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The role of gender in mental health

A statistical analysis of the relationships between gender-related norms and mental health in a Swedish context

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Abstract

Gender constitutes an important determinant of mental health. Previous research has pointed out the need to investigate and operationalize the concept of gender beyond two distinct categories to account for the social and relational aspects of gender that may influence mental health outcomes. In this thesis I investigate the influence of gender-related norms on mental health outcomes among women and men in a Swedish context. In doing so, I adopt an assessment tool developed by Nielsen et al. (2021). Using multiple linear regression, I analyse data from a recent survey by the Swedish Gender Equality Agency (Jämställdhetsmyndigheten) with 6750 respondents. The gender-related norms investigated are *Caregiver strain, Work strain, Performance demand, Discrimination, Social support, Risk-taking, Independence,* and *Emotional intelligence*. Mental health is measured through the WHO-5 Wellbeing Index. The results show that the gender-related norms both had negative and positive relationships with mental health. The influence of gender-related norms was similar for women and men with risk-taking and discrimination as two exceptions. The finding suggests that social and relational aspects of gender are important to consider in when investigating variations in health outcomes among individuals.

Key words: gender norms, mental health, wellbeing, multiple linear regression, gender inequalities
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Table of contents

List of figures and tables

1 Introduction

Mental health constitutes an important matter for public health in Sweden as well as internationally (Folkhälsomyndigheten, 2020). Gender is considered one of the most important health determinants (Díaz-Morales, 2017) together with other social factors such as income, employment and living situation (Folkhälsomyndigheten, 2019). In a Swedish context, there are clear gender inequalities in mental health that are expressed through the overrepresentation of girls and young women in different self-reported mental health problems (Jämställdhetsmyndigheten, 2021). More women than men also experience sick-leave from work with psychiatric diagnosis (ibid). On the other hand, the gender gap can also be seen in the higher suicide rates among men compared to women, indicating a risk of men's mental health being disregarded (ibid). These patterns make mental health an important issue for gender equality policy and point to the need to investigate which gender-related factors may influence health outcomes and contribute to unequal conditions for a good mental health among women and men.

Although gender is increasingly recognized an essential variable to accurately understand health there is a lack of clarity in how gender in relation to health should be conceptualized (Díaz-Morales, 2017). Scholars of gender theory have criticized existing research for an exclusive focus on gender differences where gender is viewed as two distinct categories, which gives limited opportunities to account for differences within these categories and for social dynamics (Connell, 2012; Hammarström & Hensing, 2018). These scholars instead define gender as a multidimensional concept that operates on an individual level, as well as through social relations, through institutions and on a societal level (Connell, 2012).

In line with these perspectives, Nielsen et al. (2021) provides an important effort to develop appropriate measurement of gender in relation to health, showing that gender-related variables operating through norms, relations and behaviours are associated with health outcomes. In the present thesis, I build on Nielsen et al. in an attempt to explore the relationships between gender-related norms and mental health for women and men in a Swedish context.

In this introductory chapter I begin by a brief background on the Swedish context of mental health from a gender perspective. I then introduce the specific aim and research questions for the thesis.

1.1 Mental health from a gender perspective in the Swedish context

The Public Health Agency of states that the Swedish population in general have a good health and most inhabitants report a good mental wellbeing. However, more and more people also report mental health problems (Folkhälsomyndigheten, n.d).

A significant challenge regarding mental health is the unequal distribution of health among the Swedish population that varies depending on social factors such as gender, income, and employment (Folkhälsomyndigheten, 2022b). There is also an interplay between social determinants of health where gender influences for example, socioeconomic position (Prince et al., 2007). Mental health inequalities have consequences on an individual level, as well as a societal level, by affecting individual's access to education and work which also affects the society as a whole (Folkhälsomyndigheten, 2022b).

Gender can be seen as one of the most important factors for inequalities in health which has been pointed out by research and public reports. A report by the Public Health Agency of Sweden (Folkhälsomyndigheten, 2019) noted that gender differences in mental health were present among all age groups. In general, women had worse mental health than men, but the patterns differed with age. Among 7–17-year-olds, boys more often had psychiatric diagnoses compared to girls, but girls more often reported mental health problems and reported worse wellbeing compared to boys. Among the older population, women both had more psychiatric diagnoses and reported worse mental health (Folkhälsomyndigheten, 2019).

Moreover, a report by the Swedish Agency for Gender Equality on the development towards gender equality in health concludes that women and younger individuals have worse mental health than men and older individuals. To achieve a gender equal mental health, the report points to the need to increase the mental health of girls and women. The report also addresses men's mental health and the overrepresentation of men when it comes to suicide rates (Jämställdhetsmyndigheten, 2021).

Another challenge for gender equality in mental health is the significant excess risk for women compared to men to experience sick-leave in general and sick-leave with psychiatric diagnosis (ibid). The Swedish Social Insurance Agency states in a report that women in general have an excess risk of starting sick-leave of 25 percent compared to men. This excess risk is even higher regarding mental disorders and stress related disorders (Försäkringskassan, 2020). The pattern of sick-leave varies with other social factors such as age, family status and place of residence. For example, the risk of sick-leave due to mental disorders is higher for ages 25 to 39 compared to ages 45 to 49 (ibid). For those that have children in ages 3-8 it is more common with sick-leave due to stress related disorders compared to those with children in other ages (ibid).

These patterns of gender inequalities in mental health point to the need to investigate the potential gender-related factors that may contribute to these inequalities in relation to stressful situations in work-life as well as in family-life and regarding unpaid care work. The variance in sick-leave due to age, family status and other factors points to the need to include intersections of other social factors in such analyses of gender inequalities in health.

The Swedish context constitutes an interest setting for investigate gender in relation to mental health. Sweden is often ranked as one of the most gender equal countries in international comparisons (EIGE, 2021; World Economic Forum, 2021). From a welfare perspective, gender relations influence the shape of the welfare state but are also highly affected by policy institutions such as public services (Orloff, 1996). Together with the other Nordic countries, Sweden has been classified as having a dual-earner model that in comparison with other welfare state models have a strong institutional support for a dual earner family, women's labour force market participation and the ability for women and men to combine family life with paid work (Korpi, 2000). The strong institutional support for gender equality could be expected to be reflected in gender equality in health in that gender-related norms could be expected to be less prevalent and hence have a limited influence on health outcomes.

However, patterns of clear gender inequalities in mental health suggest that norms and structures reinforcing gender inequalities that affects health outcomes still are highly prevalent. In line with this, scholars have pointed to the relevance of studying the Swedish case of gender inequalities and health, especially in relation to work-life aspects. According to Keisu, Tafvelin and Brodin (2021), Sweden constitutes a striking case for the investigation of how gender norms shape work environments, work organisations and health. The authors point to the policy structures of the Swedish welfare state that supports gender equality. At the same, there is a highly segregated labour market with more women employed within the welfare sector which has undergone a reduction of resources due to reforms associated with NPM. The interactions between these characteristics make the Swedish case of particular interest when researching gender norms, job organisations and health (ibid).

To conclude, several patterns of gender and social inequalities in mental health are visible among the Swedish population making up important challenges to gender equality policy as well as to public health policy. Being a relatively gender equal country but at the same time facing challenges of unequal conditions to mental health between women, men and other social groups, Sweden forms an interesting case to explore how gender-related norms influence mental health outcomes.

1.2 Aim and research questions

The aim of this thesis is to investigate the influence of gender-related norms on mental health outcomes among women and men in a Swedish context. More specifically, this thesis adopts a gender assessment tool developed by Nielsen et al. (2021) - The Stanford Gender-Related Variables for Health Research, to explore the relationships between gender-related norms and mental health among the Swedish population. The thesis sets out to answer the two following research questions:

What is the influence of gender-related norms on mental health?

Does the influence of gender-related norms on mental health differ for women and men?

In order to answer these questions, I use an explorative approach to quantitatively analyse data from a recent survey carried out by the Swedish Gender Equality Agency, which includes questions measuring gender-related norms in line with Nielsen et al. (2021). In doing so, the thesis aims to contribute with knowledge of which potential gender-related norms influences mental health positively or negatively and how gender differences and inequalities in mental health can be understood in relation to these norms. To increase knowledge of gender in health is important for the needs to improve health and equity as well as to precision health care and medicine (Greaves & Ritz, 2022). Hence, this study wants to contribute with knowledge valuable from a health care and policy perspective (ibid) as well as from a gender equality perspective.

2 Previous research

The following sections outline the perspectives within contemporary literature on gender-related norms and gender inequalities in relation to health outcomes that are important for the scope of this thesis.

2.1 Gender as the main analytical category

Several scholars have argued that existing research on sex and gender in health have had mainly two focuses, namely, to analyses sex differences in health and to address women´s and men´s health needs respectively (Springer et al., 2012; Diaz-Morales, 2017). According to Springer et al. (2012) these two focus areas have contributed with knowledge on distribution and causes of diseases and mortality to improve the allocating of resources. However, these perspectives have at the same often reinforced binary constructions of gender where differences in health outcomes are viewed as self-evident (Springer et al., 2012). On the contrary, there is a growing body of gender research that, rather than looking primarily at gender differences in health, focuses on gendered phenomena on multiple levels in society; structural, group and individual level (Hammarström, 2007).

In line with this perspective Heise et al. (2019, p.2441) point out that gender norms, defined as "the often unspoken rules that govern the attributes and behaviours that are valued and considered acceptable for men, women, and gender minorities", are embedded in institutions where these restrictive norms reproduce and reinforce power hierarchies. Building on previous empirical data and research, the authors argue that gender norms and gender inequality generates health-related inequalities through various pathways, including gender-related differences in exposures and gendered health behaviours.

2.2 Social norms and the influence on gender-related health behaviours

An extensive interdisciplinary research field have noted that social norms related to gender influence health outcomes. Within this field, there is a substantial body of literature on the relationships between norms and ideals regarding masculinity and men's (and women's) health. In a Swedish Government Official Report

(SOU) on men and gender equality it is noted that masculinity norms affect men's relation to care and health. Beliefs and ideals, for example that men are strong and invulnerable, may affect men's willingness to seek health care and talk about health-related problems (SOU, 2014:6). The report denotes the complex patterns regarding gender-based differences in health. On an average men have a shorter life length than women but at the same time women report more physical and mental health problems compared to men (ibid). A common explanation for this pattern has been that women face a "double burden" in more often than men taking responsibility for work and the unpaid care and work simultaneously. However, there are also indications of that men are underdiagnosed with mental disorders and seek health care to a lesser extent than women (ibid). To conclude, the report illustrates the importance of also considering men's experiences and vulnerability when analysing differences in health from a gender equality perspective.

Within international literature on masculinities and health, the perspective of Courtenay (2000) have been influential both in Sweden and internationally (Sandberg, 2014). Building on social constructionist scholars, Courtenay argues that gender is one of the most important sociocultural factors influencing health-behaviours and that unhealthy beliefs and behaviours are ways of demonstrating idealized forms of masculinity. From this perspective, health-related behaviours and beliefs are enactments of hegemonic gender ideals, for example that men are independent, self-reliant, and strong (Courtenay, 2000). These beliefs also reflect gender power relations, where men are more powerful and less vulnerable than women and asking for help and caring about health is associated with femininity (Courtenay, 2000). Importantly, Courtenay also emphasizes differences between men in how masculinity is expressed, depending on factors such as age, ethnicity, social class, and sexuality. Moreover, different forms of masculinities are constructed in relation to one another, which means that dominant masculinities subordinate other forms of masculinities, for example gay or lower-class men.

Courtenay's perspective offers insights in how sociocultural norms associated with gender may play a role in gendered health behaviours and outcomes. However, as Sandberg (2014) notes, this perspective is based on a North American context and does not consider how masculinity norms vary between different country contexts. Sandberg (2014) also points to that research and knowledge on men and men's health related behaviours tend to be relatively static, risking to diminishing new norms and ideals, and the possibility of positive change.

A perspective that moves beyond this static view of health behaviour is offered in an extensive systematic review of the role of masculinity on men's help seeking for depression by Seidler et al. (2016). In line with social constructionist perspective, the authors criticize research that simply addressing a singular traditional masculinity as a deficit for being too simplistic. Instead, they argue for the view of "masculinity as a constantly evolving social, historical and psychological phenomenon." (Seidler et al., 2016, p.115). From the overall findings of the synthesizing of quantitative and qualitative research the authors suggest that traditional masculine norms can increase the risk of experience

depression but also be an obstacle to the ability to seek help for experience symptoms. However, the authors argue that increased accessibility, appropriateness, and engagement of health service can increase men's help seeking (ibid). Finally, it is suggested that future research develops more nuanced measurement of masculinities that takes into account also positive dimensions (Seidler, 2016, p.115).

2.3 Gender inequalities and the influence on health outcomes

Research in a Swedish context have showed that gender unequal relations have an impact on health outcomes, specifically when it comes to paid and unpaid work. For example, a doctoral thesis by Lisa Harryson (2013) investigates gender relations of paid work in the workplace and unpaid work in the home in relation to mental illness among women and men, using longitudinal survey data, register and interview data from a Northern Swedish cohort. The results of the statistical analysis showed that respondents perceptions of their couple relationships as gender unequal was associated with psychological distress for both women and men. At the workplace level gender equality, measured by five statistical indicators, was related to psychological distress for women but not for men. The thesis concluded that "gender equality at home and at work is central for reducing mental illness among both women and men, but also for achieving a good average health status in the population, which is a central public health target" (ibid, p.4).

Moreover, in a book chapter Nyberg et al. (2021) analyse how increased gender differences in health can be understood with regard to psychosocial work factors in differently gendered industries in Sweden. Using data from the Swedish Work Environment Survey (SWES) the authors analysed how psychosocial working conditions differed between differently gendered industries between women and men and how these working conditions had developed over time. The results showed that both women and men employed in female-dominated industries such as education, health and social care industries had higher probabilities of reporting high job demands and low decision authority, as well as being exposed to workplace violence by people that the work organisation provides services for, compared to other industries. These industries are also the ones where rates of sickness absence are higher. The authors discuss these results in relation to the *exposure hypothesis* arguing that women's higher levels of sickness absence can be explained in that women are more exposed to stressors and strains compared to men as a result of occupying different types of jobs. Contrary, the *vulnerability hypothesis* means that gender differences are due to a stronger negative effect of exposures for women compared to men (Mastekaasa & Melsom, 2014, as cited in Nyberg et al., 2021). Finally, the authors argue that differences in the development and quality of psychosocial work conditions

between differently gendered industries may provide explanations for the gender differences in work-related mental health that has developed in Sweden. (Nyberg et al., 2021).

2.4 Existing quantitative measurements of gender in health

There have been several efforts in previous research to investigate the influence of gender in health through quantitative measurements. The use of quantitative measurement of sex and gender in health-related research was examined in a recent review article by (Horstmann et al., 2022). Through a scoping review, the authors identified 170 studies including 77 instrument measuring sex and/or gender in quantitative health-related research between 2000 and 2020. The results showed that many of the measurements had been developed in a US context. The authors identified different conceptualizations of sex and/or gender, ”ranging from mutually exclusive masculinity and femininity to multiple categories of sex and/or gender” (Horstmann et al., 2022, p.10). Although sex and/or gender was measured in various ways, the majority made distinctions between masculinity and femininity, although not mutually exclusive (Horstmann et al., 2022). The authors argue that future research should focus on new ways of operationalisations of sex and gender to account for varieties and multiple dimensions.

The review showed that the most widely used instruments were the Bem Sex Role Inventory (BSRI) and secondly the Conformity to Masculinity Norms Inventory (CMNI). The BSRI was developed in 1974 but is still widely used, measuring ”participants’ match with a defined set of personality traits to assess their degree of femininity, masculinity and androgyny” (Bem, 1974, as cited in Horstmann et al., 2022, p.2). The authors points to an increased criticism towards the BSRI in the recent decades for reinforcing outdated gender stereotypes (ibid).

The second most influential measurement, CMNI, is a multidimensional measurement of specific masculinity norms such as Winning, Emotional Control, Risk Taking and Violence (Gerdes & Levant, 2018). CMNI is examined for example by Gerdes and Levant (2018) who uses content analysis to examine 17 studies using the measurement. The results showed that the masculine norms had both positive and negative relationships with health outcomes. For example, Winning and Risk-taking had a “fairly equal balance of positive and negative outcomes” (ibid, p.237) whereas Primacy of work was mostly associated with positive outcomes and for example Emotional control, Violence, and Self-reliance was merely associated with negative health outcomes.

Summarising the perspectives introduced in this chapter on previous literature, there have been important efforts to bring a gender perspective into the understandings of the distribution of health among the population. Research has pointed out that gender-related norms linked to masculinity influence health

outcomes and are interlinked with gender power relations. Research has also brought insights on how patterns of structural gender equalities may impact the health outcomes of individuals, especially in relation to paid and unpaid work. Finally, measurement of gender has been developed within health-related research to quantitively assess the influence of gender-related norms and behaviours on health.

However, one can conclude that there is still an existing knowledge gap in how gender-related norms beyond mutually exclusive and binary categories such as masculine or feminine (Horstmann et al., 2022) influence mental health outcomes. There is also an addressed need to develop relevant and nuanced operationalisations that can account for the multidimensional structure of gender-related norms as operating at the same time on an individual, relational, and institutional level. The development of a gender assessment tool by Nielsen et al. (2021), that will be introduced in the following theory sections, is an important contribution to address these issues. However, as noted by Horstmann et al. (2022) most measurements of gender-related aspects have been developed in a US context, as is also the case with Nielsen et al. (2021). Thus, the present thesis can contribute to the field by extending this measurement to a Swedish context.

3 Theoretical framework

This chapter lays out the theoretical approach in the present thesis. I first make a brief note on my ontological and epistemological assumptions. I then outline the analytical approach to the measurement of gender-related variables according to Nielsen et al. (2021) which is the main perspective this thesis adopts. Thereafter, I also introduce a complementary theoretical perspective of gender relations and health that I adopt from Connell (2012). Finally, I present the conceptual and theoretical definitions of mental health, health determinants and health inequalities that this thesis adopts.

3.1 Ontological and epistemological considerations

Regarding the ontological position of this thesis, I lean towards a critical realist approach which is often seen as a middle way between positivist and on the other hand interpretivist approaches (Zachariadis et al., 2013). It shares an ontological position with positivism in terms of foundationalism, meaning that the world exists independently of our knowledge of it and that causal statements of social phenomenon can be made (Marsh et al., 2017). However, according to the realist approach these social phenomena are influenced by structures that cannot be directly observed (ibid).

An important implication of the modern critical realism approach is that structure and agency are mutually constitutive of each other. On the one hand, social structures exist independently on our interpretations of them and work to constraint and facilitate outcomes. On the other hand, the interpretation and understanding of these structures also affects outcomes, meaning that structures are interpreted and changed by reflexive agents (ibid). More concretely, gender norms can be seen as structures that affects and can determine mental health outcomes, but these norms are socially constructed by individuals and groups and can be changed. In line with this, Hammarström (2007, p.124) argues that "analysing gender means investigating both structures and agency". Similarly, Connell (2012, p.1677) state that "relational theory, while acknowledging the weight of history, allows a certain optimism about gender inequalities. Gender structures do change."

When it comes to the implications of research design of the critical realist approach, it allows for the use of both quantitative and qualitative data. However, the quantitative approach will only be appropriate for relationships that are directly observable (ibid). A distinction can be made between extensive and intensive design (Brandén, 2016). Extensive design is more linked to quantitative

approaches and is used with an exploratory aim. Extensive methodological approaches are concerned with what empirical phenomenon that are expressed and if they show any patterns. This type of design often investigate data with many cases, often survey data that is analysed through statistical methods (ibid). Intensive design, on the other hand, is used with the aim of explaining why a certain empirical phenomenon is expressed. With this design, a few strategically selected cases are studied in detail, and often several qualitative methods are combined (ibid). This thesis will use an extensive design, which fits with the explorative aim of the study, that is to investigate the patterns of the relationship between gender-related factors and health outcomes.

