Association between job strain and health

A cross-sectional study within a native Swedish and immigrant population

Authors: Rosol Sleman
Viktoria Vuleta
Program in Public Health Science with Health Economics, 180 hp

Thesis in Public Health Science with Health Economics I, 15 credits

Spring term 2014

Supervisor: Robin Fornazar

Examiner: Gösta Axelsson

UNIVERSITY OF GOTHENBURG

English title: Association between job strain and health. A cross-sectional study within a native Swedish and immigrant population

Swedish title: Associationen mellan arbetsrelaterad stress och hälsa. En tvärsnittsstudie inom en population bestående av svenskar och invandrare

Authors: Rosol Sleman, Viktoria Vuleta

Programme: Programme in public health science with health economics

Course: Thesis in public health science with health economics I, 15 credits, spring term 2014

Supervisor: Robin Fornazar

Examiner: Gösta Axelsson

ABSTRACT

Introduction: Psychosocial work-related factors, such as work-related stress, are significant causes for the occurrence of stress related disorders and psychiatric problems. Within the frameworks of public health, working conditions are commonly used as a risk indicator for health measures. According to the demand-control social support model (DCS), morbidity have clearly been linked to a work environment that constitutes high psychosocial demand, low decision latitude, and low social support. **Aim:** The main purpose of this study is to learn if the connection previously found between the DCS model and health is applicable for both a native Swedish and immigrant population in West of Sweden. Secondary purpose is to examine differences in the relationship outcomes between the native Swedes and immigrants. **Method:** The data for this study were taken from the Health Assets Project (HAP). The population sample was divided in two groups consisting of 2795 native Swedes and 319 immigrants of both males and females ranging from 19 to 64 years. Participants' health status was measured by persistent illness (PI), and mental wellbeing (MW). Job strain was measured according to the DCS model. Raw data from HAP were statistically selected from where the relationship between DCS and health status were analyzed. **Results:** The analysis supported prior research indicating a significant correlation between DCS and MW. A greater proportion of participant in the immigrant group experienced high strain occupations, low MW, and low social support. **Conclusion:** Work-related stress can be seen as a key factor in predicting risk factors for poor health. Understanding psychosocial work-related factors may provide knowledge that can be integrated into prevention and health promotion efforts with the workplace as an arena, and as such contribute to improved strategies for occupational health. Using the DCS model as a preventive tool in creating a healthy work environment can have positive effects on the population in terms of fewer incidents of various diseases affecting

both morbidity and mortality. It is important to understand the role of demographics in work-related stress, occupational differences, and different individual needs to better adapt the work based on the conditions of the individual.

Keywords: Work-related stress, Demand-control social support model, health, immigrants.

Abbreviations:

