer significant at T2. We interpret this as that the difference between the sexes decreased over time.

The girls in both countries had lower results in the sub-scale *‘Psychological well-being’* than the boys at both waves. Thus the pattern with girls reporting lower levels of psychological wellbeing that we are used to seeing in western democracies over decades (Birgerstam, 2013; Kling et al., 1999; Thorsén, Antonson, Sundquist, & Sundquist, 2016) was also found in Bulgaria at both times, with different governance.

Previous studies

There is a great shortage of previous studies on psychological differences between democracies and dictatorships due to lack of possibilities to collect the data (Moghaddam, 2013). Kling et al found no articles from any Soviet-bloc country in their meta-analysis on self-esteem in 1999 (Kling et al., 1999). We were only able to find one previous study comparing self-esteem between the two blocs during the cold war as part of a study in modal personality in 1958 (Inkeles, 1958). The results from the non-validated methods were presented interpreted qualitatively without description of methodology and showed rather high and secure self-esteem and little self-evaluation and doubt of their inner selves in the Soviets compared with American citizens matched for age, sex, occupation and education. Their conjectural conclusions were that the trust-distrust polarisation was very important, that loyalty between group and family could be interchangeable, that a general desensitisation from shame might be a result of the Soviet shaming strategy.

The change in macro-environmental stressors related to governance in the communistic dictatorship Bulgaria

It is very plausible that the macro-environmental stressors in the two countries have equalised as Bulgaria has lost many important stressors that were intimately related to the communistic dictatorship. We suggest this decrease in stressors as a reasonable explanation to the increased global self-esteem by the increased self-esteem in the sub-scale '*Relations to others*' in the second wave of Bulgarian data. It is possible that this is related mainly to the repression from the governing system, which were suggested to decrease global self-esteem, primarily in the sub-scale '*Relations to others*'. A previous study on self-esteem in different countries found that self-esteem is positively correlated to Power Distance indicating that a person that is far from the power or less influential has a lower self-esteem (Schmitt & Allik, 2005).

To briefly sum up the macro-social stressors related to the communistic dictatorship governance in Bulgaria discussed in more detail in Paper I and II, the shaming and punishment curriculum of Makarenko (Makarenko, 1979) that constituted the pedagogical cornerstone in Bulgaria for a long time (Socialist Party of Bulgaria, 1987) and was firmly based on negative social evaluation (Bronfenbrenner, 1970, 1976; Kalling-Kant, 1948). Negative social evaluations are known to form the strongest stress reactions in terms of released GCs (Dickerson & Kemeny, 2004). This stressor exerted its allostatic load together with communistic societal system with pre-fabricated truths (Kharkordin, 1999), propaganda (Risso, 2013) (Moghaddam, 2013) and the insatiable demand of ever-higher production (Kharkordin, 1999) with goals that are non-negotiable (Kharkordin, 1999), which gave the adolescents exposed for the stressor the additional load of low decision latitude (Karasek, 1990). The blend was finally spiced with the ever-present system of mutual surveillance (Kharkordin, 1999). This combination of macro-environmental stressors could, for the vulnerable, be the 'perfect storm' of allostatic load.

Governance influences most areas in society, which might have contributed to the formation of self-esteem in the adolescents, including the familial space, i.e. child-rearing, income inequality, female emancipation etc.

Relations to family

The increases in the sub-scale '*Relations to family*' is interesting as it is the only sub-scale where we see improvement in both countries over time. A Swedish study examining three cohorts of adults in 1958, 1981, and 2011, showed that a more authoritative and less authoritarian parental role has evolved in Sweden, and in democracies worldwide, over the last decennia (Trifan, Stattin, & Lauree, 2014). Almost all the changes from authoritarian parenting roles in the Swedish study

occurred between the 1981 and 2011 cohorts. Adolescents with parents conducting an authoritative parenting role, i.e. patterns of warmth, non-punitive discipline, and consistency, had significantly higher self-esteem, than those being treated with an authoritarian parental style (Milevsky, 2007) being what Soviet childrearing literature recommended by isolating or ignoring the child as well as withdrawing of love and privileges as a method of punishment after misbehaviour (Bronfenbrenner, 1976; Finzi-Dottan, 2011; Shor, 2000). This pedagogical theory severely influenced childrearing in the family in the Soviet-bloc, amongst others Bulgaria (Socialist Party of Bulgaria, 1987). We presume that the changes in social, economic, legal, and political factors that lead to the changes from authoritarian to authoritative parenting in Sweden (Trifan et al., 2014) also took place in Bulgaria after the fall of communism although we have no firm evidence thereof. The relations to parents and peers in adolescence have additive and complementary roles. They have been shown to have an effect on self-esteem and, secondary, on psychological well-being and expression of psychological symptoms in European adolescents (R. B. Wilkinson, 2004). This could possibly be due to increased resilience.

Income inequality

One factor that has been tied to self-esteem on a macro-environmental level is income inequality where Wilkinson & Pickett have proposed a model that implies that an increase in income inequality leads to an increase in social anxiety in all societal strata, and that status competition becomes more important as there is a more at stake if a person lowers their status. Loss of status is a strong social stressor that in its turn leads to an increase in stress hormones such as cortisol. People are more prone to exaggerate their desirable qualities relative to other people in increased inequalities (R. P. Wilkinson, Kate, 2018). This works as a protective mechanism as humans have a universal desire to enhance and protect their feelings of self-worth (Rosenberg, 1995) and this eventually results in a decreased self-esteem (R. P. Wilkinson, Kate, 2018). However, the GINI-score used to measure income inequalities where a higher score means a less equal distribution in income, with a range from 0 (no inequality) to 1 (maximal inequality) increased both in Bulgaria and in Sweden (Tóth, 2013) with Sweden having a virtually unchanged global self-esteem whereas Bulgaria had a significant increase. We interpret the findings in Bulgaria that the inequalities in the dictatorship, with the higher load of macro-social stressors, was more important in relation to self-esteem than income inequality. This is well in-line with Johnson et al that related to this in a study of economic inequality in relation to psychotic symptoms where they control for years of democracy as a potential confounder using the Polity IV-scale (Johnson, 2015). The Swedish change could possibly be modified by other changes that oppose the effects of income inequality.

The deterioration of psychological well-being in Sweden

The deterioration of '*Psychological well-being*' in Sweden follows other studies in Western democracies over in the whole post-war period (Thorsén et al., 2016). Many hypotheses on the causality of this have been formed. The increased status anxiety that has been shown to follow increasing income inequality could be one explanation (R. P. Wilkinson, Kate, 2018). The status anxiety could increase with a comparison not just on the local level but also nationally and globally through social media. An increased distance between expectations and possibilities in life has also been proposed to increase a deteriorating psychological well-being although living conditions have improved (Thorsén et al., 2016). This could also become exaggerated by the global comparisons in social media, which could lead to even higher and more improbable expectations. Peer influence and self-presentation on the Internet has also been shown to be important to adolescents where positive peer evaluations strongly influence reward processing by comparative popularity quantified as 'likes', notwithstanding the peer endorsement depicting risky behaviours (Sherman, Payton, Hernandez, Greenfield, & Dapretto, 2016). We have no reason to believe that these comparisons with others should be less expressed in Bulgaria than in Sweden but a protecting factor towards this might be a feeling of improvement over time in the last generations that arguably should be higher in the former dictatorship, Bulgaria, where the improvements both in macro-environmental stressors as well as living conditions have improved in the last decades in a way that should be very tangible to the adolescents.