3.2 Stanford Gender-Related Variables for Health research

In this thesis, I draw on the work of Nielsen et al. (2021) and their development of a gender assessment tool - *Stanford Gender-related Variables for Health Research*. The study of Nielsen et al. works as a theoretical framework for this thesis, in which their assessment tool is adopted and explored in the Swedish context.

As introduced above, previous research shed light on the relevance of different gender-related norms to understand the health outcomes for individuals and gender inequalities in health. However, the need for more composite measurements of gender variables has been pointed out (Phillips, 2005).

Nielsen et al. (2021) develops a measurement of gender-related variables to investigate the impact of *gender as a sociocultural variable* (GASV) on health outcomes. Nielsen and colleagues argue that GASV constitutes an important complement to *sex a biological variable* (SABV) when analysing health and disease processes. To develop the assessment tool, the authors conducted an extensive systematic review of measurements of gender from year 1975-2015. The review identified 74 eligible scales, from which the authors distinguished 11 composite constructs including 44 items which through exploratory and confirmatory factor analysis were reduced to 7 constructs with 25 items. The final assessment tool consisted of seven constructs: *caregiver strain, work strain, independence, risk-taking, emotional intelligence, social support,* and *discrimination*.

The relationship between the gender-related constructs and health outcomes were analysed using negative binominal regressions and logistic regressions. The sample was three US cross-sectional survey populations with data of 2051, 2135, and 489 number of individuals respectively.

Health outcomes were measured through physical health, mental health, activity levels, general health status, smoking, vaping, binge drinking, and BMI. The results showed that the gender-related variables had both negative and positive associations with the different health outcomes examined. Regarding

mental health, caregiver strain and discrimination were significantly associated with lower mental health. Social support, on the other hand, was significantly associated with higher mental health. The remaining associations with mental health were not significant. Caregiver strain and discrimination were also associated with fair or poor self-rated health (ibid). Moreover, the authors note that the gender-related variables related to norms (for example caregiver strain) and relations (for example discrimination) had stronger correlations compared to gender-related traits (for example independence). The authors argue that "this finding aligns with extant research suggesting that institutional and interpersonal aspects of gender may be more important than individual traits and characteristics in shaping health and disease processes" (ibid, p.10).

The Stanford Gender-Related Variables for Health Research offers a tool to bring further understanding to gender differences in health research since more aspects can be captured than a person's self-identified or assigned gender category (ibid).

3.2.1 Three dimensions of gender-related norms

In this section I introduce the theoretical and conceptual definitions of the gender assessment tool developed by Nielsen et al. (2021) that I adopt for the purpose of this thesis. The authors define gender as "sociocultural factors that shape the identities, attitudes, behaviours, bodily appearances, and habits of women, men, and gender diverse individuals" (ibid, p.3). From this perspective, gender is a complex concept that varies with social norms and values and also intersects with other social categories such as sex and self-reported gender identity (ibid).

Importantly, the assessment tool developed by Nielsen et al. does not reduce gender into a two-dimensional scale of masculinity and femininity as oppositional sides of the scale (ibid). Instead, Nielsen et al. view gender as multidimensional where "any given individual may experience different configurations of gender norms, traits, and relations that cannot be subsumed into a "masculine" or "feminine" score or considered "fixed" (2021, p.2). Furthermore, the authors define gender as operating on three dimensions: intrapersonal, interpersonal, and institutional.

3.2.2 Intrapersonal aspects of gender

The intrapersonal aspects of gender are defined by the authors as *gender-related traits*. According to Nielsen et al., gender-related traits refer to how individuals or groups think or act in relation to gender norms and towards cultural meanings ascribed to gender, which are not possible to measure through self-reported gender categories such as women, man, non-binary etc.

The authors measure these aspects of gender through self-reported personality attributes including the three variables *risk-taking*, *emotional intelligence* and

independence. *Risk-taking* refers to physical and behavioural risks such as general risk-taking behaviour, in financial decisions and with respect to recreational activities. *Independence* refers to the personality trait of being focus rather on oneself as an individual rather than part of a community or group. Individuals with high independence would view it as important to themselves to be independent, would not often turn for others for help when in need, and view it as important to solve their problems on their own. Finally, *emotional intelligence* refers to abilities to recognize and manage one's own feelings and use emotions when solving problems. These aspects were measured by asking respondents how often they talk to friends about their problems, how easy it is for them to understand and express what they are feeling, and how easy it is for them to ask other people for help when in need.

3.2.3 Interpersonal aspects of gender

The interpersonal aspects of gender are defined as *gender relations*. These concern interactions between individuals but also between individuals and institutions in relation to gender norms. "Gender relations encompass how gender shapes social interactions in romantic relationships, friendships, families, schools, workplaces and public settings, for instance, the power relation between a man patient and woman physician" (Nielsen et al., 2021, p.4). The variables measuring these aspects are *social support* and *discrimination*. *Social support* refers to experiences and satisfaction with type, availability, and level of social support for individuals. Social support can be for example physical, emotional, or financial support and come from partner, friends, or colleagues. Nielsen et al. asked respondents how often in the past year respondents had someone to ask for advice, someone to show them love and affection, and how often they felt lonely.

The *discrimination* construct looks at experiences of "systemic unfair treatment" (Nielsen et al. 2021, p.4) in different situations. The authors focused on how often respondents had felt discriminated in different situations.

3.2.4 Institutional aspects of gender

Finally, the institutional aspects of gender are defined as *gender norms*. Whereas the interpersonal and intrapersonal aspects of gender focus on individuals and their interactions and relations with other individuals and the society, the institutional aspects of gender focus on the norms produced by social institutions such as governments, families, schools, and workplaces. These norms relate to formal and unformal rules reflecting gender power relations that "operate as rules and expectations of what behaviours and activities are appropriate for women, men, and gender-diverse individuals in a given social setting" (Nielsen et al., 2021, p.4). The variables measuring these aspects are *work strain* and *caregiver strain*. *Caregiver strain* refers to experiences of negative consequences of responsibility for unpaid caregiving, for example by taking care of children, an

elderly, or a disabled family member. Nielsen et al. measured caregiver strain by asking respondent if they experienced emotional or physical exhaustion or worried about the future due to their care responsibilities.

Work strain is the experience of exhaustion due to job strain or emotional job demands. The authors measured work strain by asking respondents on their work speed, work repetition, emotional job demands, perceived risk, and physical hazards at work. The authors also measured the respondents time use, in terms of time spent on paid work and caring for others.

3.2.5 Adaption of the Stanford Gender-Related Variables for Health Research to the Swedish context

In the present thesis, I use the term *gender-related norms* when referring to the variables measuring the gender-related variables developed by Nielsen and colleagues. This term is used since I interpret all three dimensions of gender aspects to capture different aspects of the social norms related to gender. Since I also include register-based data on the respondent's gender in the analysis, I use the term gender-related norms when referring to the aspects of gender that are not captured by gender as categorical variable to avoid conflation with gender as an individual's legal gender. Unlike Nielsen et al. I only analyse the gender-related norms in relation to legal gender and not in relation to self-reported gender identity since the data does not include a similar variable.

Nielsen et al. note that institutional and cultural contexts may influence individuals' conformity to certain gender norms and their influence on health outcomes. The authors therefore encourage researchers to test the gender-related variables in different settings and among different populations. It is also encouraged to complement their assessment tool with other variables reflecting contemporary norms since their assessment tool includes some older measurement scales (ibid).

In this thesis, I adopt the seven variables developed in Nielsen and colleagues' study. However, some of the constructs include different items and some are differently phrased. Moreover, an additional variable measuring how often respondent experience performance demands was adopted. The reason for including this variable was that previous research has shown that expectations of performance may influence mental health outcomes negatively especially for young girls (see for example Bergh & Giota, 2022) who are also an overrepresented group when it comes to self-reported mental health problems. The structure of the variables and items will be further introduced operationalisations section.

3.3 Gender relational theory

In this thesis, I also build on the gender relational theory perspective according to Connell (2012). Connell takes a starting point in moving beyond the categorical thinking that has often been dominant when analysing gender as a structural determinant of health. This categorical thinking can be based on biological essentialism where masculinity and femininity are viewed as natural opposites, but also on social norms and expectations where the male sex role vs. the female sex role are viewed as static dichotomies (2012). According to Connell, these perspectives have offered insights on understanding gender inequalities in health and due to different forms of oppression, such as age, ethnicity, and socioeconomic position. However, the gender relational theory also considers differences within gender categories and the social dynamics of gender inequalities.

Gender relational theory view gender as a social structure is constituted in "the patterned relations between women and men (and among women and among men)" (Connell, 2012, p.1677). From a gender relational perspective, gender can be defined as a multidimensional social structure that operates at the intrapersonal, interpersonal, institutional, and society-wide level (ibid). Furthermore, gender that embraces different relations in society such as economic relations, power relations, affective relations, and symbolic relations.

According to Connell, gender norms are not given by nature, nor something completely forced upon us by social norms. Gender is also constructed by individuals through our in everyday social practices such as housework, paid work, child-rearing, and sexuality (Connell, 2021). The social practices in which gender is enacted occurs in different institutions and sites, "such as families, companies, governments, and neighbourhoods" (Connell, 2012, p.1677).

The large-scale patterns that can be found across these institutions constitutes structures, for example contrasts between masculinity and femininity and gender division of labour in the home (Connell, 2012). Hence structures operate within institutions shaping gender relations that are assumed to produce gendered effects on health. In the gender relational theoretical framework, the concept gender order refers to the structure of gender relations in a given society at a given time.

Similarly, the concept gender regime refers to the structure of gender relations in a given institution. (ibid). Finally, Connells uses the concept social embodiment to describe the process where individuals enact gender and socially construct gender structures, which is a reflexive process (Connell, 2012).

Scholars apart from Connell have adopted the conceptual definition of gender in line with the gender relational theory. For example, Díaz-Morales (2017, p.55) defines gender as a social construct that varies with roles, norms and values of a given society. Furthermore, Diaz-Morales points to that biological (sex-based) factors as well as social (gender-based) factors both impacts health in different ways, mostly through an interaction making it difficult to isolate gender and sex (2017).

Moreover, Greaves and Ritz (2022) also point to that sex- and gender-related factors are multifaced and interact with each other and with other intersectional factors. Sex and gender should not be view as two separate measurements, where sex is simply about biology and gender simply about sociology (Greaves & Ritz,

2022). In this thesis I build on the perspectives presented in this section from a gender relational approach and view gender-related norms as:

- Social and relational processes/sociocultural behaviours and attitudes
- Social constructs that vary with roles, norms and values of a given society
- Multidimensional and expressed through intrapersonal, interpersonal, and institutional aspect that intersect to shape the health of individuals
- Multifaced and interact with sex and with other intersectional factors

As the last point suggests, both gender and sex as well as the interactions between both are important aspects when analysing gendered health outcomes. In the present thesis, I therefore investigate both gender-related norms and register-based gender.

3.4 Theoretical approach to mental health and mental health inequalities

3.4.1 The concept of mental health: More than merely the absence of mental illness

According to WHO, mental health can most fundamentally be defined as "a state of mental well-being that enables people to cope with the stresses of life, to realize their abilities, to learn well and work well, and to contribute to their communities. Mental health is an integral component of health and well-being and is more than the absence of mental disorder" (WHO, 2022b, p.8) .

Similarly, the National Board of Health and Welfare, the Public Health Agency of Sweden and the Swedish Association of Local Authorities and Regions (SALAR) defines mental health as an umbrella term consisting of both mental well-being and mental illness (Socialstyrelsen et al., 2020). These are not opposites but rather two dimensions within the overarching mental health concept, which implies that a person with no mental illness can experience a low wellbeing and vice versa. The mental illness dimension covers one the hand mental distress, such as worries, anxiety, and sleeping difficulties and on the other hand mental disorders, for which there are determined requirements for psychiatric diagnoses (ibid).

The concept of mental wellbeing is not merely the absence mental disorders or mental distress but rather a state of mind with its own value that covers both wellbeing and abilities to function. According to the authors, aspects of mental wellbeing include the ability to balance between positive and negative feelings, the feeling satisfaction with life, having good social relations, developing one's inner potential, and feeling enjoyment, lust, and happiness (ibid). As well as being

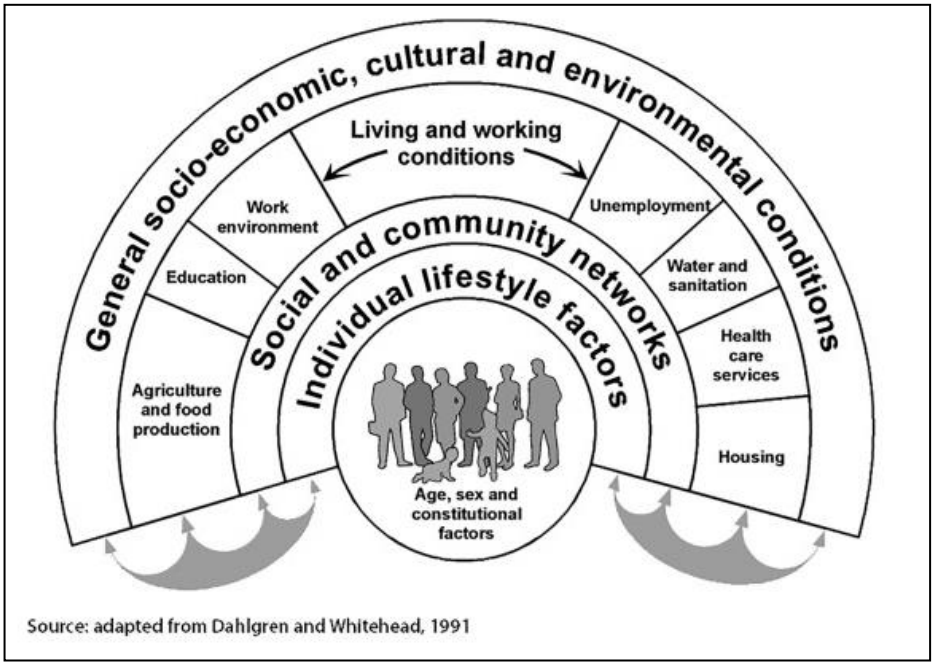
an individual resource, mental wellbeing is also of societal value from a social and economic perspective (ibid).

When describing mental health issues, the authors recommend using the concept mental health when referring to the area in general and to specifying if a specific concept is referred to and how it measured, for example through self-reported data or registrations.

3.4.2 Social determinants of health

A person's mental health is determined by multiple social, psychological, and biological factors (WHO, 2018). The concept of social determinants of health refers to both societal-level influence on health such as living and working conditions and individual level risk factors such as health behaviours (Graham, 2004). One of the most widely known model developed for the concept of social determinants for health is Dahlgren and Whiteheads rainbow-like model (2007) illustrated in figure 1. In the centre of the model, individual factors that are relatively "fixed" such as sex and age can be found. The centre is surrounded by layers in theory could be changed by policy. The first layer consists of personal behaviour factors, whereas the second layer in holds individuals' interactions with other individuals and their community. In the third layer are living- and working conditions, which is finally surrounded by economic, cultural, and environmental influences that prevail in the overall society (ibid). The model also emphasizes interactions between the different layers, where individual lifestyle factors are embedded in more structural factors (Dahlgren and Whitehead, 2007, p.21).

Figure 1. Dahlgren and Whiteheads model of the social determinant of health. Source: Dahlgren and Whitehead, 2007.



3.4.3 Distinguishing between social determinants of health and health inequalities

Health inequalities can be defined as "systematic differences in the health of groups and communities occupying unequal positions in society" (Graham, 2004, p.101). According to Graham (2004) the concept of social determinants is understood to have a dual meaning in both referring to "1) social factors promoting and undermining the health of individuals and 2) the social processes underlying the unequal distributions of these factors between groups occupying unequal positions in society" (ibid, p.102, numbers added). To avoid conflation between the two meanings, Graham differs between health determinants/social determinants of health on the one hand and health inequality determinants/social determinants of the distribution of health determinants on the other hand. Similarly, Dahlgren and Whitehead argue that it is of "critical importance to distinguish between social determinants of health for the overall population and the social determinants of inequities in health" (2007, p.24). Whereas social determinants of health include factors that are positive or negative for health for the whole population, determinants of inequalities in health differ between groups in society, for example based on socioeconomical factors. For example, unhealthy psychosocial work environments is a risk factor for health for unskilled workers that are exposed to these environments but may not affect other groups of the population (Lundberg, 1991, as cited in Dahlgren and Whitehead, 2007).

4 Method

To analyse the influence of gender-related norms on mental health outcomes, I use quantitative analysis with an explorative approach. All data preparation and analyses were done in R-studio (R-code for the analysis part is included in appendix 2). In the following sections I outline the methodological strategy of the present thesis. I begin by introducing the choice of material – survey data from Jämställdhetsundersökningen (Gender Equality Survey, my translation). I then outline the operationalisations of the variables of interest, followed by a description of the control variables included in the analysis. This is followed by note on how weights are used in the analysis to account for non-responses. Thereafter, I describe the process of constructing summative scales from the independent variables followed by reliability tests of scales. I then outline the estimation model, multiple regression model and its assumptions. Finally, I briefly present the regression diagnostics conducted in order to evaluate the goodness of the fit of the estimation model.

4.1 Jämställdhetsundersökningen

The choice of empirical material for the thesis was cross-sectional survey data from the survey Jämställdhetsundersökningen (Gender Equality Survey, my translation). Jämställdhetsundesökningen was carried out in the beginning of 2022 by the national agency for implementation of gender equality policy, Swedish Gender Equality Agency (Jämställdhetsmyndigheten).

The survey consists of questions regarding the respondents' attitudes and opinions on gender equality issues, perceived wellbeing and mental health, and behaviours and experiences related to gender norms. The survey was administrated by Statistics Sweden (SCB). Apart from the survey questions, SCB also collected information on the respondents from a register containing microdata on the whole Swedish population (Register över Totalbefolkningen, RTB). The register variables are for example gender, age, and income (SCB, n.d).

The number of survey respondents was 6750 which was 32,7 percent of the total sample of 20 119 individuals (SCB, 2022). The sample method was stratified random sampling. The total selection frame consisted of Swedish inhabitants of age 16 and older. The total selection frame was stratified by age and divided into four groups where all individuals within each group had the same probability to be part of the total sample (ibid).

Two different media were used in the data collection and the respondents were given the option of answering the survey by paper or by web (ibid). Hence the survey was carried out as in a multi-mode system, which has several advantages such as the ability to reach more individuals in the sample frame (Persson, 2016).

4.2 Operationalisations

4.2.1 Operationalisations of independent variables

The independent variables, gender-related norms, are measured by seven constructs based to Nielsen et al. (2021). The data from Jämställdhetsundersökningen contains between two to six variables belonging to each of the seven constructs. Table 1 shows the seven constructs and an additional construct measuring performance demand, with items and survey question. Most of the variables corresponds to the item for each of the construct in Nielsen et al. but there are some differences. Some of the questions are phrased slightly different, for example, time specifications are phrased "12 months" instead of "the past year". The data from Jämställdhetsundersökningen also contains some additional questions, for example two questions asking respondents about experiences of one's own and other people's expectations about their performance. Finally, some of the questions represented among the items from Nielsen et al. are not represented in Jämställdhetsundersökningen or have been adjusted to fit better a Swedish context.

Table 1. Operationalisation of gender-related norms. Constructs and items.