DCS **–** demand-control social support model

HAP – Health Assets Project

MW – mental wellbeing

PI – persistent illness

SEP – socio economic position

SAMMANFATTNING

Introduktion: Psykosociala arbetsrelaterade faktorer, såsom arbetsrelaterad stress, är viktiga orsaker till förekomsten av stressrelaterade sjukdomar och psykiska problem. Inom ramarna för folkhälsa används arbetsvillkor vanligen som en riskindikator vid mätning av hälsotillstånd. Enligt krav-kontroll socialt stöd modellen (DCS) har sjuklighet tydligt kopplats till en arbetsmiljö som utgörs av höga psykosociala krav, lågt beslutsutrymme, och lågt socialt stöd. **Syfte:** Det huvudsakliga syftet med denna studie är att få kunskap om huruvida tidigare resultat som påvisat samband mellan DCS och hälsa gäller för en befolkning bestående av personer födda i Sverige och immigranter i Västsverige. Sekundärt syfte är att undersöka om det förekommer skillnader i resultaten mellan Svenskar och immigranter. **Metod:** Data från denna studie har hämtats ifrån hälsoresursprojektet (HAP). Populationsurvalet delades in två grupper bestående av 2795 svenskar och 319 immigranter av både män och kvinnor mellan åldrarna 19 till 64. Deltagarnas hälsotillstånd mättes med långvarig sjukdom (PI), och psykiskt välbefinnande (MW). Arbetsrelaterad stress mättes i enlighet med DCS modell. Rådata från HAP bestod av ett slumpmässigt urval varifrån förhållandet mellan DCS och hälsotillstånd analyserades. **Resultat:** Analysen stöder tidigare forskning som visar på ett signifikant samband mellan DCS och MW. En större andel deltagare i gruppen bestående av immigranter upplevde yrken med högre arbetsbelastning, lägre MW, och lägre socialt stöd. **Slutsats:** Arbetsrelaterad stress kan ses som en viktig faktor för att förutsäga riskfaktorer för ohälsa. En förståelse för psykosociala arbetsrelaterade faktorer kan ge kunskap som kan integreras i förebyggande och hälsofrämjande interventioner med arbetsplatsen som arena, och därigenom bidra till förbättrade strategier inom företagshälsa. Genom att använda DCS-modellen som ett förebyggande verktyg kan en god arbetsmiljö med positiva effekter på befolkningen uppnås i form av färre incidenter av sjukdomar som påverkar både sjuklighet och dödlighet. Det är viktigt att förstå den roll som demografiska förhållanden kan ha i arbetsrelaterad stress, skillnader i yrken, och olika individuella behov för att bättre kunna anpassa arbetet utifrån förutsättningarna för den enskilda individen.

Nyckelord: Arbetsrelaterad stress**,** krav-kontroll stöd modellen, hälsa, immigranter.

TABLE OF CONTENT

1. Introduction

Work-related stress and sickness absence are social problems that consequently are associated with substantial costs both for the individuals, and their entire work organization and society at large (1). An important public health related risk indicator for health measures is sickness absence and its concomitant risk factors of working conditions (2). Sickness absence and working conditions are widely used to measure and predict morbidity, and as a marker of social and organizational problems for working populations (3). Hence, work-related stress is considered as an important risk indicator in occupational health studies (4).

The psychosocial work environment was given wide attention in the 1990s. A growing proportion of employees reported work situations with increasing job demand (5). The changes in the work environment during this time resulted in a rise in mental requirements, and in a reduction of the perceived controllability. Work-related mental health problems and long-term sickness increased (6). There was a decreasing trend in sickness absence during the early 1980s in Sweden. This rate increased in 1984-1988. Sickness absence decreased again between 1989 and 1996, and later increased considerably in 1997. During this period there was also a shift in the type of sickness absence. High levels of long-term sickness absence replaced the short-term sickness absence that took place in the 1980s (2).

There are multifactorial and complex causes behind the occurrence of sickness absence. Potential contributors could depend on both individual perceptions of and responses to illness, and societal factors such as the sickness insurance system, indispensability at work, family responsibilities, and informal norms of acceptable levels of absence among colleagues (4). Psychosocial work-related factors, such as work-related stress, are considered as significant causes for the occurrence of poor health and sickness absence (6). Thus, stress related disorders and psychiatric problems could stem from a stressful work situation (7). There is strong epidemiological evidence, which has found that high psychological demand is a risk factor of work-related stress (8). Understanding psychosocial work-related factors may contribute to improved prevention strategies for occupational health.

