

Aspects of positive and negative mental health in young people, aged 16-29 years: measurements, determinants, and interventions



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MENTAL HEALTH IN YOUNG PEOPLE
AGED 16-29 YEARS: MEASUREMENTS,
DETERMINANTS, AND INTERVENTIONS**

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Aspects of positive and negative mental health in young people aged 16-29 years: measurements, determinants, and interventions

THESIS FOR DOCTORAL DEGREE (PhD)

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“There is a crack in everything. That's how the light gets in.”

- Leonard Cohen, Selected Poems, 1956-1968.

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Kintsugi, the Japanese art of repairing pottery may be compared to positive mental health, well-being, and resilience.

In kintsugi the broken pieces are re-joined by seams of gold. Breakage is treated as part of the history rather than something to disguise. Once broken, the pottery will never return to its original shape, but may be transformed to something even stronger and more beautiful than before. Emphasis is placed on what is added, not on what has been lost.

(Inspired by Itai Ivtzan and his lecture on Second Wave Positive Psychology – Embracing the Dark Side of Life, Budapest 2018).

ABSTRACT

Background: Mental health problems in young people, i.e. those self-reported as well as registered diagnoses, have been of concern for decades. For Western societies, most studies indicate a rise in symptoms, but also in diagnoses of depression, anxiety and stress in younger age groups since the 1990s. The increase follows a pattern of societal changes, namely a prolongation of young people's years in education, later entry into the labour market with frequently insecure conditions, longer-standing time without own housing and postponed building of partnership and family. A large number of studies focusing on young people's mental ill health have been carried out, but less attention has been paid to positive mental health (PMH) in the age group of 16-29 years. PMH allows a view where building on strengths, capacity and health promotion is accentuated rather than leaning on deficit models and prevention of mental ill health. A balanced consideration of both aspects of mental health should give a more complete picture of the mental health characteristics in young people.

Aim: The overall aim was to identify which potential determinants are associated with or may predict positive and negative mental health (NMH) in the age group of 16-29 years by self-reporting measurements, and to investigate the effectiveness of mental health interventions.

Methods: The thesis is built on analyses of two population surveys (*Study I and Study II*), along with merged data from intervened secondary schools (*Study III*), and lastly on a systematic review and meta-analysis of mental health interventions for students in tertiary education (*Study IV*). Specifically, the data-sources and study populations for the specific research questions were as follows. First, we investigated if the 12-item General Health Questionnaire (GHQ-12) had the capacity to measure PMH in addition to NMH. We employed data from the cross-sectional Swedish National Public Health Survey 2004-2009, including 41,668 individuals aged 16-29 years. Additionally, we investigated if the survey's health and background factors, i.e. potential determinants of mental health, could be related to either PMH or NMH factors (*Study I*). Second, we examined which potential determinants predict stable mental health, specifically reporting < 3 GHQ-points at all four measurement waves in the population aged 18-29 years compared to older age groups. We utilised longitudinal data from the Stockholm Public Health Cohort 2002, 2007, 2010, and 2014 including 3,373 individuals in the younger group, and 16,614 individuals aged 30-84 years (*Study II*). Third, we explored whether subjective well-being (SWB), i.e. emotional well-being and life satisfaction, is associated with personality traits at baseline and at 15-18 months of follow-up and whether personality traits may prospectively predict subjective well-being and vice versa. We employed our earlier data-collection from four secondary schools, two intervention- and two control schools, including 446 pupils (*Study III*). Finally, we investigated sustainable promotive and preventive mental health intervention effects for students in higher education. A systematic review and meta-analyses based on 26 included studies and a study population of 8,136 individuals were conducted (*Study IV*).

Results: *Study I.* The General Health Questionnaire 12 (GHQ-12) in the National Health Survey revealed a capacity to measure PMH as well as NMH. However, when we examined the association between the GHQ-12 scores and 22 potential determinants of health, we found that most determinants showed significant and opposing effects on both PMH and NMH. Nonetheless, female sex, economic strain, risky gambling, and, above all, suicide ideation and perceived humiliation increased NMH more than they decreased PMH, and could qualify as risk factors. Participating in societal events and moderate gambling elevated PMH more than they reduced NMH and could subsequently be ascribed as promotive factors. Being a student was associated with lower PMH and higher NMH compared to being employed. Lastly, PMH decreased as age increased in the group of 16-29 years, whereas no age-related changes were found for NMH. *Study II.* In the Stockholm Public Health Cohort, 46% for males and 36% for females reported stable mental health among young people aged 18-29 years,

compared to 66% and 55% respectively, in the age group 30 years and above. Out of 17 possible determinants of health, six predicted stable mental health in the younger group: occupational status, especially employment, emotional support, being male, being born in Sweden, absence of financial strain, and consumption of fruit and berries. In the older age group, the pattern was similar, with 11 significant determinants of health. However, more determinants were related to social capital and health behaviour compared to the younger group, and a significant group difference was evident for physical activity and absence of financial strain with higher importance in the older group. **Study III.** Among secondary school pupils aged 16 years, SWB at baseline and follow-up was associated with low levels of Neuroticism, and high levels of Conscientiousness, Extraversion and Agreeableness. In particular, the correlation between SWB and Neuroticism was strong. Compared to boys, trait stability was significantly higher in girls. However, one exception was Neuroticism, the only trait with stability in boys. SWB showed one prospective effect, namely on Agreeableness and only in girls. For personality traits, no prospective effects on SWB were found. **Study IV.** According to our systematic review and meta-analysis combined effects for interventions designed to prevent mental ill health in students in higher education showed that the symptom reduction sustained up to 7-12 months post-intervention, although the effect size was small, ES of -0.28 (95% CI -0.49, -0.08). Specifically, for depression the sustainability was up to 13-18 months, for anxiety up to 7-12 months, and for stress up to 3-6 months. The sustainability for interventions designed to increase positive mental health was up to 3-6 months for all effects combined, and the effect size was small, ES of 0.32 (95% CI 0.05, 0.59). Specifically, active coping sustained 3-6 months with a medium effect size, ES of 0.75 (95% CI 0.19, 1.30).

Conclusions: In our national sample, the GHQ-12 did not systematically discriminate potential determinants associated to positive and negative mental health, respectively, and therefore should be reserved for its purpose of origin, namely to measure symptoms of mental ill health in the population. Our results which show that young females seem to perceive less stable mental health and higher levels of Neuroticism compared to their male peers confirm the results from earlier studies. This is also true regarding young people's less stable mental health and higher levels of mental ill health symptoms compared to older age groups. As occupational status, especially employment, and emotional support may serve as determinants predicting mental health stability among young people, promoting them should be a matter of urgency. Interventions in higher education showed sustainable effects, and it may be of importance to endorse those interventions. As other interventions enhancing positive mental health, and those with a whole-system approach in schools, higher education, and working-life are less well explored, further research should shed a light on these important topics.

LIST OF SCIENTIFIC PAPERS

- I. Winzer R, Lindblad F, Sorjonen K, Lindberg L. Positive versus negative mental health in emerging adulthood: a national cross-sectional survey. *BMC Public Health* 2014; (14):1238.
- II. Winzer R, Sorjonen K, Lindberg L. What predicts stable mental health in the 18-29 age group compared to older age groups? Results from the Stockholm Public Health Cohort 2002-2014. *International Journal of Environmental Research and Public Health* 2018;(15):2859
- III. Winzer R, Vaez M, Lindberg L, Sorjonen K. Concurrent and Change Associations Between Subjective Well-Being and Personality in a Swedish Adolescent Sample – are Prospective Effects Evident 15-18 Months Ahead? Submitted
- IV. Winzer R, Lindberg L, Guldbrandsson K, Sidorchuk A. Effects of mental health interventions for students in higher education are sustainable over time: a systematic review of randomized controlled trials. *PeerJ* 2018; 6:e4598.

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LIST OF ABBREVIATIONS

ACT	Acceptance and Commitment Therapy/Training
CBT	Cognitive Behavioural Therapy
CFA	Confirmatory Factor Analysis
DISA	Depression in Swedish Adolescents
EFA	Exploratory Factor Analysis
EPHPP	Effective Public Health Practice Project Quality Assessment Tool
GHQ	General Health Questionnaire
HBSC	Health Behaviour in School-aged Children
NEET	Neither in Employment, Education or Training
NMH	Negative Mental Health
PICO	Population, Intervention, Comparator, and Outcome
PMH	Positive Mental Health
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-analyses
SEL	Social Emotional Learning
SDH	Social Determinants of Health
SDMH	Social Determinants of Mental Health
SHoT	Studentenes Helse- og Trivselundersøkelse [Students' Health and Welfare Survey]
SWB	Subjective Well-being
SWLS	Satisfaction with Life Scale
UK	United Kingdom
US	United States
WEMWBS	Warwick Edinburgh Mental Wellbeing Scale
WHO	World Health Organization
WHO-5	World Health Organization Well-being Index
WMH-ICS	WHO World Mental Health International College Student project

1 A PERSONAL INTRODUCTION

This doctoral project has been ongoing for a long time, and I have been engaged in it at the same time as my full-time employment at the Public Health Agency of Sweden, formerly the Public Health Institute. Since my own youth, I have been curious about what it takes to make the transition into adulthood. My first acquaintance with research on young people was in the late 1980s when I was asked to co-author a publication on young people's life conditions (1). I remember the exciting feeling of coming across something new in the field of emerging adulthood – along with the fact that this term was not yet established. Although we did not develop ground-breaking science, it was a privilege having the possibility to spend hours in the Archives of Stockholm, reading historical documents, and to discover that young people's social, mental and environmental factors have always been of greatest importance.

My next source of knowledge on young people and mental health – besides the knowledge I obtained from my growing up relatives and my friends' sons and daughters – was 10 years later when I conducted an evaluation of short-term counselling. I had the chance to interview 51 young people, aged 18-29 years, before they entered their four-session counselling with trained psychotherapists. The majority of them had experienced troubled moods for a long time and their self-reported distress was highly elevated. I met most of them again 3 months post-intervention and held telephone interviews with those few who did not attend in person. For me it was amazing to encounter their mitigated distress and their strengths in mastering life in a new way. This comparatively brief and small intervention seemed to have made a real difference to them. The study, although without any control group, was published as my Master's thesis in public health (2). A couple of months later I had the opportunity to co-author a similar evaluation, although this time of a longer lasting psychodynamic therapy with young people (3). Again, the intervention showed that it is possible to accomplish substantial alterations in life with comparatively small means. These experiences made me feel that I was on the right track and to try to explore more about young people's mental health and positive resources, though by other methods than evaluating counselling and psychotherapy.

This thesis is the result of my attempts, some of which turned out to be impossible or rather hard to perform, while others showed no results. My learning process has been a low budget project. As I was not granted or employed by KI as a doctoral student, the study objectives, and their measurements had to be at little or no cost, which might have influenced the executions of some studies. On the other hand, these circumstances forced me to think "outside the box" and to find new solutions. However, I am happy for all I learnt from this long expedition, but I am also grateful that it has now come to an end.

2 BACKGROUND

In the following paragraphs, I will give a short description of the key elements in my thesis: First, the terminology of mental health, positive and negative mental health, and different concepts related to them will be covered. Second, I will briefly discuss different terms for young people and research on young people's transition into adulthood. Personality and identity development, their social determinants of health, and a description of what we currently know about the prevalence and incidence of their mental health will be explored. Third, I will provide a brief description of the intervention field, covering promotion and prevention and relating to upper secondary school-, college-, and university students.

2.1 THE AMBIGUOUS CONCEPT OF MENTAL HEALTH

2.1.1 Mental health and well-being

As so many have done before me, I start traditionally by introducing the concept of mental health with the definition given by the WHO. Namely, this is "...a *state of well-being* in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community" (4). An additional comment in the same document is that "Mental health and well-being are fundamental to our collective and individual ability as humans to think, emote, interact with each other, earn a living and enjoy life. On this basis, the promotion, protection and restoration of mental health can be regarded as a vital concern of individuals, communities and societies throughout the world." The definition of mental health is a useful basis for common understanding and discussion but a shortcoming is its scientific vagueness, which makes it difficult to measure and to apply in various settings. The mental health definition is related to the mental well-being component in the constitutional definition of the WHO about general health; health is a state of *complete physical, mental and social well-being* and not merely the absence of disease or infirmity (5).

Well-being and mental health are closely related and, within academic institutions and governmental divisions, their concepts are sometimes mentioned in conjunction (Institute for Health and Wellbeing at the University of Glasgow, Wellbeing and Mental Health at Mental Health England, The Mental Health, Wellbeing and Ageing division in Australia). Nonetheless, the theoretical backgrounds of the two concepts are of different origin. While mental health is grounded in the field of public health, the concept of well-being has its origin in psychology (6).

2.1.2 Positive mental health

A term intimately related to well-being is *positive mental health* and, in the last few decades, the literature, rooted in the field of positive psychology, has rapidly grown. Positive mental health was introduced in 1950s by Marie Jahoda and is based on six facets: a) Attitudes toward the self, b) Growth, development, and self-actualisation, c) Integration, d) Autonomy, e) Perception of reality, and f) Environmental mastery (7, 8) These facets are similar to those

developed by Carol Ryff and her measurements of *psychological well-being* (9). Ryff had a critical approach towards previous interpretations of *subjective well-being* (10) equating it with *hedonic well-being* and their inventories (11) and she claimed that these notions were placing too much emphasis on the concept of happiness (10). Moreover, *subjective well-being* is constituted by avoiding pain and experiencing pleasure, based on ideas from the Greek philosopher Aristippus from the 4th century BC. Later forms of hedonism have been presented by philosophers such as Thomas Hobbes in the 17th century. He claimed that happiness lies in the pursuit of our human appetites. The Marquis de Sade in the 18th century, in similarity with the coetaneous Utilitarian philosopher Jeremy Bentham, meant that the pursuit of sensation and pleasure is the goal of life and that a good society is built up by individuals maximising their pleasure and self-interest (12). However, people reporting happiness and pleasure do not necessarily live their lives in *psychological or eudaimonian well-being*. The eudaimonian perspective has its roots in Aristotelian philosophy, where Aristoteles viewed *hedonic well-being* as a vulgar ideal leading people to be slavish followers of desires whereas eudaimonic well-being deals with psychological functioning, self-realization and living well (13). Furthermore, the concept requires people to live in harmony with their daimon or true self (14). Corey L.M. Keyes integrated the hedonic and eudaimonic well-being as two separate components into his model of *flourishing mental health* (15, 16). Keyes also elaborated a measurement scale, the Mental Health Continuum with 40 items; the long form and the 14-item short form consisting of hedonic, eudaimonic but also *social well-being*. The latter aspect was elaborated by Keyes in the early 1990s based on classical sociology and focused on social tasks (17).

However, the concept of *subjective well-being*, including *emotional well-being* (high amount of positive affect and low amount of negative affect), and an *evaluative aspect on one's satisfaction with life* has also developed during the years (18, 19) and is one of the indicators in the World Values Survey. According to Diener et al. subjective well-being could be seen as a predictor for eudaimonic well-being (20), whereas others have examined a high correlation but a clear distinction between the two well-being factors (14, 21) and a study on molecular genetic data revealed a large overlap between genes influencing eudaimonia and those influencing hedonia (22). The heritability of well-being has been investigated by twin-studies, predominantly since the early 2000s, and a meta-analysis has shown that genetic factors explained about 35% of the variance in well-being and satisfaction with life in different populations (23). Hypotheses on effects of impaired well-being for the risk of ill-health have been tested (24). Furthermore, positive mental health is generally associated with reduced premature mortality, morbidity and better disease outcomes, where biological processes including neuroendocrine, inflammatory and metabolic pathways have been identified (25).

Positive mental health and positive psychology are intertwined and have developed rapidly during the last few decades, originally as a counteraction against the pathologic view of mental health. Martin Seligman and Mihály Csíkszentmihályi could be seen as the main contributors and the “fathers” of positive psychology (26, 27). Martin Seligman is recognised for his concept of well-being, comprising five elements: Positive Emotion, Engagement, Relationships, Meaning, Accomplishment (PERMA) (28). Mihály Csíkszentmihályi is known for his contributions in the field of creativity and flow (29). The core foundation of positive psychology may be described as hope, wisdom, future mindedness, courage,

spirituality, responsibility, and perseverance (26) A collaboration between positive psychology, with its capacity to measure mental well-being, and public health, especially health promotion, could result in social change (6).

However, positive psychology has been criticised for ignoring the bleak reality of human existence (30, 31), and to exclusively value positive emotions as beneficial and negative emotions as undesirable and therefore needing to be avoided. The critics argued that qualities such as optimism, when becoming unrealistic, could be counteractive and underestimate risks and, for instance, stimulate risky behaviour. However, Seligman also pointed out the importance that one must be “able to use pessimism’s keen sense of reality when we need it” (32). According to the predecessors of the positive psychology movement, the critics have influenced the field of positive psychology and contributed to a development and maturation towards a second wave of positive psychology (33, 34). The second wave entails that many experiences involve a mix of the positive and the negative and the dialectical nature of well-being being recognised. Nowadays, the dark and light sides of life are seen as complementary and taking the dark sides into account may even produce post-traumatic growth (34).

2.1.3 Mental ill health – negative mental health

Although well-being is an aspect of mental health according to the definition of the WHO, mental health is poorly defined, used in a confusing way and often the term expresses the opposite of its meaning, namely in the connotation of *mental ill health* or *negative mental health*. Mental ill health may be seen as a contrast to well-being and expresses mental illness, but also sub-clinical symptoms such as psychological distress and mental difficulties. However, there is no clear definition given, and in the literature the terms cover a broad spectrum from *mental health problems* to *psychiatric diagnoses*. Therefore, I have made an effort to explain what we mean in our papers by using the terms. As we are focusing on self-reported data, mental ill health and negative mental health are, in this thesis, related to symptoms of, for example, anxiety, depression, and stress and not to diagnoses.

2.1.4 Mental health – a single or dual continuum?

The traditional view has been to regard (positive) mental health and mental ill health as two poles of a single continuum (35), which is also termed the normative or “modal perspective” (36). Other scholars have stated that (positive) mental health constitutes an entity of its own, although there is an association between mental health and mental ill health (37). Headey et al. illustrated the associations in the following way: “A person is unlikely to be both satisfied with life and depressed, but may be satisfied and anxious” (38). The concepts may be seen as related but distinct dimensions and are therefore called the two continuum model (39, 40), see Figure 1.

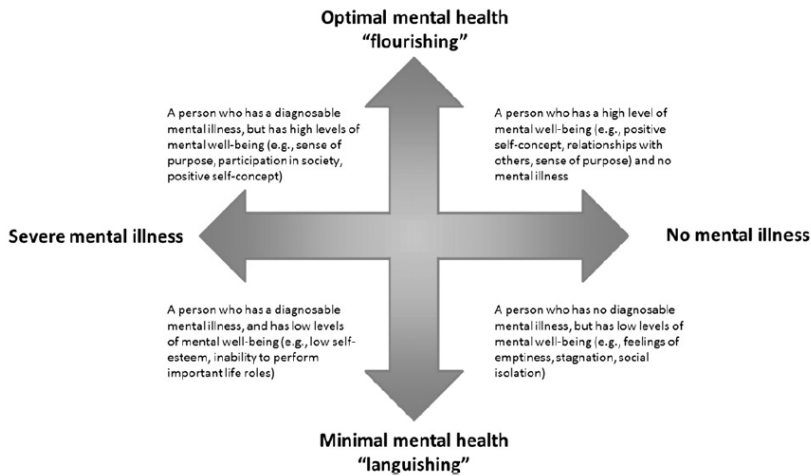


Figure 1. The dual factor continuum of mental health and mental illness, adapted from the theoretical work of Keyes et al. (Keyes, 2002). Reprinted from Preventive Medicine, Vol 87, June 1, 2016. Enns J et al. Mapping interventions that promote mental health in the general population: A scoping review of reviews, p. 70-80, Copyright (2019), with permission from Elsevier.

The dual continuum model illustrates, on the one hand, complete (optimal) mental health i.e. *flourishing*, a status free from symptoms of mental ill health, with high levels of well-being, positive emotions and psychological and social functioning. However, on the other hand, the model demonstrates incomplete (minimal) mental health, i.e. *languishing* with low levels of well-being (41). By empirical studies, Corey Keyes has demonstrated that while the co-occurrence with languishing is frequent, flourishing sometimes may coincide with mental illness (16, 42, 43).