Gender norm construct	Question
Caregiver strain	
In the past 12 months, how often did you feel physically exhausted because of your caretaking responsibilities?	F7a
In the past 12 months, how often did you feel emotionally exhausted because of your caretaking responsibilities?	F7b
In the past 12 months, how often have your caretaking responsibilities caused you to worry about the future?	F7c
How much time did you spend yesterday taking care of someone in need (not related to work), for example a child, an elderly, or a person with a disability?	F17c
Work strain	
In the past 12 months, how often have you experienced your work- or study activities as stressful?	F4a
In the past 12 months, how often did you feel emotionally exhausted from your work- or study activities?	F4b

In the past 12 months, how often did you feel physically exhausted from your work- or study activities?	F4c
How much time did you spend yesterday on paid work, studies, or internship?	F17a
Performance demand	
In the past 12 months, how often did you feel that you could not live up to other people's expectations of your performance?	F4d
In the past 12 months, how often did you feel that you could not live up to your own expectations of your performance?	F4e
Discrimination	
Because of your gender, how often have you felt discriminated against when applying for a job?	F8a
Because of your gender, how often have you felt discriminated against when at school?	F8b
Because of your gender, how often have you felt discriminated against when at work?	F8c
Because of your gender, how often have you felt discriminated against when receiving medical care?	F8d
Because of your gender, how often have you felt discriminated against in public settings?	F8e
Because of your gender, how often have you felt discriminated against in your family?	F8f
Social support	
How often do you have someone to show you love and affection?	F10d
How often do you have someone, apart from those in your household, to help you with daily chores?	F10e
Risk taking	
In general, how prepared are you to take risks?	F5a
How prepared are you to take risks when making financial decisions?	F5b
How prepared are you to take risks when it comes to recreational activities?	F5c
Independence	
How important is it for you to solve your problems on your own?	F11a
How important is it for you to be independent?	F11b
Emotional intelligence	
How often do friends talk to you about their problems?	F10a
How often do you talk to your friends about your problems?	F10b
How often do you sense if a person feels uncomfortable in a group?	F10c
How easy or hard is it for you to express what you are feeling to family and friends?	F12

Note: Questions measuring gender-related norms, from Jämställdhetsundersökningen. Questions were asked in Swedish in the survey. English translations are based on Nielsen et al. (2021) and my own translation.

4.2.2 Operationalisation of the dependent variable

The dependent variable, mental health, is measured thought the WHO-5 Wellbeing index, a validated and widely used index for measuring wellbeing and screening for depression (Topp et al., 2015). The WHO-5 index consists of five items on a six-point Likert scale ranging from 0 (at no time) to 5 (all of the time) (Sischka et al., 2020). The items do not measure a specific disease and are single dimensioned with only positively phrased items. The WHO-5 can be used both as a measurement of wellbeing outcomes and as a tool for screening of depression, where a cut-off score of ≤ 50 is used to indicate reduced well-being (ibid).

Table 2 displays the survey questions making up the index. For the purpose of this thesis, I use the English translations. According to Topp et al., it is recommended to multiply the raw score (reaching from 5-0 as stated in the figure) by 4 "because scales measuring health related quality of life are conventionally translated to a percentage scale from 0 (absent) to 100 (maximal)" (2015, p. 168).

Several benefits of using the WHO-5 index to assess mental health have been put forward, for example that it is easily translated and relatively independent of specific cultural norms when used in different contexts (Topp et al., 2015). A report by the Swedish Association of Local Authorities and Regions (SALAR), focusing on how masculine norms can created obstacles for men to report mental health problems, points out that using a general scale WHO-5 to assess mental health can be beneficial as it does not ask for depressive symptoms but rather wellbeing in a sense that also men with difficulties to verbally express feelings can answer (SKL, 2018).

The data from Jämställdhetsundersökningen contains an already combined variable constructed from the five variables displayed in table 2. The index variables consist of the sum of the scores for each individual for each of the five variables, multiplied with 4 to translate it into a percentage score as recommended in the literature (Topp et al., 2015). Accordingly, values range from 0 (minimum wellbeing) to 100 (maximum wellbeing).

Table 2. Operationalisation of mental health: Items of WHO-5 Wellbeing Index

Question	Survey question number
How often in the past two week have you felt cheerful and in good spirits?	F2a
How often in the past two week have you felt calm and relaxed?	F2b
How often in the past two weeks have you felt active and vigorous?	F2c
How often in the past two weeks have you woken up feeling fresh and rested?	F2d
How often in the past two weeks have your daily life been filled with things that interest you?	F2e

Note: Questions measuring mental health, from Jämställdhetsundersökningen. Questions were asked in Swedish in the survey. English translations are based Topp et al. (2015).

4.2.3 Control variables

To estimate the correlation between the gender-related norms and subjective wellbeing, several control variables that were expected to potentially have a relationship with the dependent variable are included in the analysis. As explained above in section 4.1, the data from Jämställdhetsundersökningen includes additional register-based information on the respondents provided by Statistics Sweden. Most control variables were retrieved from the register information. Control variables that were made up of categorical data were coded into dummy variables. The below variables were included.

Gender
Register based information of the respondent's legal gender was used as a control variable. The gender variable was also used to create two separate datasets to analyse the influence of gender norms for women and men respectively. Previous research on a Swedish population have shown that being a woman was associated with mental health outcomes, for example psychiatric inpatient diagnosis (Linder et al., 2020).

Age
A variable measuring age of the respondent was included. This variable was kept in its original scale in the analysis. Previous studies on mental health have shown that the rates of reported mental wellbeing and psychological distress varies with age. In a survey conducted by the Public Health Agency of Sweden the youngest age group, individuals aged 16-29, had the highest share of reported severe psychological distress and the highest share of reported severe problems with anxiety or worry (Folkhälsomyndigheten, 2020). When it comes to wellbeing, women aged 16-29 reported had the lowest share of individuals who reported very good subjective wellbeing (ibid).

Economic standard, educational attainment, and occupational status
Economic standard, educational attainment and occupational status were included to consider the potential influence of socioeconomic position on mental health. Information on economic standard and educational attainment was register-based. Data on occupational status was retrieved from one of the survey questions included in Jämställdhetsundersökningen. I chose to measure economic standard rather than alternative indicators such as income as economic standard takes into account the gathered income and the composition of a household (Folkhälsomyndigheten, 2022a).

In previous surveys on the Swedish population, the share of reported mental health problems have been showed to vary between different socio-economic groups (Folkhälsomyndigheten, 2020). For example, the highest share of reported psychological distress is found in the group with the lowest income. High mental wellbeing was more common for those with a high income. Moreover, a higher share of those with only compulsory education compared to those with post-secondary school education whereas I higher share of respondents with post-

secondary education reported more stress than respondents with only compulsory education (ibid).

Living situation
The variables household type, having children and having children under the age of six were also included to consider the respondent's living situation. This was motivated by previous surveys that have shown that the prevalence of mental health problems is more common in groups such as single parents (Folkhälsomyndigheten, 2019).

Background
Background was measured by a register-based variable with information of if the respondent was born in Sweden, outside of Sweden, and if one or both parents of the respondents are born outside of Sweden. According to a report by the Public Health Agency (Folkhälsomyndigheten, 2019) individuals born outside of Sweden generally had worse self-reported mental health, including worse mental wellbeing. Previous studies have established that there are existing inequalities in mental health between individuals with foreign background compared to those with Swedish background where being foreign born or having foreign born parents is associated with a higher risk of different aspects of mental health problems (Brydsten et al., 2019; Linder et al., 2020)

4.3 Using weights to account for nonresponses

Nonresponses can cause significant problems in survey research (Yan & Curtin, 2010). Usually, nonresponses are divided into unit nonresponses and item nonresponses. The former refers to the complete absence of one unit (for example an individual) of a given sample and the latter refers to the absence of a specific question in the survey (an item) (ibid). Unit nonresponses may pose a problem especially if the missing units do not correspond to a random subset of the total sample, which is often the case (Sapsford, 2007). There are different techniques to deal with the potential bias that comes with unit nonresponses, such as different techniques to making the sample more representative of the population by adjusting sampling weights (Lumley, 2010).

To account for unit nonresponses, I included pre-calculated weights in the analysis provided by Statistics Sweden with the data from Jämställdhetsundersökningen. To obtain the weights, a calibration estimation was used by Statistics Sweden by using the register variables to adjust the weights of the sample (SCB, 2022). The response rate was higher among older individuals, among women, among married and people living with a partner, among Swedish born, and among individuals with higher educational attainment (ibid). Hence, weights were calculated based on information of these variables to allow for better prediction of the whole population.

4.4 Constructing summative scales of gender-related norms

To analyse the associations between the gender-related norms and mental health, summative scales (also referred to as constructs) were constructed from groups of single variables, as presented above in table 1. Summative scales are composite variables that are made up of two or more variables that are conceptually or statistically related (Song et al., 2013). There are several benefits of using composite variables rather than single variables, for example in addressing multicollinearity in regression analysis and to organize multiple highly correlated variables to more meaningful or accessible information (ibid). Moreover, composite variables also allow for analysis of complex constructs in detail, as well as increases the information about the latent variable of interest and thereby also internal consistency (Martinez-Martin, 2010).

According to Mazziotta and Pareto (2013) there is no universal method when it comes to creating composite variables. In this thesis, I chose to combine the sum of the item score into a total score, a commonly used approach (Martinez-Martin, 2010; Streiner & Norman, 2008). According to Streiner and Norman this approach "is conceptually and arithmetically simple and makes few assumptions about the individual items; the only implicit assumption is that the items are equally important in contributing to the total score" (2008, p.1).

Mazziotta and Pareto (2013) outline four steps for the process of constructing composite variables. The first step involves defining the phenomenon to be measured that should refer to theoretical framework. The second step consists of selecting a group of individual variables according to factors such as their relevance, analytical plausibleness, and accessibility. In the third step the indicators are normalized to make them comparable if they are not measured on the same scale. The fourth step is to aggregate the normalized indicators, where different aggregation methods are possible. Similar steps are described by Djurfelt et al. (2010, p.451). Here, first step is to exclude irrelevant categories, then coding variables in the same direction. Thereafter, variables should be transformed into a standardized scale if they are measured on multiple scales. Finally, single variables are summed up. Combining the steps described by Mazziotta and Pareto (2013) and Djurfelt et al. (2010) I followed the below steps when constructing the summative scales:

1. **Selection of variables**
   Variables were selected based on the analytical framework offered by Nielsen et al. (2021). As described in the operationalization section, the set of single variables formed the seven constructs developed by Nielsen et al. One additional set of variables was selected, measuring 'performance demand'.

2. **Excluding of irrelevant categories**

Responses of the category "not applicable" were given the value '0', meaning that these responses were given the same value as those who responded that they had no conformity to the given statement, to maximize the sample. Categories "I don´t know" and "I don't know/not applicable" were excluded from the analysis by being coded as missing values, as information of these responses were considered unknown. After the recoding of the variables, all single variables ranged from 0-3, excluding NAs.

3. **Reversing and recoding of variables**
   For all variables, a lower value indicated a "stronger" conformity to the statement whereas a higher value indicated a weaker conformity to the norm. To facilitate interpretation, all variables were reversed so that a higher value indicated a stronger conformity to the given gender norm and a lower value indicated a lower conformity. For example, response category "often", which originally had the value 0, were given the value 3, and response category "never" was recoded from 3 to 0, etc.

4. **Ensuring variables are on the same scale**
   All variables except variables measuring time-use in relation to caregiving responsibilities and work were measured on the same scale (four-point Likert scale). For the two variables measuring time-use (see question F17a and F17c in table 1) respondents were asked how much time they had spent the previous day on caregiving responsibilities and work activities respectively. These variables were measured with the number of reported hours and minutes combined. I transformed these variables into the same scale by recoding the values into four groups based on the amount of time spent. However, as discussed in the below section on reliability, these variables were later excluded from the constructs and instead used as two single variables as they decreased the internal consistency of the constructs.

5. **Creating summative scale from the sum of item scores**
   Finally, the single variables were summed up to retrieve a summative scale for each of the 8 constructs/composite variables. Hence, each individual was given a score based on the total score of the sum of the single items.

The strategy of summing up scores means that the score should be interpreted as that a higher score equals a higher level of experiences of the gender-related norms. In some cases, this could mean that an individual with lower values on multiple items will generate an equal or higher score compared to an individual with a higher value on one item. For example, for a construct consisting of three items, an individual with a value '1' on all items will have the same value as an individual with the value '3' on one item and the value '0' on the remaining items. The assumption in this case is that a higher score within a construct equals a higher number of experiences of the given gender-related norm.

4.5 Reliability

The reliability of the summative scales was analysed through Cronbach alpha and the Spearman Brown coefficient. Cronbach alpha is a common reliability measure for multi-item scales. The Cronbach alpha coefficient gives information of the internal consistency of a measure, which is the inter-relatedness of variables, or the extent to which the items measure the same concept or construct (Tavakol & Dennick, 2011). Often, an alpha value between 0.7 and 0.95 are considered acceptable (ibid). For scales consisting of only two items, it has been argued that Cronbach alpha is not a sufficient measure of reliability (Eisinga et al., 2013). Instead, Eisinga et al. suggest that the Spearman-Brown coefficient is the most appropriate reliability statistic for a two-item scale (ibid). Therefore, I assessed the reliability of the scales with more than two items through Cronbach alpha and the two-items scales with the Spearman-Brown coefficient.

4.5.1 Cronbach Alpha

Cronbach alpha for the five-item scale measuring the dependent variable, wellbeing, was 0.87. According to common thresholds, this indicates a good internal consistency for the WHO-5 Wellbeing index for the present sample. Cronbach alpha would not have increased if any item was dropped from the scale.

Table 3 report the alpha values for the variables included in each construct. For the items within the caregiver strain-construct, the Cronbach-alpha analysis showed a value of 0.48. Moreover, the output also revealed that one of the variables, time spent on caregiving responsibilities (F17c) was negatively correlated with the scale. To ensure the reliability of the scale, I decided to drop the time-use variable from the scale. Instead, the time-use variables were included in the model as two single variables measuring the number of hours spent on caregiving and paid work respectively.

Running the Cronbach alpha again on the new set of items, the coefficient increased to 0.82. The analysis of the work strain construct resulted in the similar, and the variable measuring time spent on paid work, studies, or internship (F17a) was negatively correlated with the scale. I took the same measure as for the caregiver strain-construct, and the new analysis on the selected items showed a coefficient of 0.91. For the remaining variables, the Cronbach alpha was considered acceptable/good.

Table 3. Cronbach alpha for multi-item scales with three or more items

Caregiver strain	0.48

Caregiver strain after dropping time-use variable	0.82
Work strain	0.53
Work strain after dropping time-use variable	0.91
Discrimination	0.86
Risk-taking	0.71
Emotional intelligence	0.65

4.5.2 Spearman-Brown coefficient

The Spearman-Brown coefficient can be interpreted in a similar way as the Cronbach alpha. For the performance demand construct and the independence construct, I interpret the values to be acceptable (0.75 and 0.71 respectively). However, as the social support construct shows a low reliability (0.14) I decided to take further measures. Since the construct consist of only two items it was not possible to drop one item to raise reliability. Therefore, I decided to include only one of the items within the social support construct in the analysis, – How often do you have someone to show you love and affection? (See operationalization section). I assessed this item to the one most conceptually related to social support.

Table 4. Spearman-Brown coefficient for two-item scales

Performance demand	0.75
Social support	0.14
Independence	0.71

4.6 Estimation model

The relationship between the gender-related norms, control variables and subject wellbeing was analysed using a multiple linear regression model using R. Multiple linear regression allows for analysis of how a dependent variable changes as the independent variables change and controlling for other potential variables (referred to as control variables or confounders). Multiple regression can make better predictions than bivariate regressions of a dependent variable, y, by allowing for taking other important independent variables into account (Ruist, 2021). In a multiple linear regression, the dependent variable is seen as a linear function of more than one independent variable (Lewis-Beck & Lewis-Beck,

2016). The general equation for the multiple linear regression can be written as below (retrieved from Lewis-Beck & Lewis-Beck, 2016):

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \ldots + \beta_k x_k + \varepsilon$$

In the equation, y is the dependent variable, the x are the independent variables and B is their unknown coefficients, i.e., the steepness of the regression line. The B0 is the intercept, and hence determines the height of the regression (ibid). E is an error term which is the error in predicting the value of y from the regression. The method for calculating the regression line is the Ordinary Least Squares (OLS) method which calculates the regression line through minimization of the sum of the squared residuals (Arkes, 2019)

4.7 Assumptions of the linear regression

Lewis-Beck and Lewis-Beck (2016, p.2) introduce the general assumptions of the linear regression including subsets of assumption presented below.

No specification errors
No specification error means that theoretical assumptions reflected in the model are correct. For specification errors to be absent, it is important that y is the dependent variable, x is the independent variable and not vice versa. It is also important that no relevant independent variables have been excluded and no irrelevant independent variables have been included in the model. Finally, the relationship between y and x should be linear (ibid).

When it comes to the specification of the independent and dependent variables, the theoretical assumptions are laid out in theory sections which concludes that there are reasons to expect that subjective wellbeing is dependent upon gender-related norms. Using a similar measurement of gender-related norms as in previous research is a way to avoiding that relevant variables have been excluded and irrelevant variables have been included in the model. The control variables have been chosen based on previous research and their relevance for health outcomes in previous surveys. I discuss the issue of excluding irrelevant variables in section 4.7.1 in terms of multicollinearity.

To investigate the assumption of linearity I draw scatterplots (see appendix 1) of the associations between each independent variable and the dependent variable. If the scatterplots would show a clear non-linear association, for example an S-shaped curve, it would imply that a non-linear model is more suitable for the given data (Ruist, 2021).

I interpreted the scatterplots as showing relatively linear relationships between each of the independent variables and the dependent variable, and none of the

relationships were clearly non-linear. The seemed strength of the relationships varied between the variables with some showing clear relationship (there was a slope of the regression line) and some show seemingly weak relationships with almost horizontal regression lines (see appendix 1).

No measurement errors

Secondly, the absence of measurement errors means that the variables have been accurately measured (ibid). Measurement errors could occur in survey responses, coding of responses or in that the variables are not sufficiently explaining the concepts of interest. Data is rarely completely free from small, non-trivial errors, for example survey respondents may not give an accurate option on a sensitive topic, or may not remember past experiences correctly (Arkes, 2019). Having noted this, I have not found indications of any systematic measurement error in the survey respondents or coding, and the concepts of interest have been operationalized thought measurement that have been validated or previously studied.

Average error term of zero

The third set of assumptions are related to the error term, i.e., the error of predicting the independent variable (y) given the values on the independent variables (x) (Lewis-Beck & Lewis-Beck, 2016). For the model not to be biased, the average of the errors should be zero. An average error term of zero means that random chance determines the values of the error terms, and if the average error term is not zero it can mean that the model systematically predict values too high or too low. This would mean that the estimation of the intercept is biased. However, Lewis-Beck and Lewis-Beck (2016) argues that since the intercept is not usually of primary interest, this potential bias is of limited importance.

Homoscedasticity

The second assumption related to the error, homoscedasticity, means that the error variance is relatively constant across different values of independent variables. If drawing a fitted regression line based on the model, this would mean that the error terms, i.e., *residuals* gather around an approximately equal width below and above this line (ibid). If for example points spread out to have a longer distance in one end of the regression line, heteroskedasticity would appear (ibid). I further examine this assumption in the section of regression diagnostics below.

The error terms should be uncorrelated

This assumption means that the error terms should not be correlated with each other, more specifically that "the error corresponding to an observation is not correlated with any of the errors for the other observations" (Lewis-Beck & Lewis-Beck, 2016, p.3). If the error terms of different observations are correlated, autocorrelation is present, and the coefficients may show significant relationship that are not. However, autocorrelation is merely an issue in time-series data when observations from one point in time might be related to observations on another point in time (ibid).