1.1 Demand-control-support model – DCS

When measuring the psychological demands at work and evaluating psychosocial health, the most commonly used psychosocial job strain model is the demand control and social support model (DCS) (6). It was originally developed by Karasek in 1976 (9) and further developed by Karasek and Theorell and was intended to focus on working conditions in effort to fill the need for such theories (10). It also played a role as a sought after counterweight against the individualization of work related stress. Later, Johnson and Hall added a third dimension of social support to the model (11). The DCS model (along with the competing model of Siegrist´s effort-reward imbalance model) has dominated the world of research for a decade. Several hundreds of articles have been published on the subject (10). Initially, the DCS theory was developed in relation to physiological theories that tested for heart disease risk (9). Later, the theory has been used for the study of other kinds of illnesses, such as mental,

musculoskeletal, and gastrointestinal diseases, and long-term sickness absence (12). DCS is empirically supported by numerous studies suggesting that individuals in occupations characterized by high work demands and low decision latitude are at an increased risk for health outcomes, such as physical (13), and psychological symptoms (4,7), cardiovascular diseases and mental disorders. DCS is a theoretical model that provides a system for describing the given work situation in terms of job strain, and measuring stress mechanisms. The basis of the model is that there are three main factors at work that determines whether individuals become stressed or not. Health is measured as a variable, which is dependent on these three dimensions. It is about the interaction between 1) external psychological demands, 2) opportunities for autonomy in the form of control and influence over the work situation (referred to as decision latitude) and 3) social support.

1.1.1 Demands

These consist of psychological demands that the environment imposes on the individual, or the demands that the individual directs at him- or her-self in the work. This means that the individual can have a supervisor or an organization that is demanding, or that the individual place high demands on him- or her-self to do a good job. Work demands involve tasks such as quantity per unit of time, emotional demands, demands of not showing emotions, and cognitive demands. Different tasks can result in different health problems, and in other situations, it is the sum of all demands that causes the problems (14).

1.1.2 Decision latitude/degree of control

This is the control and influence that the individual has over the work. It theorises the individual's opportunities to exercise control over their work situation. The decision latitude is an important aspect of the individual's health. The ability to manage stress is critical in excessive workloads. Being able to influence various situations at work gives people opportunities to create stability in their environment (15). Therefore, work tasks that are adapted to the individual's abilities are important to avoid health problems (14). It is important to make a distinction between being able to influence living situation at work (control at work), and to influence longer-term processes in the form of democratic opportunities (job control).

1.1.3 Social support

The third dimension of the DCS model describes social support or social climate. Studies show that social support promotes good health, and correspondingly lack of social support leads to health risks (16). Therefore, interaction and good relationships in the workplace are of great importance (17). If the individual, in addition to a tense climate, is isolated with low social support from colleagues or superiors an, so-called, ISO-tense situation will be created. In situations with high demands and low degree of decision latitude, social support works as a buffer, and can get people to endure difficult working conditions.

1.2 Main components of the Demand-control social support model

Simplified, the main components of the DCS model consist of four different types of interactions that create specific conditions:

1)   High-strain work: high psychological demands and low decision latitude.
The long-term effects of a tense work environment create stress that inhibit learning and development, and psycho physiological stress that may increase the risk of disease.

2)   Active work: high psychological demands and high decision latitude.
The long-term effects of an active work environment create psychological stimulation, resistance against stress, and improved coping.

3)   Passive work: low psychological demands and low decision latitude.
The long-term of a passive work environment create loss of some of the knowledge and skills that the individual had before doing the work.

4)   Low-strain work: low psychological demands and high decision latitude.
The long-term effects of a relaxed work environment correspond to the ideal work environment (14).

According to the DCS model the worst combination for disease risk is the high-strain work situation, characterized by high demands and low decision latitude, combined with low social support for individuals from colleagues and supervisors (16). Workplaces with good decision latitude offer the employees a lot of information about happenings and make them feel as a part of the decision-making processes, as well as giving them the opportunity to develop skills so that they can take control in unexpected work situations. Common objectives and agreed principles can create a good social support (14). Workload can be experienced as positive and challenging in a good way under the conditions of having control over the work. Ideally, the job requirements are balanced with the individual's competence.