However, both the single continuum and the dual continuum perspective have been questioned and empirically tested for the concepts of mental health, psychological distress and mental illness (36). Payton, by his analyses, rejected the modal perspective and instead found a discontinuity between the three concepts. They may be correlated, but each concept constitutes a distinct phenomenon and mental health, psychological distress and mental disorder should not be conflated. They may be caused or predicted by different factors and they also cause or predict diverse outcomes. In the dual continuum perspective, psychological distress did not warrant sufficient attention. The analyses confirmed that the dual continuum model is right in viewing mental health as not solely the absence of mental illness (36).

2.2 TRANSITIONS IN YOUNG PEOPLE AGED 16-29 YEARS

In the following paragraphs, I provide a description of how young people aged 16-29 years are termed and described during the years. I will also give some background on identity development, which might facilitate the understanding of challenges during transition to adulthood, and on personality maturation, as personality trait is the focus in study III. Lastly, I conclude by giving some statistical facts on transitional hardships. Important biological processes for the transition period, such as the development of the central nervous system,

could have been mentioned in the following paragraphs. However, I refrain from this challenge as biological development is beyond the scope of this thesis.

2.2.1 Adolescents; young adults or emerging adults?

There are several terms defining *young people* and classifying adolescence is the least unambiguous. According to the Encyclopedia Britannica adolescence in Western societies is understood as the period between 10 and 19 years and roughly equivalent to the word teenage (44). Furthermore, adolescence encompasses psychological, social, and moral terrain as well as the strictly physical aspects of maturation. The WHO description is equivalent to this, and refers to adolescence as the agespan of 10-19 years (45). Conversely, the United Nations seem to prefer to use the definition for youth, i.e. 15-24 years (46). The concept of adolescence seems to have been established by the psychologist G. Stanley Hall, who published his two-volume work and postulated the development of adolescence in 1904 (47). He described in considerable depth many somatic phenomena which he suggested to be characteristic for the age stage from puberty into the 20s, such as the development of the voice and blushing. Moreover, he regarded adolescence as a period of a rebirth, a period when the adolescent experiences confusion before reaching adulthood. Consequently, Hall warned adults of putting too much pressure on the male adolescent (48).

The age period of young adulthood is described by Erik Homburger Erikson in his theory on psychosocial stages for the age group of 20-24 years, but also for those of 20-39 years (49). According to a contemporary developmental psychologist, Richard Young, the transitions into young adulthood end at 35 years (50). In 2000, Jeffrey Arnett coined the term *emerging adulthood*, principally referring to the age span of 18-25 years, but also to 18-29 years (51, 52). Arnett claims a need for this fairly new idiom and refers to the tremendous life changes young people have undergone during the last half century. Based on his research Arnett describes the emerging adulthood as a distinct developmental period following adolescence. The period includes five features: *the age of identity explorations*, *the age of instability*, *the self-focused age*, *the age of feeling in-between*, and *the age of possibilities* (53).

As shown, the definitions of the different concepts for youth are indistinct and frequently overlap each other. In my papers, I refer to *emerging adults* only in Paper I, as here the study population is distinct, 16-29 years of age. In Paper II, the study group consists of a cohort and has reached an age far beyond emerging adulthood at the third follow-up, in Paper III only adolescents are in focus, and in Paper IV the age of the students in higher education is unknown to us. In this regard, I thus use the terms young people, emerging adults and young adults interchangeably.

2.2.2 Identity- and personality development

The sociologist Shmuel Eisenstadt was a pioneer in the research field of young people. He problematized the transition to adulthood in his classical work, *From Generation to Generation* (54, 55). Adolescence is also viewed as a process of rite of passage, with

concepts from different disciplines such as psychology, sociology, cultural anthropology and theology. Arnold van Gennep formulated the original three passage steps in 1909; separation of individuals from their previous identity, through transition to a new identity and incorporation into a new role or status. These steps were later expanded into 14 steps where the authors rejected the idea of separating from old roles and moving into new ones. Instead they viewed the process as an expansion of boundaries to incorporate the components of the new role (56).

One of the most well-known contributors to the research field of identity is Erik Homburger Erikson. Similar to van Gennep he illustrated the identity formation as a process of slow progress into the growth of ego. During the course of development, the identifications of childhood are gradually substituted by a new formation which is larger than the sum of its parts. Erikson pointed to the urgency of solving every critical step in the developmental stage, otherwise the individual would face what he called psychosocial crises later on in adulthood and coined the concept of Identity versus Role Confusion (49, 57). James Marcia expanded Erikson's model and defined four identity statuses: *identity diffusion*, *identity foreclosure*, *identity moratorium* and *identity achievement*. Diffusion refers to a status where individuals who do not have stable commitments to goals and values; foreclosure is a status where no personal choices have been made, but have been chosen by authority figures; moratorium is a delay, a process of exploration where no definite commitments have been made. Finally, identity achievement means a status where individuals have explored and committed themselves to self-chosen values and goals (58, 59). A meta-analysis of 124 studies on identity status change during adolescence and young adulthood concluded that large mean proportions of samples had not reached an identity achievement in young adulthood, i.e. up to 25 years. During the transition, the mean proportion of those adolescents who made progressive identity changes was 36%, contrasted to 15% who made regressive changes and 49% who stayed stable (60). In a Swedish study of 136 young adults aged 24-26 years, women were more likely to have reached an identity achievement after a process of active exploration while men to a greater extent lacked identity-defining commitments (61).

The different stages of the identity development may have been well researched and illustrated, but the concept and contents of what we mean by identity are ambiguous and often vaguely formulated. James E. Côté points to the consequences when describing identity from a psychological, i.e. an individual perspective, or sociological, i.e. an interactional perspective, respectively (62). As the public health field deals with groups and societal levels a sociological view of identity issues is most appropriate from this view. Another remark made by Côté refers to the development of social identities depending on their socio-historical context. While identity formation in pre-modern societies tends to be described as a fairly linear move from childhood to adulthood, in early modernity it has to be accomplished in relation to the increasing choices. In parallel with social identity formation the transition to adulthood has undergone a historical development: from short and ritualised in pre-modernity; via extended with social markers in early modernity; to prolonged and individualised in late/post modernity. In "our" late- or postmodern societies the individualisation process is more widespread and young people are challenged by

continual management of social identities as they are formed and also afterwards, once they are formed. Moreover, Côté admits that the individualisation process and social identities are confined to class, gender and race/ethnicity (62).

The concept of personality has, in parallel with identity formation, attracted research on transition in adolescence and young adulthood. Identity development is closely linked with personality (63) in adolescence and young adulthood (64, 65). Today, the study of personality is principally equivalent with the investigation of personality traits, encompassing thinking, feeling and and behaving (66). The Big Five Model, a taxonomy of five higher order personality traits, has its origins in the 1960s (67) and is also frequently used for measuring personality in adolescents and young adults across countries (68-71). The five higher order traits are listed below, with their descriptions being inspired by Caspi and colleagues (66).

- 1) *Extraversion/Positive Emotionality*. High levels on the scale indicate expressiveness, energy, and dominance, while low levels signify individuals who are quiet, inhibited, lethargic, and more satisfied to let others lead.
- 2) *Neuroticism/Negative Emotionality*. High levels are associated with anxiousness, vulnerability to stress, guilt-proneness, lack of confidence, moodiness, anger, and frustration. Low levels are related to a stable and adaptable personality.
- 3) *Conscientiousness/Constraint*. High levels are associated with self-control, versus behavioural impulsivity, attention, achievement, motivation, orderliness, responsibility, and conventionality.
- 4) *Agreeableness*. High levels are related with cooperation, consideration, empathy, generosity, politeness, and kindness, while low levels indicate aggressiveness, rudeness, spitefulness, stubbornness, cynicism, and manipulation.
- 5) *Openness to experience/Intellect*. High levels are linked to imagination, creativity, and aesthetical sensitivity. Intellect is associated with quickness to learn, cleverness, and being insightful. Among the five traits, Openness seems to be the most debated and least understood.

Each higher order trait, also called superfactor, is associated with traits of lower order, termed as facets – e.g. representing being talkative and good at leading others for the components of sociability and dominance within the superfactor Extraversion.

Today, it seems well established that genetics account for around 50% of the variance in personality characteristics, whereas environmental factors account for the other half (72). However, personality traits have long been seen as relatively stable during the life-course (73). It was suggested that mean-level changes in temperament and traits occur during childhood and adolescence, but are more or less fixed at the age of 30 (74). According to Srivastava et al., until the late 1990s, it was assumed that beyond being fixed, “traits are insulated from the direct influence of environmental factors” and are completely biological in their origin, referred to as the “hard plaster hypothesis” (75). However, the authors rejected the hypothesis by testing it in a sample of more than 130,000 responders to an

Internet survey, aged 21-60 years, where Conscientiousness increased most during the 20s, and further augmented together with Agreeableness throughout early and middle adulthood. Neuroticism declined in women and was stable in men and Extraversion declined for women, and Openness slightly declined with age.

Roberts et al., in their meta-analysis of 92 studies, measured mean-level changes in personality traits (76). They found that the most pronounced changes in personality traits occur during late adolescence to emerging adulthood, i.e. between ages of 18-22. Openness and social dominance, a facet of Extraversion, increased while Neuroticism decreased and Agreeableness remained stable. Conscientiousness, however, increased during the ages of 20-30 and also during the following years. In early adolescence, i.e. 10-18 years, only emotional stability and social dominance increased. This might be seen as an adolescent “personality trait moratorium”, comparable with the identity moratorium. Roberts et al. concluded that changes in personality take place in emerging adulthood, rather than in adolescence. In addition, they point out the plasticity of personality traits during the lifespan, far beyond the age of 30. These changes in personality are generally rather positive, with a decrease in Neuroticism, an increase in Conscientiousness, Agreeableness, and Openness to experience.

Other studies have confirmed the changes in personality traits (71, 77). Authors have theorised about the value of becoming more conscientious and agreeable nowadays, not in adolescence, but in young adulthood. They suggest the Social Investment Theory as a framework for understanding the phenomena (75, 78, 79). The theory, encompassing contextual perspectives, proposes that transition and role changes in young adulthood, such as moving from home, entering higher education or the labour market, getting married, and becoming a parent, forces young people to invest in new social roles. These processes are so strong that they fuel personality changes and maturation. The social investment theory seems reasonable and applicable for the age group aged 16-29 years.

Gender differences in personality traits have been investigated by meta-analyses (80, 81) and synthesised data from more than 23,000 individuals across 26 cultures (82). In Western societies, women generally rate themselves higher regarding the superfactors of Extraversion, Agreeableness, Conscientiousness, and Neuroticism compared to men. However for the lower order traits (facets), findings are inconsistent.

2.2.3 Hardships related to compulsory, upper secondary, and tertiary education plus work entrance: some statistical facts

During the last three or four decades, the living conditions for emerging adults have undergone an extensive change compared to previous age cohorts. Demographic and sociological studies demonstrate that the length of transition from adolescence to young adulthood has been significantly prolonged in most Western societies since the 1990s (51, 83, 84). In the following paragraphs, I will illustrate the extended process with data from Sweden on prolonged time living with one’s family of origin, education, and labour market.

Young people are living for a longer period with their families of origin and leave their parental home later compared to prior cohorts. In 2015, among young men in Sweden, a little over 50%, and, among women, around 40%, still lived with their parents at age 22. In urban regions with a scarcity in housing, the percentages are even higher (85).

Education is a crucial factor for a smooth transition into adulthood and the first step is to fulfil either the requirements to attend upper secondary school, a vocational, or a university preparatory programme. However, 13% of girls and 18% of boys are not eligible due to poor compulsory school grades. Low socioeconomic position and migration background are risk factors for not being eligible for upper secondary school programmes (86). A harsh consequence of this could be the status of NEET (Not in Employment, Education or Training), and, in 2018, 6.3% of males and 6.1% of females, aged 15-24 years, were classified as NEET in Sweden (87).

In Sweden, unemployment rates in young people have dropped considerably during the last decade and are among the lowest in Europe. In 2018, among those 18-24 years old, 8.6% were unemployed. However, there is a noticeable gender gap, with 10.2% in young men and 6.9% in young women. The gap in unemployment between those of Swedish and foreign origin is decreasing, although the levels are still high. Due to the migration crisis in 2015, when the rate of young newcomers rose significantly, 20% among young immigrants are unemployed and enrolled in employment services, compared to 3.5% of Swedish origin (88).

Upper secondary education, the next educational step, is, for many, an entrance to the labour market. In 2017, three years after their diploma, 80% among those having attained a vocational programme had employment as their main activity, while 10% were in education. Among the latter group, the share was higher in women compared to men and higher in those with a foreign background compared to those of Swedish origin (89).

Among young people who attained an upper secondary preparatory programme for higher education, barely 60% enrolled at a university 3 years later. The proportions were higher in women compared to men, and in those with foreign background compared with those of Swedish origin. However, 3 years after their school leave, 40% had work as their main activity, approximately as many as those from vocational programmes (90).

As in other OECD countries, there has been a considerable rise in people enrolling in tertiary education in Sweden during the last few decades. In 2016, among the adult population, 41% had attained at least 2 years of tertiary education; 48% in women and 35% in men (91). The differences in education level between men and women have increased in all OECD countries between 2006 and 2016. During last decades, a prolongation for entrance in tertiary education has taken place, and, in 2015, the average entrance age was 24 years in Sweden, compared to 22 years in OECD countries. Among those aged 19 years, barely 13% had entered higher education in 2016. The dropout rate from higher education, i.e. those students who did not show up in semesters 3 and 4, has been relatively high; 23%

in men and 19% in women (92). The highest proportions constitute men in female-dominated professions, such as teacher programmes, with 37% dropout. Further risks for dropout include: low grades from upper secondary education, low entrance age, and for some educational courses, foreign origin is a risk factor (92). Among those who graduate, two out of three are women. By and large, graduated students have better chances for rapid establishment on the labour market and lower unemployment rates compared with those only having attained an upper secondary qualification. In 2017, 90% of the graduates hold a position on the labour market 3 years after graduation, compared to 50% among those with an upper secondary exam (91).

When entering the labour market, precarious work with a lack of legal protection, low social and financial benefits, and temporary employments are usual. In 2014, temporal employments constituted 16.7% in the Swedish workforce; the older the age group, the lower the share of temporal employment. The largest percentages represented the youngest group, and, among those aged 16-24 years, 56% were temporarily employed (93). For them, vocational and training institutions that offer a greater chance of obtaining a foothold in the labour market are crucial. While some young people have the skills to navigate the labour market fruitfully, others, possibly the majority, have problems in their transition including family formation, and additionally show low well-being (94).

As shown, the transition to adulthood is a long process, and the establishing age, i.e. the age when 75% of a cohort has entered the labour market, has increased from 20 years during the 1980s to 29 years in 2014 (95).

2.3 SOCIAL DETERMINANTS OF HEALTH

In the 1990s the focus shifted from measurements on illness outcomes to the assessment of social determinants of health (SDH). It soon became evident that in order to tackle social health inequities efforts were needed broadly and on different levels. The WHO defines the SDH as *conditions in which people are born, grow, live, work and age. These circumstances are shaped by the distribution of money, power and resources at global, national and local levels. The social determinants of health are mostly responsible for health inequities - the unfair and avoidable differences in health status seen within and between countries* (96).

The starting point for the work on SDH was the finding that among all studied countries, health follows a social gradient, creating inequality among different social groups (97). The social gradient in health implies that for every step up on the social ladder (as indicated by for example income, education or occupation), we find better health. The evidence on the SDH has been summarised in the Solid Facts (98) and several policy areas are discussed where actions may reduce the social gradient in health, for example, stress, social exclusion, work, unemployment, social support, addiction, and food.

The WHO Commission on Social Determinants of Health has put the work on the SDH forward (99) and, in 2008, formulated three overarching recommendations for increasing equity in health: 1) Improving daily living conditions, 2) Tackling the inequitable distribution of money and resources and 3) Measuring and understanding the problem and

assessing the impact of action. These recommendations have inspired countries, including Sweden, to set their goals for improving equity in health (100, 101).

Over the years, the SDH have become well known and are now frequently referred to (97, 102-104). To gain an impression of how many articles have been published, I consulted the database PubMed. A rough search for “social determinants of health” in publication titles and abstracts generated more than 3,700 hits (April 2019).

Probably the best known model on social determinants is the so-called rainbow model, elaborated by Margaret Whitehead and Göran Dahlgren (105) which, in a simple, yet illustrative, manner, describes the SDH and how they interact in different levels. The model demonstrates four layers of determinants: first, the societal level, with general, socio-economic, cultural, and environmental conditions; second, living- and working conditions; third, social and community networks; and, finally, the fourth level, which concerns individual lifestyle factors. All of these are addressable by public health policies. The innermost layer consists of factors less likely to be affected by policies, namely age, sex and constitutional factors. How these determinants are distributed in the population determines the level of health inequalities.

However, as the scope of this thesis is mental health in young people, I took a closer look on SDH linked with mental health in general, and further SDH linked with mental health in young people.

2.3.1 Social determinants of mental health in the entire population

Compared to a vast amount of literature on SDH searched on the PubMed database, the hits on social determinants of mental health (SDMH) were considerably more scarce and generated only 54 records (April 2019). The majority of them were papers linked with mental disorders. Allen et al. summarise evidence: a) on SDMH for common mental health disorders, and b) action on determinants to prevent mental ill health and promote mental health (106). The authors applied a framework to organise evidence on a life-course approach from pre- and perinatal to older age. Overall, the authors identified the social gradient, with poor people being at highest risk for mental disorders. In addition, women compared to men at every level of household income were at higher risk of psychiatric diagnoses, and cumulative stress was linked to mental disorder. The authors suggest that action should be taken throughout the life-course at all societal settings. Cumulative stress was also identified as a key SDMH by Fisher and Baum, who argue that chronic arousal of stress systems is a major determinant for mental health problems and disorders. Chronic arousal is based on proximal stressors such as low income, insecure housing, social isolation, insecure employment, unemployment, living in an unsafe community as well as gendered violence (107).

To illustrate how the SDMH operate across the distal and proximal levels, Brunners and Marmots model may be helpful, see Figure 2.

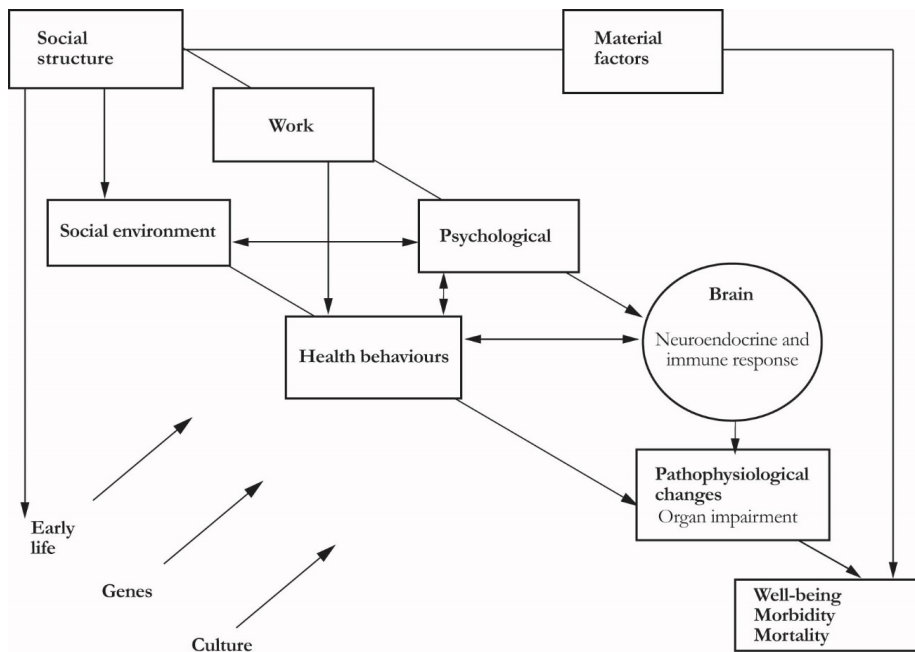


Figure 2. Social determinants of health. Reprinted from Brunner E, Marmot M. Social organization, stress and health, p. 9. In: Marmot M, Wilkinson RG (editors) Social Determinants of Health. Oxford: Oxford University Press 2008. Reprinted with permission from the Publishers' Licensing Services, April 19, 2019.