The error term should be uncorrelated with the independent variable
Lewis-Beck and Lewis Beck (2016) argues that in non-experimental research designs it can be hard to meet the assumption of that the independent variable is uncorrelated with the error term. An independent variable could be correlated with the error term if important explanatory variables are not included in the model that are correlated with the independent variables. To give an example, in a regression analysis that estimates the relationship between economic standard and mental health, education may be a variable that correlates with economic standard. Excluding education from the model would then mean that the relationship is biased since economic standard is correlated with the error term (the error term in this case can be interpreted as excluded variables). Although there is always a risk that explanatory variables have been excluded from the model that are correlated with the independent variables included in the model, I have intended to account for this potential bias by including control variables that are known from previous research to be important predictors of mental health. Moreover, Arkes (2019) argues that this assumption must not hold if the objective is to determine predictors of an outcome rather than estimating causal effects or adjust outcomes.

Normality: The error term should be normally distributed
A final assumption of the regression is that error terms should be normally distributed (Lewis-Beck & Lewis-Beck, 2016). A common way to check this assumption of the data, is to inspect the estimated error terms, i.e., residuals through normal probability plots (Ibid). I used R to graphically inspect the residuals from the bivariate regressions between the gender norms respectively and the dependent variable by drawing normal probability plots. I also draw a normal probability plot of the final regression models with control variables included. The normal probability plot compares sample percentiles of the data with theoretical percentiles from a standard normal distribution. If the dots follow more or less a straight line, this indicates that the distribution is normal (ibid). For some of the plots, the dots lower in the upper part of the line (see appendix 1). However, as the dots did not show any clear shape other than the straight line, for example an “s”-shape or a concaved line up or down (Olive, 2017) I took no further measures. Moreover, Arkes (2019) argues that due to the so-called Central Limit Theorem, errors terms should be approximately normally distributed if the sample is larger than 200.

4.8 Regression diagnostics

After building the multiple regression (MLR) model, I evaluated the goodness of the fit of the model.

4.8.1 Multicollinearity

Multicollinearity means that there is a strong linear relationship between the independent variables (Olive, 2017; Ruist, 2021). Multicollinearity may result in problems predicting the relationship between independent variables and the outcome in a precise manner if the correlation between the independent variables is too high in relation to the number of observations (ibid). Ruist (2021) points to that there is no set threshold when it comes to deciding whether multicollinearity is a problem for the precision of the predictions but when the dataset includes many observations the chances of making more precise prediction increases.

However, it could be suspected that several of the control variables I included in the regression model are highly related to one another. For example, economic standard and education are both different measures related to socioeconomic position both relate to the respondent's relationship status. According to Olive (2017), when multicollinearity is present the variance inflation factor (VIF) and the R2 are large. I calculated the variance inflation factor (VIF) for the variables originally included in the model. Although there is no established threshold for what is considered an acceptable VIF-value, a common rule of thumb is that a value greater than 4 require further investigation (see for example Pennsylvania State University, 2018). For none of the independent variables the values were close to 4. However, some of the control variables had a value greater than 5, which could indicate that multicollinearity is present in the model. The variables with a high VIF-value were the control variables measuring if the respondent had children, had children under the age of six, and if the respondent were living with children in the household. As it could be expected that these variables were to some extent measuring the same concept, I decided to omit the two control variables measuring if the respondent had children and if the respondent had children under the age of six, as I assessed that living with children in the household alone could account for measuring if the respondent's living situation with children. A second VIF-calculation without the two variables showed no sign of multicollinearity.

4.8.2 Inspection of residuals

I checked the goodness of fit of the MLR model by drawing residual plots. In appendix 1, regression diagnostics for the multiple regression on the whole sample (the model presented in table 8) are included.

In a residual plot showing the residuals versus the fitted values, the plotted points should ideally scatter around the horizontal line where the residuals=0 and no other patterns should be present (Olive, 2017). Moreover, the variance in the errors should be approximately constant. If this is the case, the model has homoscedasticity. On the other hand, if the variance of the errors is dependent of the value of y, the homoscedasticity does not hold and there is heteroskedasticity, which means that estimated standard errors will be biased (Arkes, 2019).

According to Arkes (2019), to correct heteroskedasticity, one can use robust standard errors, also referred to as Huber-White estimators. "This allows the

standard errors to vary by the values of the X variables" (Arkes, 2019, p.154). I concluded that in the model for the bivariate relationship between discrimination and the dependent variable, there was a small possibility of having heteroskedasticity in model. I therefore used robust standard errors to correct for this potential bias.

Moreover, the plots of regression diagnostics also revealed that there were a few outliers in the data, however, as the plot of leverage showed that no observation had a higher Cook's distance value than 0,5 and hence were not influential cases to the regression (Olive, 2017).

5 Results

In this chapter, I present the results from the analysis of the relationships between gender-related norms and mental health. I begin by presenting the sample characteristics through descriptive statistics with regard the variables included in the model. This is followed by a presentation of the results from the regression analyses. First, I present results from bivariate regression models analysing the relationships between the gender-related norms respectively and wellbeing. Second, I present the results from the multiple regression model including all independent variables and control variables. Third, I present the results from multiple regression models for women and men separately. Finally, in order to graphically illustrate and compare the relationships between the gender-related norms and mental health, I present regression results in coefficient plots.

5.1 Descriptive statistics

In this section I present and comment on the descriptive statistics of the sample. Table 5 presents the number of observations, median values, means, standard deviations and ranges for the independent variables - the gender-related norms, and the dependent variable - wellbeing. To enable comparison, I also present the same summary statistics for women and men in the sample respectively.
Some features of the data can be noted. The number of observations range from 5770 to 6538 and hence the number of missing cases also varies.

The caregiver strain variable included responses of those individuals who reported that they had no caregiving responsibilities in a selection question asking respondents to ignore the survey questions on caregiving strain if this was the case. These responses were included in order to avoid a great loss of observations for this variable, and since it was assumed reporting no caregiving responsibilities was the equivalent of having a score of ’0’ on the caregiver strain scale.

For the time-use variables, these were some outliers that have been excluded from the analysis, namely those who reported spending more than 24 hours a day or more than 60 minutes (since the survey asked respondents to report the time spent in hours and minutes).

The lower number of observations for the variables measuring time spent on paid work and unpaid caregiving respectively means that for these variables, the number item-nonresponses are higher compared to the other variables. A reason for the higher number of non-responses for the time-use variables may be that respondents that did not spend any time on work or caregiving instead of

reporting 0 time spent, did not fill out the question, however, this is difficult to determine.

The number of observations is higher for women than men for all variables, which reflect the overall response rate which was higher for women compared to men (see table 6).

Moreover, the median values are relatively low in relation to the minimum and maximum value for some of the variables, for example caregiver strain and time spent on (unpaid caregiving) where the median values are 0. This means that there are many cases among the lower values for these variables. For the caregiving strain variables, an explanation for the many respondents having a score of '0' on the caregiver strain construct is that many of the respondents reported that they did not have any caregiving responsibilities. In appendix 1 histograms for each variable are included for further information on the distribution of responses.

For the variables work strain, performance demand, discrimination and emotional intelligence median values are higher for women compared to men. Median values for risk-taking and wellbeing are higher for men compared to women. The same pattern can be seen among the mean values for the variables, where men furthermore have a higher mean of hours spent on paid work and women have a higher mean of hours spent on unpaid caregiving.

Table 5. Descriptive statistics: Independent variables and dependent variables.

Variable	N	Median	Mean	SD	Min	Max
Caregiver strain	6332	0	1.69	2.67	0	9
Women	3418	0	2.04	2.92		
Men	2914	0	1.28	2.26		
Work strain	6490	3	3.63	3.27	0	9
Women	3499	4	4.03	3.43		
Men	2991	3	3.16	3.02		
Time spent on paid work, studies, or internship	5917	1	3.60	4.01	0	24
Women	3136	1	3.54	3.93		
Men	2781	1	3.66	4.11		
Time spent on (unpaid) caregiving	5770	0	1.28	3.13	0	24
Women	3069	0	1.50	3.54		
Men	2701	0	1.02	2.56		
Performance	6492	3	2.81	2.07	0	6
Women	3501	3	2.98	2.12		
Men	2991	2	2.62	2.00		
Discrimination	6273	1	2.16	3.09	0	18
Women	3409	2	3.13	3.44		
Men	2864	0	1.00	2.09		
Independence	6486	4	4.40	1.28	1	6
Women	3503	4	4.47	1.24		
Men	2983	4	4.32	1.33		
Risk-taking	6424	4	3.65	2.10	1	9

Women	3454	3	3.45	2.07		
Men	2970	4	3.89	2.10		
Emotional intelligence	6520	7	6.98	2.60	1	12
Women	3520	8	7.78	2.40		
Men	3000	6	6.05	2.51		
WHO-5 Wellbeing Index	6538	64	58,83	21,12	0	100
Women	3526	60	56.4	21.3	0	100
Men	3012	64	61.7	20.5	0	100
Variable measuring social support	N	%				
How often do you have someone to show you love and affection?	6350	100				
Often' or 'sometimes'	5467	86,1				
Women	3059	44.05				
Men	2408	55.95				
'Occasionally' or 'never'	883	13,9				
Women	376	42.58				
Men	507	57.42				

Note: Number of observations, median value, mean value, standard deviations, and range calculated for independent variables. Two decimals included.

Sample characteristic grouped by the control variables are presented in table 6. There are some sample characteristics that can be noted. There are more women than men in the sample. Employed and retired are the largest occupational groups in the sample. Moreover, the largest group in the sample with regard to background are domestic born individuals with domestic born parents, making up 77.42 percent of the sample.

The largest educational group are respondents with post-secondary education and the second largest are respondents with upper secondary education. The largest group in the sample with regard to household type are those living together with a partner but not having children in the household. The second largest household type is made up of those living together with a partner and with children in the household. The median economic standard is 299 965 kr/year, and the mean is around 355 703 kr/year. Finally, the median age of individuals in the sample is 54 years and the mean is around 51.

Table 6. Descriptive statistics: Control variables.

Variable	%	N
Gender	100	6570
Women	53,91	3542
Men	46,09	3028
Occupational status	100	6487
Employed	44,83	2 908
Student	14,40	934
Sick-leave	1,54	100

Unemployed	2,31	150				
Retired	32,30	2095				
Parental leave	1,17	76				
Other	3,45	224				
Background	100	6569				
Foreign born	12,80	841				
Domestic born with foreign born parents	2,69	177				
Domestic born with one foreign born parent	7,08	465				
Domestic born with domestic born parents	77,42	5086				
Educational attainment	100	6570				
Compulsory	16,65	1094				
Upper secondary (and post-secondary shorter than 2 years)	34,89	2292				
Post-secondary 2 years or longer	44,44	2920				
Unknown	4,02	264				
Household type	100	6569				
Single with children	5,60	368				
Single without children	21,49	1412				
Co-habitant with children	30,80	2023				
Co-habitant without children	34,66	2277				
Other	7,44	489				
Economic standard	N=6541	Median=299 965	Mean=355 703,8	SD=590 244	Min=-205204	Max=35 393 182
Age	N=6570	Median=54	Mean=51,25	SD=21.24	Min=16	Max=101

Note: Percentages of total number of observations and number of observations for all control variables included in the model. Two decimals included. For interval scale variables the table shows number of observations, median value, mean value, standard deviations, and range.

5.2 Linear regression models

5.2.1 Bivariate models

In this section I present the results from bivariate regression models with the gender-related norms respectively as independent variables and wellbeing as the dependent variable. Table 7 displays the bivariate models, including unstandardized b-coefficients, robust standard errors, significance levels, number of observations and adjusted R-square values (the proportion of explained variance adjusted for the explanatory power of added variables). Model 1, 2, 3 and

4 shows that *caregiver strain, work strain, performance demand* and *discrimination* were negatively related to the dependent variable and the relationships were significant on the 0.001 level. Model 5 displays the relationship between the variable measuring social support and wellbeing. For those having 'often' or 'sometimes' someone to show them love and affection, there was a positive and significant relationship with wellbeing, compared to those having 'occasionally' or 'never' someone to show them love and affection (reference category). Moreover, model 6 shows a negative but non-significant relationship between independence and the dependent variable. Risk-taking was positively related to the dependent variable in model 7, but the relationship was not significant. Finally, in model 8 it is displayed that emotional intelligence was positively and significantly related to wellbeing. The number of observations for each relationship shows that some observations have been excluded due to missingness. Adjusted R-square is relatively low in all models which indicates that the gender norms respectively do not explain much of the variance in the dependent variable. However, this is expected since the models only include the bivariate relationships.

Table 7. Result from bivariate linear regressions. Unstandardized b-coefficients and standard errors in parentheses.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Caregiver strain	-1.58*** (0.10)							
Work strain		-1.81*** (0.08)						
Performance demand			-3.57*** (0.12)					
Discrimination				-1.56*** (0.09)				
How often do you have someone to show you love and affection?								
'Often' or 'sometimes'					11.94 ***			
Reference category: 'Occasionally' or 'never'					(0.82)			
Independence						-0.14 (0.22)		
Risk-taking							0.03 (0.13)	
Emotional intelligence								0.37 *** (0.11)
N	6311	6488	6490	6251	6328	6465	6421	6498
Adjusted R-square	0.04	0.08	0.12	0.05	0.04	-0.00	-0.00	0.00

*Note: Significant codes: ***= 0.001, **= 0.01, *=0.05. Rounded to two decimals.*

5.2.2 Multiple linear regression

In this section I present the results from the regression analysis including all independent variables and control variables. Table 8 shows the result of the multiple regression model. The model includes weights, meaning that a value is added to the variables based on register information to enable to make better prediction of the whole sample, the Swedish population (see more information on weights in section 4.3). Adjusted R-square was 0.29. This means that approximately one third of the variation in the WHO-5 wellbeing index could be attributed to variance in the independent variables included in the model.

In the model, *caregiver strain, work strain, performance demand* and *discrimination* were significantly related to lower wellbeing, holding constant the control variables. To give an example of how the relationships can be concretized, the unstandardized b-coefficient for the caregiver strain scale show that with one score on the caregiver strain scale, the average wellbeing is expected to be reduced by approximately one WHO-5 wellbeing scale score. Likewise, an increase of one score on the work strain scale is expected to reduce the average wellbeing with 1,5 scores on the WHO-5 wellbeing scale. It is important to note that the b-coefficients are unstandardized, meaning that the scales have different ranges due to the different number of items in each scale. Hence, the model does not show the relative strengths of the relationships of different gender-related norms.

Moreover, *risk-taking* and *independence* were both positively and significantly related with wellbeing. However, since neither risk-taking nor independence had significant associations with the dependent variable in the bivariate regressions, the results can be regarded as inconclusive. The final construct measuring gender-related norms in the model, *emotional intelligence*, were significantly related to higher wellbeing.

The single item measuring an aspect of *social support*, having someone showing love and affection, was significantly related to wellbeing in the model. For those having someone who ‘often’ or ‘’sometimes’ showed them love and affection, it was expected to have an increased average wellbeing of approximately 9 scores on the WHO-5 index. The two variables measuring *time spent on paid work, studying or internship* and *time spent on taking care of someone* respectively showed no significant relationship with wellbeing in the model.

Among the control variables, *gender, employment status, household type, education* and *economic standard* had significant relationships with the dependent variable. Being a woman was significantly related to lower wellbeing compared to men. Being retired, on sick-leave, unemployed, or ‘other’ was also related to lower wellbeing compared to those employed. Since the meaning of the category ‘other’ is not know it is difficult to draw any conclusions from this particular finding. The results indicate that being on sick-leave had a particular influence on wellbeing. However, as noted above the exact comparative strengths of the relationships cannot be determined from the model. Regarding household type, it

was significantly related to lower wellbeing to live in a single household without children compared to living together with a partner and with children. Having upper secondary school education or ‘unknown’ educational attainment compared to having post-secondary school education was also significantly and negatively related to wellbeing. However, as the name of the category implies, it is difficult to determine the characteristics of unknown educational attainment and therefore it is also difficult to draw conclusions form this particular result. Finally, for those in the group with the lowest economic standard there was a significantly and negative relationship with wellbeing as well as for those in the second lowest group of economic standards, compared to those in the highest group. The remaining relationships between control variables and the dependent variable were non-significant.

Table 8. Multiple regression model. Unstandardized b-coefficients and robust standard errors in parentheses

Caregiver strain	-1.00***	(0.13)
Work strain	-1.52***	(0.14)
Performance demand	-2.63***	(0.20)
Discrimination	-0.44***	(0.12)
Independence	0.59*	(0.25)
Risk-taking	0.64***	(0.17)
Emotional intelligence	0.96***	(0.15)
Often' or 'sometimes' having someone to show you love and affection	9.09***	(1.00)
(Reference category: ‘Occasionally’ or ‘never’ having someone to show you love and affection)		
Hours spent on paid work, studying or internship	0.08	(0.08)
Hours spent on care	0.09	(0.12)
Gender		
Woman	-3.02***	(0.70)
(Reference category: Man)		
Age	0.04	(0.03)
Employment status		
Student	0.22	(1.14)
Retired	-5.01***	(1.22)
Unemployed	-7.37***	(2.15)
Sick-leave	-17.01***	(2.38)
Parental leave	-0.08	(2.66)
Other	-4.45*	(2.05)
(Reference category: Employed)		
Household type		
Single with children	-1.18	(1.41)
Single without children	-3.70***	(0.93)
Cohabitant with children	-1.17	(0.85)
Other	-1.13	(1.30)
(Reference category: Cohabitant without children)		
Educational attainment		
Compulsory	-1.73	(1.07)
Upper secondary	-1.36*	(0.65)
Unknown	5.89**	(2.23)
(Reference category: post-secondary		
Background		
Foreign born	0.84	(0.98)
Domestic born with one foreign born parent	2.00	(1.12)
Domestic born with foreign born parents	1.25	(1.58)
(Reference category: Domestic born with domestic born parents)		
Economic standard		

Economic standard quartil 1 (lowest)	-3.87***	(0.97)
Economic standard quartil 2	-1.69*	(0.81)
Economic standard quartil 3	-0.94	(0.76)
(Reference category: Economic standard quartil 4 (highest))		
N	5093	
Adj. R-square	0.2967	

*Note: Significant codes: ***= 0.001, **= 0.01, *=0.05.*

5.2.3 Separate models for women and men

To investigate the second research question more specifically, if the relationship between gender-related norms and mental health varies for women and men, I ran multiple regressions dataset with all women and all men in the sample separately. The results of the separate regression models for women and men respectively are shown in table 9.

The results from the separate regression analysis on women and men in the dataset respectively showed that some of the gender-related norms were significantly related to wellbeing for women but not for men. For women, *caregiver strain*, *work strain, performance demand* and *discrimination* were all significantly and negatively related to wellbeing. *Independence* had no significant relationship with the dependent variable whilst *risk-taking*, *emotional intelligence* and the single variable measuring *social support* were positively related to wellbeing.

For men, *caregiver strain, work strain,* and *performance demand* were significantly related to lower wellbeing but the association between *discrimination* and wellbeing was not significant. Neither *independence* nor *risk-taking* was significantly related to wellbeing for men. *Emotional intelligence* and the variable measuring *social support* were positively related to wellbeing and the relationships were significant which was in line with the result for women. Like the multiple regression model for both women and men, the variables measuring *time spent on work* and *unpaid care* respectively were not significantly related to wellbeing in the separate analyses either.

There were also some differences between the models of women and men respectively with regard to the control variables. For women, age was positively related to wellbeing on the 0.05-significance level, so that with a higher age a higher wellbeing was expected. For men, age was not significantly related to wellbeing in the model. Sick-leave was significantly related to lower wellbeing for both women and men compared to those that were employed. For women but not for men, being retired, unemployed or 'other' compared to being employed was also related to wellbeing. However, as the category 'other' is unknown it is difficult to draw any conclusions from this. For both women and men, being single without children compared to living with a partner without children had a significant and negative relationship with wellbeing. For women, having compulsory education compared to post-secondary was negatively associated with wellbeing on the 0.05-significance level. For men, having 'unknown' educational attainment had a significant and positive relationship with the outcome variable,

however, this category consists of few individuals in the sample (n=121) which makes it difficult to draw any conclusions from this finding. Moreover, for men, being domestic born with foreign born parent compared to those whose parent were both born in Sweden, had a positive association with wellbeing on the 0.05-significant level. Finally, economic standard had significant relationships with wellbeing for both women and men, where a lower wellbeing was expected with a lower economic standard.