Theorell's stress map of the Demand-control social support model:
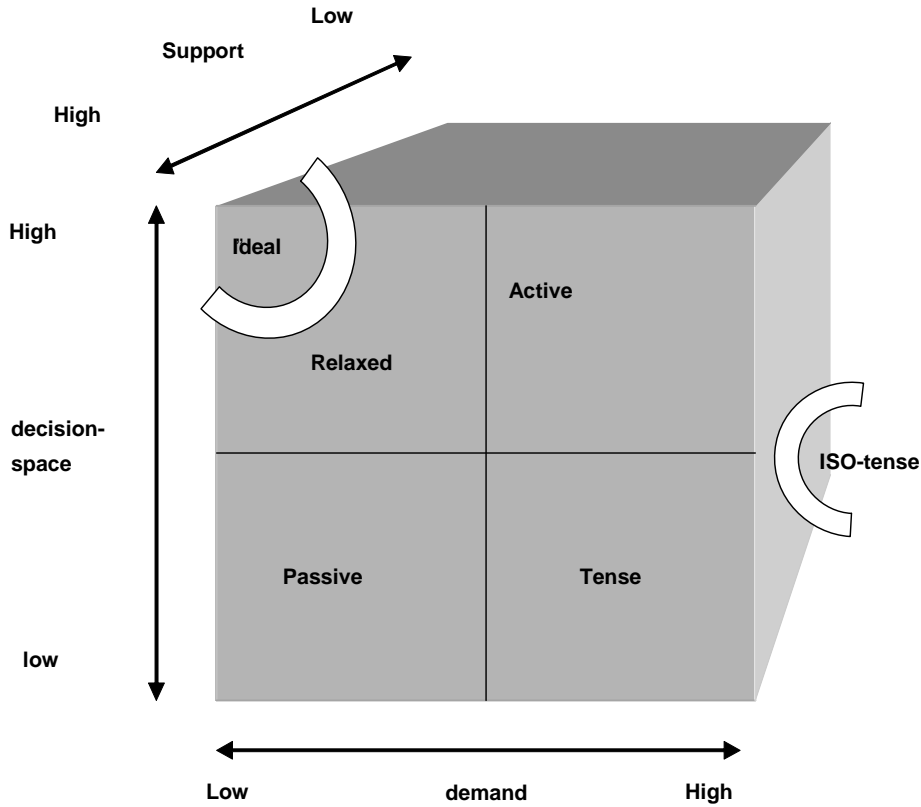
Figure 1: Demand-control social support model (17).

1.3 Association between Demand-control social support model and morbidity

A large number of epidemiological studies have shown that perception of adverse psychosocial working conditions are related to an elevated risk of cardio-vascular disease (18) stroke, psychosomatic gastrointestinal disorders, and mental illnesses such as depression and chronic fatigue syndrome (19). There are consistent findings that high demands and low social support at the workplace are predictors of onset of subsequent depressive symptoms or major depressive episodes (20). Morbidity have clearly been linked to a work environment that constitutes high demand and low decision latitude (tense) (21, 22). Also, prior work has found that social relationships of high quality or quantity influence health status and have powerful effects on physical and mental wellbeing, and in lack of, increase the risk of mortality (23).

1.4 Demands for adaptability and flexibility

Many occupations in contemporary working life are associated with considerable mental and emotional demands (19). These demands are reflections of changes in and around work organizations and their effects upon work characteristics, which in turn affect the health and wellbeing of today's employees (24). Epidemiological studies reveal that work-related poor health is more a cause of the development of societal factors than within individual (25). On a macro-level contemporary working life processes new systems of work organization such as increased internationalization and competition, new cognitive demands, modern information and communication technology and management, and with it new organizational practices (10). Related to health, these parameters can be problematised as a product of the globalization of our working life. On a micro-level working life relates to the environment such as working conditions, which are considered in the DCS model. As employment conditions change, we face new challenges and increased demands on flexibility (24). For employees, this conversion has resulted in expanded work content with greater responsibility that is characterized by participation and freedom (26). According to Theorell (17) the focus on stress issues is not a trend, but rather reflects a dramatic change in our general experience of adaptation requirements. It has brought with it an increased risk of poor health and sickness absence for individuals. A possible resilience in being able to handle these demands may be found in good interpersonal and cognitive skills (24). Individuals who are unable to adapt to the rapid changes will be more vulnerable for experiencing negative health consequences. They will have more difficulties finding their ways to become accustomed to the workplace, and have less capacity to influence and adapt the work for their own conditions (14). Individuals who are vulnerable to these changes could represent disadvantaged groups in society. Therefore, it is important to study the association between work-related factors and health in relation to different vulnerable groups in society. It is important that we take into account the major changes that the working conditions are constantly undergoing, and that we relate and change our approaches with asking questions and establishing relationships with health in phase with these changes (10).