Alegria et al. have summarised the state-of-the-art on SDMH (108). They found that the scope of recent research has been on unemployment, precarious employment, employment condition, occupational class, income, financial strain, discrimination, family relationships, urbanicity vs. rural areas, migration status, and, minority status. However, they point out that their findings inhibit them from a conclusive understanding of which determinants should be addressed to prevent mental ill health and promote positive mental health. Further they explain, we do not know in which populations interventions may be most effective.

Mental health inequalities, i.e. systematic differences in mental health outcomes between groups based on gender, ethnicity, sexual minority status, functional disability, and socioeconomic position are indeed another, albeit adjacent, outcome. However, McAllister et al. have investigated how structural level determinants, i.e. policy domains of overall welfare states, family policies, employment policies, income support and social insurance, area-based interventions, and education-based policies affected mental health inequalities (109). Their systematic review showed a reduction in mental health inequalities in women by dual-earner systems in welfare states, such as the Nordic countries. However, their findings on socioeconomic inequalities were inconsistent: investments in paid parental leave improved overall mental health in mothers but did not decrease the mental health gap between those in high and low socioeconomic positions, respectively. Austerity measures, such as reducing benefit levels and cutting programmes, tended to decrease mental health and increase inequalities. Interventions on area-based initiatives were understudied. Limited results showed an improvement in women's well-being by neighbourhood renewal.

Educational policies were not found, so no conclusions can be drawn as to how those affect mental health and mental health inequalities.

2.3.2 Social determinants of mental health in young people – a knowledge gap

A search on the database PubMed for SDMH and young people produced – of course – even fewer results compared with a search on SDMH and the entire population. Only a handful of articles showed up. Viner et al., in their extensive, but not systematic review, analysed the SDH for different outcomes in the age group of 10-24 years. The authors identified the strongest determinants of adolescent health worldwide (110): national wealth, income inequality, and access to education. In addition, these included safe and supportive families, safe and supportive schools, and positive and supportive peers. However, specific measures for mental health outcomes were not included in the review; instead, “being bullied” was used as a proxy for mental health.

McIntyre et al. assessed the SDMH for university students in an empirical study among 1,135 respondents in Northern England (111). They found high rates in symptoms of poor mental health, i.e. anxiety (21%), depression (11%), and suicidal thoughts (20%). These symptoms were linked to environmental factors: childhood adversity, economic deprivation, and discrimination. However, the strongest SDMH for mental distress was shown for feelings of social isolation.

I did expect to find more evidence for SDMH in young people, preferably as reported by systematic reviews. This paucity of findings is astonishing as pre-conditions and life circumstances in adolescence and young adulthood differ remarkably from those in adulthood (112-114). Furthermore, the transition to adulthood is a critical period with developmental risks and possibilities and therefore more evidence on the SDMH in young people is warranted. Therefore, we attempt to fill part of the knowledge gap and conclude that the SDMH for the age group of 16-29 years should be given further attention. With our studies, i.e. Study I and Study II, we want to address this knowledge gap.

2.4 TRENDS AND PREVALENCES IN MENTAL HEALTH AND MENTAL ILL HEALTH AMONG YOUNG PEOPLE

In the following paragraphs, I illustrate trends in mental well-being and mental distress in young people, primarily measured by self-reported data, which is the focus of this thesis. However, national trend data for positive mental health is scarce, and I will give an overview with an illustration on subjective well-being and its uneven distribution by data summarised in the World Happiness Report (115). Thereafter follows an analysis of the Scandinavian area on the corresponding data, trend data for the United Kingdom on subjective as well as psychological well-being, and lastly on available cross-sectional data on subjective well-being in the age group 16 years and above, and trend data on adolescents’ subjective well-being. Some following paragraphs will address hypotheses on what factors that may be contributing to the negative mental health trend. I conclude this section by providing an

overview of mental ill health trends and briefly contrast the described self-assessments by registered data, i.e. diagnoses and prescription of pharmaceuticals.

2.4.1 Positive mental health - trend data not frequently available

2.4.1.1 The World Happiness Report – Subjective Well-being

Data on positive mental health are still less common compared with data on mental distress and mental illness. However, during the last decade, there has been an increase in surveys assessing positive mental health in populations. The most well-known and worldwide survey is the Gallup World Poll including data on happiness from 156 countries. Data have been collected from national representative samples, at least 1,000 individuals from each country, ages 18 and upwards. Interviews are conducted face-to-face and by telephone. Since 2005/06 these data on well-being have been summarised by the World Happiness Report (115), produced by the United Nations Sustainable Solutions Network, and data are accessible at a country level, but are not specified for age groups. Subjective well-being is measured by an evaluation of life satisfaction, i.e. the self-anchoring scale Cantril's ladder (116), and further by items on positive and negative affect, based on the individual's assessment of yesterday's emotions (117).

Regarding satisfaction with life, welfare states lead the happiness ranking list in 2016-2018, i.e. Finland, Denmark, Norway, Iceland, the Netherlands, and Switzerland are in the top 6 of the ranking list. These countries are followed by Sweden, New Zealand, Canada, Austria, Australia, Costa Rica, and Israel. The United Kingdom appears at number 15 and the United States number 19. An attempt has been made by explaining satisfaction with life with six variables across countries: GDP per capita, social support, healthy life expectancy, freedom to make life choices, generosity to donate money to a charity, and absence of corruption (118). Results show that levels of countries' happiness ranking are largely explained by GDP per capital and social support, whereas the other four variables differ in importance. The World Happiness Report 2019 also presents changes in life satisfaction for the period of 2005-2008 to 2016-2018. Globally, the changes tended to be larger for middle- and low income countries, e.g. an increase of 1.4 for Benin, on the top of the list, and a decrease of -1.9 for Venezuela, the country with the largest decline in life satisfaction among all countries. For the above-mentioned leading countries on the ranking list, changes were generally small, with a stability of 0.0 for Norway and Switzerland, and The Netherlands, Sweden, Costa Rica and Israel. Finland, Austria, Australia, Israel, and the United Kingdom increased their levels of life satisfaction with 0.1, and a small decline was shown with -0.1 for New Zealand, -0.2 for Canada, and -0.3 for Denmark. The decrease in life satisfaction for the United States was -0.4 and in the report a chapter was devoted on the decline in life satisfaction and happiness among the adults and adolescents since 2012 (119).

The report also describes changes in the distribution of life satisfaction. A clear increase in between-country inequality and also a rise in within-country inequality is evident from 2007 to 2018.

2.4.1.2 Data from the USA – Well-being

National data on adolescent high school pupils from 1972-2014 revealed that recent adolescents reported more subjective well-being compared to their predecessors in previous decades. The same pattern was evident for young adults 18-29 years, and, contradictorily, subjective well-being declined from 2010 to 2014 in the age group above 30 (120). However, national data on subjective well-being, self-esteem, and self-satisfaction between 2012-2016 among 8th, 10th and 12th graders revealed a remarkable decline in well-being between 2012-2016 (121).

2.4.1.3 Data from Scandinavia – Subjective Well-being

As reported, Nordic countries report the overall highest levels of happiness and 88% indicate that they are “thriving”, i.e. they score between 7 and 10 on Cantril’s ladder. However, 12% are “struggling”, i.e. scoring between 5 and 6, or “suffering”, i.e. scoring between 0 and 4 according to a report from the Nordic Council of Ministers (122). Although changes have been minor, the distribution of happiness within groups of Scandinavians has shifted and become more unequal during 2012-2016 (122). The analysis, based on the European Social Survey, shows that life satisfaction generally is at the lowest among the oldest, aged 80 and above, but the second most vulnerable group consists of young people, aged 18-23 years. Among them, 14% belong to the groups “struggling” or “suffering”. Typically, there is a gender gap, and in Sweden young women report the lowest levels of happiness: 20% report decreased life satisfaction, with 13% “struggling” and 7% “suffering”. The corresponding levels for young Swedish men are 10% and 3%, respectively. In the Nordic countries, the top five circumstances most closely correlated with “struggling” and “suffering” are poor general health, poor mental health, inequality of income, unemployment and limited social contact.

2.4.1.4 National trend data from the United Kingdom – Subjective and Psychological Well-being

Scotland and England both have a long tradition of measuring mental well-being nationally. In Scotland the Scottish Health Survey was established in 2008, and in England the Health Survey for England has reported well-being in the population since 2010. In the beginning, well-being showed a U-shaped distribution across age, with high levels of well-being among the youngest and oldest groups worldwide and in the UK (123, 124). A similar trend was also shown by the Warwick Edinburgh Mental Well-being Scale (WEMWBS) in 2010-13, but only in men, while young women, ages 16-24, showed the lowest levels of well-being among all age groups (125). Trend data from the UK, where mental health and well-being from England, Scotland and Wales were followed from 1995-2014 in children and youths 4-24 years of age, showed no statistical changes for well-being (126). However, girls 13-15 and 16-24 years of age constituted an exception, as their well-being declined, OR -1.06 and OR -0.21, respectively, according to the Scottish Health Survey 2003-2014.

2.4.1.5 Data from Sweden – Subjective and Psychological Well-being

For Sweden, national trend data on well-being are not yet available. In 2016 well-being was assessed for the first time by the WHO-5 Well-being Index in the National Health Survey. The population comprised a random sample of 20,000 individuals, aged 16-84 years. In the age group 16-29 years, 29% reported the highest levels of mental health, 25% in women and 33% in men. In the whole sample, 16-84 years, 36%, 32% in women and 39% in men represented the highest reporters. In concordance with the Scottish Survey, young women aged 16-29 and 30-44 reported the lowest levels of well-being, 25% in each age group, compared to men's well-being in the same age groups, 32% and 33% respectively (127).

Regarding adolescents, in 2017/18 well-being was measured for the first time in the Health Behaviour in School-aged Children-study (HBSC). The short version of the Warwick Edinburg Mental Well-being Scale (SWEMWBS) was used in the Swedish sample of 15-year-old pupils, with around 1,700 individuals. The results indicate that 85% of boys and 66% of girls rate their well-being as very high or high (128). However, these levels are not comparable with the WHO-5 Well-being Scale used in the National Health Survey 2016 for the older age group.

National long-term trends in positive mental health are available only in terms of life satisfaction and solely for the age group of 11-15 years. Life satisfaction has been measured by an adapted adolescent version of Cantril's ladder (129) for schoolchildren aged 11-15 and is also used across European countries and in North America. A majority of the pupils in Sweden assess their life satisfaction as high, and no statistically significant difference has been evident for the time-period of 2001/02-2017/18, although boys assess their life satisfaction more highly compared with girls. However, levels of satisfaction are highest in boys aged 11 and decrease with age and are lowest in girls aged 15. Among them, 77% reported high satisfaction with life in 2017/18, compared with 86% in boys of the same age group (128).

2.4.2 Mental ill health among young people generally

2.4.2.1 Self-reported trend data - Western societies

Bor and colleagues conducted a systematic review of self-reported trend data on children's and adolescents' mental distress with a timespan of at least 10 years from the 20th to the 21st centuries (130). According to their findings an increase in mental distress is evident for adolescent girls going into the 21st century, whereas the trend for adolescent boys was unclear. The review part on adolescents was based on 12 studies from Northern Europe, the United States and China.

Trend data on depressive symptoms in adolescents confirm the findings of Bor et al. by analyses of national representative school samples among 8th, 9th, and 12th graders in the United States from 1991 to 2018 (131). The authors found that in girls, symptoms of depression decreased between 1991 and 2011, then started to increase in 2012 and peaked in 2018. The trend in boys is similar, albeit not as marked as in girls. These trends were similar with regard to ethnicity and parental education.

Potrebny et al., however, analysed self-reported data on psychosomatic health complaints, e.g. feeling low, feeling nervous, irritability or bad temper, and difficulties in getting to sleep, from adolescents in 36 countries, including Europe, the United States, Israel, and New Zealand (132). Overall, only a small increase was noticeable from 1982 to 2013. However, Northern Europe constituted an exception where a significant increase was evident, above all in girls.

In the United Kingdom, data from a national representative cohort study indicated an increase in mental distress, measured by the GHQ-12, from age 16 to age 30, with women scoring significant higher, i.e. worsening distress. Self-esteem was negatively, and childhood behavioural problems were positively, associated with GHQ-12 and predictors of GHQ-12 levels 14 years ahead (133). However, national trend data from population surveys in England and Scotland revealed an increase in GHQ-12 scores in the age group of 16-24, only between 2011 and 2014 (126). Data also indicate a polarisation of young people's distress between 1991 and 2008. An increase of variance was evident for those women aged 16-24 years scoring low (decreased distress), high and very high (increased distress), while young men in the same age group increased their levels of scoring low and very low (134).

2.4.2.2 Self-reported trend data – Nordic Countries

An analysis of trends in psychosomatic health complaints among adolescents in the Nordic countries between 1994 and 2014 (135) measured every fourth year showed an increase in all countries, with a more noticeable rise in complaints in 2014. The highest levels were shown in Sweden and Finland, followed by Norway and Denmark, in both girls and boys, although with higher levels in girls. An interaction analysis for the Norwegian adolescent sample revealed that the largest increase in psychological complaints between 1994 and 2014 was mainly attributed to older adolescent girls, compared to younger girls and boys (136). The corresponding Swedish data from 2017/2018 show an increase among older adolescents in psychosomatic complaints, predominantly in girls, since the first survey, in 1985/86 (128).

2.4.3 Mental ill health among students in tertiary education

Mental health problems, particularly symptoms of depression, anxiety, and stress in students in higher education have been an issue since the 1990s (137-141). Systematic reviews from the last decade indicate prevalence rates for depression and symptoms of depression ranging from between 27% and 34% and reaching 11% for suicidal ideation (142-144).

In students, symptoms of anxiety, depression, and stress are more frequent compared to their peers in corresponding age groups (145-147), and the general population (142, 144). Female students, minority groups, and students with financial problems represent the groups with the highest risks (145, 148, 149).

Two national surveys in US college students between 2007 and 2018 showed a distinct increase in symptoms of depression, anxiety, non-suicidal self-injury, suicidal ideation and suicide attempts (150). In addition, anger, suicide plans and low flourishing measured in one of the studies, showed a sharp increase. The increase is most evident for the period from

2013-2018, and generally larger in female students compared to males. One exception is suicide attempts, where the rise was larger for males, 64%, compared to females, 50%.

One of the WHO World Mental Health International College Student project's (WMH-ICS) aims is to investigate students' mental health by internet-based self-reported questionnaires screening for common mental disorders and their sociodemographic correlates (151). The WMH-ICS first year of baseline surveys included nearly 14,000 students from 19 campuses across eight countries (Australia, Belgium, Germany, Mexico, Northern Ireland, South Africa, Spain, and the United States). Among the respondents, (46% response rate), 35% screened positively for one or more common lifetime disorders, and 31% rated themselves for one or more disorders during the last 12 months (152). The intension is to include a majority of countries and provide trend data for comparison between campuses and countries in the WMH-ICS.

For Europe, trend data on mental ill health for students in higher education are scarce and in Sweden no national student health survey is in place. In contrast, Norway provides time-series by the Students' Health and Welfare Survey (SHoT study), a survey distributed since 2010 to all full-time students aged 18-35 years in tertiary education (153). Findings, summarised in the cohort profile, show an increase in psychological distress in students from 16% in 2010, 21% in 2014, and 29% in 2018. Data on suicidal behaviour from the 2018 data collection, including 50,054 online responders (69% women, response rate in total 31%), revealed lifetime suicide thoughts among 21%, and lifetime non-suicidal self-harm in 20% among the students (154). In line with earlier findings (142, 148), levels were higher in women, students who were living alone, students with low income, and among immigrants. Among those in the SHoT study reporting severe psychological distress, 20% in females and 9% in males were four times as likely to report low academic self-efficacy, and twice as likely to report low academic achievement compared to those students with few or moderate levels of psychological distress (155).

The rise in self-reported symptoms of depression, anxiety, and stress has been questioned and one opinion is that these reports do not correspond to a "real" increase in mental ill health, but to an increased openness, and willingness to report a state of feeling low. Therefore, are register-based data on "objective" data of mental ill health diagnoses and care consumption more reliable? In addition, long-term register-based data could be doubted, as they are associated with issues such as current societal norms, resource allocation, patients' help-seeking behaviour, and changes in diagnostic criteria. However, when self-reported data and those more "objective" register-data show a similar development, we could be more confident in a pattern of the development. So, what do these more "objective" data tell us? The trend on depression in the United States and Swedish trend data on diagnoses in depression, anxiety, and stress-related syndromes are described below.

2.4.3.1 Diagnoses, treatment – trend data from USA and Sweden

Weinberger et al. analysed the prevalence of major depressive episodes in the United States' general population between 2005 and 2015 and found a significant increase in the youngest, i.e. 12-17 and 18-25 years, and the oldest, i.e. 50 years and older, age groups, although the significant most rapid increase was evident for adolescents aged 12-17 years (156). Mojtabai

and colleagues further investigated these data in adolescents and young adults between 2005 and 2014, including more than 172,000 adolescents and around 180,000 young adults (157). The prevalence of 12-month major depressive episodes increased significantly from 8.7% in 2005 to 11.3% in 2014 in adolescents and from 8.8% to 9.6% in young adults. In adolescents, the rise was more noticeable in girls compared to boys. However, the increase was statistically significant only in the age-range of 12-20 years, and remained significant after controlling for socio-demographic factors and drug-abuse disorders. While contact with mental healthcare providers did not rise overall, the use of prescription medication and inpatient hospitalisation was evident in adolescents.

Swedish data (158) on *diagnosed depression* indicate the largest increase in young women, aged 16-22 years. In this age group 4,100/100,000 were seeking care in specialised outpatient care in 2013. Their share increased each year to a little over 5,000 per 100,000 population in 2017. However, in the female age group of 23-29 years no increase was evident, and the figures remained more or less stable, around 3,400 per 100,000 population. For young males aged 16-22 the trend is similar with a little above 2,000 per 100,000 population seeking care in 2013 to around 2,300 per 100,000 population in 2017. The trend in the male age group of 23-29 years is similar to the younger male age group, an increase was evident from a little above 2,000 per 100,000 population to a little above 2,200 per 100,000 population. Regarding *diagnoses for anxiety*, there is a remarkable increase in young females aged 16-22 years from around 5,000 per 100,000 population in 2013 to a little above 7,100 per 100,000 population, while the trend is stable for the older female age group and males. *Diagnoses for stress-related syndromes* raised among males and females 16-29 years between 2013 and 2017, and was most sharply among young females 16-22 years, i.e. from 776 per 100,000 population to 995 per 100,000 population.

The figures above show that there has been an increase in mental ill health among young females particularly during the last few decades.

2.5 WHY DO SELF-REPORTED MENTAL HEALTH PROBLEMS AND DIAGNOSED MENTAL ILL HEALTH INCREASE IN YOUNG PEOPLE – AND PERHAPS WELL-BEING DECREASE?

A common question is: “How can we explain the increase in symptoms of poor mental health among young people in Western societies?” Unfortunately, there are many theories, but in the literature there is no consensus on the causes and conclusive answers cannot be found. Mental health constitutes of a broad spectrum of influences that have different impacts in individuals and groups.

I will here provide a short illustration of some theories which may contribute to an understanding of the phenomena. I start by describing an evolutionary approach, followed by theories on screen-time, sleep-deficiency, unhealthy nutrition, sedentary behaviour, societal inequality, and perfectionism.

2.5.1 Mismatch between biological and psychosocial maturation?

Potentially, an evolutionary approach could explain part of the puzzle of why young people report more psychological distress and diagnoses on mental disorder have increased more compared to older groups and earlier cohorts.

Patton and Viner have described today's mismatch between the prolongation in transition to adulthood including subsequent psychosocial maturation and the earlier puberty maturation compared to pre-industrial societies (159), see Figure 3.