Table 9. Multiple regression models on separate dataset for women and men respectively. Unstandardized b-coefficients and robust standard errors in parentheses.

Variable	Sep. model women	Sep. model women	Sep. model men	Sep. model men
Caregiver strain	-1.21***	(0.17)	-0.75**	(0.23)
Work strain	-0.86***	(0.19)	-2.19***	(0.21)
Performance demand	-2.67***	(0.29)	-2.56***	(0.28)
Discrimination	-0.61***	(0.14)	-0.18	(0.24)
Independence	0.68	(0.39)	0.52	(0.33)
Risk-taking	0.80***	(0.23)	0.47	(0.24)
Emotional intelligence	1.03***	(0.21)	0.89***	(0.20)
Often' or 'sometimes' having someone	10.24***	(1.56)	8.67***	(1.3138920)
to show you love and affection				
Hours spent on paid work, studying or internship	0.06	(0.12)	0.11	(0.12)
Hours spent on care	0.14	(0.15)	-0.00	(0.19)
Age	0.10*	(0.04)	-0.01	(0.04)
Employment status				
Student	-0.25	(1.56)	0.67	(1.66)
Retired	-6.92***	(1.75)	-2.65	(1.68)
Unemployed	-9.13**	(3.13)	-4.27	(2.81)
Sick-leave	-16.93***	(3.10)	-18.26***	(3.88)
Parental leave	2.45	(2.95)	-5.77	(7.32)
Other	-5.97*	(2.84)	-1.47	(2.81)
(Reference category: Employed)				
Household type				
Single with children	-2.54	(1.97)	-0.30	(2.02)
Single without children	-2.70*	(1.28)	-4.39***	(1.31)
Cohabitant with children	-1.59	(1.18)	-0.30	(1.16)
Other	-0.19	(1.72)	-1.75	(1.89)
(Reference category: Cohabitant without children)				
Educational attainment				
Compulsory	-4.38*	(1.77)	0.10	(1.28)
Upper secondary	-1.35	(0.88)	-1.40	(0.94)
Unknown	2.07	(2.94)	9.13**	(3.14)

(Reference category: post-secondary)

Background				
Foreign born	1.29	(1.33)	0.64	(1.43)
Domestic born with one foreign born parent	0.48	(1.58)	3.82*	(1.58)
Domestic born with foreign born parents	0.44	(2.36)	2.79	(2.14)
(Reference category: Domestic born with domestic born parents)				
Economic standard				
Economic standard quartile 1 (lowest)	-3.35*	(1.32)	-4.04**	(1.41)
Economic standard quartile 2	-2.10	(1.14)	-1.37	(1.16)
Economic standard quartile 3	-2.35*	(1.14)	0.06	(1.03)
(Reference category: Economic standard quartile 4 (highest))				
N	2718		2375	
Adj. R-square	0.2868		0.3121	

*Note: Significant codes: ***= 0.001, **= 0.01, *=0.05.*

5.3 Coefficients plots

The regression models presented above determined if there were any significant relationships between each of the gender-related norms and wellbeing, and the direction of these relationship. However, in order to facilitate interpretation and comparison of regression results I illustrate the relationships between the various gender-related norms and wellbeing in coefficients plots.

The coefficient plots show the coefficients for each of the gender norms together with the confidence intervals. As mentioned above, the coefficients from the regressions are unstandardized and hence not all measured on the scale. In order to make the coefficients comparable, I standardized the gender-related norm variables into z-scores (Streiner & Norman, 2008). Z-scores gives all the variables a mean of 0 and a standard deviation of 1, which means instead of raw scores, scores are expressed in standard deviation units. With this transformation the original distribution is preserved (ibid). To obtain the standardized coefficients, I ran the multiple regression again with the standardized variables.

Figures 1, 2, and 3 illustrate the results from the regressions with standardized coefficients. The red dots are the standardized b-coefficients, and the lines represent 95% confidence intervals. As the variable measuring social support was coded as a dummy variable, and hence could not be standardized and interpreted the same way, it is not included in the coefficient plots. The variables measuring

time spent on work and unpaid care were also excluded since they had no significant associations in the regression models.

Figure 1 shows that *caregiver strain*, *work strain*, and *performance demand* are the gender-related norms that had the comparatively clearest negative relationship with wellbeing among the gender-related norms. The coefficient for *discrimination* were closer to the zero-line but still had a significant and negative relationship with the wellbeing. The figure also shows that *independence* and *risk-taking* were significantly and positively related to wellbeing. However, as the bivariate regression models showed no significant association between independence and wellbeing or risk-taking and wellbeing these results are regarded as inconclusive. Moreover, *emotional intelligence* showed the most cleared positive relationship comparing with the other gender-related norms in the figure.

Regarding the coefficients from regression models on separate datasets for women and men, figure 2 and 3 shows that the patterns of the relationships between gender-related norms and wellbeing are similar for women and men. For both women and men, *caregiver strain*, *work strain* and *performance demand* showed the clearest negative relationships with wellbeing. *Independence* and *risk-taking* showed positive relationships but the relationships were not significant, except for risk-taking for women. *Emotional intelligence* showed the clearest positive relationship with wellbeing for both women and men. The main difference that can be seen comparing the influence on wellbeing of gender-related norms between women and men is for the discrimination coefficient. Discrimination showed a significant and negative relationship with wellbeing for women but for men the line demonstrating the confidence interval touches the zero line, meaning that the relationship is not significant.

Figure 2. Coefficient plot. Multiple regression model with standardised independent variables.

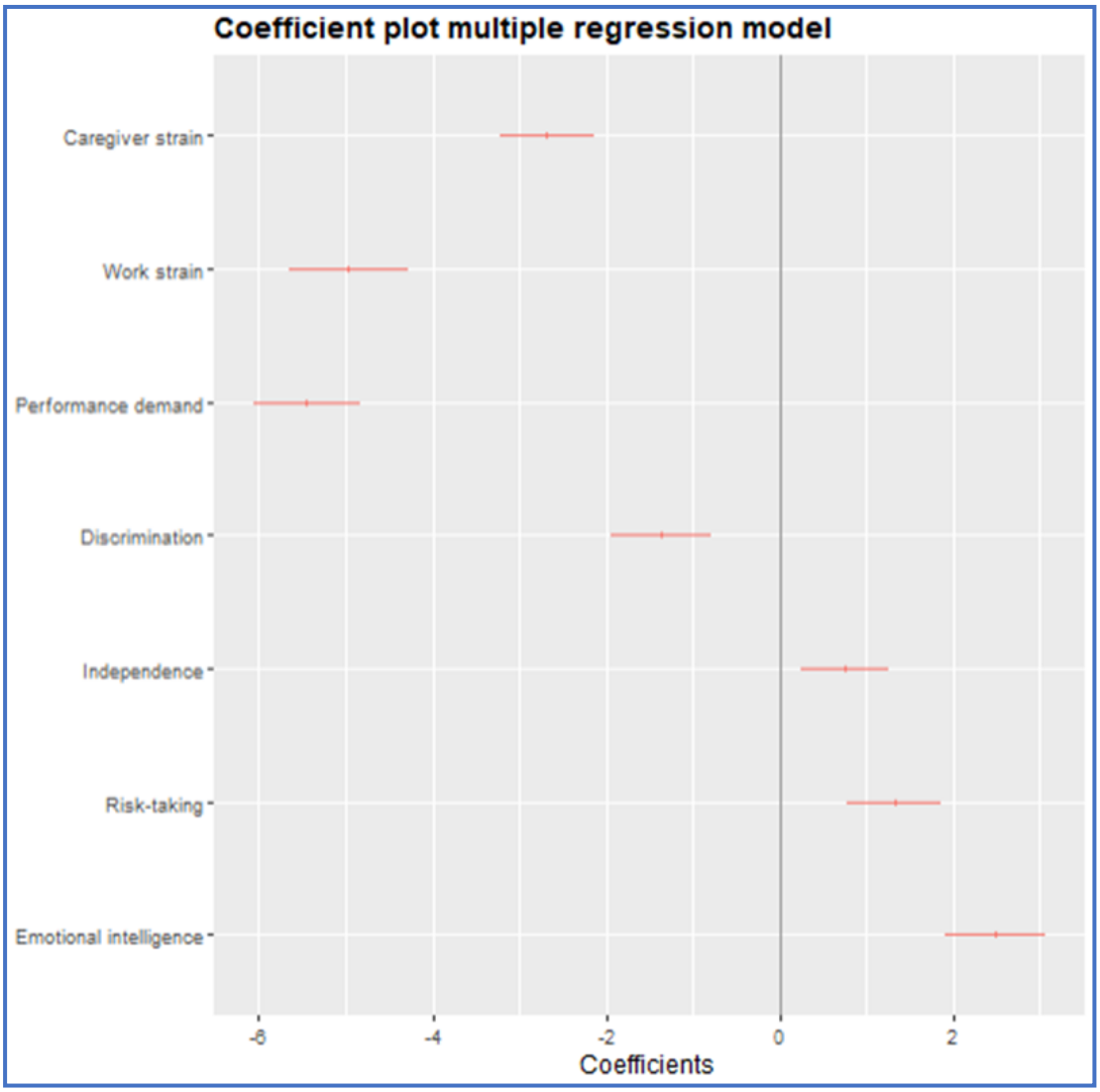


Figure 3. Coefficient plot. Multiple regression for women with standardized independent variables.

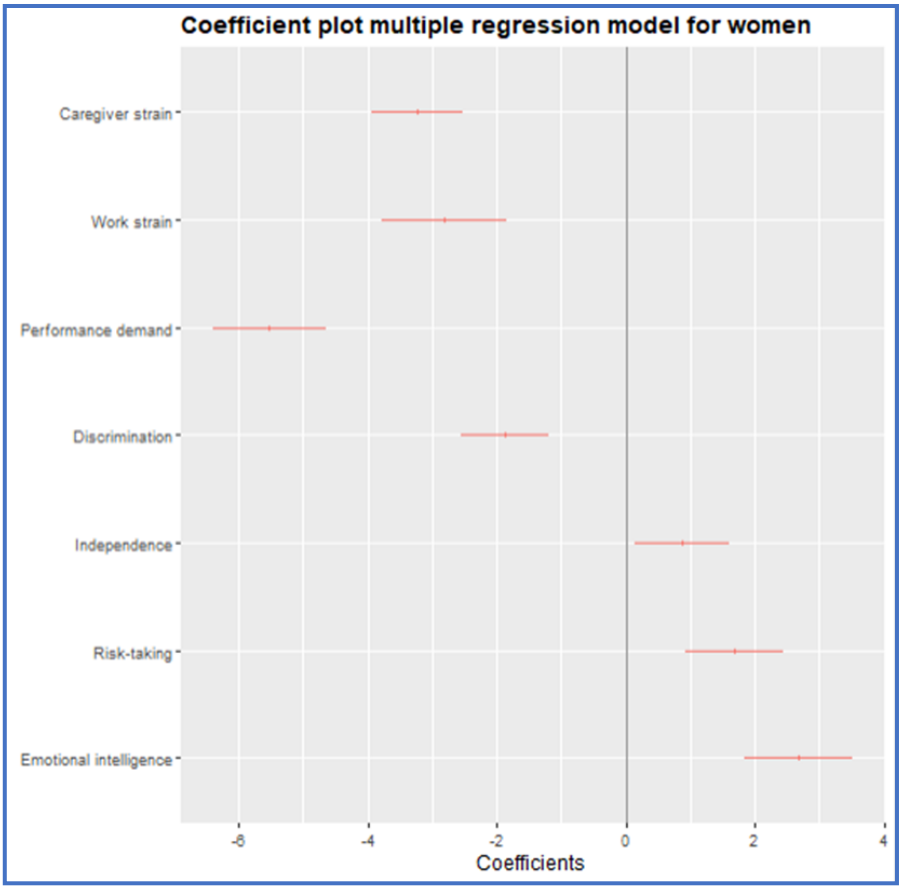
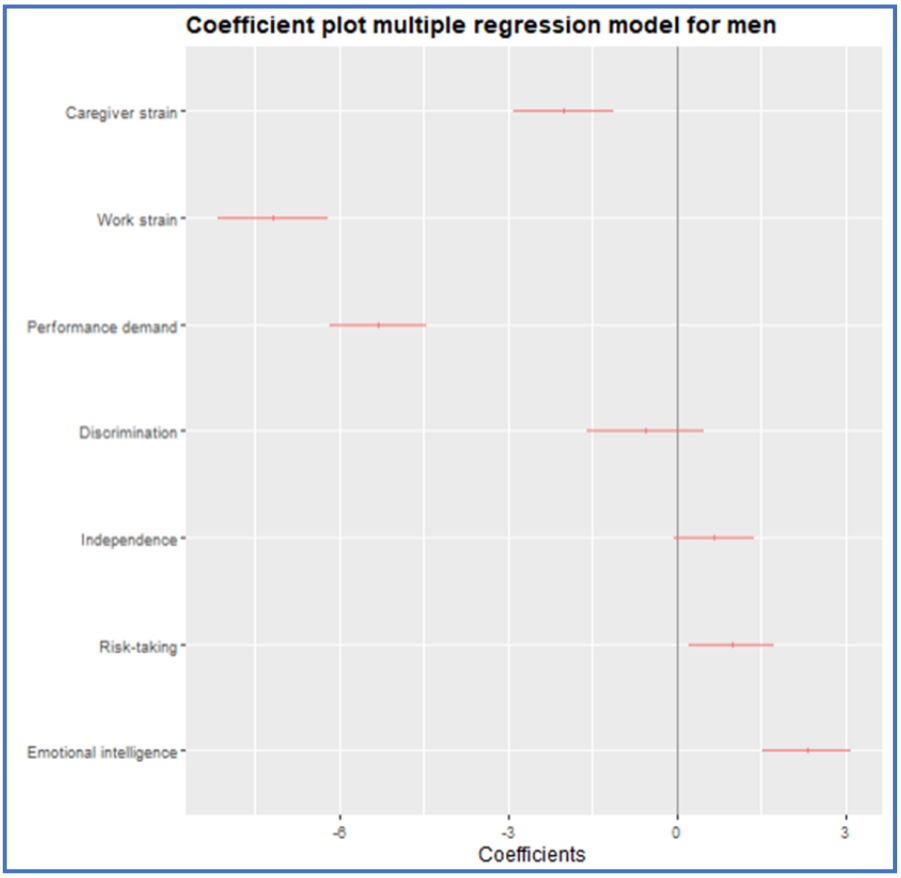


Figure 4. Coefficient plot. Multiple regression model for men with standardized independent variables.



6 Discussion

In the following chapter I reflect on the main findings of the analysis in relation to the theoretical perspectives and previous literature introduced in the thesis. The following two sections addresses the research questions for this thesis respectively. First, I discuss the influence of gender-related norms on mental health outcomes and second the differences of this influence among women and men. Then I discuss some main methodological considerations of the thesis. Finally, I reflect on the strength and limitation of the present study and implications for further research.

6.1.1 Gender-related norms influence mental health both negatively and positively

The results from the statistical analyses indicated that mental health was influenced both negatively and positively by several of the gender related norms. The results suggests that the gender-related norms *caregiver strain*, *work strain* and *performance demand* had the clearest negative influence on the mental health outcomes among the gender-related norms studied. Emotional and physical exhaustion and worries about the future due to caregiving- and work responsibilities, as well as feelings of not living up to other's or one's own expectations of performance, seems to have clear negative consequences for the wellbeing of both women and men in the sample. The results are in line with Nielsen et al. (2021) who also found that caregiver strain and work strain was negatively associated with lower mental wellbeing. However, for work strain the association was not significant. Performance demand, which was a gender-related norm that was added to Nielsens and colleague's assessment tool for the purpose of this thesis, had a clear negative relationship with wellbeing. This suggest that performance- and achievement-related norms matter for the mental health of the individuals in the sample.

Moreover, Nielsen et al. (2021) found that gender-related norms on the institutional level (caregiver strain and work strain) and interpersonal level (discrimination and social support) had stronger associations with health than the intrapersonal aspects of gender norms (emotional intelligence, independence and risk-taking, although risk-taking was an exception to this). The findings of this thesis are partly in line with this, especially with regard to the institutional aspects of gender which in this study was found to have the clearest negative influence on wellbeing. The inconclusive results regarding risk-taking and independence are also in line with these findings. However, emotional intelligence had a significant

relationship with wellbeing in the present thesis, which suggest that there is a positive influence of emotional intelligence on mental health in the sample.

Furthermore, the results from the statistical analysis showed that with all of the gender-related norms together with control variables known to be important factors for mental health, included in the analyses, there was still a considerable amount of explained variance in wellbeing that was not attributed to the variance in the independent variables. To provide exhaustive explanations of which factors determines mental health is outside of the scope of this thesis. However, this result suggests that other factors not included in the analyses of this thesis are important for variations in wellbeing outcomes. Considering Dahlgren and Whiteheads rainbow-like model (2007), showing that multiple social, psychological and biological factors affects the mental health of an individual, these finding are made understandable due to the complex and layered nature of determinants of mental health.

This thesis's analysis has used control variables on multiple layers in Dahlgren and Whiteheads model, including individual factors that can be considered relatively fixed, such as age and gender, and living- and working conditions such as family situation and economic standard. The gender-related norms included in the analysis are also found on multiple levels in the rainbow-like model, where intrapersonal norms such as risk-taking and independence can be found among the personal behaviour factors closer to the centre, social support, and discrimination in the next layer of individuals interactions with each other and the society, and work strain and caregiver strain among working- and living conditions. However, there are most likely many factors that the analysis of this thesis could not take into account, for example individual factors and broader economic, cultural, and environmental influences in the society (ibid).

6.1.2 Similar patterns for women and men

The results from the separate analysis for women and men showed that the patterns of the relationships between the gender-related norms and wellbeing were clearly similar for among women and men. This finding suggests that the influence of gender-related norms on mental health did not differ for women and men in sample. One exception was the relationship between discrimination and wellbeing. Discrimination had a significant relationship with lower wellbeing for women but for men the relationship was non-significant. This finding can be understood in relation to the theoretical approach offered by Graham (2004) who differed between on the one hand health determinants as the factors promoting or undermining health for all individuals and on the other hand health inequality determinants as "the social processes underlying the unequal distributions of these factors between groups occupying unequal positions in society" (ibid, p.102). From this perspective, it can be expected that discrimination would influence women's health more than men's as gender-based discrimination can be seen as an expression of unequal power relations between women and men. Moreover, this finding can also be linked to Connells gender relational theory (2012) arguing

that enactments of gender in everyday life constitutes and is constituted by the structure of gender relations in the society, reflecting the gender order of that society (Connell, 2012). According to this perspective, gender-based discrimination can be seen as an expression of the gender order whereas other gender related norms do not necessary reflect gender power relations. Moreover, the descriptive statistics also showed that women had higher mean and median values regarding experiences of discrimination, which could indicate that more women than men are affected by this gender-related norm.

Another exception to the similar patterns of the relationships between gender-related norms and mental health for women and men was that risk-taking was positively and significantly related to wellbeing for women but not for men. Contrary to what could be expected according to previous research on the influence of masculinity norms on health outcomes, the result in this study suggests that risk-taking and independence did not influence mental health for men in the sample, as the results from the regressions were inconclusive. In previous literature, risk-taking and independence have been associated with (both positive and negative) health outcomes for men (see for example Gerdes & Levant, 2018; Wong et al., 2017). It could thus have been expected that these norms would be of particular importance for men's mental health outcomes in the sample. However, it should be noted that the cross-sectional design of the study makes it difficult to make further conclusions from this finding.