Other areas of inequality

It would seem that great inequalities in child well-being in such areas as material well-being, health and safety, educational well-being, behaviours and risks, housing and environment should lead to differences in self-esteem measured with a multi sub-scale questionnaire such as ITIA would produce better self-esteem in the less deprived countries. The fact that there is no difference in self-esteem although the differences in the above-mentioned areas of well-being between Sweden and Bulgaria as reported by UNICEF Office of Research in 2013 could also be attributed to the amelioration in Bulgaria related to the inequality in the times of dictatorship rather than in comparison with other countries today (UNICEF Office of Research, 2013).

Differences between the sexes

The Bulgarian adolescents at T1 reported less difference in self-esteem between the sexes than the Swedish adolescents where the Swedish males reported significantly higher scores than the Swedish females in the sub-scales '*Physical characteristics*' and '*Talents and skills*' in addition to the global self-esteem. Urie Bronfenbrenner is one of the few researchers that studied child and adolescent development across the iron curtain and made comparisons between the USA and the Soviet Union although not in terms of self-esteem per se. He writes in his book '*Two Worlds of Childhood*' that it is mainly girls that play the key roles in the collective discipline acting both as leaders of the collectives and therefore also as judges in the cases where a punishment is to be dealt out and administered (Bronfenbrenner, 1976). This could be one reason to the minor difference in self-esteem between the sexes in Bulgaria; the almost exclusively female exertion of power in the collective is an expression of power and likely to decrease the feeling of poor self-esteem. A previous study on self-esteem in different countries found that self-esteem is positively correlated to Power Distance indicating that a person that is far from the power or less influential has a lower self-esteem (Schmitt & Allik, 2005).

The emancipation, which was an important socialist dogma, might have resulted in the lesser difference between the sexes in Bulgaria at T1. There was a vast difference in how women were seen in the Soviet bloc and in the Western democracies. In the Soviet bloc women were idealised working mothers, upheld important state functions, and murals of strong communist women as farmers, engineers, or soldiers were ever-present, see Figure C (Kruks, 1989; Molyneux, 1981; Petrova, 1994). In the Western democracies, as in Sweden, women pictured in the streets in advertisements were rather objectified by their looks than for their strong contribution to society, see Figure D. This could possibly have had a negative impact on the self-esteem of the Swedish girls, something that is well in-line with Harter's finding of the conditionality of the perceived level of social support (Harter, 1993).



Figure C Propaganda poster from the Soviet Union by the Russian artist Bri-Bejn. The text reads 'Women workers, women kolkhoz workers, driving the tractor, at the workbench, with the rifle. Be the shockworkers of defence'. Source Moderna museét.



Figure D Elle Macpherson in the H&M poster campaign all over Sweden in 1990. Source: Afonbladet.

The female adolescents in both countries in our study reported lower scores on the sub-scale '*Psychological well-being*' than the male adolescents. A lower psychological well-being in females than males is well-known from earlier findings in Sweden and the democracies of the Western world (Bremberg, 2006; Folkhälsomyndigheten, 2010; C. Hagquist & Forsberg, 2007; Petersen, 2007; Thorsén et al., 2016). However, to our best knowledge, it has never previously been shown in the Soviet-bloc. A biological explanation for the lower self-esteem in females in the sub-scale '*Psychological well-being*' cannot be ruled out, as we see no difference between the two countries in spite of great disparities in governance, child-rearing, and the societal image of women. It has been shown that biological changes during puberty are closely linked to depression, as rising sex-hormone levels in adolescent girls potentiate the risk of depression through mechanisms that are unrelated to the psychosocial effects of morphological changes in girls' bodies (Kling et al., 1999).

Since there were no significant interactions between sex and time in either country for the scores in ITIA global or any of the subscales, we have no evidence that the sex differences in self-esteem has changed over time. In spite of this, we see a pattern that sex differences at T1 were larger than at T2 in several of the scales. Today, there is a significant difference between the sexes only in the sub-scale '*Psychological well-being*' and this is the same in both countries. This could account for a change to equal forms of governance in both countries. This change seems mainly driven by an equalisation between the sexes in Sweden as the difference between the sexes in Sweden has decreased and where the data has changed we see a decrease in the boys' scores and an increase in the girls' scores in ITIA global scale, '*Physical characteristics*', and '*Talents and skills*', although without any significant interaction between sex and time. This follows the changes in parental roles and the development of a more gender equal society in Sweden and elsewhere in the Western democracies (Trifan et al., 2014).

Revolution as such

One could also question whether it is the change of governance, or the creative destruction during the revolution and its aftermath in itself, that makes its mark on the self-esteem? Bulgaria has since the Second World War had two revolutions. The first a communistic revolution that had women's emancipation as a matter of principle and ideology, and the second, the post-communistic return to democracy, being initially referred to as a 'family attachment of women' type of revolution which, by definition, focuses on the differences between the genders and female domesticity according to certain studies from Eastern Europe (Moghadam, 1995; Molyneux, 1981). This post-communistic revolutionary ideology concerning gender issues could be seen as anathema to the communistic emancipation as well

as, leaning on conservative and (neo-)liberal ideology, dismissed as irrelevant in relation to economic concerns (Moghadam, 1995). The ideological constructs of revolution and the following corresponding governance cannot be disentangled in this study, but neither is this our aim. Our time-lag study captures two static time frames one generation into the two post-revolutionary states of Bulgaria (communistic and post-communistic respectively) in comparison with the never-revolutionised Swedish society and as such it might be able to shed some light on the state's governance role in forming the self-esteem of its compatriots.

In conclusion, we have tried to explain the difference found in self-esteem between the two countries and the improvement in self-esteem taking place in Bulgaria in terms of macro-social stressors, directly and indirectly, related to governance. There is no evidence for any causality in our study between self-esteem and these stressors in our study, we only infer what has been found in earlier studies. The change in global self-esteem related to relations to others in Bulgaria after the fall of communism and the equalisation between the two countries is however manifest, and we believe the decrease of macro-social stressors to be the best explanation. The improvement in self-esteem in Bulgaria should also infer an improved resilience towards stressors.

Paper III

Paper III suggests that perceived stress levels and psychiatric symptoms in Swedish upper secondary school students may not be due to the two studied macro-environmental stressors: high urbanicity and high academic proficiency of the school. It also shows a clear correlation between stress, sleep quality, neuroticism and psychiatric symptoms measured by the SCL-90.

Our findings are contradictory to US findings, i.e. that individuals attending schools with higher academic demands experience more perceived stress (Kaplan et al., 2005; Suldo et al., 2008). However, there are important differences between the studies: there are cultural differences between the US and Swedish schools and the two Swedish schools are fully comparable in terms of curriculum, which is not the case in the study of American schools by Suldo et al (Suldo et al., 2008).

To attend a certain upper secondary school in Sweden the students compete for entry by means of grades: the higher the academic proficiency of the school, the higher the grades that are normally needed for enrolment. This could account for a form of selection bias where the students are seeded to an environment where they are to perform academically on a certain level that they can, or cannot, cope with the stressors of. The findings that the perceived stress level is high in both environments could thus be related to a system where the students are spurred to perform a little

higher than they with relative ease can cope with, given the abilities and resilience-factors they possess. The teachers could possibly try to vary the stressors on a class level as long as the curriculum permits in order to make most students perform at their best with an adequate dose of stress according to the hormesis-theory of stress which accounts for a goldilocks-zone of stress where a person performs optimally (Selye, 1976). This might, however, be difficult on a personal level and therefore some students, with a mismatch between resilience factors and academic proficiency, might be seriously challenged by the stressors even with a teacher-led optimisation on a class level. To reduce stressors is however only one way of addressing the allostatic load, wherefore an attempt in increasing individual resilience factors in another way to attempt to reduce the perceived stress. To also introduce stress resilience training into the curriculum could be one way of addressing this problem where allostatic load becomes an overload.