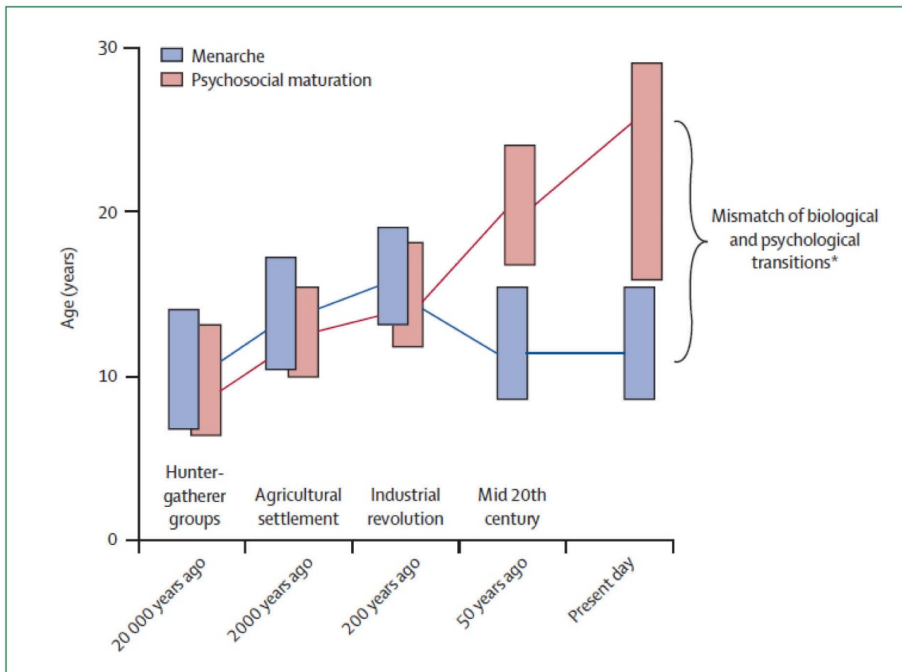


Figure 3. Changing relation between probable range of menarcheal age and psychosocial transitions into adulthood. Adapted from Patton GC, Viner R. Adolescent transitions in health. *Lancet* 2007; 369:1130-39. Reprinted with permission from Copyright Clearance Center.

Two hundred years ago, the transition from puberty to adult roles, defined by sexual activity, matrimony, and parenthood ranged from around 2 years in girls and 4 years in boys. Today, the incongruity between biological and social maturation may contribute to a life “on hold”, where socio-economic forces playing a considerable role and may endanger a positive development, including mental well-being, in young people. See also my earlier description, 2.2 on Transitions in young people.

2.5.2 Increased screen-based activities?

Jean Twenge, according to US national data, claims that the decrease in mental health is linked to screen-time use, i.e. since 2012, when the use of smartphones in the American population surpassed 50% (119). The generation born between 1995 and 2012 is the first generation who do not remember a time before the Internet. In 2017, an average US 17- to

18-year-old adolescent spent more than 6 h/d of leisure time on digital media, i.e. the Internet, social media, games and texting. In 2018, 95% of adolescents had access to a smartphone and 45% of them reported that they were constantly online. Twenge also shows that those adolescents spending more time on social media compared to non-screen activities, e.g. being active in sports, engaged in personal relations, and homework were the unhappiest, whereas those being moderately active on screen were the happiest (121).

In a systematic review of reviews (160) the associations between screen-time and consequences for health and well-being in young people were analysed. Moderately strong evidence was found for the association between screen-time and higher levels of depressive symptoms (and greater obesity/adiposity). Moderate levels of evidence were found for higher energy intake, poorer quality of nutrition, and poorer quality of life, whereas weak associational evidence was found for, for example, anxiety, poor sleep outcomes, low self-esteem and well-being, poorer cognitive development and lower educational attainment. No clear evidence was found for the association between screen-time and suicidal ideation.

2.5.3 Insufficient sleep?

Ensuring sufficient sleep is important for mental health in general and especially for adolescents. Sleep deficiency and inadequate sleep are shown to have consequences on overall health, mental health, school performance (161, 162). Longer sleep duration is associated with better emotional regulation, better quality of life, well-being, and academic performance (163). In parallel with increased digital activity in adolescents, their sleep-duration has decreased in US adolescents between 2009 and in 2015. The increase among those sleeping less than 7 hours was 16-17%. By 2015, 40% among US adolescents did not achieve 7 hours of sleep most nights (164). Furthermore, screen activities were most strongly positively correlated with insufficient sleep, and, in contrast, in-person social interaction and exercise decreased the odds for short sleep duration. Consequently, increased sleep deficiency or inadequate sleep, moderated by excessive digital activity, could be one of the factors resulting in decreased well-being and increased mental ill health.

2.5.4 Unhealthy nutrition?

Nutritional patterns have likewise changed in Western populations over the last few decades. O'Neil and colleagues (165) systematically investigated the association between healthy dietary patterns, (high nutritional density, for instance fruits, vegetables, fish, etc.) and internalising disorders, and symptoms of depression and anxiety. They found significant cross-sectional associations between unhealthy dietary patterns and poorer mental health. However, prospective data were inconsistent between unhealthy diet and worse mental health and healthy diet and better mental health, respectively. The systematic review has been replicated and effect-sizes have been included (166). Though the effect sizes were small, the authors could confirm O'Neil and colleagues' earlier findings. Two meta-analyses, although not especially focusing on young people, are in line with the associations found. Liu and colleagues focused on fruit and vegetable intake and the risk for depression showed an inverse association, and a decreased risk by cross-sectional and cohort studies (167). Li et al.

instead aimed at analysing depression and symptoms of depression and total dietary patterns. They found that a healthy diet characterized as “Mediterranean” decreased the risk of depression, and contrary, a diet containing, for instance, high amounts of red/processed meat, refined grains, sweets, high-fat dairy products, and low amounts of vegetables and fruits was associated with increased risk of depression (168). Similarly, an association between ultra-processed food consumption and depression was reported in a cohort study among post-secondary students in Spain (169). Nutritional patterns and diet quality have to a large extent been neglected within the mental health field. However, it is worth including nutritional factors when assessing the increase in mental ill health and decrease in well-being, respectively.

2.5.5 Decreased physical activity, increased sedentary time?

While experimental studies have shown large and moderate treatment effects of physical activity on depression in young people (170, 171), the association between physical activity and mental health is weaker in observational studies. An updated review of reviews, with an attempt to investigate causality, confirmed medium effect sizes for physical intervention on depression, but the observational evidence for the associations ranged from null to small (172). However, overall the authors found a partial support for a causality between physical activity and depression. In addition, for cognitive functioning a causal association was assessed, though for anxiety and self-esteem no causality was found.

Regarding the evidence for physical activity, the increase in sedentary behaviour, shown in the US population between 2001 and 2016, may be a factor contributing to decreased well-being and increased mental ill health (173). While the time spent on watching television and video remained stable during the 15 years, i.e. at least 2 h/d, the estimated computer time outside school and work increased by 1 h/d in all age groups. Adolescents increased their total sitting time from 7.0 to 8.2 h/d, and younger adults from 5.5 to 6.5 h/d. Prolonged total sitting time was associated with higher household income, educational attainment and Body Mass Index.

2.5.6 Increased inequality?

It is well known that income inequalities are associated with inequalities in health, and, potentially, with the level of different types of health outcomes, including mental ill health. In 2006, Wilkinson and Pickett reviewed the literature and found 155 papers, of which the majority confirmed the hypothesis on countries’ income inequalities and population health and found an association (174). In a later review and analysis they tested the link between income inequality and health by applying the criteria for epidemiological causation (175). They found the link to be causal, with the exception of suicide, which tends to be more common in equal societies. This is despite the fact that depression, a precursor of suicide, is more widespread in unequal societies. Ribeiro and colleagues conducted a systematic review and meta-analysis on the effect of income inequality and mental health problems and mental health disorders, respectively (176). Their meta-analysis showed that income inequality was associated with both outcomes, albeit with small effect-sizes. The authors concluded: “Reducing income inequality could improve population mental health and well-being, which supports its inclusion in the public health agenda.”

Inequality is a social stressor and leads to status anxiety, where people in low inequality countries report less status anxiety compared with people in high inequality countries irrespective of the income rank curve (177). The phenomenon also affects individuals' social relations, self-esteem, and increases self-doubt (178). Income inequality has increased in most Western countries since the 1980s (179), and, according to the World Inequality Report, it is most likely that the inequality gap will rise even further in the future (180). In Sweden, income gaps continue to widen, and Sweden is among the EU countries where income inequality has widened the most since 2007 (181). This is despite the fact that households' individual standards continue to increase. The GINI coefficient, a measure of statistical dispersion and income inequality within a nation, has continuously increased and is now the highest since the measurement started in the mid-1980s. Therefore, inequality could play an important role in partly explaining the increase in mental ill health. In their recent book Wilkinson and Pickett give an analysis and description of how societal processes "get under people's skin" (182).

2.5.7 Increased perfectionism?

Curran and Hill investigated if perfectionism in young people has coincided with societal changes and increased in birth cohorts between 1989 and 2016 (183). Their basic assumption was that young people in Western societies today face a tougher reality regarding social and economic conditions compared with their parents. The authors refer to the neoliberal era, including individualistic, meritocratic, and competitive norms, and to anxious and controlling parenting styles; all of which could have influenced an increase in perfectionism. In their analysis, the authors applied a multidimensional model of perfectionism (184), where the concept is understood directionally, and seen in three different forms: a) toward the self, in terms of unrealistic expectations towards oneself, and being punitive in self-evaluations (self-oriented perfectionism), b) perceived from others, feelings of being harshly judged by others (socially prescribed perfectionism), and c) perfectionistic expectations and high standards put on others (other oriented perfectionism). Curran and Hill examined college students in the United States, Canada, and the United Kingdom, in total 164 samples and around 42,000 participants from 1989-2016. The results show that the three dimensions of perfectionism have linearly increased over time in all countries, irrespective of gender. The smallest changes were observed for self-oriented perfectionism, potentially the dimension with the highest heritability and strongest robustness against cultural changes. Self-oriented perfectionism increased more in the US college students compared to those in Canada and the UK. The largest changes, twice that of the other two dimensions, were evident for socially prescribed perfectionism. In a meta-analysis on perfectionism and psychopathology, this dimension has been identified to have the largest association with depression and anxiety (185). The increase in socially prescribed perfectionism mirrors that young people today perceive their environment as being increasingly demanding, that they are harshly judged by others, and that they continuously have to perform perfectly to gain approval from others. Given the findings by Curran and Hill on the rise of, above all, socially prescribed perfectionism with its association with negative mental health outcomes, increased perfectionism could be a candidate for the rise in mental ill health in young people.

2.5.8 A weakened school system?

These hypotheses for explanations to the negative mental health trend in young people could be added by others, country-specific suggestions. For instance, the increases in mental health complaints and heightened levels of reported school pressure among adolescents in Sweden are in line with their deteriorating school achievements between 1995 and 2012. During this period, the Swedish school system underwent several restructurings, which may have weakened the education system (186). Moreover, in the Nordic countries, with the exception of Finland, traditional education has been toned down in school education. This means that subject knowledge and grit have been de-emphasised, in favour of progressive, youth-centred ideas with the intention to reach higher achievement via school enjoyment (187). However, according to research and new evidence summarised in the report, while youth-centred methods induce more positive experiences, they reduce pupils' academic achievement which has consequences for their mental health. Evidence shows that more traditional educational methods and hierarchical school environments are favouring school achievement in disadvantaged pupils. Overall, there is little evidence for progressive methods improving pupil school performance, despite in high-achieving and gifted pupils. Subsequently, these changes in school systems and pedagogic methods could have contributed to the rise in adolescents' mental health complaints.

These above proposed contributing factors may not stand alone, but could be intertwined and strengthening each other. If they are real determinants for the current mental health status in young people, future empirics and research will show us.

2.6 INTERVENTIONS – PROMOTING AND PREVENTING

2.6.1 Interventions generally

Interventions are often defined as programmes, policies, practices and guidelines which are designed for an individual, organisation, community, region or system (188). Primary intervention, in contrast to secondary and tertiary intervention, is not a new issue, but has been practised during at least the last century (189). Today, it is more common to differentiate between universal, selective and indicated interventions referring to the target population. The first type is generally aimed at members in a population, the second one is given to a subgroup at elevated risk, whereas the third is provided to individuals with manifest signs or symptoms of a disorder (190). The aim of intervening may be to address protective or risk factors, to alter health behaviours or to improve health-related outcomes.

Due to the characteristics of the objective, interventions may or may not be conducted with a specific gender focus. For instance, in high-income countries the prevalence of suicide in men is more than two times higher compared to women (191, 192). In order to address the suicidal process preceding suicide in males, it is worth conducting specifically male targeted interventions (193). On the other hand, the higher prevalence of self-reported mental health problems among women versus men may require consideration of the gender system when designing universal interventions. To avoid a cementation of traditional gender roles in caring responsibility and capacity it is worth examining health-promoting programmes and family programmes with a focus on gender before implementing them (194).

Interventions based on positive psychology such as training, exercise, and therapy aimed at raising positive feelings, cognitions and behaviours have been examined in a meta-analysis of randomised controlled studies (195). They were also aimed at the general population as well as at groups with psychosocial problems, and they included self-help, group training, and therapy. Outcomes were measured as subjective well-being, psychological well-being and depression. The results showed small effect sizes for all outcome variables post-intervention. For subjective well-being and psychological well-being, effects were shown even at follow-up 3-6 months post-intervention. The authors conclude that positive psychology interventions might be appropriate to strengthen people's resources, and to build up resilience. Furthermore, they could be applied in the context of public health as easily available and non-stigmatising tools.

2.6.2 Interventions in schools

Promoting mental health and preventing mental ill health in young people by delivering various programmes has been commonplace for several decades (196). Schools are a unique setting for delivering universal interventions and have been frequently used to study these effects, and prevention programmes for anxiety and depression are common (197). A systematic review of universal, resilience-promoting interventions in schools showed small effect sizes for reduction in symptoms of depression and anxiety, at least at short-term follow-up for children and adolescents (198). Another systematic review and meta-analysis analysing programmes on universal and targeted (selective and indicated) bases on around 32,000 school pupils, showed small effects sizes at post-intervention and 12 months of follow-up for symptoms of anxiety and depression (199). However, the effects on depressive symptoms were smaller for universal programmes compared to targeted programmes, whereas the effects for anxiety symptoms were comparable for universal and targeted programmes at follow-up. There was some indication that effects were larger when delivered by external personnel for depressive symptoms, but not for anxiety symptoms, compared to when being provided by school staff.

Probably some of the most commonly examined interventions are those based on the framework of social emotional learning (SEL). The concept, an integrated social, emotional and academic education, is applied from pre-school to secondary school. It is based on five cornerstones: self-awareness, social awareness, social management, relationship skills, and responsible decision making (200). A meta-analysis of 82 SEL interventions showed significantly better outcomes on social emotional skills, attitudes and well-being compared to controls (201). Moreover, the effects were sustained at follow-up assessments, conducted between 6 months and 18 years post-intervention. A systematic review investigated effective mental health promotion and prevention intervention in the European context (202). The authors confirmed the evidence for interventions on SEL and suggested it to build a foundation for other universal interventions, e.g. anxiety and depression prevention in school settings. However, the majority of the identified interventions have not been thoroughly evaluated, and documentation on their implementation in the European context is scarce.

2.6.2.1 *Whole-school approaches*

Instead of a delivery of programmes for diverse outcomes in schools, the WHO advocates a whole-school approach, named Health Promoting Schools, where healthy living, learning, and working conditions are combined and designed to boost each other. The framework includes: a) health is addressed within the school curriculum, b) health and well-being are promoted by schools' social and physical environment, and c) schools engage with families and communities to strengthen health and well-being outside the school setting (203). A Cochrane systematic review evaluated the framework and 67 cluster randomised trials were included in the meta-analysis (204). The authors found evidence for some health behaviour outcomes; however, for mental health outcomes no evidence was found and, due to lack of data, educational outcomes could not be assessed.

The Cochrane review illustrates some of the challenges in intervention science. It seems that many interventions could have been effective. However, shortcomings in their implementation made them reveal null effects. Therefore, before settling multi-component interventions, they should be examined through an implementation lens (205). An analysis on whole-school policy changes in Austrian schools showed that beneficial changes are associated with a thorough implementation process (206).

However, findings on whole-school approaches and their mental health outcomes are inconclusive. A later review of reviews on school-based interventions concluded: "Findings of three reviews with a focus on the maintenance and/or promotion of mental health and general well-being suggested that interventions aimed at changes in the social and the school environment were more effective than those that only targeted individual behaviour change among pupils" (207). So, again, further well-designed, high-quality studies are warranted.

2.6.3 Interventions in tertiary education

As shown, students in higher education report high levels of mental ill health and these affect students' academic achievement (141, 208, 209). Commonly, student health services provide support covering different universal intervention features, e.g. psycho-education, cognitive behavioural, meditation, mindfulness, relaxation and social skills (210-212). Intervention types are usually delivered online (213), or face-to-face, individually or in groups, respectively (210) and show effects on mental health for both types of delivery.

However, other approaches could be taken into account. In line with the whole setting approach in primary- and secondary schools, a healthy university approach (214) could be considered. The concept building on Ottawa Charter on Health Promotion (215) and conceptualising the whole setting as a social system, is implemented in, for example, the United Kingdom, Germany, in the USA and in China. Healthy universities aim at a "holistic understanding of health; takes a whole university approach; and aspires to create a learning environment and organisational culture that enhances the health, wellbeing and sustainability of its community and enables people to achieve their full potential" (216). Yet, the concept has not gained comparable attention compared to other setting approaches, e.g. the healthy city approach. Dooris et al. conducted a scoping review of this issue and found that the concept is lacking in clarity and theorisation when applied in a variety of universities (217),

although it has potential to support engagement and flourishing in students, staff, and the wider community. Though a shift from the pathogenic to the salutogenic perspective is necessary for the implementation of the concept (218). A Norwegian holistic intervention approach, based on health promotion theory and implementation knowledge seems to have promising future outcomes contributing to healthy universities (219).

In Study IV, we examined the sustainability in mental health promoting and ill health preventing interventions for students in tertiary education.

3 AIM OF THE THESIS

To identify which potential determinants are associated with or predict positive and negative mental health in the age group of 16-29 years by self-reporting measurements, and to investigate the effectiveness of mental health interventions.

3.1 STUDY SPECIFIC AIMS

To investigate whether it is possible to identify dimensions corresponding to positive and negative mental health in a sample of young people aged 16-29. Furthermore, to examine how each dimension is related to demographic, social and health factors, i.e. presumptive determinants of mental health, and to explore any differences and similarities between these associations. (Study I).

To assess which determinants of health contribute to stable mental health in the 18-29 age group; this means investigating the determinants contributing to a state free from psychological distress. Furthermore, to explore if these determinants differ from those observed in the older population, 30 years and older. (Study II).

To investigate the associations between subjective well-being and personality traits at baseline and at 15-18 months follow-up in adolescent girls and boys as well as prospective effects over time. (Study III).

To systematically identify, appraise and summarise the existing data from randomised control trials reporting on whether the effects of mental health promoting and mental ill health preventing interventions are sustained for at least 3 months of post-interventional follow-up. (Study IV).