Overall, the similar patterns of the relationships between gender norms and wellbeing for women and men is an important finding of this thesis, suggesting that the influence of gender-related norms on mental health is similar for women and men. This finding is especially notable when put in relation to existing patterns of gender inequalities in health in the Swedish context, expressed for example in women's higher risk of experience sick-leave with psychiatric diagnosis (Försäkringskassan, 2020). Previous scholars have stressed the relevance of the *exposure hypothesis* for explaining gender differences in sick-leave, meaning that "women are more exposed to stressors and strains than men, due to their occupying different jobs and social roles" (Nyberg et al., 2021, p.35). In contrast, the *vulnerability hypothesis* means that gender differences depend on a stronger negative effect of exposures for women compared to men (ibid). In line with exposure hypothesis, the findings of the present thesis indicate that experiences of work-related gender norms influence the wellbeing of women and men in equal ways.

If this approach is applied to the overall pattern of the influence of gender-related norms on health outcomes for women and men, the finding of this thesis indicates that when experiencing the same gender-related norms, women and men are affected in the same way. This also supports the perspectives arguing that rather than labelling a social norm as 'masculine' and 'feminine' it is important to focus on the influence of the specific norm in question on health outcomes (Horstmann, et al. 2022; Nielsen et al, 2021).

Finally, this thesis finds support for that gender-related norms influences mental health outcomes both negatively and positively and on multiple levels through institutional norms such as work strain and caregiver strain and through

interpersonal- and intrapersonal norms such as discrimination and emotional intelligence. The notion of gender as multidimensional and operating on intrapersonal, interpersonal, and society-wide level simultaneously (Connell, 2012) hence can provide important insight in understanding mental health outcomes.

6.1.3 Methodological considerations

Validity and reliability are the main criteria to evaluate quantitative research, where the former refers to the extent to which the study measures what is supposed to be measured and the latter to the extent to which the results are dependable and consistent (Leavy, 2017). The use of registered based data as control variables is a strength in terms of reliability as it will make the study replicable. The weights adjustments to the sample have made it possible to account for potential bias in unit non-responses such as systematic differences between respondents and non-respondents (Elliott et al., 2005).

A strength in terms of validity is that the gender-related norms have been operationalized in line with a previously tested measurement tool from Nielsen et al. (2021). Regarding the operationalizations of mental health through the WHO-5 wellbeing index, validity is strengthened by using a measurement that previously used in many studies and validated as a sufficient measurement of mental health.

A potential weakness in terms of validity could be the handling of Likert-type data as interval scale data, which have been met with some criticism. The survey questions making up dependent and the independent variables were measured with so called Likert scales, which is typically an ordinal scale where respondents are asked to rate how much they agree or disagree with a statement, often on a five- to seven-point scale (Sullivan & Artino, 2013). Although Likert data are assumed to be ordinal, Likert scales are often used as interval scales to allow for parametric tests when several Likert type items are put together to a composite scale.

According to Joshi et al. (2015) there is no consensus regarding handling Likert data as interval scale data. One school of researchers argue that the Likert scale does not show the relative size or the distance between two different responses quantitively, meaning that *equidistance* cannot be assumed, and hence the data can never be considered as interval data. However, another other school of researchers argue that when several items are combined to a summative or composite score "then this individualistic summative score (for all the items) of a participant shows a sensible realistic distance from the individual summative score of another individual; hence, can be labelled as 'interval estimates'" (Joshi et al., 2015, p.399).

Due to the criticism, I also considered other methodological strategies, for example measuring the outcome variable using a cut-off score as has previously been done with the WHO-5 index to screen for depression (Topp et al., 2015). However, as the aim of the thesis was not to measure depression but rather overall levels of wellbeing, the linear regression analysis (and hence treating the variables

as interval-scale data) was assumed to be the most fruitful approach to answer the research questions.

Another potential weakness of the study is that some of the scales had relatively few items which could question the assumption of equidistance of the scales. On the other hand, a smaller number of items could increase the accessibility of the survey to avoid non-responses and, as noted by Nielsen et al. (2021), increase the usefulness of the survey tool to researchers and practitioners.

Furthermore, the strategy of constructing the summative scales could be a potential weakness as all the items in each scale are given the same weight, and hence are assumed to be of equal important for the latent construct (the scale) and the outcome variable. I considered other strategies to generate the composite scales that considers weights, relationships between independent variables (for example principal component analysis or factor analysis) or relationships between independent and dependent variables (partial least square structural equation models). However, as the scope of this thesis was to explore the relationships between an already theoretically generated assessment tool and health outcomes in a new context rather than evaluate and refine the assessment tool itself, the strategy of using summative scores was seen as the most feasible.

6.1.4 Strengths, limitations, and implications for further research

A strength of this thesis is that the survey data from Jämställdhetsundersökningen has enabled to explore and extend a previously tested measurement tool of gender-related norms in a new context on a nationally representative sample. Since this measurement has not previously been used in a Swedish context, it has offered valuable insights on the influence of gender-related norms on mental health. A limitation is the cross-sectional design which means that the data is measured only on one point in time. Therefore, it is important to note that determining causality is outside of the ability and scope of the present study. As noted by Nielsen "confounding or even reverse causality (health phenotypes affecting gender-related behaviors and attitudes) should be considered" (2021, p.11).

To gain increased knowledge of how gender-related norms determine mental health outcomes and changes in the patterns over time, further research could study the gender-related norms in a longitudinal sense. Future research could also further test and evaluate the measurement tool itself and potentially add dimensions of gender-related norms that could be important in a Swedish context. Moreover, a challenge when it comes to surveys is that some individuals may for example be more likely to report mental health problems, for example young individuals may be more used to talk about mental health (Folkhälsomyndigheten, 2020). To account for these challenges, in future research it could be of advantage to also investigate the influence of the gender-related norms with qualitative methods, for example through interviews.

7 Conclusion

This thesis was initiated with the observation of persistent gender differences in mental health in the Swedish context, pointing to the need of studying the potential gender-related factors contributing to these unequal conditions for a good mental health among the population. Scholars note that understanding gender-based differences and inequalities in health is often reduced to binary construction of gender where these differences are viewed as self-evident (Springer et al., 2012). This provides limited opportunities of considering social and relational aspects of gender (Connell, 2012).

Building on Nielsen et al. (2021) this thesis was set out to investigate the influence of gender-related norms on mental health outcomes among women and men in a Swedish context. In doing so, survey data from Jämställdhetsundersökningen was analysed statistically with an explorative approach.

This thesis contributes with insights on the patterns of relationships between gender-related norms and mental health for women and men among the Swedish population.

The statistical analysis showed that the influence of the gender-related norms on mental health outcomes, measured by wellbeing, varied between the different norms. The institutional level gender-related norms, measured through *caregiver strain, work strain* and *performance demand* had clear negative and significant relationships with wellbeing outcomes.

Discrimination, which concerned interpersonal aspects of gender-related norms, was also significantly related to lower wellbeing. Due to low reliability of the measurement of *social support*, the other gender-related norm on the interpersonal level, it was not possible to investigate the influence of this gender-related norm on wellbeing. However, the single variable kept in the analysis pertaining to this gender-related norm, having someone to show one love and affection, had a clear and significant positive relationship with wellbeing.

The gender-related norms concerning individual traits on an intrapersonal level showed diverse relationships with mental health. *Risk-taking* and *independence* was not significantly related to wellbeing. *Emotional intelligence* was significantly related to higher levels of wellbeing.

The separate statistical analyses for women and men showed that the gender-related norms influenced the wellbeing of women and men in similar ways with two exceptions. *Risk-taking* was positively and significantly related to wellbeing for women but not for men. *Discrimination* was significantly related to lower levels of wellbeing for women, but the results were not significant for men. Apart from this, the overall results showed clearly similar patterns of the influence of gender related norms on wellbeing for women and men.

Overall, the findings suggests that gender-related norms do influence mental health outcomes both positively and negatively and that these norms influence the wellbeing of women and men in similar ways. The findings point to the need of further investigate how gender-related norms influence mental health outcomes among different populations.

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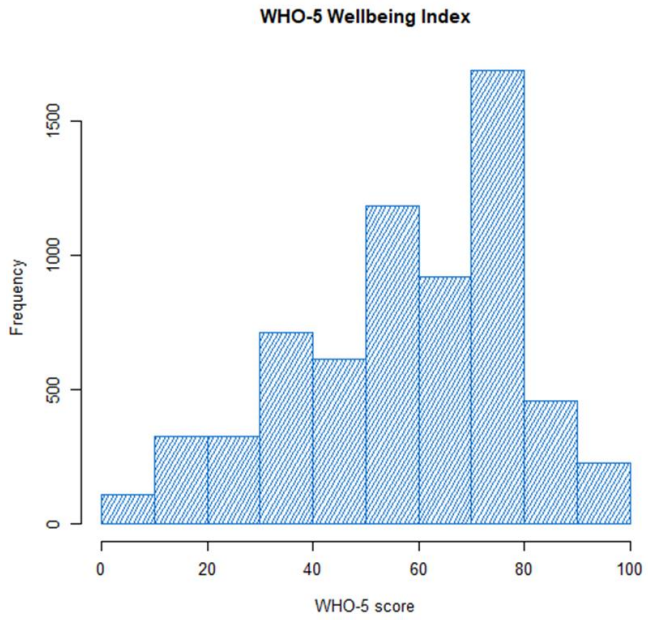
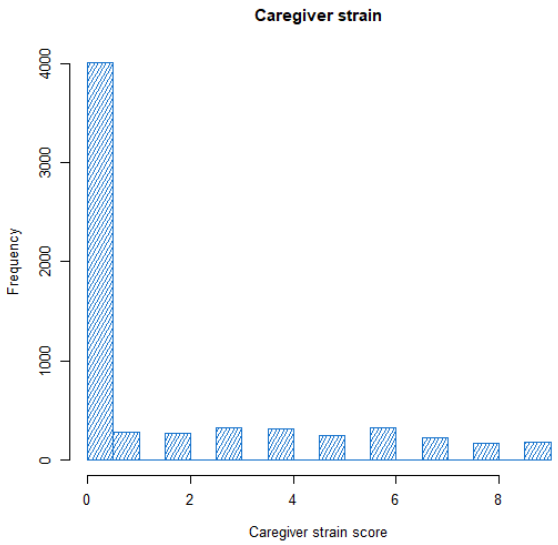
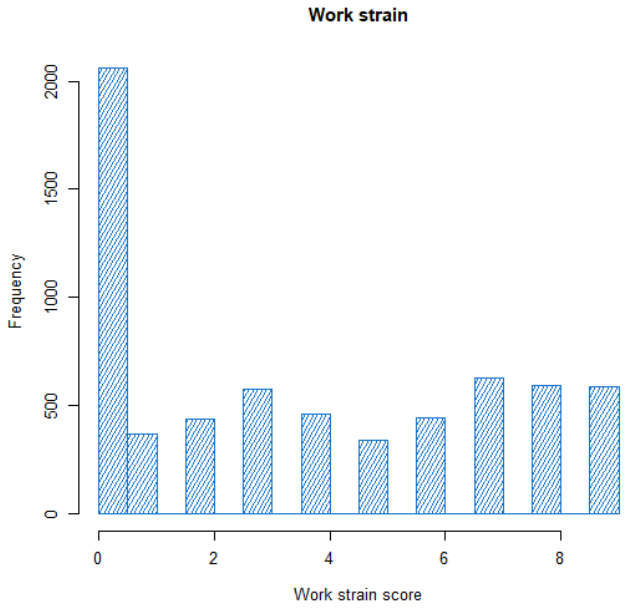
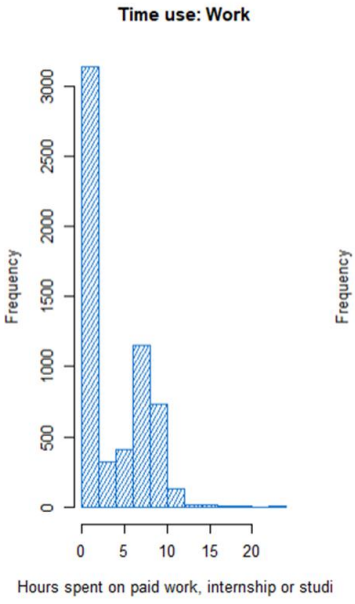
9 Appendix 1. Diagrams and data plots.

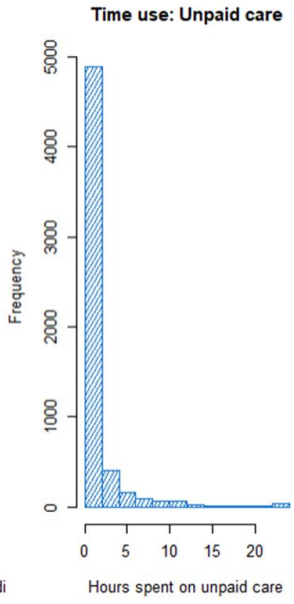
9.1 Histograms

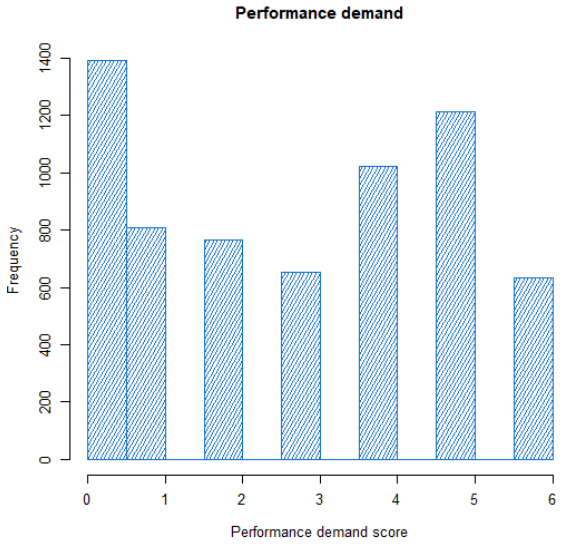


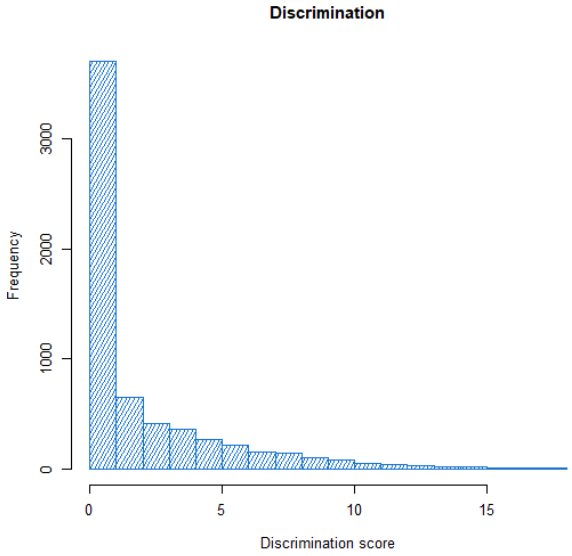


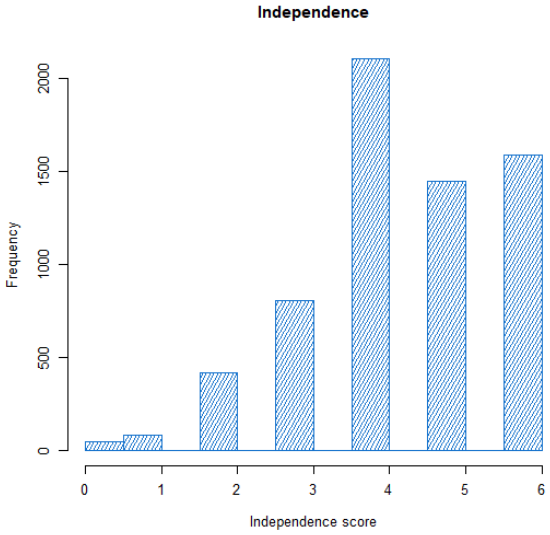


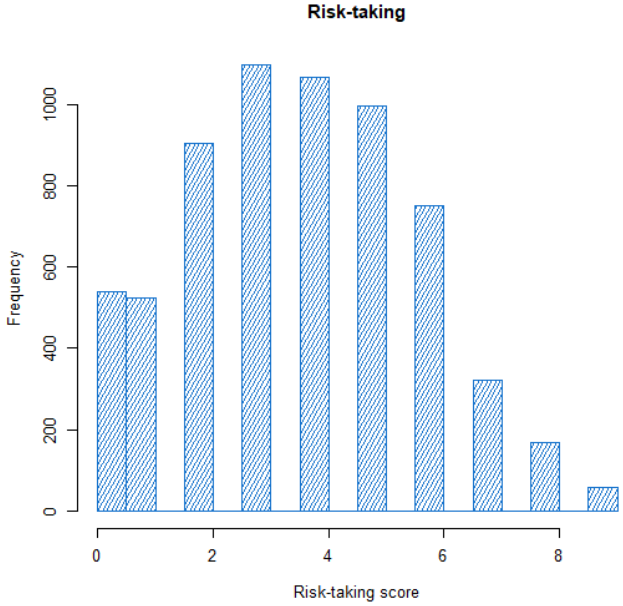


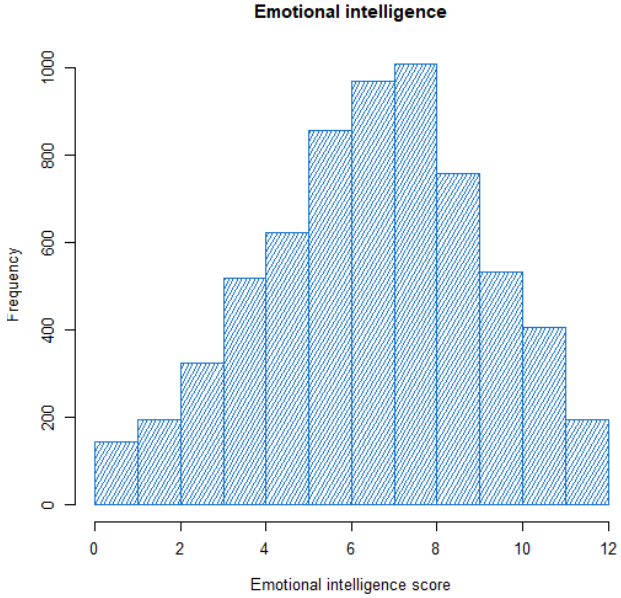



Performance demand
Frequency
0
200
400
600
800
1000
1200
1400
0
1
2
3
4
5
6
Performance demand score