The suggested association between high stress and reduced academic performance (Kaplan et al., 2005) is thus not supported by our study, although it is possible that reduced academic performance might occur at a later stage.

Since there has been some speculation concerning whether students attending schools of high academic proficiency are more ‘stressed out’ than other students, we opted for two very different schools when choosing the population in order to have differences in academic performance and urbanicity. The response rates of the schools were fairly similar. No difference in stress-related symptoms was observed in this study when results from the two schools were compared. Even though Spyken, with its higher academic proficiency and higher urbanicity, had a non-significant tendency towards a somewhat higher female contribution, there were no differences between the schools. This is in spite of the fact that females are known to suffer more from psychiatric problems than males at this age and normally also show a higher degree of psychosocial stress (Bremberg, 2006) (C. Hagquist & Forsberg, 2007; Petersen, 2007).

Our study shows a clear correlation between stress, sleep quality, neuroticism and psychiatric symptoms measured by the SCL-90. Our findings are thus well in-line with current research in adults. Low sleep quality drives stress levels and vice versa, something that could end up in a ‘vicious circle’ (T. Åkerstedt et al., 2007). Stress is also thought to be both caused by and the cause of internalizing psychopathology (Carter, Garber, Ciesla, & Cole, 2006). Neuroticism has been shown to partially account for the relationship between depression and stress, as well as that between social phobia and stress (Uliaszek et al., 2010).

Paper IV

Our main finding in the RCT in Paper IV is that the compliance rates of the two Internet-based self-help programmes were very low in adolescents. Therefore, the feasibility in conducting Internet-based self-help programmes using mindfulness may be limited in adolescents due to compliance. We found no association between psychiatric and stress-related symptoms and compliance in any of the intervention groups thus implying that the adolescents did not drop out of the study due to either low or high levels of stress or psychiatric symptoms. Unfortunately, the limited compliance did not allow us to investigate our first aim, whether there is an effect of iMBI, delivered as an Internet-based self-help programme, on psychiatric and stress-related symptoms in adolescents, due to insufficient statistical power. However, the few participants that complied to the iMBI had good results.

The positive effects of mindfulness training are related to compliance rates. As in our study, limited compliance to an intervention may occur in several steps; drop out from the protocol (only a limited number of the adolescents actually logged in) or failure to engage in the intervention (the few adolescents who actually logged in most performed only a very limited number of sessions and only one adolescent completed all 40 sessions). It should come as no surprise that by doing the intervention the participant gets the effects of it. A meta-analysis on face-to-face MBIs in adolescents showed a positive correlation between minutes of mindfulness training and effect sizes (Zenner et al., 2014). Kuyken et al. reported that at least 50% attendance at the eight sessions of Mindfulness Based Cognitive Therapy (MBCT) is considered necessary to receive an adequate treatment dose (Kuyken et al., 2010).

According to Christensen et al. (Christensen, Griffiths, & Farrer, 2009), there are three general approaches to investigate compliance in Internet-based interventions for anxiety and depression. The first is applicable to our study and involves the examination of correlations to personality, demographic, and service delivery factors. Kabat-Zinn and Chapman-Waldrop found, however, no association between compliance to MBSR and GSI in referred somatic and psychiatric patients (Kabat-Zinn & Chapman-Waldrop, 1988). Compliance rates may decrease in Internet-based (Titov et al., 2014) (Aardoom, Dingemans, Spinhoven, & Van Furth, 2013), longer, and preventive (rather than treatment) interventions in healthy population-based samples (Stice, Shaw, Bohon, Marti, & Rohde, 2009). We found no evidence of an association between compliance rates and psychiatric and stress-related symptoms in our study population of non-clinical Swedish adolescents, which is in accordance with the face-to-face mindfulness study by Kabat-Zinn and Chapman-Waldrop who concluded that ‘there was no indication that severity of symptoms or illness affected outcome in terms of programme completion’. It is possible that feelings of shame or embarrassment could have been behind our students’ reluctance to log into the

interventions during class time, although it also was possible for the students to log in outside class time. Another possibility is that some students may have found the intervention to be anxiety inducing, as previous studies have shown that emotional distress (Christensen et al., 2009) decreases compliance and MBSR has been described as a stress-reducing technique that initially increases stress (Kabat-Zinn, 2013).

We have some anecdotal findings that were reported to us by students and school personnel. Some students found the intervention downright ‘boring’ and others said that they did not complete the intervention due to lack of time. A teacher, school nurse, and school counsellor were of the opinion that stress, due to school issues, made the students less compliant to such interventions. Both students and personnel wanted stress interventions, like mindfulness classes, to be part of the curriculum to increase compliance and decrease stress. In an RCT conducted in Belgian schools, where mindfulness classes were part of the curriculum, the compliance rate was 85% (Raes, Griffith, Gucht, & Williams, 2014).

Previous studies have examined how compliance to iPTs can be increased. For example, an Australian study found that compliance to iCBT in adults could be increased with e-mail reminders (Titov et al., 2014). Some studies have found that guidance by trained psychotherapists augments the participation rate (G. Andersson, Carlbring, Berger, Almlöv, & Cuijpers, 2009), while other studies, including university students, have found no such effect (Tillfors et al., 2008). Material incentives have been shown to enhance compliance in children and adolescents as well as adults (Bogels, Hoogstad, van Dun, de Schutter, & Restifo, 2008; Giuffrida & Torgerson, 1997; Smith, Weinman, Johnson, & Wait, 1990; Yokley & Glenwick, 1984).

We were invited by a teacher to lecture for her two classes in an upper secondary school in Alingsås. After the lectures the students could use the iMBI for eight weeks but this time were told by the teacher that they could log-in to their iMBI three to four times during the week for eight weeks during Swedish class. The compliance was however not much improved (unpublished material), notwithstanding high scores on psychiatric questionnaires reflecting likely psychological suffering. A proposition put forward could be to include mindfulness as an iMBI as a compulsory part of the Physical Education and Health class. This would add the incentive of grades on the subject, which might increase compliance and thus the feasibility and possibility to evaluate effect.