Table 1. Overview of Study I-IV

	Research question	Sources	Study design	Outcomes	N
Study I	Does the General Health Questionnaire possess the capacity to measure positive mental health beyond mental distress?	National Health Survey 2004-2009	Cross-sectional	a) Factor model of the GHQ-12 b) Associations between the GHQ-scores and potential determinants of positive and negative mental health	41,668 (56% females)
Study II	Which determinants predict stable mental health in young people, compared to the group 30 years and above?	Stockholm Public Health Cohort 2002-2014	Longitudinal	Stable mental health, i.e. < 3 points GHQ-12 at measurements 2002, 2007, 2010, and 2014	Ages 18-29 years: 3,373 (60% females), and Ages ≥ 30 years: 16,614 (56% females)
Study III	Are adolescent personality traits concurrently and prospectively associated with subjective well-being at 15-18 months follow-up?	Four secondary schools in Stockholm and Southern Sweden	Longitudinal	Stability and changes in personality associated with subjective well-being	446 (76% females)
Study IV	Are interventions promoting mental health and preventing mental ill health in post-secondary students sustainable at least 3 months post-intervention?	Database searches for original RCT-studies	Systematic review and meta-analysis	Increased positive mental health, decreased mental ill health symptoms	8,136 (60% females)

4 METHODOLOGY

4.1 THE NATIONAL PUBLIC HEALTH SURVEY – STUDY I

The National Public Health Survey (220) has been conducted annually by the Public Health Agency of Sweden between 2004 and 2016. The purpose of the survey is to examine population health and to show changes in health and their determinants over time. Between 2004 and 2016 the national survey sample comprised 10,000-20,000 people, aged 16-84 years. Since 2016 the survey is performed biannually and the national sample size has been

enlarged to 40,000 people. Statistics Sweden provides a randomly drawn sample from the Total Population Register and, furthermore, gives access to data-linkage to different registers. Data-linkages have increased during recent years, and nowadays include data on education, income, allowance, pension, sick leave, healthcare, prescription of pharmaceuticals, and cause of death. Respondents participate on a voluntary basis, are informed on the data-linkage, their personal data are confidential and legislatively protected, and individual responses are anonymised.

The national survey is a collaboration between the Public Health Agency of Sweden and health regions in Sweden. The latter are offered to add their regional samples, and therefore the total sample sizes have varied over the years. In 2018, the national and regional samples comprised 280,000 people, the largest sample ever (220).

The survey includes around 65 items on physical health, mental health, social relationships, health behaviour, financial condition, occupation and work environment, contact with healthcare services, and consumption of pharmaceuticals. Mental health is measured by items on symptoms of stress, anxiety, worry, and nervousness and by the General Health Questionnaire, GHQ-12 (221). Well-being was measured the first time in 2015, when the WHO-5 Well-being Index was included (222), but the scale was replaced by the short version of the Warwick-Edinburgh Mental Well-being Scale (223) in 2018. The national health survey is distributed as a postal- and web-based survey in Swedish, English, and Finnish. The rate of non-responders is high, and has increased during the years from 39.2% in 2004 to 57.9% in 2018. However, an attrition analysis conducted in 2009 and built on earlier surveys indicated that there would not have been statistically significant differences in the results if the non-responders would have answered the survey (220). Four years after our published study based on the survey, a renewed attrition analysis was conducted and stated concerns about the low response rate (224). Non-response was primarily associated with age, sex, education, income, country of birth, civic status, and year of immigration. Using weighted calibration in order to compensate for attrition was effective for some response items and groups of respondents, although not for the age group of 16-29 years. Instead, in this group attrition bias increased by weighted calibration.

4.1.1 Participants and procedures

Data from the National Public Health Surveys from 2004 to 2009 were used. The study population comprised six annually selected national samples of 10,000 (2005, 2006, 2007) or 20,000 (2004, 2008, 2009) persons aged 16-84 years (18-84 years in 2004). Participating health regions and municipalities varied between years. The samples were randomly selected, or selected through different stratified sample criteria (e.g. municipality, age). In total 134,563 women and 113,724 men responded, among them 23,394 women and 18,274 men aged 16-29 years.

From all available data, questions covering health, social relations, and health behaviour were used in this study. Information about native country and citizenship was retrieved from registry data. The respondents were informed about data linkage and ensured confidentiality. If the questionnaires were not returned in time, three reminders were sent out. The response rate varied between 57% and 61% across years.

4.1.2 The General Health Questionnaire (GHQ-12) – applied in Study I and Study II

In our studies, we used the GHQ-12 for measuring mental health and mental-ill health outcomes; an instrument originally intended to be used as a unidimensional scale for assessing “psychiatric morbidity” in clinical and community settings (221). The GHQ originated from a 60-item version and 30-, 28-, and 12-item versions are in use (225). The latter, (GHQ-12), is most commonly employed in population studies, and targeted at young people (133, 226-229). The GHQ-12 comprises of six positively (no.1, 2, 4, 5, 7, and 12) and six negatively (no. 3, 6, 8, 9, 10, and 11) phrased items. The respondents are asked to think about the last 2 weeks and rate to what extent they agree on statements and symptoms of depression, and anxiety. For a description of the items, see Study I. The response alternatives for the positively phrased items are “more/better than usual”, “same as usual”, “less /worse than usual”, and “much less/worse than usual”. For the negatively phrased items the response alternatives are: “not at all”, “not more than usual”, “more than usual”, “much more than usual”. There are three possible scoring methods: A) Standard method, where all items are coded 0-0-1-1. B) The Ordinal/Likert method, where all items are coded 0-1-2-3. C) Lastly, there is the more uncommon Corrected method, where the positively phrased items are coded 0-0-1-1, and the negatively phrased items 0-1-1-1. The items are summarised and range between 0-12 (Standard method and Corrected method), or between 0-36 (Likert method). Higher scores indicate higher levels of psychological distress. For the Standard and Corrected method commonly cut-offs are set with a score of >2 or >3 indicating negative mental health (230, 231).

The GHQ-12 has been validated in the Swedish population (232) by structured psychiatric interviews of depression in a Stockholm population setting. The instrument performed well in detecting depression and symptoms of depression, with excellent fit by the Likert- and Corrected scoring method, and acceptable fit for the Standard method.

Several surveys have examined the positive and negative items of the GHQ-12 and GHQ-30 separately (233-236). These studies indicate that the two classes of items may be used as separate but correlated scales reflecting “positive and negative mental health” (37). The positive and negative dimensions of the GHQ-12 have been tested in two population studies in the United Kingdom. Hu and colleagues identified two factors, one corresponding to “symptoms of mental disorder” and the other to “positive mental health”. Supplementary analyses showed that these factors were associated with age, gender, employment status, housing, and household composition in unique ways (237). Huppert and Whittington, who also identified two health factors from the GHQ, reported that differences between levels of positive mental health and mental ill health were associated with demographic, health-related, and social factors (37). Specifically, physical illness, disability, and lack of social support were strongly associated with negative mental health, but not with positive mental health.

Although the GHQ was originally designed as a unidimensional scale, authors have found bi- and multi-dimensional underlying factors (238, 239), and different scoring methods

have been questioned. Additionally, bias of the negative formulated items has been found (240-242). To address these issues two meta-analyses on the structure of the GHQ-12 were conducted, and summarised in one publication (243). The results do not confirm a strict, but essentially unidimensionality, of the instrument with a factor interpreted as “general distress”. Furthermore, the influence of the biased wording was limited. Conclusions on the scoring methods could not be drawn as most original studies in the meta-analyses had applied the Likert scoring. The authors recommend the use of the GHQ-12 for the detection of general distress, and endorse the application of more fine-grained instruments if a specified symptomatology is to be examined.

4.1.3 Analyses

4.1.3.1 Study variables

To assess the outcome variables, Positive Mental Health and Negative Mental Health, we examined the GHQ-12, included in the National Public Health Survey. In order to also capture the responses to the positively phrased items, we coded the answers on the four-point Likert scale from 0 to 3.

The Health Survey was further scrutinised for possible determinants of health, and 23 variables, related to socio-demographics, trust, social participation, support, health behaviour, violations, and suicidal ideation, and behaviour were identified. Indexes were created for the items of community trust, participation, healthy eating, and risky alcohol consumption.

For community trust, responses were used for questions about how much the respondent trusted the healthcare system, schools, police, social services, employment services, Swedish Social Insurance Administration, courts, parliament, and politicians. The summarised scores for the responses were categorised as being “Very high” (very high or rather high for all 10 questions), “High” (very high or rather high for 8 or 9 questions), “Low” (low or no trust for 3–5 questions) and “Very low” (low or no trust for 6-10 questions). The reliability of community trust has formerly been reported to be high, and the Cronbach $\alpha = 0.84$ in this study.

For participation an index was built using responses to questions about respondent participation (in the last 12 months) in any of the following: a study circle/course at work, a study circle/course during leisure time, union meetings, other meetings with associations, theatre/cinema, art exhibitions, the church, sporting events, writing a letter to a newspaper, taking part in political manifestations, public events such as nightclubs or dancing, meeting with relatives, and private parties. The summarised scores for the responses were classified as being “High” (7-13 activities), “Moderate” (2-6 activities), “Low” (1 activity), and “None” (none of the listed activities).

The survey contained two questions on healthy eating: “How often do you eat vegetables and root vegetables?” and “How often do you eat fruits and berries?” The responses for each question were weighted so that three times a day or more was coded as 3, twice a day was coded as 2, once a day was coded as 1, 5-6 times a week was coded as 0.8, 3-4 times a

week was coded as 0.5, 1-2 times a week was coded as 0.2 and sometimes per month or never was coded as 0.07. Next, the weighted answers from the two questions were combined to produce a value between 0.07 and 6. The cut-off for dichotomisation was set at 5, with a value of < 5 categorised as “Low consumption” and ≥ 5 as “High consumption”.

Risky alcohol consumption was assessed by the Swedish version of the Alcohol Use Disorders Identification Test. The first question was phrased: “How frequently have you drunk alcohol in the past 12 months?” with possible responses of never (0), once per month or less (1), 2-4 times a month (2), 2-3 times a week (3), and 4 times a week or more (4). The second question was: “How many glasses of alcohol do you have on a typical day when you are drinking?” One glass corresponded to 330 ml of beer, 100-150 ml of wine, or 40 ml of liquor, with the following possible responses: 1-2 glasses (0), 3-4 glasses (1), 5-6 glasses (2), 7-9 glasses (3) and 10 or more glasses (4). The last question was: “How often do you have six or more glasses of alcohol on one occasion?” with the following response options being: never (0), less than once per month (1), monthly (2), weekly (3) and daily or almost daily (4). The points were calculated and respondents were classified as having either low (< 8 points for men, < 6 for women) or high (≥ 8 points for men, ≥ 6 for women) consumption.

Risky gambling was calculated by the following three items: “How many times during the last 12 months have you: a) tried to reduce the frequency of your gambling, b) felt restless and irritated if you have been unable to gamble, and c) lied about how much you have gambled”. The response options were: never (0), 1-2 times (1), and 3 times or more (2). The scores were computed and a value of 1 was used as the cut-off for risky gambling.

4.1.3.2 Statistical analysis

To investigate whether the GHQ-12 could be used to measure both positive and negative mental health, exploratory factor analysis (EFA) was applied. Scree plots, eigenvalues, and differences in model fit were used to ascertain the number of factors. Orthogonal (varimax) and oblique (geomin) rotation analyses were performed, followed by a confirmatory factor analysis (CFA). Two indices of incremental fit were used—the Tucker–Lewis index (TLI) and the comparative fit index (CFI)—to assess the fit between specified models and the data. A value > 0.95 on these indices was considered to indicate a close fit. In addition, the root-mean-square error of approximation (RMSEA) was used, on which a value < 0.05 is considered to indicate a close fit. The GHQ-12 items were defined as ordinal and a robust weighted least squares estimator was used. The DIFFTEST function in Mplus was applied to calculate the significance of the difference between the effects on positive mental health and negative mental health. All data analyses were conducted with the Mplus 7.11 software program.

4.2 THE STOCKHOLM PUBLIC HEALTH COHORT – STUDY II

The Stockholm Public Health Cohort (SPHC) is a population-based postal and/or web survey set up in 2002 (244). The survey included an area-stratified random sample of 50,000 inhabitants in Stockholm County aged 18-84 years in 2002, and was followed up in

2007, 2010, and 2014. The response rate was 62% in 2002 ($n = 31,182$), and the resurveyed rates for the follow-up years were 79%, 77%, and 71%, respectively, with mortality rates taken into account.

The survey comprises approximately 100 questions about physical and mental health and health-related factors such as social relationships, health behaviour, financial condition, occupation, and work environment.

Data collection is conducted by Statistics Sweden in collaboration with the Department of Public Health Sciences at Karolinska Institutet. Survey data are supplemented by register data, i.e. several registers kept by the National Board of Health and Welfare, the Social Insurance Register, and the Multi-Generation Register. Participants gave their informed consent to future contacts and record linkages.

4.2.1 Participants and procedures

Data from the Stockholm Public Health Cohort were used for the subgroup sample ages 18–29 years and the 12-year period, 2002–2014. In 2002, our age group comprised 3,373 persons, 2,012 women (59.7%) and 1,361 men (40.3%), equalling a response rate of 53.9%. As a non-response analysis was not available, we were not able to comment on the attrition characteristics. In the following surveys, 2007, 2010, and 2014, the responders comprised of 3,339 (59.5% female), 2,471 (61.4% female), and 1,704 (61.8% female), respectively. For the 18–29 age group a comparison was made with the rest of the population, 30 years and older, 9377 women (56.4%) and 7237 men (43.6%).

4.2.2 The GHQ-12 measuring stability

Our outcome variable, absence of psychological distress, was measured by the GHQ-12. Following the results of a recent validation (238), we used the Standard GHQ-12 Scoring method, in the range of 0–12 points. Subsequent to earlier analyses of the same cohort, a cut-off of ≥ 3 points was chosen for symptoms of mental ill-health (245). ‘Absence of psychological distress’ was defined as a GHQ-12 score < 3 at all four measuring points, 2002, 2007, 2010, and 2014 referred to as ‘stable mental health’ henceforth.

4.2.3 Analyses

4.2.3.1 Study variables

A comparison was made with respondents reporting psychological distress at one to three time points during the four measuring points, referred as ‘unstable mental health’. Nonetheless, we excluded the respondents reporting psychological distress at all four measurement points (i.e., the state of constant stable negative mental health when measured) as they were considered to be too few to be included in the statistical analyses. The stable mental health and unstable mental health groups were compared separately in the 18–29 and 30–84 age groups for the purpose of assessing if the determinants among the younger and older age groups differed from each other. The potential determinants of health, i.e. the survey items, their response alternatives, and categorisation measured in 2002—are described and commented in Study II, Supplementary Materials, Table S2.

4.2.3.2 *Statistical analysis*

To predict stable mental health, logistic regression analysis was performed separately for the 18-29 age group and the 30 years and over age group. Case-wise deletion, the default in SPSS, was applied, i.e., only respondents with complete data were included in the analyses. For 15 out of the 17 variables, the attrition rate varied from 0.0% to 2.8%. Attrition was highest for community trust, with 7.5% in the younger group, and 8.4% in the older group, and, additionally, hazardous alcohol consumption, with 9.7% and 10.2%, respectively.

Interaction analysis was conducted for presumptive differences in health determinants between the two groups. All analyses were performed with IBM/SPSS Statistics version 22.0 (IBM Corp., Armonk, NY, USA). The level of statistical significance at $p < 0.05$ was used.

4.3 SURVEYS IN UPPER SECONDARY SCHOOLS – STUDY III

The study is based on two quasi-experimental interventions; Acceptance and Commitment Therapy/Training (ACT) (246), and Depression in Swedish Adolescents (DISA) (247), which were conducted in upper secondary schools several years earlier than the current study. ACT was a four-session programme aimed at conveying skills to handle stressful situations in life and thereby to reduce self-perceived stress. The programme was given at prestigious schools in Southern Sweden and included in the curriculum. The 10-session programme DISA was designed to prevent symptoms of depression in girls and was delivered in esteemed schools in Stockholm, and also incorporated into the curriculum. These interventions were originally planned to build up Study III and Study IV, respectively, in my thesis. However, at post-intervention and at one-year post-intervention follow-up, the interventions did not show any effects compared to controls, and, moreover, we considered them to be difficult to be published. This issue has been discussed with the Examination Board at my half-time seminar. Instead, we agreed on working on a systematic review, which is documented in the half-time seminar protocol. The systematic review of interventions for students in higher education resulted in my published Study IV. Nonetheless, in our view, the collected data from the post-secondary schools including pupils' background data and eight instruments on well-being, life-satisfaction, and mental ill-health, and all measured at three time points, should not remain unused. Instead, we decided to employ the data for a new Study III.

4.3.1 Participants and procedures

At baseline, the study population (N=446, 76% female) consisted of pupils in four Swedish rather prestigious secondary schools. Among them, 283 individuals (71% female) answered the questionnaire at 15 and 18 months follow-up. The questionnaires were filled out voluntarily during school lessons, and the sealed envelopes were collected by school staff. One of the interventions was followed up at 15 months, and the other at 18 months after baseline measurements. For the current study, the samples from the former intervention, and control groups were collapsed due to the absence of differences at baseline- and follow-up measurements. Thereby, a larger study population was gained for the current study.

4.3.2 Analyses

4.3.2.1 *The WHO-5 Well-being Index*

The World Health Organization Well-being Index (WHO-5) is a brief, frequently applied scale measuring well-being. The instrument has been used in a range of countries and populations, including adolescents (222). The authors concluded that the WHO-5 tapped into the SWB of the respondents and that the scale is appropriate for research of well-being over time. The WHO-5 comprises five statements (e.g. I have felt cheerful and in good spirits), and these are rated on a 6-point Likert Scale ranging from 5 = all of the time, to 0 = at no time, and the respondent is asked to reflect on the last 2 weeks. The raw scores range from 0 to 25 and are multiplied by 4, where 100 indicates best imaginable state of well-being. The alpha reliabilities of the scale were reasonably strong, 0.81 at baseline and almost acceptable, 0.67 at follow-up.

According to Topp and colleagues (222), the WHO-5 could be a sufficient instrument for measuring SWB. However, as that instrument only includes a single item on life satisfaction and the survey comprised an appropriate scale on this issue, it seemed appropriate to add the Satisfaction with Life Scale (11) in our measurement of SWB.

4.3.2.2 *Satisfaction with Life Scale*

Beyond including people's emotional responses to ongoing life, SWB also includes the evaluative factor of life satisfaction (20). The Satisfaction with Life Scale (SWLS) has been used in different populations in various countries (248-250) as well as in Swedish adolescents (251).

In this 5-item inventory the respondent is asked to rate his or her agreement with statements (e.g. I am satisfied with my life) on a 7-point Likert Scale ranging from 1 = strongly disagree to 7 = strongly agree. The items are scored by summing up the raw scores ranging from 5 to 35. The reliabilities of the scale were strong, 0.82 at baseline and 0.86 at follow-up.

4.3.2.3 *The Big Five Personality Model*

The Big-Five Inventory is frequently employed to measure personality traits in different societies and populations, including adolescents (68, 69, 71). Personality traits were assessed by the 44-item version by John, Naumann and Soto (252). The instrument measures Extraversion (eight items), Agreeableness (nine items), Conscientiousness (nine items), Neuroticism (nine items), and Openness (ten items). All items are rated on a 5-point Likert scale, ranging from 1 = strongly disagree, to 5 = strongly agree. Scoring instructions were provided by the Berkeley Personality Lab, Institute of Personality & Social Research. The scales' alpha reliabilities at baseline and follow-up were 0.83 and 0.85 for Extraversion, 0.73 and 0.69 for Agreeableness, 0.81 and 0.81 for Conscientiousness, 0.81 and 0.83 for Neuroticism, 0.74 and 0.75 for Openness.

4.3.2.4 Statistical analysis

The distribution of personality traits and SWB were illustrated with means (M) and standard deviations (SD) separately for girls and boys at baseline and at 15-18 months follow-up. T-tests were used in order to analyse differences between means of personality traits and SWB at both time points. Autoregressive models were utilised to scrutinise concurrent and change associations as well as prospective effects between SWB and Big Five personality traits at two time points. Missing values were replaced with predicted values through multiple imputation and by the creation of 20 datasets.

We fitted autoregressive models with five different personality traits and two measures of SWB, hence ten separate models, to data (Figure 4). Analyses were conducted first for the total sample, and then stratified by gender.