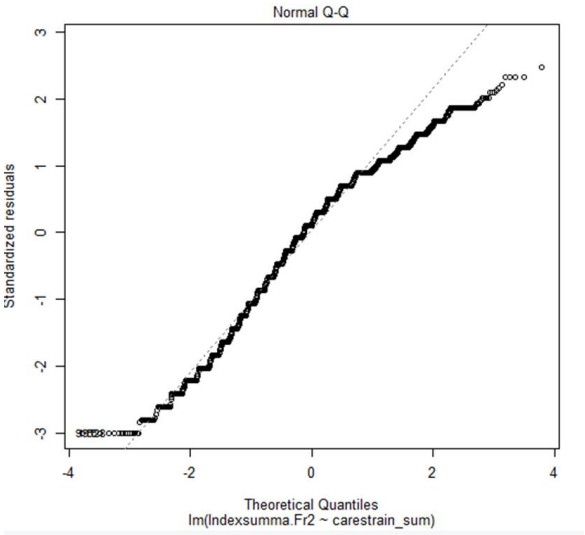

Discrimination
Frequency
0
1000
2000
3000
0
5
10
15
Discrimination score

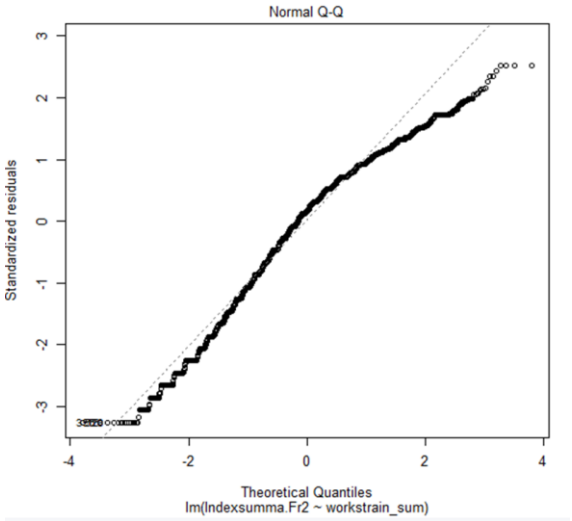

Independence
Frequency
0
500
1000
1500
2000
0
1
2
3
4
5
6
Independence score

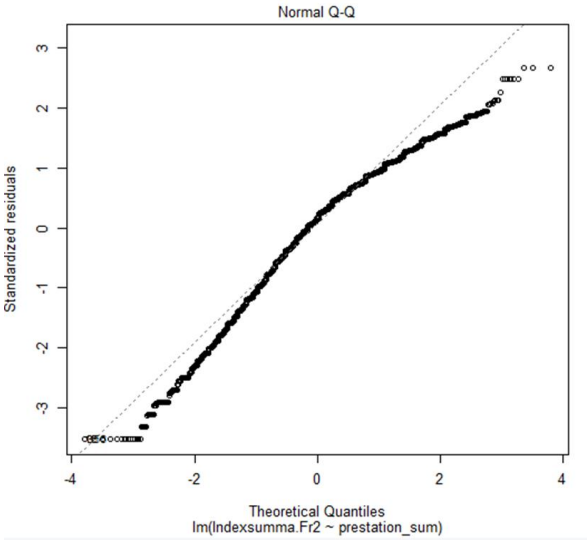

Risk-taking
Frequency
0
200
400
600
800
1000
0
2
4
6
8
Risk-taking score

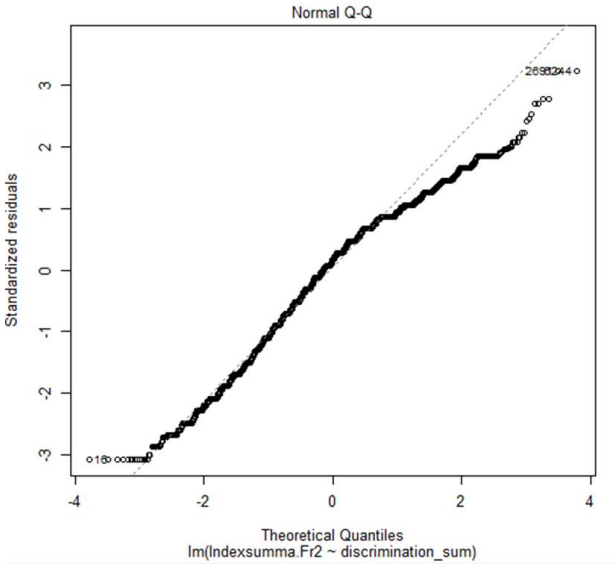

Emotional intelligence
Frequency
0
200
400
600
800
1000
0
2
4
6
8
10
12
Emotional intelligence score

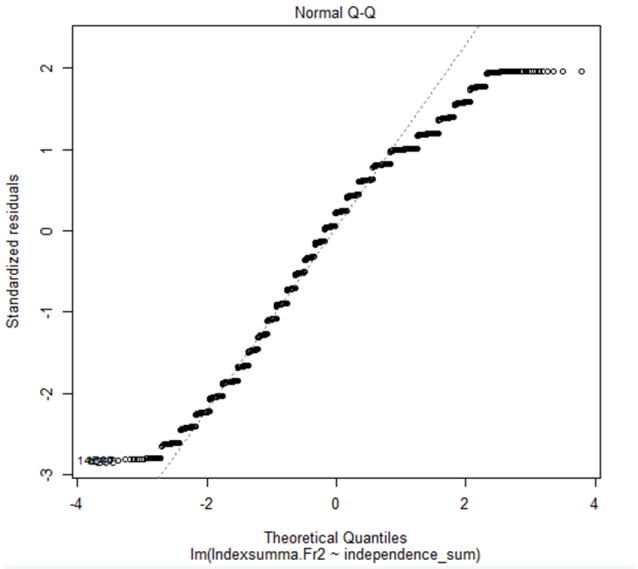
9.2 Normal probability plots

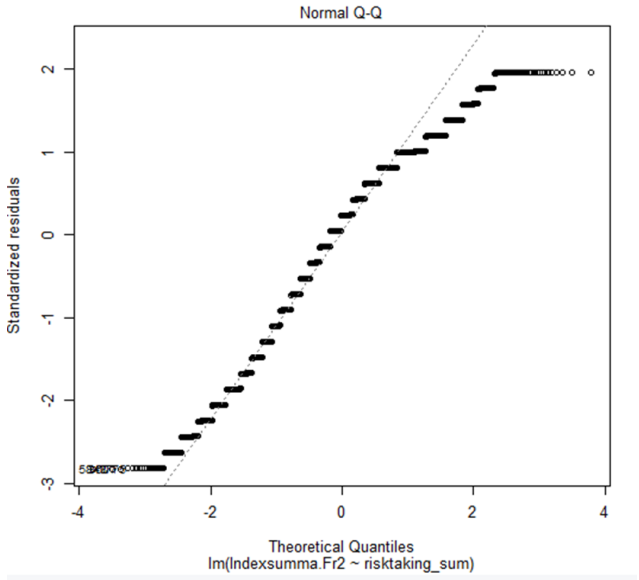


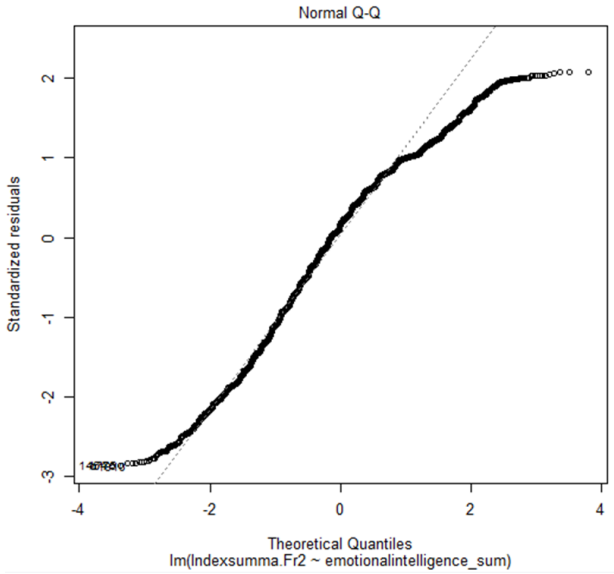




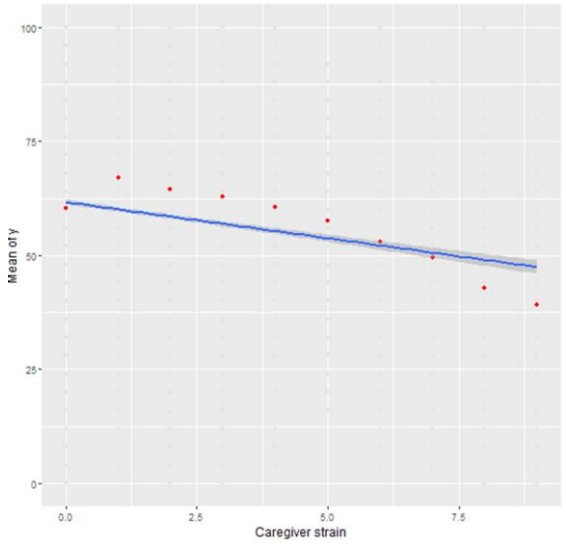

Normal Q-Q
Standardized residuals
Theoretical Quantiles
lm(Indexsumma.Fr2 ~ discrimination_sum)

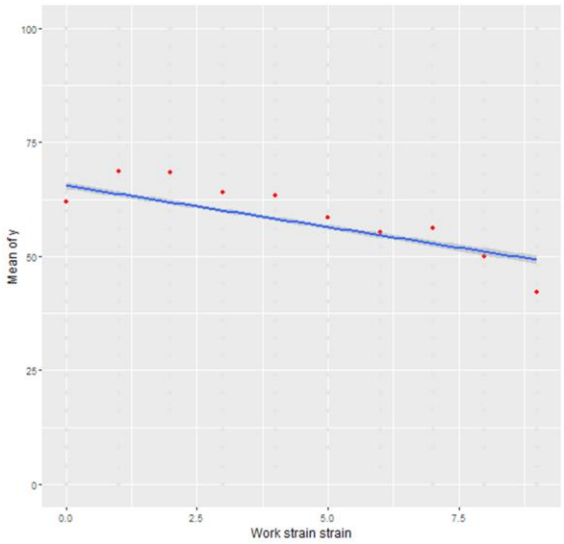

Normal Q-Q
Standardized residuals
Theoretical Quantiles
lm(Indexsumma.Fr2 ~ independence_sum)

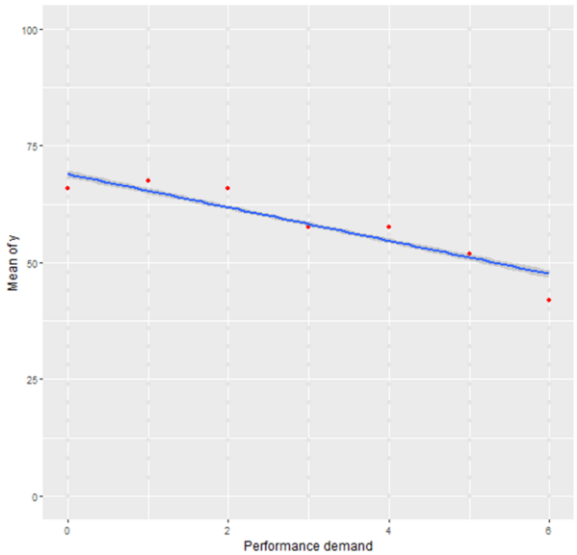

Normal Q-Q
Standardized residuals
Theoretical Quantiles
lm(Indexsumma.Fr2 ~ risktaking_sum)

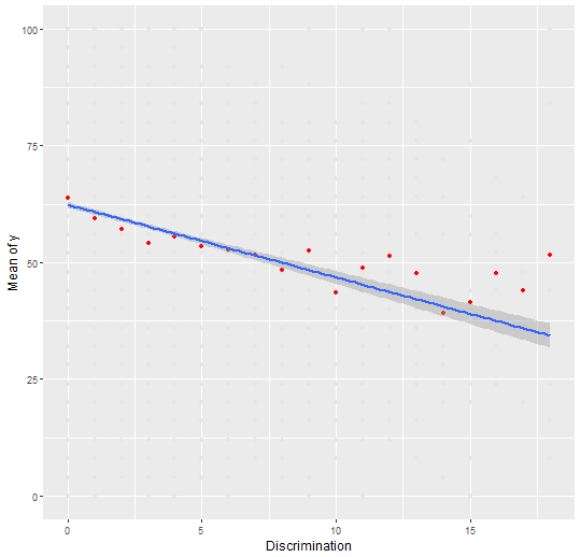

Normal Q-Q
Standardized residuals
Theoretical Quantiles
lm(Indexsumma.Fr2 ~ emotionalintelligence_sum)