1.5 Immigrants as a vulnerable group in the society

Despite evidence that proves the importance of both the labour market role and working conditions to migrant integration, as well as health and well-being, there is a lack of research that have empirically examined the influence of working conditions to health among immigrant groups in Sweden (27). Immigrant workers are in a unique position and experience a different social context than their native counterparts (28). Unlike people who are born in the country they live in, immigrants have to adapt to the new dominant culture in their adopted country. Also, immigrants undergo stressors such as lack of language proficiency, isolation, lack of marketable job skills, and legal status (28, 29). An extra vulnerability factor is the disruption of the continuity of the social networks and the accompanying social support that comes with it (30). International migration and geographic mobility has negative effects on the social networks established by the immigrant in its country of origin. Many immigrants report work-related discrimination, which results in reduced wellbeing at work (31).

Discrimination is considered as a determinant of an individual's state of health (32). It constitutes a health risk factor within the immigrant population's working environment, where its negative effects on health are greater for immigrants who are at risk for social exclusion and marginalization (33). Nonetheless, discrimination is linked to individual difference variables (such as gender, and ethnic group), and across social variables (such as social structure, socio economic position, and hierarchy). Inequality in the labour market is considered to be partly due to individual differences (e.g. education, skills), and partly by differences in labour market treatment where immigrants are treated differently because of their ascribed characteristics (discriminatory behaviour). Therefore immigrants are more likely to suffer from a marginalized status in the labour market (34).

In a Swedish study of work-related health factors for female immigrants it was found that female immigrants experienced ethnic discrimination in their workplace. Further, their working conditions were poorer than their native counterparts. As a result of these factors the female immigrants had higher rates of sickness absence and early retirement (35). Due to this unfavourable situation for immigrants, it may be reasonable to expect immigrants to report lower wellbeing and poorer levels of and negative combinations of DCS, than do native Swedes. Although, there may be a diversity of how immigrants from different places, conditions, and qualifications experience and evaluate their work. Also, immigrants may differ in their exposure to work-related advantages or disadvantages according to DCS. There is a problem in treating immigrants as a homogeneous group. Both work- and health-conditions can vary for immigrants depending on pre-migration factors. Immigrants are a heterogeneous group with various reasons for migrating. The conditions in the adopted country can differ for immigrants that are highly educated, low educated, labour immigrants, or refugees. For this reason work-related health might be likely to vary among immigrant groups. On the basis that immigrants as a minority have a more vulnerable position, there is reason to hypothesise that individuals in this group will be particularly vulnerable to risk factors according to DCS at work, with fewer health protective factors that buffer from the adverse consequences of the psychosocial work environment.

In terms of health, there is a complex relationship between socio economic position (SEP) and the work environment (4). There is a strong association between SEP, poor health, and sickness absence (3). Not accounting for SEP (or other demographic areas, or potentially confounding effects of health) may result in an overestimation of the effect of the work environment. Numerous studies have been done to find out the impact or the effect of SEP on health. One example is a follow-up study by Mikael Rostila and John Fritzell that included men and women in Sweden. They studied mortality differentials between groups of foreign-born immigrants in Sweden and if SEP could explain such differences. The result of their study showed that SEP, especially income and working class, explained most of the differences in mortality between countries of birth (36).