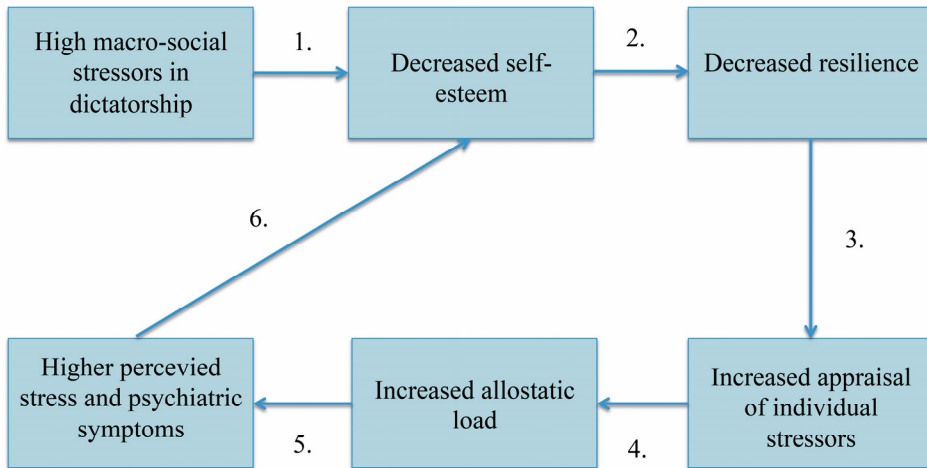
Thus we can address the classic two modus operandi for imposing behaviour according to Cognitive Behavioural Therapy - we could either use negative reinforcement as in forcing the adolescents to do mindfulness or we could use positive reinforcement by guidance and friendly reminders. Both could be implemented through a change in the school curriculum, which both students and

personnel have asked for. However, this study shows that an iMBI, without other incentives, cannot in itself solve the problem of high allostatic load in adolescents related to the macro-environmental stressors discussed in Papers I-III.

Overall perspective of the main findings

The main findings in this thesis are the fact that several macro-environmental stressors constitute a stress-landscape that has an impact on several aspects of the psychological well-being of adolescents. After the change in governance from communistic dictatorship to democracy in Bulgaria the scores in global self-esteem, and the sub-scale '*Relations to others*', equalised in comparison with the stable democracy Sweden. Causality cannot be ruled out, but can only possibly be shown related to country and time, not governance and the possible macro-social stressors following the demise of a communistic dictatorship. Nevertheless something changed the levels of self-esteem from before the fall of the Berlin wall to the situation 25 years later with a democratic Europe joint in the European Union. We find the best possible explanation to the equalisation in self-esteem to be the fall of the Soviet-bloc and communistic dictatorship, as this change brought with it a change in many macro-social stressors. This lower level of self-esteem related to the communistic dictatorship governance and its macro-social stressors is referred to in this thesis as the hypothesis of 'Dictatorship damage'. In the last decade, since 2005, the former increase in democracy globally, seen since the fall of the Soviet-bloc, has now started to regress and the organisation Freedom House reports (Schenkkan & Repucci, 2019) an increasing number of countries with decreased democratic freedom. The world is getting more autocratic and some of these dictatorships, such as China or Saudi-Arabia, also get more power, which makes studies on dictatorships all the more important.

It is possible that it is through the mechanisms of the scar hypothesis that the macro-social stressors exert their effect on self-esteem in adolescents. The author suggests that adolescents in a dictatorship might find themselves in a vicious circle as the mechanisms of the scar-hypothesis decreases the well-known stress-resilience factor self-esteem, which eventually might lead to increased psychopathology through reduced capacity of buffering stressors according to the stress-buffering hypothesis. The allostatic overload that is the result of the reduced buffering capacity can further reduce self-esteem anew via the scar hypothesis, see Figure E. Accordingly, the author suggests that the individual might have less resilience in coping with stressors due to the 'Dictatorship damage' also on the individual level in addition to any macro-social stressors.



Mechanism

1. Dictatorship damage-hypothesis
2. Stress-buffering hypothesis
3. Resilience
4. Stress appraisal
5. Allostatic overload
6. Scar-hypothesis

Figure E. The vicious circle of decreased self-esteem and increased allostatic load in relation to the scar and the stress-buffering hypotheses. Note that mechanism one, the ‘dictatorship damage’ hypothesis, might be closely related to the scar-hypothesis.

All individuals will be exposed to different stressors during their lives. For most Swedish adolescents one of the major perceived stressors is school achievement (Bremberg, 2006). This must not be confused with school being something negative in itself. A sound eustress is found to make people flourish and to deliver results that prides them, what Selye refers to as ‘to enjoy the eustress of fulfilment’ (Selye, 1976). As Lazarus and Folkman (Lazarus & Folkman, 1984) state stress could be viewed as a struggle between opposing forces, demands countered by coping. The harsher lives of previous generations, with the macro-social stressors of ever-present illness and death due to communicable diseases, starvation, and possibly large social inequality, have mostly disappeared in Europe (Lazarus & Folkman, 1984; R. Sapolsky et al., 1986). Social change always makes new demands, i.e. stressors, and depending on how the individual copes with those stressors, it can cause stress and either positive or negative consequences (Lazarus & Folkman, 1984). Unfortunately, we find that stress in adolescence is increasing (Thorsén et al., 2016) in the last decades and that psychological well-being is decreasing in both the Governance project and the CHAMPS-project. The stress and psychiatric symptoms did not differ with different academic results and urbanicity of the school, which possibly could derive the conclusion that the problem is more generalised to

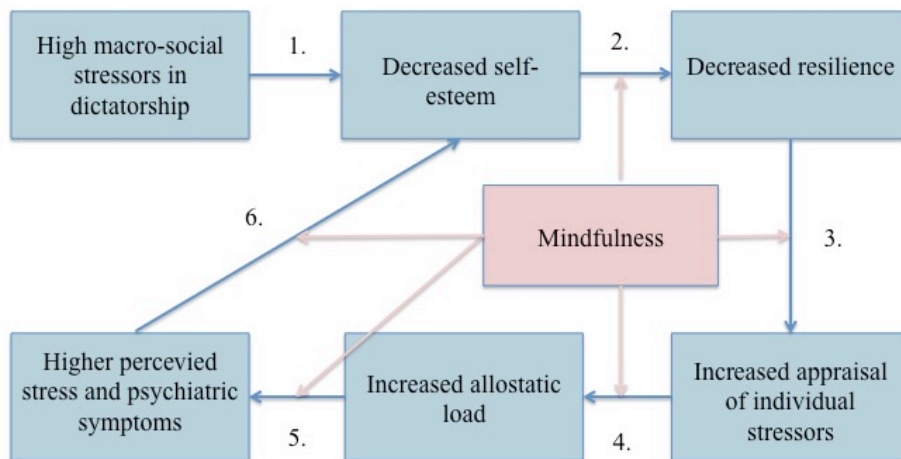
adolescents in Western democracies, not just high achieving schools in urban areas. With the emerging evidence that stress-related ill-health seems to be increasing, it is imperative that we attempt to change the trend. And, as is pointed out by Lazarus and Folkman, new stressors will continue to evolve when previous stressors are decreased due to social change (Lazarus & Folkman, 1984). Being on a high macro-level, and therefore hard to approach, an attempt trying to reduce the macro-social stressors by the individual might not be a single feasible way to tackle allostatic overload in adolescents.

Self-esteem is a well-known stress-resilience factor (Brown, 2010; Cast & Burke, 2002; Zeigler-Hill, 2011) but the concept of self-esteem has its drawbacks with unstable self-esteem and the tendency to exaggerate one's self-worth in order to protect self-esteem. This is well illustrated in narcissists who boosts their egos to an inflated self-esteem with a strong need for external approval leading to social problems (Neff & Vonk, 2009). A person with an unstable and fluctuating self-esteem might have an increased focus on the negative aspects of self-esteem although highly healthy and secure forms of self-esteem do exist.