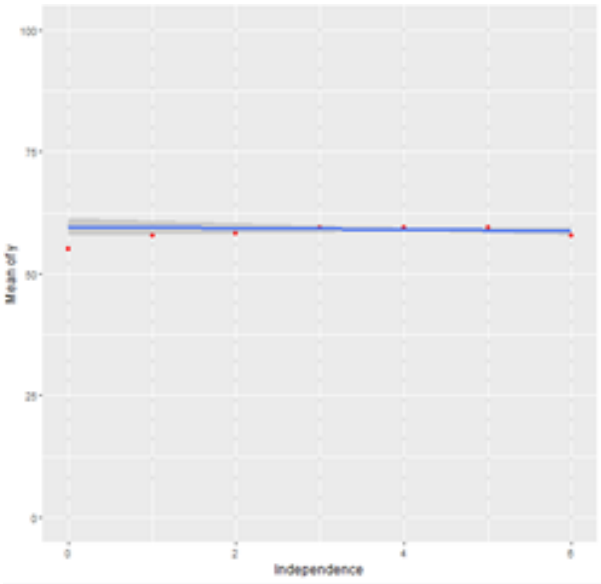
9.3 Scatterplots

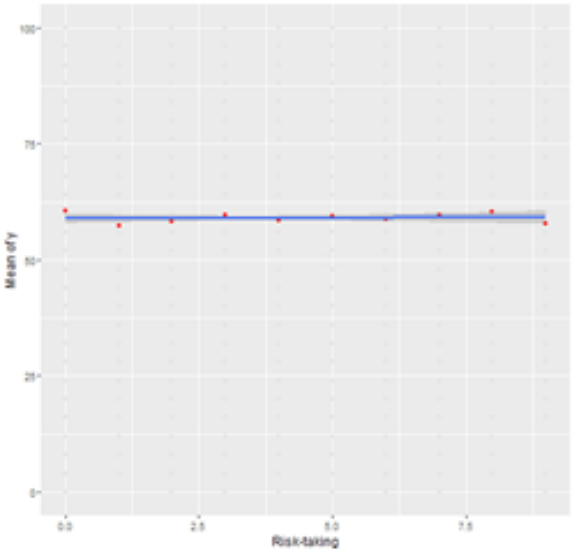


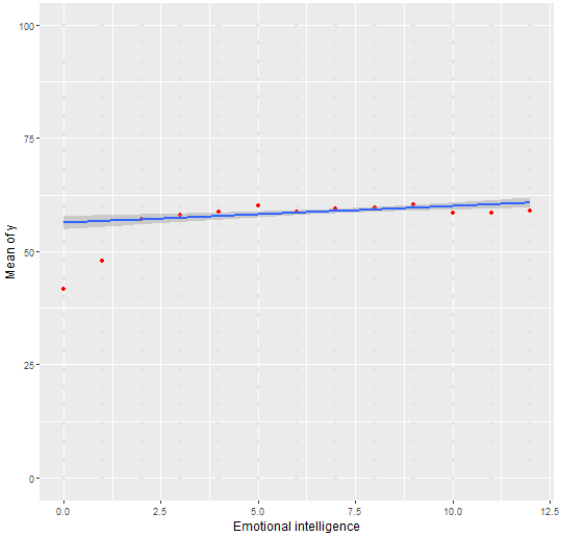




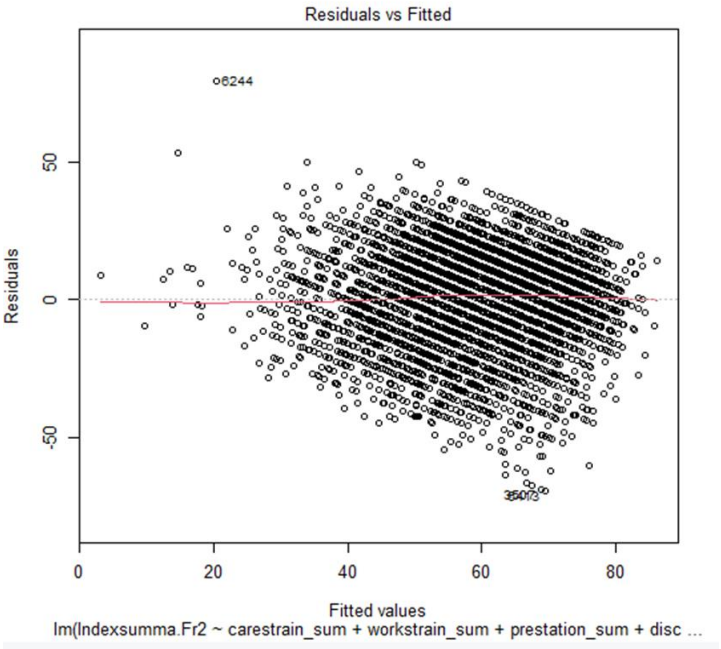

Mean of y
100
75
50
25
0
0
5
10
15
Discrimination

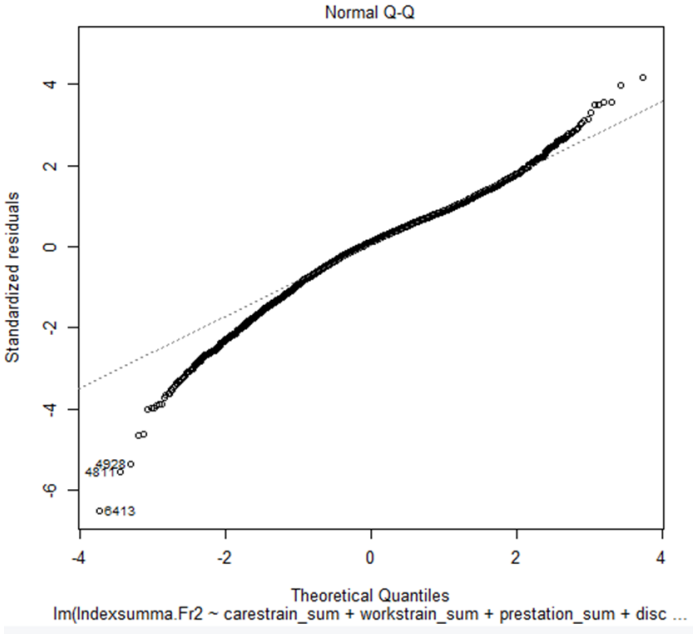

Mean of y
100
75
50
25
0
0
2
4
6
Independence

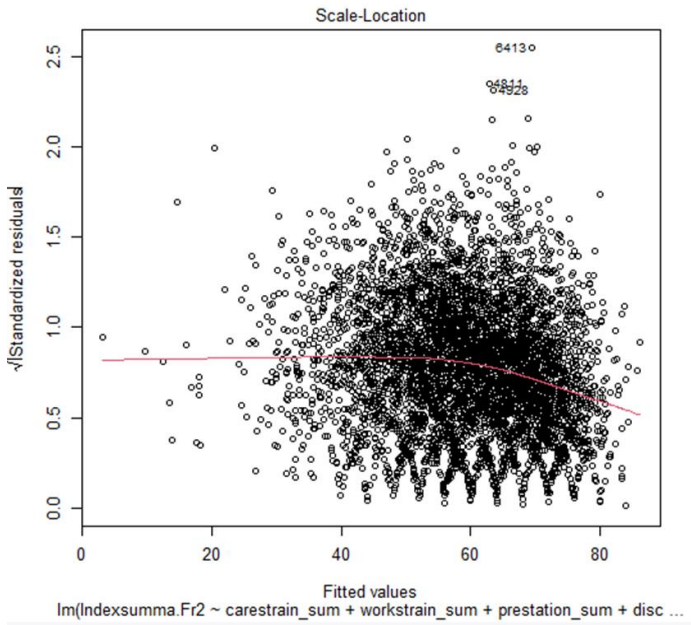

Mean of y
100
75
50
25
0
0.0
2.5
5.0
7.5
Risk-taking

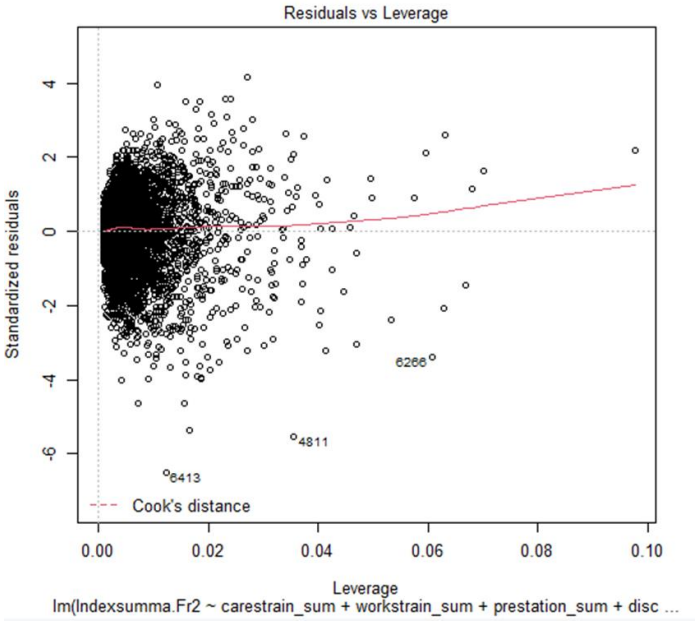

Mean of y
100
75
50
25
0
0.0
2.5
5.0
7.5
10.0
12.5
Emotional intelligence

9.4 Regression diagnostics: Residual plots









10 Appendix 2, R code

```
###### Settings
################################Import and subset data
########################Settings for my variables
###Value 99 is coded as missing values for variables
###Value 5 (not applicable) is recoded to 4 (never)
######Value 5 (I dont know) is recoded as NAs to exclude them)
####################Coding of control variables to dummies
#################create composite variables of independent variables, with sum of rows#######

#Caregiver strain
mindata$carestrain_sum<-rowSums(mindata[,c("F6_ej_omsorgsansvar_0", "F7a_Vänd","F7b_Vänd","F7c_Vänd")],na.rm=TRUE)
#Workstrain
mindata$workstrain_sum <-rowSums(mindata[,c("F4a_Vänd","F4b_Vänd","F4c_Vänd")],na.rm=TRUE)
#Performance_demand
mindata$prestation_sum <- rowSums(mindata[,c("F4d_Vänd","F4e_Vänd")],na.rm=TRUE)
#Social support, later was excluded
mindata$socialsupport_sum<-rowSums(mindata[,c("F10d_Vänd","F10e_Vänd")],na.rm=TRUE)
#Discrimination
mindata$discrimination_sum <-rowSums(mindata[,c("F8a_Vänd","F8b_Vänd","F8c_Vänd","F8d_Vänd","F8e_Vänd","F8f_Vänd")],na.rm=TRUE)
#Indpendence
mindata$independence_sum<-rowSums(mindata[,c("F11a_Vänd","F11b_Vänd")],na.rm=TRUE)
#Risktaking
mindata$risktaking_sum<-rowSums(mindata[,c("F5a_Vänd","F5b_Vänd","F5c_Vänd")],na.rm=TRUE)
#Emotional intelligence
mindata$emotionalintelligence_sum<-rowSums(mindata[,c("F10a_Vänd","F10b_Vänd","F10c_Vänd","F12_Vänd")],na.rm=TRUE)

#####Need to adjust so that values for people who have NA on all items get NA and not 0 as their sum score
mindata$carestrain_sum[rowSums(!is.na(mindata[c("F6_ej_omsorgsansvar_0","F7a_Vänd","F7b_Vänd","F7c_Vänd")])) == 0] <- NA
count(mindata, carestrain_sum)
mindata$carestrain_sum_b[rowSums(!is.na(mindata[c("F7a_Vänd","F7b_Vänd","F7c_Vänd")])) == 0] <- NA
mindata$carestrain_sum_1till4[rowSums(!is.na(mindata[c("F6_ej_omsorgsansvar_1", "F7a_1till4","F7b_1till4","F7c_1till4")])) == 0] <- NA
mindata$workstrain_sum[rowSums(!is.na(mindata[c("F4a_Vänd","F4b_Vänd","F4c_Vänd")])) == 0] <- NA
mindata$prestation_sum[rowSums(!is.na(mindata[c("F4d_Vänd","F4e_Vänd")])) == 0] <- NA
mindata$socialsupport_sum[rowSums(!is.na(mindata[c("F10d_Vänd","F10e_Vänd")])) == 0] <- NA
mindata$discrimination_sum[rowSums(!is.na(mindata[c("F8a_Vänd","F8b_Vänd","F8c_Vänd","F8d_Vänd","F8e_Vänd","F8f_Vänd")])) == 0] <- NA
mindata$independence_sum[rowSums(!is.na(mindata[c("F11a_Vänd","F11b_Vänd")])) == 0] <- NA
mindata$risktaking_sum[rowSums(!is.na(mindata[c("F5a_Vänd","F5b_Vänd","F5c_Vänd")])) == 0] <- NA
mindata$emotionalintelligence_sum[rowSums(!is.na(mindata[c("F10a_Vänd","F10b_Vänd","F10c_Vänd","F12_Vänd")])) == 0]<- NA

################################DATA ANALYSIS#########################################################################
#####################################Simple linear regression#########################
#########################Heteroscedasticity-Consistent Covariance Matrix Estimation
install.packages(c("lmtest","sandwich"))
library(lmtest)
library(sandwich)

################Carestrain
linearMod_Carestrain<- lm(Indexsumma.Fr2 ~carestrain_sum,data=mindata)  # build linear regression model
print(linearMod_Carestrain)
summary(linearMod_Carestrain)
summary(coeftest(linearMod_Carestrain, vcov = vcovHC(linearMod_Carestrain, type = "HC3")))
plot(linearMod_Carestrain)
nobs(linearMod_Carestrain)

#Time-use care
linearMod_omsorgstid<- lm(Indexsumma.Fr2 ~F17c_1_2_sum_timmar,data=mindata)  # build linear regression model
print(linearMod_omsorgstid)
summary(linearMod_omsorgstid)
qqnorm(linearMod_omsorgstid$residuals)#OK

#Workstrain
linearMod_Workstrain<- lm(Indexsumma.Fr2 ~workstrain_sum,data=mindata)  # build linear regression model
print(linearMod_Workstrain)
summary(linearMod_Workstrain)
nobs(linearMod_Workstrain)
plot(linearMod_Workstrain)
coeftest(linearMod_Workstrain, vcov = vcovHC(linearMod_Workstrain, type = "HC3"))

#Time-use work
linearMod_arbetstid<- lm(Indexsumma.Fr2 ~F17a_1_2_sum_timmar,data=mindata)  # build linear regression model
print(linearMod_arbetstid)
summary(linearMod_arbetstid)

#Performance
linearMod_prestation<- lm(Indexsumma.Fr2 ~prestation_sum,data=mindata)  # build linear regression model
print(linearMod_prestation)
summary(linearMod_prestation)
plot(linearMod_prestation)
coeftest(linearMod_prestation, vcov = vcovHC(linearMod_prestation, type = "HC3"))

#Discrmination
linearMod_Discrimination<- lm(Indexsumma.Fr2 ~discrimination_sum,data=mindata)  # build linear regression model
print(linearMod_Discrimination)
summary(linearMod_Discrimination)
coeftest(linearMod_Discrimination, vcov = vcovHC(linearMod_Discrimination, type = "HC3"))
plot(linearMod_Discrimination)
```

```r
#Social support
#F10d
LinearMod_F10d <- lm(Indexsumma.Fr2 ~Soc_F10d_sammanslagen_dummy_1,data=mindata)  # build linear regression model
print(LinearMod_F10d)
coeftest(LinearMod_F10d, vcov = vcovHC(LinearMod_F10d, type = "HC3"))
summary(LinearMod_F10d)
nobs(LinearMod_F10d)

#Independence
linearMod_Independence<- lm(Indexsumma.Fr2 ~independence_sum,data=mindata)  # build linear regression model
print(linearMod_Independence)
summary(linearMod_Independence)
coeftest(linearMod_Independence, vcov = vcovHC(linearMod_Independence, type = "HC3"))
nobs(linearMod_Independence)
plot(linearMod_Independence)

#Risktaking
linearMod_Risktaking<- lm(Indexsumma.Fr2 ~risktaking_sum,data=mindata)  # build linear regression model
print(linearMod_Risktaking)
summary(linearMod_Risktaking)
coeftest(linearMod_Risktaking, vcov = vcovHC(linearMod_Risktaking, type = "HC3"))
plot(linearMod_Risktaking)

#Emotional intelligence
linearMod_Emotionalintelligence<- lm(Indexsumma.Fr2 ~emotionalintelligence_sum,data=mindata)  # build linear regression model
print(linearMod_Emotionalintelligence)
summary(linearMod_Emotionalintelligence)
coeftest(linearMod_Emotionalintelligence, vcov = vcovHC(linearMod_Emotionalintelligence, type = "HC3"))
plot(linearMod_Emotionalintelligence)

##################Multiple linear regressions#########################
#With control variables and weights
linearMod_Gendernorms_wcon_medvikt<-
  lm(Indexsumma.Fr2 ~
       carestrain_sum+workstrain_sum +prestation_sum+discrimination_sum +independence_sum+risktaking_sum+emotionalintelligence_sum+
       Soc_F10d_sammanslagen_dummy_1+
       F17a_1_2_sum_timmar+F17c_1_2_sum_timmar+
       Kvinna_dummy+Ålder+
       Studerande_dummy+Pensionär_dummy+Arbetslös_dummy+Sjukskriven_dummy+Föräldraledig_dummy+Annansyss_dummy+
       Ensamstående_medbarn_dummy+Ensamstående_utanbarn_dummy+Sammanboende_medbarn_dummy+Övrigthushållstyp_dummy+
       Förgymnasial_dummy+Gymnasial_dummy+Okänd_utb_dummy+
       Utrikesfödd_dummy+Inrikesfödd21_dummy+Inrikesfödd12_dummy+
       Ek_standard_1+Ek_standard_2+Ek_standard_3,data=mindata, weights=Vikt)
print(linearMod_Gendernorms_wcon_medvikt)
summary(linearMod_Gendernorms_wcon_medvikt)
nobs(linearMod_Gendernorms_wcon_medvikt)
coeftest(linearMod_Gendernorms_wcon_medvikt, vcov = vcovHC(linearMod_Gendernorms_wcon_medvikt, type = "HC3"))
plot(linearMod_Gendernorms_wcon_medvikt)


##########################Analyses of gender norms for women and men respectively ##################
###Subsetting dataset for men/women
Data_män <- (filter(mindata, Kön== "1"))
Data_kvinnor <- (filter(mindata,Kön=="0"))
count(Data_män, Utbildningsnivå)
count(Data_män, F10d_sammanslagen)

###Women
linearMod_Kvinnor<-
  lm(Indexsumma.Fr2 ~
       carestrain_sum +workstrain_sum +prestation_sum+discrimination_sum +independence_sum+risktaking_sum+emotionalintelligence_sum+
       Soc_F10d_sammanslagen_dummy_1+
       F17a_1_2_sum_timmar+F17c_1_2_sum_timmar+Ålder+
       Studerande_dummy+Pensionär_dummy+Arbetslös_dummy+Sjukskriven_dummy+Föräldraledig_dummy+Annansyss_dummy+
       Ensamstående_medbarn_dummy+Ensamstående_utanbarn_dummy+Sammanboende_medbarn_dummy+Övrigthushållstyp_dummy+
       Förgymnasial_dummy+Gymnasial_dummy+Okänd_utb_dummy+
       Utrikesfödd_dummy+Inrikesfödd21_dummy+Inrikesfödd12_dummy+
       Ek_standard_1+Ek_standard_2+Ek_standard_3,data=Data_kvinnor, weights=Vikt)
print(linearMod_Kvinnor)
summary(linearMod_Kvinnor)
nobs(linearMod_Kvinnor)
coeftest(linearMod_Kvinnor, vcov = vcovHC(linearMod_Kvinnor, type = "HC3"))

###Men
linearMod_Män<-lm(Indexsumma.Fr2 ~
       carestrain_sum+workstrain_sum +prestation_sum+discrimination_sum +independence_sum+risktaking_sum+emotionalintelligence_sum+
         Soc_F10d_sammanslagen_dummy_1+
       F17a_1_2_sum_timmar+F17c_1_2_sum_timmar+Ålder+
       Studerande_dummy+Pensionär_dummy+Arbetslös_dummy+Sjukskriven_dummy+Föräldraledig_dummy+Annansyss_dummy+
       Ensamstående_medbarn_dummy+Ensamstående_utanbarn_dummy+Sammanboende_medbarn_dummy+Övrigthushållstyp_dummy+
       Förgymnasial_dummy+Gymnasial_dummy+Okänd_utb_dummy+
       Utrikesfödd_dummy+Inrikesfödd21_dummy+Inrikesfödd12_dummy+
       Ek_standard_1+Ek_standard_2+Ek_standard_3,data=Data_män,weights=Vikt)
print(linearMod_Män)
summary(linearMod_Män)
coeftest(linearMod_Män, vcov = vcovHC(linearMod_Män, type = "HC3"))
nobs(linearMod_Män)

#######Coefficient plot
##Rescale to z-scores
mindata$carestrain_scaled <- scale(mindata$carestrain_sum, center=TRUE, scale=TRUE)
hist(mindata$carestrain_scaled)
count(mindata, carestrain_scaled)
mindata$workstrain_scaled <- scale(mindata$workstrain_sum, center=TRUE, scale=TRUE)
count(mindata,workstrain_scaled)
mindata$performance_scaled <- scale(mindata$prestation_sum, center=TRUE, scale=TRUE)
count(mindata, performance_scaled)
mindata$discrimination_scaled <- scale(mindata$discrimination_sum, center=TRUE, scale=TRUE)
count(mindata, discrimination_scaled)
mindata$independence_scaled <- scale(mindata$independence_sum)[, 1]
count(mindata, independence_scaled)
mindata$risktaking_scaled <- scale(mindata$risktaking_sum, center=TRUE, scale=TRUE)
count(mindata, risktaking_scaled)
mindata$emtionalintelligence_scaled <- scale(mindata$emotionalintelligence_sum, center = , scale=TRUE)
count(mindata, emtionalintelligence_scaled)
```

```r
#LM with standardised variables
linearMod_Gendernorms_scaled<-
  lm(Indexsumma.Fr2 ~
       carestrain_scaled+workstrain_scaled +performance_scaled+discrimination_scaled +independence_scaled+
       risktaking_scaled+emtionalintelligence_scaled+
       Soc_F10d_sammanslagen_dummy_1+
       F17a_1_2_sum_timmar+F17c_1_2_sum_timmar+
       Kvinna_dummy+Ålder+
       Studerande_dummy+Pensionär_dummy+Arbetslös_dummy+Sjukskriven_dummy+Föräldraledig_dummy+Annansyss_dummy+
       Ensamstående_medbarn_dummy+Ensamstående_utanbarn_dummy+Sammanboende_medbarn_dummy+Övrigthushållstyp_dummy+
       Förgymnasial_dummy+Gymnasial_dummy+Okänd_utb_dummy+
       Utrikesfödd_dummy+Inrikesfödd21_dummy+Inrikesfödd12_dummy+
       Ek_standard_1+Ek_standard_2+Ek_standard_3,data=mindata,weights=Vikt)
print(linearMod_Gendernorms_scaled)
summary(linearMod_Gendernorms_scaled)

install.packages("GGally")
library(GGally)
install.packages("broom.helpers")
library(broom.helpers)
install.packages("dotwhisker")
library(dotwhisker)
library(dplyr)
#########
LM <- broom::tidy(linearMod_Gendernorms_scaled) %>% relabel_predictors(carestrain_scaled = "Caregiver strain",
                                                                       workstrain_scaled="Work strain",performance_scaled = "Performance demand",
                                                                       discrimination_scaled = "Discrimination", independence_scaled = "Independence",
                                                                       risktaking_scaled = "Risk-taking",
                                                                       emtionalintelligence_scaled="Emotional intelligence")
PLOT <- dwplot(LM, vars=c("Caregiver strain","Work strain","Performance demand","Discrimination", "Independence","Risk-taking","Emotional intelligence"),
       vline = geom_vline(xintercept= 0,colour = "grey60"))
PLOT +ggtitle("Coefficient plot multiple regression model")+xlab("Coefficients")+
  theme(
    plot.title = element_text(face = "bold"))
```

```r
############Women and men resp
##women
linearMod_Kvinnor_b<-
  lm(Indexsumma.Fr2 ~
       carestrain_scaled +workstrain_scaled +performance_scaled+discrimination_scaled +independence_scaled+risktaking_scaled+emtionalintelligence_scaled+
       Soc_F10d_sammanslagen_dummy_1+F17a_1_2_sum_timmar+F17c_1_2_sum_timmar+Ålder+
       Studerande_dummy+Pensionär_dummy+Arbetslös_dummy+Sjukskriven_dummy+Föräldraledig_dummy+Annansyss_dummy+
       Ensamstående_medbarn_dummy+Ensamstående_utanbarn_dummy+Sammanboende_medbarn_dummy+Övrigthushållstyp_dummy+
       Förgymnasial_dummy+Gymnasial_dummy+Okänd_utb_dummy+
       Utrikesfödd_dummy+Inrikesfödd21_dummy+Inrikesfödd12_dummy+
       Ek_standard_1+Ek_standard_2+Ek_standard_3,data=Data_kvinnor, weights=Vikt)
print(linearMod_Kvinnor_b)
summary(linearMod_Kvinnor_b)
##plot
view(LM_K <- broom::tidy(linearMod_Kvinnor_b) %>% relabel_predictors(carestrain_scaled = "Caregiver strain",
                                                                     workstrain_scaled="Work strain",performance_scaled = "Performance demand",
                                                                     discrimination_scaled = "Discrimination", independence_scaled = "Independence",
                                                                     risktaking_scaled = "Risk-taking",
                                                                     emtionalintelligence_scaled="Emotional intelligence"))
PLOT_K <- dwplot(LM_K, vars=c("Caregiver strain","Work strain","Performance demand","Discrimination", "Independence","Risk-taking","Emotional intelligence"),
       vline = geom_vline(xintercept = 0,colour = "grey60"))
PLOT_K+ggtitle("Coefficient plot multiple regression model for women")+xlab("Coefficients")+
  theme(
    plot.title = element_text(face = "bold"))

###Men
linearMod_Män_b<-lm(Indexsumma.Fr2 ~
                      carestrain_scaled +workstrain_scaled +performance_scaled+discrimination_scaled +independence_scaled+risktaking_scaled+
                        emtionalintelligence_scaled+
                        Soc_F10d_sammanslagen_dummy_1+F17a_1_2_sum_timmar+F17c_1_2_sum_timmar+Ålder+
                      Studerande_dummy+Pensionär_dummy+Arbetslös_dummy+Sjukskriven_dummy+Föräldraledig_dummy+Annansyss_dummy+
                      Ensamstående_medbarn_dummy+Ensamstående_utanbarn_dummy+Sammanboende_medbarn_dummy+Övrigthushållstyp_dummy+
                      Förgymnasial_dummy+Gymnasial_dummy+Okänd_utb_dummy+
                      Utrikesfödd_dummy+Inrikesfödd21_dummy+Inrikesfödd12_dummy+
                      Ek_standard_1+Ek_standard_2+Ek_standard_3,data=Data_män,weights=Vikt)
print(linearMod_Män_b)
summary(linearMod_Män_b)
view(LM_M <- broom::tidy(linearMod_Män_b) %>% relabel_predictors(carestrain_scaled = "Caregiver strain",workstrain_scaled="Work strain",
                                                                 performance_scaled = "Performance demand",
                                                                 discrimination_scaled = "Discrimination", independence_scaled = "Independence",
                                                                 risktaking_scaled = "Risk-taking",
                                                                 emtionalintelligence_scaled="Emotional intelligence"))
PLOT_M <- dwplot(LM_M, vars=c("Caregiver strain","work strain","Performance demand","Discrimination", "Independence","Risk-taking","Emotional intelligence"),
       vline = geom_vline(xintercept = 0,colour = "grey60"))
PLOT_M+ggtitle("Coefficient plot multiple regression model for men")+xlab("Coefficients")+
  theme(
    plot.title = element_text(face = "bold"))
```