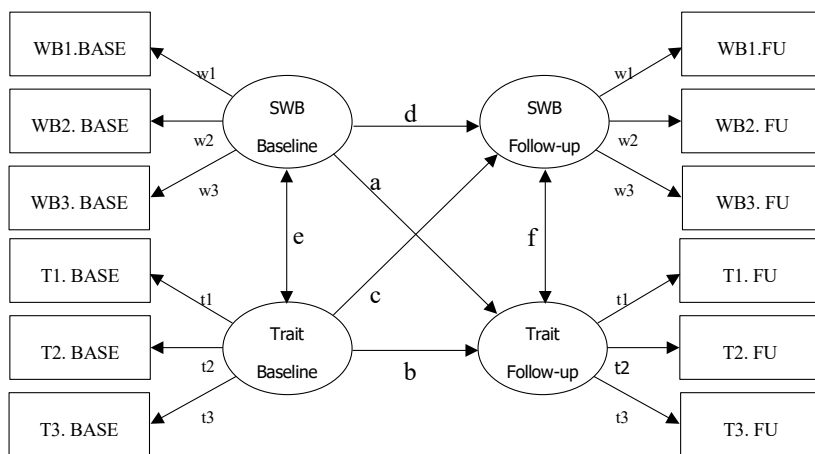


Figure 4. Illustration of the analysed autoregressive models including measures of SWB (measured by the WHO-5 Well-being Index and the Satisfaction with Life Scale) and personality traits (measured by the Big Five Inventory) at baseline and at 15-18 months follow-up.

Note: The arrows indicate: a = Prospective SWB effects, b = Trait Stability, c = Prospective traits effects, d = SWB stability, e = Concurrent correlations, f = Change correlations. The error terms for the same item (e.g. T3) were allowed to correlate across the two time points. For measurement invariance, factor loadings (e.g. t_3), intercepts, and residuals of the same item were constrained to be equal at the two time points. Parameters b and d indicate rank-order stability and are not affected by possible mean level changes in SWB/traits. (Reprinted from Study III)

Error terms of the same item measured at the two time points were allowed to correlate. Measurement invariance was secured by constraining factor loadings, intercepts, and residuals to be equal at the two time points. In the comparisons between female and male participants, factor loadings, intercepts, and residuals were also constrained to be equal for the two genders. The significance of gender differences on parameter values were tested by constraining the parameter to be equal for the two genders and calculating the increase in the model's χ^2 -value compared to an unconstrained model. The ten models and gender differences were also analyzed employing full information maximum likelihood (FIML)

estimation instead of multiple imputation and the results were very similar to those presented here. Analyses were conducted with R.3.5.0 statistical software (253), employing the packages lavaan (254), semTools (255), and Amelia (256).

4.4 INTERVENTIONS IN HIGHER EDUCATION – SYSTEMATIC REVIEW AND META-ANALYSIS – STUDY IV

4.4.1 Eligibility and database searches

The study protocol has been registered in PROSPERO, CRD42015029353. The guidelines for conducting systematic review as suggested by the Cochrane handbook for systematic reviews of interventions (257) have been followed. Study findings were reported according to the PRISMA statement (258).

The PICO components were developed following discussions on eligibility criteria with stakeholders from the student health services and librarians from KI: Population = students in university settings; Intervention = any types of mental health-promoting and mental ill health-preventing interventions; Comparator = any types of active or inactive controls; Outcome = (a) positive mental health, including well-being, coping, locus of control, resilience, self-esteem/self-compassion, stress management, academic achievement or academic performance, and (b) mental ill health, including symptoms of anxiety, symptoms of depression, psychological distress, worry, fatigue, sleeping problems, and perceived stress. The study design was limited to RCTs with at least 3 months of post-intervention follow-up. Language restrictions were initially not applied. Exclusion criteria were set for studies on students with diagnosed psychiatric disorders and studies conducted in primary care settings.

A sensitive search strategy was developed in collaboration with librarians and the following databases were searched: Medline (Ovid), PsycInfo (Ovid), Eric (Ovid) and Scopus. Grey literature was searched in Dissertations & Theses (ProQuest), Dart Europe, OpenGrey and Base Bielefeld. The searches were restricted to studies published from January 1, 1995 to December 31, 2015. Keywords and MESH terms are reported in Study IV, Supplemental Information (Data, S2 and Data, S3, respectively). A manual scrutinisation was performed for reference lists of relevant reviews and studies selected for inclusion. Hand-searching was applied for the following journals from January 2012 to March 2016: *College Student Journal*, *Journal of American College Health* and *Journal of College Counseling*.

4.4.2 Analyses

4.4.2.1 Study selection, data extraction, and quality assessments

Two pairs of authors independently screened the records. Initially, the eligibility of each article was evaluated by title and abstract and, if relevant, a full-text examination was applied. Only English-language publications were appraised at this stage, and a loss of 20 publications in Chinese (k=15), Japanese (k=3), Korean (k=1) and Spanish (k=1) was evident. Grey literature was taken into account when accessible free of charge. Disagreements were

resolved through panel discussions. Studies selected for inclusion were scrutinised for probable overlap in study populations; however, none were found.

Data extraction from the articles included first author, country of origin, setting, funding, inclusion and exclusion criteria, characteristics of the intervention and comparison groups (age, gender, ethnicity), characteristics of the intervention (type, format, delivery level, length of session, duration), type of comparison, outcome definition and measurement scale, sample size, post-intervention length of follow-up, percentage of withdrawals at each measurement point, and study quality. For missing data in the original reports authors were contacted for further clarification.

Following Conley, et al. (210), original interventions were grouped into: (a) cognitive behaviour therapy (CBT)-related, (b) mind-body-related, (c) psycho-educational-related. Intervention delivery level was considered as universal or selective. Comparators were subdivided into active controls and inactive controls. The study outcomes listed above were classified into: a) mental ill health outcomes, b) positive mental health and academic performance outcomes.

Study quality was assessed independently by the authors and three colleagues using the Effective Public Health Practice Project Quality Assessment Tool (EPHPP), as recommended by the Cochrane Collaboration for public health reviews (257). Discrepancies resolved by discussions with one of the assessors not involved in the process.

4.4.2.2 *Statistical analysis*

The variety of instruments applied for measuring outcomes required a standardisation, and standardised mean difference using Hedges' g was chosen as a common effect size (ES) for performing a quantitative synthesis. At each post-intervention follow-up time point, ES was calculated separately as a difference in means between intervention and control group. Thus, for mental ill health outcomes ESs below zero indicated a superiority of the intervention group over the controls. In contrast, for positive mental health and academic performance outcomes, ESs above zero pointed out that the results favoured the intervention. Cohen's convention (259) was applied for the interpretation of the magnitude of Hedges' g , defining the ES as small (0.2), medium (0.5), and large (0.8).

To overcome unit-of analysis error, and using multiple assessment of the same construct, precautions were taken (257). For more than one ES reported for the same outcome in a given study (e.g., for depression assessed by both the Hamilton Depression Rating Scale and Beck Depression Inventory), the ES was averaged to obtain the single outcome measure per intervention at each measurement point. Similarly, ESs were averaged within trials with multiple interventions of an equivalent nature, i.e. if interventions belonged to the same category. A comparable approach was applied to studies with multiple comparisons.

Meta-analysis was performed for all specific outcomes as well as for outcomes combined within mental ill health and positive mental health and academic performance categories.

A random-effects model incorporating both within- and between-study variability was used because of the initial assumptions of between-study heterogeneity. Post-intervention follow-ups were categorised as 3-6 months, 7-12 months, and 13-18 months to assess the sustainability of intervention effect over time and to address the variety of the follow-up.

Statistical heterogeneity among the studies was evaluated using Q and I^2 statistics. For Q , p -value < 0.1 was considered as representative of statistically significant heterogeneity, and I^2 values of 25%, 50% and 75% were pointing to low, moderate and high heterogeneity, respectively (260).

The subgroup analyses were conducted by stratifying the main analysis by previously identified moderators related to interventions (category of intervention, delivery level, type of format, type of controls), study-level moderators (initial study size, study quality) and moderators related to participant characteristics (gender, country). The analyses were conducted if at least two studies were included in each subgroup. Following Hart et al. (261), sensitivity analysis was conducted to explore if the overall pooled ES differed if the lowest or the highest original ES were chosen from the studies with multiple outcome assessments or multiple interventions or comparisons. In meta-analyses with three or more studies included, publication bias was assessed by funnel plots, Egger's regression asymmetry test, and the Begg-Mazumdar adjusted rank correlation test (262, 263).

All statistical analyses were performed using STATA version 13.1 (StataCorp, College Station, TX). P -values < 0.05 were considered statistically significant. All statistical tests were two-sided.

4.5 ETHICAL CONSIDERATIONS

4.5.1.1 Ethical approval

Firstly, all studies received approval by the Regional Ethical Committee in Stockholm, application number 2007/1021-31/3, and for the amendments 2009/1788-31/3, 2010/1879-31/5, 2013/1027-32, and 2018/1569-32. Secondly, I have reflected on the ethical principles stated (264, 265) and will apply them for my studies.

4.5.1.2 Ethical concerns with Study I, II, and IV

For Study I, Study II, and Study IV, I do not see any significant ethical issues. As described earlier, Study I is based on data from the National Public Health Survey. Our participants, aged 16-29 years, constituted a sub-group of the sample, aged 16-84 years. The sample was randomly drawn from the Total Population Register and provided by Statistics Sweden or selected through different stratified sample criteria by health regions and municipalities. The participants gave their informed consent to answer the survey and to the data linkages. Their responses were treated in accordance with regulation and legislation. For Study II, the circumstances were similar. The Stockholm Public Health Cohort, also consisting of a random sample, 18 years and onwards, drawn from the Total Population Register and the procedure for the participants was analogous to Study I. Furthermore, the study population in Study II accepted to be contacted in the future. Study IV, a systematic review and meta-

analysis included data from published original, peer-reviewed papers and it is assumed that the original studies have undergone ethical approval.

4.5.1.3 Ethical concerns with Study III

The study population, adolescents aged 16-17 years, was recruited by us, and originally for our evaluation of the interventions DISA and ACT, included in the curricula of the participating schools. We provided written information on our evaluation, a survey on a voluntary basis, including data on demographics, measurements on well-being and psychological distress, and compliance to the intervention. The information was given to school staff, participants, controls, and parents, and allowed by the Regional Ethical Committee. The information letter was repeated at post-intervention and follow-up.

Although participation in the survey was voluntary, and almost every pupil in the school-class participated, we cannot rule out that responding to our questions might have provoked negative feelings or distress in some adolescents. Therefore, the school health service, also present at some schools, was informed by principals or teachers about our survey in order to be prepared.

Our major concern was on the unused survey data after the 1-year of follow-up, when our evaluations on both interventions showed null-results causing difficulties to publish the results. We considered conducting implementation analyses on the interventions. However, due to limits in time and resources, our plans were not feasible. Therefore, years later, we used the survey data for our Study III and we hope that by doing so, the pupils' efforts in giving us responses at three time points were not in vain.

4.5.1.4 General consideration

From an ethical point of view, research should be freely available and accessible for everyone. For this purpose, we chose to make all our publications accessible on an Open Access basis.

5 OVERVIEW OF RESULTS

5.1 STUDY I

Entitled: Positive versus negative mental health in emerging adulthood: a national cross-sectional survey

Firstly, our Exploratory and Confirmatory Factor Analyses demonstrated a two-factor model, on the instrument GHQ-12, and the two factors were preliminarily termed Positive Mental Health (PMH) and Negative Mental Health (NMH). Secondly, the potential determinants of mental health were applied on PMH and NMH. Most of the 22 potential determinants of mental health showed significant and opposing effects on both PMH and NMH. The remaining potential determinants, i.e. those that elevated NMH more than decreased PMH were female sex, economic strain, risky gambling, perceived humiliation, and suicide ideation, with the strongest effects associated with suicide ideation and perceived humiliation. The associations between possible determinants of mental health were generally stronger for NMH compared to PMH. Employment, compared to being a student, decreased NMH more than it elevated PMH. In contrast to those being employed, students demonstrated lower levels of PMH and higher levels of NMH. Furthermore, increasing age reduced PMH, but did not however affect NMH. Only two possible determinants significantly elevated PMH without influencing NMH. These were, participating in societal events and modest gambling.

5.2 STUDY II

Entitled: What predicts stable mental health in the 18-29 age group compared to older age groups? Results from the Stockholm Public Health Cohort 2002-2014

Stable mental health was reported in 46.2% out of 939 men and 35.7% out of 1,466 women in the age group of 18-29 years, and compared to 66% and 55%, respectively in the age group of 30-84 years of age. Out of 17 potential determinants of health, six predicted stable mental health. Among them, occupational status was the strongest predictor in the young age group, especially being employed. The others were, in the following order: emotional support, being male, being born in Sweden, absence of financial strain, and consumption of fruit and berries. Physical activity, absence of daily smoking and absence of harmful alcohol consumption were not associated with stable mental health. In the older age group, the pattern was similar, with nine determinants predicting stable mental health and ranked as: absence of financial strain, occupational status, emotional support, being male, regular physical activity, instrumental support, interpersonal trust, community trust, and absence of harmful alcohol consumption. In the older age group, running an own business and having a position outside the labor market were the occupational statuses associated with the most stable mental health. Statistically significant differences between the younger and older groups were evident for physical activity and absence of financial strain, namely being more important in the older group.

5.3 STUDY III

Entitled: Concurrent and change associations between subjective well-being and personality in a Swedish adolescent sample – are prospective effects evident 15-18 months ahead?

At baseline, mean levels of Agreeableness, Neuroticism, and Openness differed between girls and boys, with higher levels in girls compared to boys. In opposition to this, mean levels of well-being, i.e. measured on the WHO-5 Well-being Index, were higher in boys compared to girls. At follow-up, 15-18 months later, the mean level difference on Neuroticism remained between girls and boys. For life satisfaction, no mean-level difference between genders was found at any time-point.

Low levels of Neuroticism, and high levels of Conscientiousness, Extraversion, and Agreeableness were associated with high levels of subjective well-being (SWB), i.e. well-being plus life satisfaction. This was evident when measured at baseline and follow-up.

For girls, the stability in personality traits and subjective well-being, was reasonably high during the time span of 15-18 months. For boys, stability was found only for Neuroticism.

Only well-being in girls showed a prospective effect on Agreeableness at follow-up. No prospective effects were found in boys, nor had any personality traits prospective effects on SWB.

5.4 STUDY IV

Entitled: Effects of mental health interventions for students in higher education are sustainable over time: a systematic review and meta-analysis of randomized controlled trials

Out of 6,571 records from six databases, 26 randomised controlled trials fulfilled the inclusion criteria and were included into the systematic review and meta-analysis. The study population consisted of 8,136 college- and university students, with an uneven gender-mix, and 17 studies comprising of more than 60% females. Fourteen of the interventions were conducted in the United States, five in Asia, three in Australia, three in Europe and one in the Middle East. Eleven studies focused on CBT-related interventions, 10 on mind-body related, and five on psycho-educational interventions, respectively. Universally and selectively delivered interventions were found with 13 studies of each category. At least one mental ill health outcome was measured in 24 studies, while at least one positive mental health outcome was assessed in 14 studies. The pooled effect sizes were generally small, although significant. For the combined mental ill health outcomes, symptom-reduction persisted up to 7-12 months post-intervention compared to controls. For depression, the symptom decrease lasted up to 13-18 months, for anxiety up to 7-12 months, and for stress up to 3-6 months post-intervention. Sub-group analyses for CBT-related interventions and the combined effects of mental ill outcomes showed effects at 3-6 and 13-18 months of follow-up. For body-mind related interventions, the results were less consistent and psycho-educational interventions revealed no effects compared to controls.

Due to the limited data of positive mental health and academic performance outcomes, analyses were only performed for studies with 3-6 months of follow-up. For these, all positive mental health effects combined, effect-sizes were small but significant, compared to controls. For the individual outcome, enhanced active coping, sustainability was also evident 3-6 months post-intervention.

6 DISCUSSION

This thesis is intended to give an integrated view of mental health, by describing its positive and negative determinants, outcomes, and types of intervention. The thesis is grounded in the field of public health with a focus on equality in health and the determinants of health. By combining positive psychology, and its originally individual perspective, with public health, then, as illustrated in this thesis, synergistic effects can strengthen both research fields, and especially health promotion (6).

In the following paragraphs I will list the main findings in this thesis, and further discuss them for each of the studies separately. Second, I will give my considerations on the possible limitations on a study-by-study basis. I finish by summarising the findings with conclusions and implications.

6.1 MAIN FINDINGS

1. The GHQ-12 demonstrated a capability to measure PMH as well as NMH. However, the instrument largely failed in systematically discriminating possible PMH and NMH determinants, respectively. (Study I).
2. A majority of the potential determinants of health revealed mirroring associations on NMH and PMH, i.e. determinants with a positive association with one of them tended to have a negative association of similar strengths with the other. (Study I).
3. PMH decreased with age, 16-29 years, while no age-related differences were found for NMH. (Study I).
4. Student status was associated with more NMH compared to employment. (Study I).
5. Stable mental health was more frequent in the older population ≥ 30 years compared to the age group 18-29 years, and more prominent in males versus females in both groups. (Study II).
6. Significant differences between the younger and older groups were physical activity and absence of financial strain with less importance in the younger group vs. the older. (Study II).
7. Low levels of Neuroticism, high levels of Conscientiousness, Extraversion and Agreeableness were related to high levels of subjective well-being at baseline and follow-up. (Study III).
8. Subjective well-being had a weak prospective effect on Agreeableness only in girls. No other prospective effects were found. (Study III).
9. Psychological interventions on students in higher education overall reduced mental ill health symptoms with small effect-sizes up to 7-12 months post-intervention. (Study IV).

10. Sustainability of symptom reduction were evident for depression up to 13-18 months, for anxiety up to 7-12 months, and for stress 3-6 months post-intervention. (Study IV).
11. Psychological interventions promoted overall positive mental health with small effect sizes up to 3-6 months post-intervention. For enhanced active coping sustainability was evident with medium effect size 3-6 months post-intervention. (Study IV).

6.2 STUDY I

In this study our intention was to investigate if the GHQ-12 had capacity to discriminate between possible determinants of health that were related to positive and negative mental health, respectively. Our factor analyses confirmed earlier hypotheses that positive and negative mental health are related, although different constructs (37, 237). Nonetheless, the two constructs and the presumptive health determinants were primarily mirror-like, meaning that determinants with a positive association with one of them tended to have a negative association of similar strengths with the other. Consequently, this finding indicates a lack of capability of the GHQ-12 to be employed for measuring positive beyond negative mental health – at least in our sample.

We found suicide ideation and humiliation to be the most significant potential determinants related to NMH. Particularly, humiliation indicating exposure to harassment, bullying, or discrimination, had a stronger association with NMH compared to threats or violence. These high levels may reflect the increased frequency of cyber-bullying in young people associated with symptoms of depression suicide ideation, suicide attempts (266). Humiliation in terms of relational victimization has shown a linear correlation with loneliness, symptoms of depression and anxiety in adolescents, with higher levels in girls (267).

Potential determinants for PMH were participating in social events and moderate gambling. Participating and playing an active role in one's environment is related to long-term buffering of mental ill health outcomes. This is shown in a longitudinal study from the United Kingdom where being a member and being active in an association was linked to lower levels of psychological distress (268). Similar results are revealed in a Swedish study including two cohorts (269). Participation in group activities at age 21 was associated with lower levels of depressive symptoms, both concurrently and at 20-year follow-up. Our result on moderate gambling is spurious, although it may be related to social participation.

Our finding that the potential determinants are more strongly associated with NMH (suicide ideation, female sex, humiliation, economic strain, risky gambling), may be of interest. The result poses questions regarding the items included in the health survey, which seem to have been constructed to measure mental ill-health rather than mental health. It is well known that bias in item scoring may be produced by whether the items are phrased negatively or positively. As mentioned in the description of the GHQ-12, bias on the negatively verbalised GHQ-12 items have been detected (240, 270, 271). Correspondingly, also changing the wording from positively to negatively phrased items in a quality of recovery survey had implications for the reliability in results (272). Thus, the inclusion of more genuine items

measuring PMH in the national survey might have given other results in our study. To include measurements of PMH in a population health survey is of importance and, as pointed out earlier, these days well-being is measured in the national health survey by the seven-item short version of the Warwick Edinburgh Wellbeing Scale.

The significance of following up well-being in a population is verified by our finding that PMH decreased with increased age in our population, 16-29 years of age, while their levels of NMH were not affected. A suggestion for this finding is that the transition period for many young people entails a struggle with those previously described hardships, although they do not necessarily affect NMH. As we have shown, students report lower levels of PMH and higher levels of NMH compared to those attaining employment. One explanation may be that employment is typically combined with some structure in life and a more or less regular income. In contrast, the position as a student is characterised by more insecurity, often changes in housing, relationships, and expectations of academic achievements. Our finding that students report higher levels of NMH compared to their peers in employment (145, 146, 273) and relative to the general population (142, 144) is well documented.