A way of addressing the problem with unstable, inflated or narcissistic self-esteem is the alternative self-concept of self-compassion, which is defined in three components: self-kindness, a sense of common humanity, and mindfulness when considering personal hardships or weaknesses (Neff, 2003; Neff & Vonk, 2009). The concept of mindfulness as a way of shifting one's focus from negative thoughts and emotions evoked by mistakes and weaknesses together with the balanced perspective of being kind towards oneself when failing and remembering that human beings are imperfect (Baer, 2003; Kabat-Zinn, 1994, 2013) has been found to soften ego-protective boundaries between the self and others and leads to improved psychological health in many aspects (Neff & Vonk, 2009). The difference between the concepts are that self-esteem is based upon positive self-evaluations, encompasses the notion of being special and better than others and generally works well in promoting psychological health only in success, not in failure, whereas self-compassion is stable in both success and in failure (Neff & Vonk, 2009). Where self-esteem works on an evaluation of the self between inferiority/superiority and thus establish social rank stability through competitiveness, self-compassion has been found to deactivate the threat-system (i.e. insecurity and defensiveness emotions) and activate the soothing system (opiate-oxytocin systems) and focuses on caring and community. Focusing also on self-compassion, especially when self-esteem becomes unstable or inflated, could be a way of broadening the self-concept. Improving self-compassion seems to offer a possibility of acquiring better psychological well-being and resilience (Neff & Vonk, 2009). Not the least as we see the psychological well-being deteriorating in the Swedish adolescents and with a risk that this might be happening in the Bulgarians later on.

A lowering in stress as in allostatic load can be achieved by decreasing the stressors or through increasing resilience in the individuals. Both these approaches can be attempted through mindfulness as mindfulness lowers the appraised stress cognitively through presence in the evaluation of the stressor as it is, not what it could become, as well as an increase of the stress-resilience through earlier detection of high allostatic load through increased body awareness and by meta-cognition purposefully creating a detachedness between the stressor and the self and thereby creating a possibility for a grounded decision. This is excellent in theory but calls for good compliance in the cultivation of mindfulness, normally through mindfulness meditations and bringing mindfulness into the presence of everyday activity. This compliance was unfortunately not achieved by the adolescent participants in our RCT in Paper IV, although previous studies, as well as the scores of the few participants that did comply with at least parts of the iMBI, hold promising results if the compliance problem can be addressed with positive results.

We hypothesised when constructing the study that iMBI could possibly give the adolescents a better stress-resilience by cultivating a trait of mindfulness. We put forward three mechanisms that might have an impact on stress-resilience in adolescents; self-compassion, meta-cognition, and non-judgmentalness. We hypothesised that by increasing self-compassion, which is a crucial part of mindfulness meditation, self-esteem will increase, which in its turn decreases the allostatic load through the stress-buffering hypothesis. Self-compassion could also possibly have an impact on the scar-hypothesis as the stigma of psychiatric disorders, which can be related to previous allostatic overload, is less felt when self-compassion is exerted. In addition both the distorted self-worth and the cognitive filters the scar-hypothesis puts on the patient, who mainly see things that are negative when they process self-relevant information (Zeigler-Hill, 2011), are mechanisms that have been shown to be positively adjusted by MBCT for depression through the mechanism of meta-cognition and the practice of non-judgmentalness (Segal, Williams, et al., 2002; Williams et al., 2014). Those two mechanisms should also positively impact stress-appraisal and the improved emotional regulation should also lead to improved coping strategies (Baer, 2003; Kabat-Zinn, 1982). We believe that the ‘dictatorship damage’ hypothesis put forward in Paper I and II could work through the scar-hypothesis and its stigmata in order to decrease the self-esteem. If this is the case, mindfulness could possible also address the ‘Dictatorship damage’. For a clearer view on the potential mindfulness interactions on the vicious circle of the scar and stress-buffering hypotheses of self-esteem see Figure F.



Mechanism

1. Dictatorship damage-hypothesis
2. Stress-buffering hypothesis
3. Resilience
4. Stress appraisal
5. Allostatic overload
6. Scar-hypothesis

Potential mindfulness interaction

- N/A
- More stable self-esteem through self-compassion
- Better coping through meta-cognition and emotional regulation
- Meta-cognition, non-judgmentalness
- Better coping through meta-cognition and emotional regulation
- Self-compassion, non-judgmentalness

Figure F The vicious circle of decreased self-esteem and increased allostatic load in relation to the scar and the stress-buffering hypotheses with the potential positive effects of mindfulness. Note that mechanism one, the 'dictatorship damage' hypothesis, might be closely related to the scar-hypothesis.

Generalisability of the findings

The generalisability of the findings are difficult to evaluate. Since the findings from the studies in Paper I and II are made with a well-validated questionnaire and due diligence was exerted when choosing the populations that at the time were deemed as relevant in all socioeconomic strata, we believe that the findings on self-esteem in relation to governance might be transferred to other communistic dictatorships, although with no claim on causality, and possibly also other dictatorships (i.e. theocratic, right-wing) as well. In Paper III there are other studies with contradictive findings, but they are conducted in another cultural setting, USA (Kaplan et al., 2005; Suldo et al., 2008), and Suldo et al also compare different curricula (Suldo et al., 2008). In perspective of this, the generalizability might extend to Scandinavian countries and possibly even to countries in the EU. In studies of compliance to internet-based psychotherapies, as in Paper IV, it has been reported that the low compliance is a common finding but might be more pronounced in Sweden as well as in adolescents (Aardoom et al., 2013). The findings are thus important in terms of generalisability, but are likely to be less prominent in settings outside of Sweden and in other age-groups. In order to evaluate the generalisability further studies should be conducted.

Strengths and limitations

Common for all four Papers

All the data in all four Papers are based on self-report in that it was reported by the participants. However, good correlation between self-reporting and general health has previously been found in upper secondary school students in the Nordic countries (Breidablik et al., 2009).

The questionnaires used in this thesis are reliable, well defined, and well-validated. They have all been used for decennia in clinically relevant studies on adolescents.

Strengths and limitations in Paper I and II

In the studies with the ITIA-scale, which has reversed items, we believe the advantages of the *acquiescence bias*, i.e. the tendency to agree positively to all items that should outweigh the limitations of the *negative item bias*, i.e. the higher likelihood to answer positively.

The biggest limitation in the two Papers is the lack of more than one scale that could have given a better understanding and could have illuminated other aspects of the personality development than the perception of the self. For example, a stress measuring questionnaire to address perceived stress could provide vital information on whether it was perceived stress from the plausible macro-environmental stressors we have found in literature that were exerting an effect on the resilience factor of self-esteem. Since no such scale was introduced at T1 it would not have been adequate in the study design to use it at T2 in a time-lag study as no conclusions on any effect would have been possible to be drawn. Nevertheless, something did change the levels of self-esteem from before the fall of the Berlin Wall to the situation 25 years later, where both countries are democracies, and the best possible explanation we can put forward is the fall of the Soviet-bloc and communistic dictatorship as this change brought with it a change in many macro-social stressors from the macro-level. And we believe that the unique material in itself is of great importance to be analysed.

The cross-sectional study construction of Paper I makes it impossible to draw any conclusions on causality, which is the main reason as to why we chose to make a time-lag study in Paper II, which can give indications on causality at the selected time-points. The possibility to find causal evidence between governance and self-esteem in this study is, however, very limited due to the fact that we analyse a proxy (country) for the variable that we seek to examine (governance) (Twenge, 2012).