6.3 STUDY II

Our findings show that in the period of 2002-2014 almost every second male and a little over every third female in the 18-29 age group reported stable mental health. This may be compared with the Dunedin Cohort, where only 17% of the participants (57% male) at no time point fulfilled any criteria for a psychiatric diagnosis during the six waves of analysis, i.e., a period of nearly 30 years (274). We identified six determinants associated with this stability in mental health: occupational status, especially employment, being absent on parental leave, emotional support, being male, being of Swedish origin, experiencing no financial strain, and healthy nutrition, proved by regular consumption of fruit and berries. The determinants were predominantly related to social position, whereas one could be assigned to social capital (emotional support) and only one was linked to health behaviour (nutrition). Notably, other health behaviour factors, i.e. physical activity, absence of daily tobacco smoking, and risky alcohol consumption, were of no importance for stable mental health. Our results are in line with those of an Australian cohort study, showing that positive development in young people was associated only to a small degree with trust in authorities, engagement in social groups and civic action (275). In line with our results, another study of the Australian cohort showed that risky consumption in late adolescence had no relationship with positive development in young adulthood (276). The authors conclude that positive development and risky alcohol consumption are not inversely related. High levels of alcohol use may be linked to social competence and high life satisfaction, and further alcohol use is somewhat normative in Australian young adults. However, this suggestion may seem dubious, especially today, as alcohol consumption among young people has decreased in European countries, North America and also in Australia (277). However, the proposal may have been justified one decade ago, the time for our conducted studies, when alcohol still commonly had the status of a rite of passage into adulthood. Our results regarding the regular intake of fruit and berries and its association with stable mental health are in line with several studies (278-281) and might be seen as a proxy for healthy nutrition overall. As shown by Emerson and Carbert in their large sample of immigrants in Canada, higher consumption of fruit and

vegetables was associated with lower levels of psychiatric diagnoses and distress, and higher levels of mental health (282). Above all, their protective associations were independent of sociodemographic factors, physical health, physical activity, and alcohol consumption.

Yet, perhaps unsurprisingly, occupational status in terms of employment was the main prospective factor for stability in mental health. Employment generally implies a steady income, and facilitates young people's establishment into society. As shown in Study I, and other, albeit cross-sectional, studies, employment was associated with better mental health versus being a student (145, 146, 273). Absence of financial strain was also prospectively associated with stability in mental health, which may be seen as self-explanatory.

According to numerous studies and a systematic review, emotional support is a key factor for mental health and linked to protection from depression during the life-course (283, 284). Moreover, in accordance with our findings, emotional support, although not practical support, revealed a stress-buffering effect in a longitudinal sample of young people (285). The gender gap in self-reported mental health between males and females, favouring males, is globally recognised (286, 287) and is evident in this study as well as in our other studies.

In comparison with the younger group, the age group 30 years and above reported stable mental health in higher proportions in both males and females. This is in line with earlier findings, pointing out lower levels of psychological distress in older age groups compared to the younger ones (288, 289). In contrast to the younger age group, more determinants associated with social capital, beyond emotional support, and also instrumental support, interpersonal trust, and community trust, were important for the older group. Absence of financial strain was a more prominent determinant in the older age group versus the younger group, while country of birth showed no significant correlation with stable mental health. Being self-employed, i.e. running one's own business, appears to be of pronounced importance for the older group and their stability in mental health. The phenomenon of well-being among self-employed people has been investigated in 28 European countries (290). The fact that a position outside the labour market favoured stable mental health in the older group may be due to that this group predominately consisted of pensioners. In the age group above 30 years of age, those outside the labour market consisted of 26% and among those above 65 years of age, 91% were in that position. Health behaviour, particularly physical activity and absence of risky alcohol consumption, seems essential for stability in mental health at an older age. Physical activity was important for the older group and indicated, together with financial strain, a significant difference between the younger and older groups. One hypothesis for the significance of physical activity in the older age group might be that sedentary behaviour commonly increases with age and has to be balanced by a choice for physical activity in order to achieve well-being. Concerning the importance of absence of financial strain in the older group, Wilkinson and Pickett suggest that inequalities affect individual health (291). They illustrate how people in equivalent groups compare themselves with each other and how relative inequalities get "under the skin" and are pronounced as stigma. In younger age groups financial difficulties are common and normalised among students and those not being established in working life.

However, financial strain becomes rarer with increasing age and, therefore, might be sentenced as a shame for those experiencing the status.

6.4 STUDY III

This study was inspired by Soto et al. (292) who, in a large national Australian adult population sample, showed concurrent and change associations between SWB and personality traits, and, moreover prospective effects of personality traits on SWB, and vice versa. Our minor replication in an adolescent sample could confirm the concurrent and change association, although it failed in revealing major prospective effects.

Our findings on the association between Neuroticism, Conscientiousness, Extraversion, and Agreeableness and well-being and life satisfaction are in accordance with earlier studies in adolescent populations. Comparable to our results, Neuroticism revealed the strongest association (negatively) with SWB, followed by Conscientiousness, and Extraversion in another Swedish sample of high school pupils (293). Likewise, Neuroticism (measured inversely as Emotional stability) was more strongly correlated with SWB compared to Extraversion in a sample of Norwegian folk high school students, mean-age 19 years (294). An instrument coherent with the Big Five Model was tested with life satisfaction as outcome in a sample of high school students in the United States. The analyses showed that 47% of the variance in adolescents' life satisfaction was explainable by personality traits and equally, Neuroticism (negatively) proved to be the strongest predictor, -0.72, followed by Conscientiousness 0.18, Extraversion 0.14, and Openness 0.13 (295). However, in contrast to our findings, none of the aforementioned studies revealed strong associations with Agreeableness.

Corresponding to our finding, Borghuis et al. reported stability in girls' personality traits over time, in a large sample in the Netherlands, where adolescents' personality was examined yearly from the ages of 12 to 22 (69). On an aggregated level, this study pointed to a stability for all traits among respondents aged 17-22 years, while during the period of 12-16 years of age, the one-year rank order stability had increased from 0.68 to 0.84. However, in their study, the increase of trait stability in early adolescence and a pause in stability increase in late adolescence was apparent for both genders. Bearing in mind that an increase in personality stability is shown to be a continuous process throughout adulthood and ongoing into the 50s (296) the continuity hiatus in increase during ages 17-22 is unexpected (297).

In our study, a gender difference in trait stability and to some extent in SWB stability is obvious. One exception is Neuroticism, where boys also revealed stability. Trait stability is associated with personality maturation (79, 297) which is evident for girls regarding Neuroticism, Agreeableness, and Conscientiousness. In contrast to our study, some other samples present no such gender differences in trait rank-order stabilities for adolescents (69). Equally, in a review of longitudinal studies, no gender differences of rank-order stabilities across the lifespan were discovered, although specific age groups could not be analysed (296). However, in a five annual wave design, Klimstra and colleagues provided data on trait rank-order stability in another Dutch study with an early to middle adolescence cohort and a middle to late adolescence cohort (298). The mean age in their latter cohort is comparable to our age group; and in their first-year follow-up, corresponding trends with our results in trait

stability are obvious. Similarly, they observed higher levels on all five trait stabilities in girls and differences in Agreeableness and Conscientiousness compared to boys.

In light of the fact that girls biologically mature at a younger age compared to boys (159, 299), this process may be linked to a personality maturation, revealed in numerous studies with an increase in Agreeableness and Conscientiousness (300-302). In line with social investment theory, these traits are of significant importance for a positive adaptation of adult roles (303) displayed by ours' and others' (71, 298) findings on girls' higher trait levels and trait stability. It is likely that the girls in our sample have already experienced this maturation, and subsequently show a high degree of stability in these traits, while the boys still are still in the process of achieving more adult levels of Agreeableness and Conscientiousness, as shown by the increase in their mean levels between the two measurements.

The positive concurrent association between Agreeableness and SWB found in girls, was weak in boys, and only obvious in life satisfaction at baseline. Analogous gender differences were also evident in the earlier mentioned US high school sample (295). The authors hypothesised that during adolescence cultural and social influences encourage gender-specific roles on personality traits. According to the literature, Agreeableness is a more feminine than masculine trait, and not accomplishing stereotype female roles, meaning acting sensitively, co-operatively, and in a tender-minded manner, may result in poorer outcomes for girls (304, 305). Our finding could be interpreted that girls high in SWB more readily adapt to, and maybe even internalise, culturally and socially expected gender roles. Weisberg and colleagues investigated gender differences in an adult population, mean age 27 years, and confirmed that women score higher on Agreeableness, alongside Extroversion and Neuroticism, compared to men (81).

Mean levels of life satisfaction at baseline and follow-up revealed no differences between genders, and this is in accordance with some earlier findings (306, 307). However, in contrast, other studies have found noticeably (308) and slightly (295) higher levels of life satisfaction in boys. The gender differences in these two latter studies might be due to the roughly one-year-younger age groups and the culturally diverse study group, respectively.

6.5 STUDY IV

The systematic review and meta-analysis showed sustainability over time of the benefits of mental health interventions aiming at students in higher education. Yet, in most of the analyses, the pooled ESs yielded significant, but small, overall effects. For the combined mental ill health outcomes, the examined effects across all preventive interventions persisted for up to 7-12 months post-intervention. Sustainability of effects was most noticeable for interventions aimed at reducing symptoms of depression, for which the superiority of intervention groups over the comparisons endured significantly for up to 13-18 months post-intervention. For the combined positive mental health and academic performance outcomes, overall results across all promotion interventions showed somewhat shorter, but still evident, remaining effects, which sustained significantly at post-intervention follow-up of 3-6 months.

To the best of our knowledge, this is the first systematic review and meta-analysis primarily focusing on the durability of the effects of mental health promoting and mental ill health preventing interventions among students in tertiary education and analysing different categories of follow-up duration. To directly compare our results with the existing literature was therefore difficult as other reviews generally assessed the effects measured at the end of interventions. Close comparisons might be three reviews conducted by Conley et al. on universal and indicated mental health prevention programmes (210, 309) and technology-delivered preventive interventions (310). The authors measured the effects of interventions across all types of adjustment outcomes in university students at the longest follow-up period reported, which varied from 2 to 52 weeks (210), 13 to 52 weeks (310) and 4 to 157 weeks (309). The first review (210) showed the period of follow-up to be negatively associated with aggregated ES across mental ill health and positive mental health outcomes combined as well as no effect for psycho-educational interventions. A comparable tendency for the effects of intervention to become non-significant as the length of follow-up increases was revealed in our study, although the sustainability of effects differed between mental ill health and positive mental health outcomes. Analogous to Conley's review (210), no effects of psycho-educational interventions on any outcomes were apparent in our data, irrespective of the duration of follow-up. The second review (310) stated a significant effect of universal interventions at any of the follow-up times ranging between 13 to 52 weeks as well as a positive effect of selective interventions throughout the follow-up periods of 2-26 weeks. Likewise, in our study, a reduction in mental ill health outcomes was observed by universal interventions for up to 7-12 months of follow-up and by selective interventions at follow-ups of up to 3-6 months. However, our results on positive mental health and academic performance outcomes were less conclusive. Similar to the third review (309), our results suggested that the most sustainable effects were found for interventions aimed at reducing symptoms of depression and symptoms of anxiety.

Only psychological interventions were retrieved, although our literature search for intervention studies was not limited to this type of intervention. The shortage of organisational mental health promoting interventions was confirmed by a scoping review (311). Thus, an exception may be a systematic review of learning environment interventions for medical students' well-being, advocating changes to curriculum (312). Their results support previous findings proposing that to increase the effectiveness of mental health promotion, all levels of delivery must contribute. This means that beyond conducting interventions aimed at individuals and groups, structural and societal levels should also be involved (313). To further improve the sustainability of student mental health promotion, psychological interventions may be given within the frame-work of a whole-setting approach, as recommended by the WHO initiative Health Promoting Universities (HPU) (214).

6.6 LIMITATIONS

Study I. Our intention was to identify which health-related factors could be categorised as PMH- and NMH factors, respectively. For these factors we used the terms "potential predictors", "presumptive predictors", and "possible determinants" for PMH and NMH, correspondingly. We could have been distinct and have chosen a single term and thereby

avoided confusion about interchangeability. Perhaps “predictor” is a less suitable expression in our context, as it may solely be associated with statistics. Tentatively, “determinant” (for positive and negative mental health, respectively) would have been adequate to use, as this is the terminology commonly used in public health.

As with many scholars before us, we have been cautious on giving the illusion of causal inference in our study, based on cross-sectional time-series between 2004 and 2009. Therefore, we used the terms “potential”, “presumptive”, and “possible” in combination with “determinant” and “predictor”. Yet, there is an ongoing discussion on “scientific euphemisms” and avoiding these in titles, aims, and discussion when presenting a paper (314). Hernán argues that causal inference is a key task in science, and not stating the aim of a causal objective may blend together results, and causal effects could be overlooked. An association measure from an observational study could be a biased estimate of a causal effect. Therefore, being explicit about the aim of the study is a precondition for sound science. In order to avoid ambiguous interpretations of study results, it is, according to Hernán, necessary not to avoid the “c-word” – not even in observational studies. Hence, in observational studies the term “causal effect” is appropriate in the title, in the Introduction section, in the Methods section, and in the Discussion section, although not in the Results section. We should perhaps have avoided these somewhat vague expressions. Indeed, the commentary paper of Hernán was an eye-opener for the future. However, in light of the study design, we cannot draw any conclusions on causation. Therefore, our use of the term “association” when referring to the strengths between PMH and NMH and the determinants should be appropriate.

A further key consideration when discussing association versus causality is the handling of confounders, which may exaggerate as well as mitigate the findings. Nonetheless, in this study, a control for confounders would not have been applicable, as, according to Table 3, in the second model, all effects are adjusted for each other. Of course, the found associations could still be confounded by variables not included in the study.

In addition, as previously mentioned, there is the problem with item wording and item content, see sections 4.1.2 and 6.2. First, the GHQ-12 appears to suffer from response bias, where the response-frame for the six negatively phrased items is ambiguous (270), which could have influenced our results. Second, the items in the survey intended to capture determinants of health contained few items related to the positive aspects of life. Items with an approach to coping, resilience, and subjective and psychological well-being could have given other results, and potentially we would have found more determinants related to PMH, compared to the two we found (participating in societal events and moderate gambling).

Another limitation is that we do not have control over the attrition population. By the time for our analyses of the health survey, we were confident with the attrition analysis conducted in 2009 (220), showing that there would not have been statistically significant differences in the results if the non-responders would have answered the survey. However, we knew from an attrition analysis of the Stockholm Public Health Cohort that younger populations, men and responders of non-Swedish origin tend to constitute high non-responders (244). In the age of

group 16-29 years response rates are generally low, and respondents may not be representative for their group.

Study II. In this study we wanted to assess which determinants predict stable mental health, when measured four times between 2002 and 2014. However, we applied the concepts “predictors” and “determinants” interchangeably. In a similar manner to Study I, we could have employed one of the terms, consequently, in concordance with Study I, which used “determinants” (for stable mental health).

For this study we could have conducted a control for potential confounders; however, we refrained from doing so. There were 17 variables chosen by us, namely those in earlier studies were shown to be related to mental health. Our intention was to explore the whole spectrum of socio-demographics, socio-economics, health behaviour, trust and support, and violations. For the two age groups we identified six and nine potential determinants, respectively, related to stable mental health. At this stage, we could have controlled for confounders such as sex and socioeconomic. However, as our intention was solely to assess associations and not causations, we refrained from further analyses and refer to Hernán et al. (314).

The longitudinal study design allowed us to be somewhat more confident in the direction of associations of our findings compared to Study I. However, we cannot be certain about the association unless we would control all contributing surrounding factors, which is not feasible in observational studies. We are aware that we cannot state causal inferences based on our results (315). Reverse causation is possible, e.g. unemployment is known to affect mental health, and, of course, mental health affects employment status. Thus, we suggest the associations between determinants and stable mental health, and, as a result, they might be referred to as “potential determinants for stable mental health”.

It would have been desired that, as an outcome, we would have investigated positive mental health and not stable mental health. However, a precondition for this is that the cohort survey would have contained a measurement on positive mental health at every time point, which was the case only for 2007. Instead, we conceived the term “stable mental health”, implying scoring less than three points on the GHQ-12 at all four measurement points. Therefore, our proxy-term indicates just freedom from mental distress and not positive mental health, and was our second-best choice.

The determinants are confined to those data included in the survey in 2002. Furthermore, important information on income and education was not relevant for our use, as these records tend to fluctuate considerably over the years in young people, and do not become stable until later in life.

When comparing our sample with the older age group, 30 and older, this group may have been too wide. We discussed dividing the older group into two or three subgroups. However, as this group was not the focus of our study, we refrained from those analyses.

Response attrition for this study is related to sex, age, income, educational level and country of birth (244), and in a response analysis on longitudinal studies found to be higher in younger populations compared to older ones (316). Bearing in mind that the responders to

this study probably consisted of those with a higher income, more highly educated, and of Swedish origin, compared to non-responders, our results on the share of stable mental health could be overestimated.

For the GHQ-12, we chose the Standard Scoring method recommended by Rey et al. and used in a large Spanish population health study (238). However, Lundin and colleagues showed in their Swedish validation of the GHQ-12 when comparing the three methods, that the Standard method performed acceptably. However, the Likert and Corrected methods showed a perfect fit for detecting symptoms of depressive disorder in a Swedish population (232). As we conducted our scoring before Lundin et al. had published their study, our applied method may not have been optimal in a Swedish context.

Study III. We assume that the main shortcomings of this study are attributable to three factors. First the comparatively short follow-up time of 15-18 months and the lack of further waves of follow-up; second, the characteristics of the study population; and, third, the loss to follow-up.

Even if adolescence is a life course including rapid changes, effects on SWB and personality might need more time to alter. A longer interval and several waves of follow-up could have generated maturation even in boys, as shown by other studies (77, 317) and involving higher levels of stability in SWB and personality traits, and traits' correlation with SWB. Furthermore, additional waves of follow-up could have provided a more extensive picture of the development in stability of traits and SWB, and possibly also prospective effects. Our aim was not to specifically focus on gender differences. Nevertheless, as a result of our analyses, these differences became apparent in most of the outcomes and thus they had to be described and discussed. We are considering addressing this issue in the title and/or introduction of the submitted manuscript.

Due to difficulties in recruiting our original study population, we ended up in enrolling highly achieving adolescents in secondary schools with high reputations. Additionally, the majority of the population were girls. Hence, our results are only generalisable to comparable groups of adolescents. Our results would be strengthened by a replication of the study with a more diverse and representative study population.

In this study, we attempted to balance out the uneven distribution in gender, with a higher proportion in girls, and the attrition rate of 36.5% by applying multiple imputation. This method is preferred over listwise deletion of non-responders, which endangers to produce biased estimates. Multiple imputation also incorporates uncertainty in prediction of these missing values and is thereby also superior to other methods of imputation, e.g. mean imputation. We agreed on multiple imputation because of these advantages and according to the literature we had read (318, 319). Furthermore, we conducted a sensitivity analysis by omitting imputation (not shown here) and employing Full Information Maximum Likelihood (FIML). The analysis revealed similar results, although the significance of gender differences in trait stability were somewhat enhanced.

However, it appears that there are even pitfalls related to multiple imputation, which may be overlooked when the different types of attrition, i.e. missing completely at random, missing at random, missing not at random, are not thorough analysed and described (320).