We believe that there might be a geographical selection bias but by choosing participants from cities, rather than rural areas, we included a population that represents the largest part of the world's population as more than 60% of the world's population live in urban areas (Henrich, 2010) and Paper III also suggests that the perceived stress did not differ due to urbanicity. The choice of schools was designed in an attempt to nullify social differences within the countries in relation to socioeconomic levels. Comparing the population from the capital in one country to a medium sized city in the other could be a bias but this selection was justified on the basis of migration patterns as Stockholm was growing steadily whereas Sofia had an internal migratory block and during the Communist regime migration was a choice underlined by political reasons, not a choice by an individual (Beleva, 2001).

There is a lack of information about Bulgarian drop-outs since no data could be attained due to the local regulations but we have no reason to believe that there were any significant differences in drop-out rates since no epidemic was reported and the attendance rates in Bulgarian schools were reported to be very high due to social control. We found the participation rate in Sweden to be adequate at T1 and it was well reproduced at T2. We believe that the change in exclusion criteria where we removed the criterion to have been a resident of the country for less than five years to be justified in order to get a representative picture of the changing societies and since very few students were removed at T1 and only from Sweden. Unfortunately, we have no exact data for the excluded participants at T1.

In the 25 years that passed between T1 and T2 there has been an evolution in study design. We were lucky to have the opportunity to use old material with unique data but therefore also had to use the same methods as was used at T1. We believe that the strength of the unique data weighs up for the older study design with no possibilities to analyse participation rate on a detailed level, such as sex or detailed exclusion criteria or the possibility to randomise the population.

There are of course other differences between Bulgaria and Sweden than the governance, as is covered in the introduction. This could of course have an impact on the results, although only considerably so in Paper I as the study-design in Paper II, at least partially, compensates for this. The two countries have most likely become closer, also in other aspects than governance over the 25 years between the time-points of data-collection, but the most salient changes are results of the new governance as they are directly opposed to the governing of a communistic dictatorship, i.e. joining the EU.

The key strength of this study lies in its unique data from both sides of the Iron curtain. All of the data were collected by a single bilingual physician, specialized in child and adolescent psychiatry, in a familiar classroom situation for the children. Data from the first wave from Bulgaria were collected before the fall of the Berlin Wall in November 1989 and the last collected Swedish first wave data were acquired

only one and half years later in a stable democratic society, i.e. a time difference that should not have had an effect upon the results. The Bulgarian version of the ITIA-questionnaire was made in a thorough process of translation and re-translation performed by bilingual physicians.

The study of personality development in dictatorships is very hard to acquire since secrecy is a well-known trait of the dictatorship elite (Moghaddam, 2013). All data-collection was effectuated when the states of governance had had a long time, a generation, to influence the adolescents and were at the two time-points deemed as stable and was made in the same way with the same well-validated questionnaire by the same investigator. The location and ages were unchanged between the two waves. Getting an opportunity like this to study such a topic is thus very rarely encountered in a world where dictatorships are many, and the debate on how a nation should be governed from a psychological point of view is too seldom discussed on a scientific basis.

Strengths and limitations in Paper III and IV

The study population was at risk of selection bias since only 14.4% of the total students chose to answer the questionnaires. This is, however, relatively consistent with another study on adolescents in the Nordic region this millennium. A Norwegian study cited in the study had a participation rate of 23.6% (Breidablik, Meland, & Lydersen, 2009). It could potentially also act as an indicator of the stress in the adolescents. The low compliance is also the most interesting finding in Paper IV as it is the outcome variable in our feasibility study. As for the compliance to the intervention we had no strategy to address any low compliance apart from increasing the sample size. The low compliance rate to the intervention did not allow for sufficient power to investigate our primary aim regarding the potential effect of the two interventions.

The non-response rates for the two Swedish schools were similar. All students followed the same curriculum, which allowed for good comparisons between the schools.

Paper III

The male students' participation rate was also lower than that of the female students, although the gender distributions of the participants from the two Swedish schools were not significantly different. The low participation rate and low proportion of males limit our ability to generalise the results to the schools as a whole. However, we have no reason to believe that this potential bias differed between the two schools. The study described in Paper III is cross-sectional and can thus not provide clues on causality.

Another limitation is that the two potential stressors, high academic proficiency and high urbanicity, were mutually confounded, i.e. it was not possible to disentangle the separate effects of these two variables although both variables should in theory have similar effects and both high urbanicity and high academic proficiency would thereby both on its own as well as in tandem increase perceived stress.

A significant strength is that this is the first study to compare a school with high academic proficiency located in an urban area and a school of average academic proficiency located in a medium-sized town.

Paper IV

The RCT resulted in the negative finding that an iMBI is not found to be feasible to reduce stress and psychiatric symptoms in adolescents without additional incentive(s). We believe negative findings to be important to report as this otherwise might lead to publication bias.

Another limitation of this intervention is that it might be dubious to introduce stress management methods, such as mindfulness, with a sole focus on the individual while neglecting the overall organisation and structures in the school setting, i.e. on a macro-social level, which in itself in this thesis has been found to entail resilience decreasing characteristics. Instead, a relational approach, which sees mindfulness as a socially contingent resource for communities, has been suggested as an alternative to the more common focus on the individual (Arthington, 2016; Stanley, 2012). Furthermore, researchers in resilience have pointed out that it is important to look at unique features of the population as well as the context in which the approach is used (Fergus & Zimmerman, 2005).

Although not being a direct limitation of the study, one could argue that all types of school interventions might compete with other important activities, such as schoolwork. However, there are studies that have reported increased focus and cognition (Zeidan et al., 2010) thus implying that the loss of some lesson time to mindfulness training might increase the possibilities to learn faster and with better results.

The study construction being a RCT and reported on Clinical Trials beforehand is a key strength in this study. There are also several strengths in this RCT that also could be useful in future studies. For example, we included an active control group, listening to music, which is something that adolescents tend to do when feeling stressed or emotionally challenged (Hendricks et al., 1999). A focus on listening is sometimes included in MBI, as in MBCT (Segal, Teasdale, Williams, & Gemar, 2002), and the partial similarity between the two interventions (Graham, 2010) makes these two groups comparable in terms of focus, although the focus in mindfulness is purposeful and without judgment.

The fact that there were no adverse reactions to any of the interventions reported is an important strength in the study, as well as an important outcome in feasibility.

Finally, this is the first RCT that aimed to study an iMBI in adolescents and the first to compare two different Internet-based self-help programmes in adolescents (both male and female).

Future research

Any opportunity to study dictatorships from within is of great value and should therefore be carried out to be able to further understand the psychology of dictatorship.

To disentangle the separate effects of academic proficiency and urbanicity on stress is important and a statistical analysis of interactions could be one way of evaluating this.

Evidently, there are more macro-environmental stressors than urbanicity, academic proficiency, curriculum and governance and its effects on society, which are important to evaluate.

As our main finding in the RCT is that the feasibility is limited due to compliance, more knowledge is needed on the potential causes behind low compliance as well as methods to increase compliance with iMBI in non-clinical samples in order to address this potential approach to lowering the macro-environmental stressors suggested in Paper I to III. The amount of time spent on doing iMBIs in relation to the outcome, a dose-response study, would also be of great importance and should be further addressed. In order to achieve better data, we believe that a study where the students have an incentive based on integrating the intervention into the curriculum in a specific subject, i.e. Physical Education and Health, could be a suitable way to try to improve compliance. This could be tried on a limited scale for research reasons in order to evaluate the effect on stress related ill-health by essentially the same methods used in this study, although using a mindfulness

questionnaire such as Five Facets of Mindfulness Questionnaire would also give an indication of whether a possible effect was modified by an increase in trait of mindfulness.

We have no reason to believe that the findings in Paper III and IV could not be generalised into a larger population, i.e. Swedish adolescents. New studies to confirm this are however needed.

The hypothesis of how macro-social stressors might influence the development of decreased self-esteem through the stress-buffering hypothesis and scar hypothesis and how mindfulness could mediate this process was not something that the Governance, nor the CHAMPS-study, was designed to investigate. However, the importance of a framework hypothesis that links self-esteem to allostatic load and self-compassion and mindfulness in order to reduce the allostatic load caused by those possible mechanisms is of interest and further research investigating this approach is recommended.

Conclusions

‘1 Die Welt ist alles, was der Fall ist.

1.1 Die Welt ist die Gesamtheit der Tatsachen, nicht der Dinge.’

(‘1 The world is everything that is the case.

1.1 The world is the totality of facts, not of things.’)

- *Ludwig Wittgenstein, ‘Tractatus Logico-Philosophicus’ (1922)*

The Governance-project

Despite the limitations, the two Papers from the Governance project (Paper I & II) are based on the only known existing data from before the fall of the Berlin Wall comparing self-esteem in a country belonging to the autocratic Soviet-bloc and a West-European democracy; data that are no longer possible to obtain. In general, the possibility to perform research in dictatorships is very hard to achieve. The democracy of Sweden formed adolescents with significantly higher self-esteem than the communistic dictatorship of Bulgaria. The prior differences in self-esteem between a democracy and a communistic dictatorship were significantly equalised over a generation of democracy in the earlier dictatorship. We suggest that the amelioration of the global self-esteem in the former dictatorship is due to decrease of social stressors, mainly mutual surveillance, and the following increase in self-esteem is in relation to other important persons such as peers and teachers. This lower self-esteem related to others in the communistic dictatorship could be seen as a 'Dictatorship damage'. We also suggest that an increase in income inequality is less important than a change from dictatorship to democracy for the self-esteem. The opportunities to make investigations in dictatorships are rare and the data presented is thus, despite compromises in study construction, of great value in understanding personality development in dictatorships.

The implication of these findings falls into different levels of society. As democracy seems to foster citizens with more self-esteem, and it could be argued that it is done by a kinder and more encouraging society without the harshness and problems of inter-personal connections in the dictatorship, an effort to safe-guard the democratic institutions should be pursued at all societal levels, not the least in schools where coming generations are formed. It is also important knowledge in dealing with persons coming from dictatorships, both in healthcare but also in school or work conditions, as integration could suffer due to the 'Dictatorship damage', which has also been pointed out in some earlier Israeli studies (Finzi-Dottan, 2011; Shor, 2000). Striving for a more democratic world could be seen as intrinsically good but could also possibly lead to higher self-esteem in the world population, which could lead to less psychological ill-health, although the causality is likely to be far more complex and many caveats exist.

CHAMPS

Our findings in Paper III suggest that there are no differences in perceived stress, bi-directionally stress-associated impairments in psychiatric symptoms and sleep, or the mediating personality trait Neuroticism between a high academic proficiency/metropolitan school and an average academic proficiency/medium-sized town school. Future studies could focus on disentangling the separate effect of academic proficiency as well as urbanicity on stress levels and stress-related psychiatric symptoms in adolescents.

The implications of these findings could be interpreted as that the stress levels and psychiatric symptoms are omnipresent and not following academic proficiency levels or urbanicity. Fellow physicians, health-personnel, school-personnel, and policymakers need to address those problems wherever they may arise and cannot focus particularly on these macro-environmental stressors. It follows the recommendations to see perceived stress and allostatic load as the ecologically valid information when addressing stress-issues, rather than concentrating on the stressors per se.

Our findings in Paper IV conclude that the compliance rates of the two Internet-based self-help programmes were very low in adolescents, which did not allow us to investigate the primary aim, the effect of iMBIs in adolescents for reduction of stress-related and psychiatric symptoms. The study provides, however, useful information for the planning of future studies in adolescents and the few results there were from participants completing at least a substantial part of the mindfulness intervention points in a positive direction.

The implications of these findings are that the need to reduce stress and psychiatric symptoms in adolescents is imperative and has been shown to grow over time as another article from the CHAMPS-project indicates. Future studies need to examine potential causes behind why compliance rates may be low in Internet-based self-help programmes, and how compliance rates can be increased in adolescents, as the potentially positive effects of mindfulness programmes on psychiatric symptoms and stress are, at least partially, related to compliance rates.

Svensk sammanfattning

Introduktion

Stress orsakas av stressorer. Den allostatiska belastningen är den totala anpassningskostnaden för en individ för att adaptera till denna stressbelastning, det vill säga dessa stressorer, över tid. Denna kontrolleras av hjärnan för att optimera hela organismen. Somliga stressorer är på en makronivå, såsom statsskick, skolor eller urbanicitet och påverkar därmed flera individer. Resiliens kan definieras som en organisms förmåga att motstå miljömässiga utmaningar mot normal funktion. Självkänsla är en stabil aspekt av en människas upplevelse och värdering av sig själv som person. Självkänsla har visat sig vara en resiliensfaktor genom att buffra stress (stress-buffer-hypotesen) men kan också minska genom hög allostatisk belastning (scar-hypothesis). Sociala stressorer kan influera genom flera kanaler såsom statsskick, som påverkar stressorer som orsakas av läroplaner och skolor, vilket i sin tur påverkar akademisk kompetensnivå. Akademisk kompetensnivå och urbanicitet är stressorer som tidigare har visats skapa stress hos ungdomar. Mindfulness är både ett tillstånd och en tredje vågens kognitiv beteendeterapeutisk (KBT) intervention som har visats ha effekt på stress och psykiatriska symptom hos såväl vuxna som ungdomar. Internetbaserad psykoterapi har visats vara ett sätt att ge terapi som är kostnadseffektivt, geografiskt oberoende, och med god möjlighet till anonymitet tilltalande för ungdomar som annars kan undvika att söka ordinarie hälsovård. Internetbaserad KBT har visat sig vara jämförbart med sedvanlig KBT. Internetbaserade mindfulnessbaserade interventioner (iMBI) har visat sig vara jämförbara eller något mindre effektiva jämfört med sedvanlig mindfulness i grupp. Inga högkvalitativa studier på iMBI hos ungdomar har genomförts.

Målsättningen med avhandlingen var att analysera makrosociala stressorer hos ungdomar och deras relation till självkänsla, upplevd stress och psykiatriska symptom samt att undersöka om en iMBI är en adekvat behandlingsmetod med effekt på stress och psykiatriska symptom hos ungdomar.