Study IV. The limited number of original studies which examined post-interventional follow-up longer than 3 months is of major concern. Furthermore, those studies identified showed a considerable variability in the lengths of follow-ups reported. In particular, this review is confined by the paucity of original studies reporting on positive mental health outcomes. Therefore, our study is primarily restricted to show aggregated effects for interventions with 3-6 months of follow-up, which affected our analysis. Other limitations include: First, moderating effects of types of intervention, e.g. participant characteristics, and study-level determinants, could not be systematically investigated for studies due to low numbers of studies with follow-up periods longer than 6 months. Subsequently, the results of sub-group analyses are tentative. This also hindered us from an in-depth investigation of sources for heterogeneity, which was generally high. Second, we attempted to reduce heterogeneity by pooling together studies with specific reported outcomes. However, for several outcomes this was not possible due to a lack of data. Third, there was insufficient evidence to obtain any aggregated ESs for some specific outcomes, namely self-reported worries, passive coping, academic performance, self-compassion, mental and subjective well-being, resilience, and happiness rating. Fourth, the reported outcomes are based on a variety of measurement scales, and, frequently, the same outcome was measured by different scales. Therefore, we chose Hedges' g as an ES and examined how sensitive the aggregated results were to our initial approach of combining the original ESs in cases of multiple outcome measures or in multi-armed RCTs. The sensitivity analyses confirmed the robustness of our findings for mental ill health, although not for positive mental health outcomes. For these, the use of the lowest ESs from the original studies distorted the results for studies with 7-12 and 13-18 months of follow-up. Fifth, we assessed more than 30% of the original studies as being of weak quality. We approached this problem by conducting sub-group analyses stratifying the trials by study quality. For both categories of outcome, the analyses revealed inconclusive results when trials with poor quality were pooled that should be accounted when interpreting our results. Selection bias was the most commonly assessed weakness. This bias, either induced by the investigators or caused by self-selection could have resulted in under- or overestimation of the original ES and subsequently affect the aggregated results. Finally, we found publication bias among the studies with 3-6 months of follow-up, and we were not able to assess publication bias for positive mental health outcomes at follow-ups longer than 6 months. This may be a result due to our restriction to English-language publications at the final stage of selection.

Studies I-IV. All our data are self-reported and based on questionnaires, where two types of self-reporting bias are common: social desirability bias and recall bias (321). The risk of socially desirable reporting is especially high in data where anonymity and confidentiality are not guaranteed. However, Studies I-III are approved for these issues, and, regarding Study IV, most original papers in the systematic review stated that the respondents were anonymous. Recall bias is critical when respondents are asked to reflect on a long period, however in our surveys most items refer to the present state, or to one or two weeks

retrospectively, correspondingly. Thus, we assume social desirability bias and recall bias are minor problems in our data.

A general remark concerning making causal inferences could be to apply Sir Bradford Hill's nine criteria on the data (322) (strength of association, consistency, specificity, temporality, biological gradient, plausibility, coherence, experiment, analogy). Although they were never intended to be used as a checklist or employed rigidly, they are still a valuable guideline and assessment aid (323). When reflecting on them, I suggest that we could not state causal inference for any our studies. However, Study IV might be the one most qualified. Of these aspects, our study shows high temporality, plausibility, and coherence. It also demonstrates some strength of association and analogy. However, there is no consistency because of high heterogeneity. Furthermore, the gold standard of the experiment level (RCT) is affected by low-study quality in 30% of the included original studies. Specificity and biological gradient seem to be irrelevant criteria in this study.

6.7 CONCLUSIONS

The overall aim of the thesis was to identify which potential determinants are associated with or predict positive (PMH) and negative mental health (NMH) in the age group of 16-29 years by self-reporting measurements, and to investigate the effectiveness of mental health interventions. The following conclusions can be drawn:

The GHQ-12 showed no capacity to measure positive mental health beyond mental distress, and should be used for its original purpose: to detect “psychiatric morbidity” in the population. Validated instruments to measure positive mental health should be employed.

The decrease in positive mental health with increased age in the 16-29 years age group, while stability in negative mental health is maintained, is alarming. A decrease in flourishing might negatively influence optimism, vitality and social interaction on the individual, group and societal level.

The lower proportion of stable mental health, in the group aged 18-29 years, compared to the group ≥ 30 years, is of concern. The phenomenon might reflect the abovementioned decline in positive mental health.

Determinants for stable mental health for younger and older age groups differed between the groups, indicating that health promoting interventions should have a life-course perspective.

Student status was related to more negative and less positive mental health compared to being employed and may result in low academic achievement, university drop out, and low occupational preparedness after graduation.

Psychological interventions for students in higher education are effective and show sustainability over time, elevating positive mental health, especially active coping. Predominantly, interventions reducing negative mental health have long-term effects for reducing symptoms of depression and anxiety. Their effectiveness should be taken into account, as well as the development of interventions promoting mental health. Moreover, the development and implementation of whole-campus interventions could have synergising effects on students, staff and the community.

Gender differences are evident for positive, negative, and stable mental health in favour of males; however, life satisfaction in adolescents showed an equal distribution. Additionally, personality traits revealed a significantly higher stability in adolescent girls compared to boys, indicating earlier maturation in girls. The later maturation in boys might have negative consequences for their educational achievement and development. In order to promote equality in health, having females' lower share in mental health and boys' later maturation in mind, structural mental health interventions should thus have a gender focus.

7 EPILOGUE

7.1 THE NEED FOR A HOLISTIC MENTAL HEALTH APPROACH

Mental health is still chiefly an issue for the healthcare sector and efforts to involve all societal sectors and levels to achieve a mental health promotion have been less fruitful. Research on mental health has concentrated on genetics, biological factors, symptoms, psychosocial factors, and stress. However, factors within the environment, for example, healthy settings that could build a fundament for good and equal mental health, have not been sufficiently addressed. Within these settings, cultural and natural involvement, physical activity, healthy nutrition, and existential aspects could be of major importance. Furthermore, these aspects have the benefit of being non-pharmaceutical, are probably without side-effects, and most likely at relatively low costs. Although several of these aspects have shown promising evidence, as will be described, they are seldom implemented to strengthen each other to support mental health.

Lisa Berkman's comprehensive model on upstream and downstream factors may help to illustrate how the different levels and components might affect the promotion of mental health and the prevention of mental ill health. The downstream social determinants are temporally and spatially close to health, although influenced by the upstream factors. These are fundamental causes that impact pathways, leading to health effects via the downstream factors (104). The model, see Figure 5, is not designed to cover all forthcoming specific areas, and the arrows could point in opposite directions. Nonetheless, the model provides an inspiration for a holistic mental health approach.

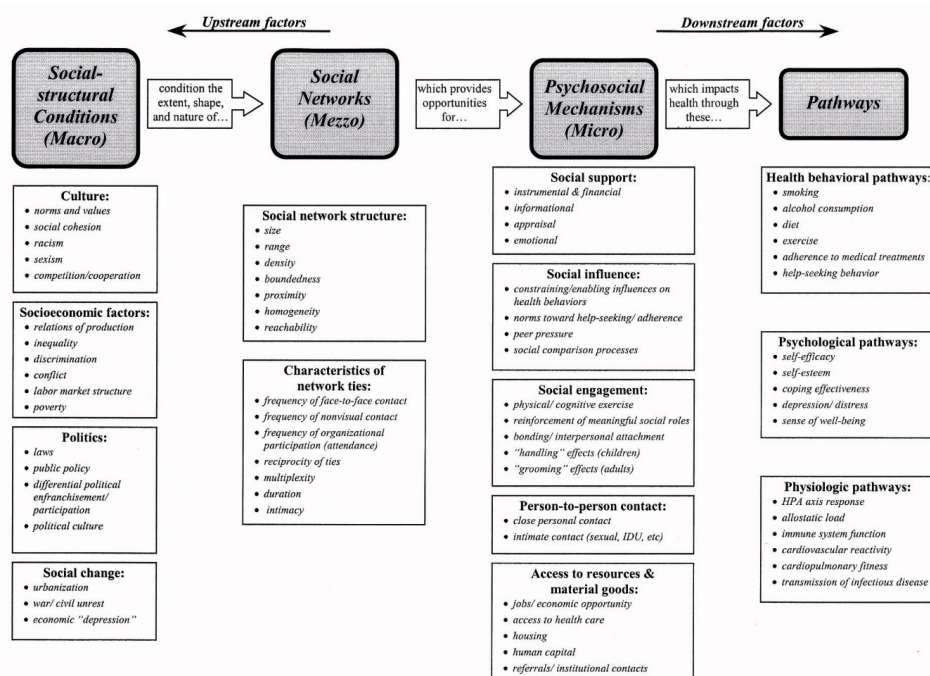


Figure 5. From social integration to health: Durkheim in the new millenium. Reprinted from Social Science & Medicine, Vol 51, 2000. Berkman et al. Copyright (2019), with permission from Elsevier.

7.1.1 Healthy settings

A healthy setting is a “place or social context in which people engage in daily activities where environmental, organisational and personal factors interact to affect health and well-being” (324). Moreover, in healthy settings promotion can be provided by organisational development and change to the physical environment, by the organisational structure, and by management and administration. The Healthy Setting movement has its roots in the Ottawa Charter 1986, with some examples being schools, workplaces, universities, hospitals and cities. According to Dooris, the model for healthy settings is ecologically based and systems are viewed as dynamic and complex, where health is embedded within the culture, daily life and the core business of the setting (325). However, healthy settings have struggled with leadership and commonly lack comprehensive evaluations. Nonetheless, Dooris concludes that the healthy setting approach is highly relevant for public health in the 21th century. In my view, given that the settings are continuously evaluated, they could build a firm ground for mental health promotion. The following paragraphs provide examples of aspects that could contribute to mental health promotion within different settings. Commonly, they have shown effects within the healthcare sector, although they seem underused in public health. Taking these aspects into account in planning, designing, implementing, and evaluating public health actions and drawing on their synergy effects could potentially increase well-being in the population.

7.1.2 Physical activity aspects

Movement and activity are natural and necessary for human beings. However, in modern societies they are often countered by infrastructure and the organisation of work and studies have to some extent inhibited outdoor activities. Nonetheless, the evidence for integrating physical activity into the promotion of mental health and preventing mental ill health has largely grown during the last decades.

In 2019, Biddle and colleagues updated their previous review of systematic reviews and meta-analyses from 2011 on physical activity and mental health in children and adolescents (172). Forty-two reviews were identified for the outcomes of depression (10 reviews), anxiety (3 reviews), self-esteem (10 reviews), and cognitive functioning (25 reviews). For depression, observational data showed only small or null associations, whereas intervention effects were moderate. Effect sizes varied for decreased anxiety and improved self-esteem, and the strongest support was shown for cognitive functioning. The authors suggest a causal and partial causal effect for physical activity and cognitive functioning and depression, respectively.

Similar findings were documented by Dale and colleagues in their umbrella review on children and youths aged 5-17 years (326). Among the 26 reviews identified, the assessed study quality was low and very low, respectively, in half of them. Nonetheless, the authors conclude that physical activity had positive mental health outcomes for children and youth, specifically for reduction in depression and depressive symptoms. Reductions were larger for clinical diagnoses and for interventions based on regular, supervised group-based aerobic exercise.

Comparable results, however for treatment effects for depression and threshold depression, were found by Bailey et al. in their systematic review based on RCTs among adolescents and young adults, aged 12-25 years (170).

7.1.3 Nutritional aspects

Healthy nutrition is important for growth and development of body structure and function. The field of nutrition and mental health has grown during the last few decades, and research is now pointing to healthy foods as being valuable for mental health. However, industrial food production has resulted in a ubiquity of processed fast food, containing an overload of sugar and low nutritional value (327).

A systematic review based on 12 included studies (9 cross-sectional and 3 longitudinal) was conducted aiming to identify the association between diet quality and diet patterns and mental health in children and adolescents (165). The authors found relationships between unhealthy dietary patterns and poorer mental health, although mainly based on cross-sectional studies. For the association with good quality diet as exposure, there was a consistent trend for all studies but one between high quality of diet and mental health, when including only high-quality studies in the analysis. The authors highlight the importance between dietary patterns and mental health in young people (165). A French population cohort study including about 27,000 adults aged 18-86 years and a mean follow-up time of more than 5 years found an

association between ultra-processed food consumption and risk for depressive symptoms (328).

There is also a concern about high intake of sugar products and risk for depression. Prospective analyses from the Whitehall II study indicate that men in the highest tertile of sugar intake from sweet food and beverages had a 23% increased risk of a common mental disorder after 5 years. The increased risk was independent of sociodemographic factors, health behaviours, obesity, and other diseases (329). In a longitudinal Spanish sample of university students, high intake of added sugar and low intake of low quality carbohydrate intake were associated with risk for depression after 10 years of follow-up (330).

A review aimed at identifying which dietary patterns or coherence with dietary guidelines are associated with depressive symptoms or depression. The review included 20 longitudinal and 21 cross-sectional studies and different forms of dietary indices were included. The paper concludes that a healthy diet, as a traditional Mediterranean diet or avoiding a pro-inflammatory diet, may protect against depression in observational studies (331).

Dietary interventions may be effective. A crossover study in healthy women, aged 20-38, showed positive effects for mood symptoms after just 10 days of a Mediterranean diet (332). In addition, large-scale dietary intervention studies indicate effects on mood-outcomes. A systematic review based on 17 intervention studies showed that in 47% depression scores were reduced significantly in the intervention groups compared to controls, whereas the remaining studies revealed null effects. Effective dietary interventions were based on a single delivery mode, given by a dietitian, and were less likely to recommend reduced intake of red meat and leaner meat products or to follow a low-cholesterol diet (333). Similar dietary intervention effects were reported by a meta-analysis based on 16 RCTs, where symptoms of depression were significantly reduced post intervention compared to controls (334). However, for symptoms of anxiety no intervention effects were observed, and greater benefits were shown in female samples.

Moreover, nutritional supplements such as multivitamin and mineral supplementation may be of interest for mental health. Several studies on neurocognitive effects have been published although the results are conflicting. In one examination of healthy people, aged 18-39 years, 4 weeks of treatment gave improved mood scores concurrent with higher vitamin B and improved blood levels (335).

7.1.4 Nature aspects

Over the years, human contact with nature has declined in many societies. This is due to urbanisation, exploitation of resources and changes in health behaviour. The definition of “nature” is not crystal clear when searching the literature for “nature and mental health”. The term nature overlaps with “natural environment”, meaning nature in the sense of a minimum of intervention or totally untouched by human beings. A common term is “urban nature” referring to nature in the urbanised society, and “nature experience” implies subjective perceptions and evaluations of environmental features.

The different dimensions of nature have been reviewed by Hartig et al. with regard to health outcomes including well-being and stress (336). This review of reviews, based on 59 reviews, has its focus on the physical environment appropriate for planning, design and actions that target general urban populations, such as urban parks, and the amount of green space near housing areas. The review of reviews illustrates the population's health benefits from exposure to the natural environment and contact with nature. The intertwining pathways between nature and health encompass air quality, physical activity, social cohesion, and stress reduction. The latter is suggested to be achieved by reduction of challenging environments, e.g. by increased distance to stressors such as traffic noise. One example is green spaces between residences resulting in reduced noise, the obscuring of unpleasant structures and increased feeling of privacy. According to the review of reviews effect sizes of outcomes in observational studies are generally small. However, quasi-experimental studies conducted in laboratory or field settings tended to show higher effect sizes on affect, cognition, and psychological outcomes. These outcomes were a reduction in self-reported anger, fatigue, anxiety and sadness, and an increase of perceived energy. The authors conclude that substantial evidence indicates the potential short-term benefits of contact with nature for stress buffering and stress reduction. However, the paper could not identify for whom, when, how and in which contexts these benefits produce most optimal outcomes.

Another review of reviews aimed at identifying urban based solutions, i.e. those strategies for actions that are inspired by, supported by or copied from nature in order to promote urban public health (337). These strategies include ecosystem restoration and greening of grey surfaces, such as green rooftops, green walls or greened brownfields. Outcome measures, among others, were stress, well-being, depression, anxiety. This later review confirms the findings made by Hartig and colleagues, and further adds strong evidence for nature having an impact on positive affect. However, long-term mental health outcomes could not be identified for residential surrounding greenness in adults.

Both umbrella reviews conclude that, even if effect sizes from observational studies were generally small, they are essential from a public health perspective (338).

7.1.5 Cultural aspects

Similar to “nature”, “culture” is a multifaceted term and has to be specified. In these paragraphs I refer to Richard Williams, who described culture as “a whole way of life, of which the arts are a process of discovery” (339). In the United Kingdom, the All-Party Parliamentary Group conducted an report on creative health (340) and introduced the term arts by including “visual and performing arts as crafts, dance, film, literature, music and singing”.

The field of arts and public health, especially mental health, has developed and grown over the past three decades. Yet, studies on the arts and mental health originate in many cases from the health sector and have been employed in different clinical situations. Jensen and Bonde reviewed the literature on arts intervention for mental health and well-being in health settings (341). They found promising results for different forms of interventions, such as participating in art and creative activities, art therapy song projects, choir singing, participating in cultural

events, and Arts on Prescription. However, due to the heterogeneity of the studies, robust conclusions could be drawn.

Comparable to nature and health, studies have predominantly been conducted using the arts for managing and preventing stress. A systematic review was performed on 37 studies, 73% of which were RCTs aimed at evaluating creative arts therapies for stress management and prevention in the general population. Applied interventions included music, art, dance, movement, and drama (342). The authors reported significant reductions of stress in 81% of the studies. Results on stress management were inconclusive.

Music is probably the aspect which has been most frequently examined for different mental health outcomes, and many interventions show significant results. De Witte and colleagues performed a systematic review meta-analyses on music interventions and stress related outcomes (343). For psychological-stress-related outcomes, such as subjective worry, anxiety, restlessness, and nervousness, the authors found significant reductions of stress with medium effect sizes ($d=0.55$, $p<.001$). Furthermore, the authors suggest that these positive effects might be due to participants' opportunity to choose their preferred music. De Witte et al. conclude regarding the normalness of stress that music interventions are easily available, at low cost and without side-effects, and can be effective for use in daily life, health settings, and work-related settings.

7.1.6 Existential aspects

A meaning of life, philosophy, religion, and spirituality are important for most people and integrating these aspects for human development and growth is essential (344). It has been illuminated how reflecting on existential questions may pave the way from a crisis of discontent to the quest for happiness, from meaninglessness anxiety to the quest for meaning and purpose, from isolation anxiety to the quest for community, from death anxiety to the quest for death acceptance, and from freedom anxiety to the quest for responsibility (31).

There is a concern that people's existential problems are not addressed in our society, and some of our burden in mental health is rooted in wondering how to cope with life. Therefore, a proposal was set out to the WHO to establish a fourth existential/spiritual health criterion, a dimension in addition to emotional, psychological and social health (345). However, findings on existential health suggest that their measurements to a high extent overlap with those measurements applied for subjective well-being (346, 347) and therefore existential health would not add further knowledge to the field.

Nonetheless, it cannot be neglected that to focus on existential reflections would address the need of many people. Cecilia Melder's dissertation (348) demonstrates the values of giving people the opportunity to reflect on life issues. Furthermore, a study investigating the association between spirituality and psychological well-being found that high levels of spirituality, with as well as without religious participation, was linked to high levels of psychological well-being (349).

7.1.7 The bright side of struggling with darkness

Human existence means bright and dark sides and some character strengths cannot be nurtured and wholly developed without an individual facing some amount of hardship and pain (350). According to an evolutionary view, depression may be the result of an ancient defence mechanism entailing a function to promote analytical thinking in order to cope with stressors in life (351). This rumination may support gaining insight to problem solving. According to the analytical rumination hypothesis, the characteristics of depression, anhedonia, avoiding contact with others, and reduction of distractive activities, facilitate problem solving and are thereby a learning process. The originators argue that the hypothesis is supported by research from different fields, e.g. genetics, pharmacology, and cognition and behaviour. Furthermore, they criticise the current trend to find quick fixes for pain by the prescription of antidepressant medications and emphasise that enduring some emotional pain can drive growth and insight into oneself solving problems of life.

The analytical rumination hypothesis has been disputed (352) and may not hold for major depression, where rumination probably has the opposite effect and can deepen the depression. However, life will shed darkness over all of us, but should not leave us without hope. Therefore, it is essential to underscore that there are some bright sides to struggling with darkness, such as the likelihood for post-traumatic growth (353), possibility for high functioning (354), and resilience (355).

The process of coping with life and breakage could be illustrated by kintsugi, the traditional Japanese art of repairing pottery shown on the cover photo of this thesis (350). Following the breakage, the broken pieces are repaired, and the seam is highlighted with gold or other metals. Once broken, the pottery will never return to its original shape, but may be transformed to something even stronger and more beautiful than before. Emphasis is placed on what is added, not what has been lost.

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