Material och metoder

Den här avhandlingen är uppdelad i två projekt: *Statsskicksprojektet* (The Governance project), som utgör delarbete I och II, analyserade ungdomar i skolor i Västerås, Sverige och Sofia, Bulgarien. Första tidpunkten (T1) var innan Berlinmurens fall i en tvärsnittsstudie och andra tidpunkten (T2) inföll 25 år senare (2015-2016) i en så kallad time-lag studie, en studie där man jämför två olika men jämförbara grupper med samma karaktäristik med tidsmellanrum, såsom två generationers skolungdomar. Vid T1 fyllde 111 svenska ungdomar (65 pojkar och 46 flickor) och 92 bulgariska ungdomar (44 pojkar och 48 flickor) i skattningsskalan "Jag Tycker Jag Är" som mäter självkänsla. Vid T2 deltog 165 svenskar (96 pojkar och 67 flickor) och 467 bulgarer (328 pojkar och 132 flickor). I *CHAMPS-projektet*, som utgör delarbete III och IV, analyserade svenska gymnasister i två skolor, en urban i Lund med hög akademisk kompetensnivå, mätt som genomsnittsbetyg, och en mer rural skola i Finspång med en genomsnittlig akademisk kompetensnivå. 283 ungdomar valde att delta och 202 (142 flickor, 50 pojkar och 10 som inte angav kön) fyllde i skattningsskalor rörande upplevd stress (Perceived Stress Scale, PSS-14), psykiatriska symptom (Symptoms Checklist, SCL-90), sömnkvalitet (Pittsburgh Sleep Quality Index, PSQI), och personlighetsdragen Neuroticism och Extraversion (Eysenck Personality Inventory, EPI). De 283 deltagarna randomiserades till antingen en åttaveckors mindfulnesskurs (IMBI), en åttaveckors internetbaserad musikterapi där de fick lyssna på klassisk, lugnande musik som aktiv kontrollgrupp eller en väntelista.

Resultat

Statsskicksprojektet

Vid T1 (1988-1991) hade svenskarna signifikant högre självkänsla än bulgarerna. Detta berodde främst på skillnaderna mellan pojkarna och på signifikant högre resultat hos båda könen i Sverige på de två relationella delskalorna för självkänsla "Relationer till föräldrarna och familjen" och "Relationer till andra". Skillnaderna mellan könen var större i Sverige. Vid T2 (2015-2016) hade skillnaderna utjämnats, förutom delskalan "Relationer till föräldrarna och familjen" där båda länderna hade förbättrats och delskalan "Psyiskt välmående" där skillnaden mellan länderna blev den motsatta och Sverige hade sämre resultat än Bulgarien. Skillnaderna mellan könen utjämnades likaledes. Det fanns en signifikant interaktion mellanland i självkänsla över tid, vilket innebär att den observerade minskningen i självkänsla mellan Sverige och Bulgarien över 25 år var statistiskt säkerställd.

CHAMPS-projektet

Det fanns inga skillnader mellan skolorna i någon av skattningsskalorna. Signifikanta korrelationer sågs mellan upplevd stress, (globala) psykiatriska symptom, sömnkvalitet och neuroticism. Färre än 20 deltagare loggade in på någon av de två interventionerna och bara en deltagare slutförde en hel intervention, vilket var mindfulnessinterventionen. De tre som gjorde minst 25% av de 40 sessionerna av iMBI förbättrade sina resultat på skattningsskalorna. Ingen skillnad sågs mellan interventionsgruppernas resultat på skattningsskalorna vid baslinjemätningen.

Konklusion

Statsskicketsprojektet

Det unika materialet på självkänsla från ett östblocksländ från före Berlinmurens fall visade en högre självkänsla i Sverige beroende på bulgarernas lägre självkänsla relaterat till andra, vilken utjämnades 25 år senare när den åter mättes med samma metod på samma platser och av samma undersökare. Vi föreslår att denna utjämnning beror på reduktion av makrosociala stressorer relaterade till det i Bulgarien ändrade statsskicket från kommunistisk diktatur till demokrati. Vi lanserar hypotesen att denna lägre självkänsla i relation till andra är en "diktaturskada". Vi visar att denna utjämnning skedde trots ökande inkomstsklyftor vilket normalt sett skall ge en minskad självkänsla, vilket ytterligare ger en indikation på att det är statsskicket som påverkar. Avhandlingen föreslår också en ond cirkel som förklaring av kopplingen mellan stressresiliens och makrosociala stressorer där en hög allostatisk belastning sänker självkänslan genom en mekanism som kan vara lik den vid diktaturskada. Den låga självkänslan motverkar sedan den högre självkänslans förmåga att buffra allostatisk belastning vilket kan leda till en ytterligare minskad självkänsla genom "the scar hypothesis".

CHAMPS-projektet

Skolornas urbanicitet och akademiska kompetensnivå korrelerade inte signifikant med stress och psykiatriska symptom hos gymnasieungdomarna. Detta kan indikera en mer global orsak till deras stress. Effekten av iMBI på stress och psykiatriska symptom gick inte att utvärdera pga låg följsamhet till interventionen. Förslag till potentiella mekanismer för hur mindfulness kan påverka den ovan beskrivna onda cirkeln beskrivs genom icke dömande, självmedkänsla, en mer stabil emotionell reglering samt metakognition där individen kognitivt noterar sitt kognitiva innehåll. För att kunna undersöka de potentiellt positiva effekterna av iMBI måste följsamhetsproblematiken adresseras. Ett sätt skulle kunna vara genom att föra in mindfulness i läroplanen.

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Spring flowers sprouting
Professor sowing knowledge
Apprentice reaping

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Appendix

Supplementary Table 1. The pieces of the internet-based Music Therapy

Composer	Piece	Opus	Soloist	Conductor	Orchestra	Time	Youtube
Pyotr Ilyich Tchaikovsky	Piano Concerto No. 1	23	Sviatoslav Richter	Yevgeny Mravinsky	Leningrad Philharmonic Orchestra	09:33	http://www.youtube.com/watch?v=3oMm34x1pBg&feature=related
Joaquín Rodrigo	Concierto de Aranjuez, Adagio	n/a	Narciso García Yepes	Raphael Frühbeck	Frankfurt Radio Symphony Orchestra	10:52	http://www.youtube.com/watch?v=CY29JyAH7c
Antonín Dvořák	Symphony Nr 9, movement 1	95	n/a	Georg Solti	Chicago Symphony Orchestra	10:37	http://www.youtube.com/watch?v=m_FrPV4uNlc
Bedřich Smetana	Má Vlast - Vitava	n/a	n/a	Ferenc Fricsay	n/a	10:21	http://www.youtube.com/watch?v=-fsYPz4aWnc
Ludwig van Beethoven	Violin Concerto, D-major, movement 1	61	Anne-Sophie Mutter	Seiji Ozawa	Boston Symphony Orchestra	10:01	http://www.youtube.com/watch?v=D3zsetUus98&feature=related
Tomaso Giovanni Albinoni	Chaconne, G-minor	n/a	David Oistrakh	n/a	n/a	10:15	http://www.youtube.com/watch?v=i4B1fcWa9o&feature=related
Sergei Rachmaninoff	Piano Concerto No. 2 in C-minor, Moderato	18	Sergei Rachmaninoff	Leopold Stokowski	Philadelphia Orchestra	09:35	http://www.youtube.com/watch?v=x8l37utZxMQ&feature=related
Maurice Ravel	Piano Concerto No 1, movement 1	n/a	Arturo Benedetti Michelangeli	Sergiu Celibidache	London Symphony Orchestra	09:50	http://www.youtube.com/watch?v=f0T4rCISZJQ&feature=related
Edward Elgar	Cello Concerto, movement 1	85	Jacqueline du Pré	n/a	n/a	12:58	http://www.youtube.com/watch?v=_J-lwzzge8&feature=related
Franz Schubert	Piano Trio No 1, movement 2	99	Yehudi Menuhin, Hephziba Menuhin, Maurice Gendron	n/a	n/a	09:23	http://www.youtube.com/watch?v=GBuHBQaYZoU&feature=related
Arcangelo Corelli	Concerto Grosso No. 1 in D-major	6	n/a	Nicholas McGegan	n/a	11:00	http://www.youtube.com/watch?v=oxtO9CzF7-o

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