Sweden is known as a welfare country that aims to reduce inequalities on a number of social and economics outcomes. Still, health inequalities remain (27). Immigrants in Sweden are a heterogeneous group. While some immigrants are from Nordic and other Western countries, with a similar background to native born, a large part of immigrants are from all around the

world, with differences in socioeconomic and cultural backgrounds and different reasons for migrating (37). Foreign-born individuals and their children embrace 19.1% of the total Swedish population, and the number of immigrants in working age in Sweden is expected to increase. Being an immigrant with a different ethnic background plays an important role in the maintenance of health inequality. This inequality is defined as one of the socioeconomic determinants of health.

Life expectancy is shorter among people living in a low/very low social class. Furthermore, diseases are more common within these two social classes. Low social class and economy affect health in life, and will affect the quality of life throughout lifetime. Poor health conditions with twice as much risk for early death are relatively high among middle-class working people and low status work than other working people in the higher status work. This is why it is important that health policy must tackle the social and economic determinants of health (27). It is important to understand the role of ethnicity in work-related stress, occupational differences, and different needs to promote healthy work environments in today's global mobility.

By studying DCS in the workplace in relation to health we can get more knowledge that can be integrated into prevention and health promotion efforts with the workplace as an arena. Also, it may prove advantageous to include prevention resources to create good psychological work that focuses on certain groups possibly in need of additional support, such as foreign-born.

2. Aim

The primary purpose of this study is to examine whether the connection previously found between the DCS model and health is applicable to, 1) a population consisting of native Swedes and 2) immigrants, when it comes to self-reported persistent illness and mental wellbeing. Secondary, based on these results, we will examine whether the correlations are the same for a Swedish population and for a population consisting of immigrants.

3. Method

3.1 Study population and data collection

The data to study our question comes from the Health Assets Project (HAP) – a large epidemiological longitudinal prospective cohort study conducted in west of Sweden. The main objective in HAP was to study individual, organizational and societal factors and health resources that promote the return-to-work after sick leave, and support the ability for individuals with health problems to stay in work. The data in the HAP study were collected through a postal self-administered questionnaire (in Swedish) and from registers of Statistics Sweden (Statistiska Centralbyrån, SCB) in 2008. Statistics Sweden provided data on sex, age, and country of birth. Variables were measured via the questionnaire on which participants

provided information about factors concerning the relationship between work conditions, physical and mental health, sickness absence, basic lifestyles in general, and socio-demographic factors. The target group was people of working age, ranging from 19 to 64 years, registered citizens in the county of Västra Götaland (West of Sweden). All participants were identified through simple random sampling by Statistics Sweden. Totally 15,114 people were asked to participate in the study. Of these, 4027 individuals chose to participate in the study. A drop-out analysis of the full sample indicated significantly higher drop-out rate among men, the youngest age group of 19-30 years, individuals with the lowest income level of ≤ 149.000 SEK, among people born outside the Nordic countries, and among single people (compared with those who were married or co-habiting), as well as women in urban areas. This study includes data from a selection of a population sample (n=4027). To study factors related to working life we excluded unemployed, students, sick listed, and people on parental leave (n=911), which led to a study population of 3116 individuals (male n=1455 (46.7%) and female n=1659 (53.3%). Although, since there were two participants for whom there was no indication of country of birth, the final study population for this study consisted of 3114 individuals. The study population was divided into two groups depending on country of birth: born in Sweden (n=2795) and born outside Sweden (immigrants, n=319). The population of immigrants consisted of individuals from; Other Nordic countries, Rest of Europe, Africa, Asia, North America, South America, Pacific Islands, Other countries (Table 1).

Table 1. Country of birth in the study sample

Country of birth	%	n
Sweden	89.7	2795
Outside Sweden	10.2	319
Other Nordic countries	2.9	90
Rest of Europe	3.5	110
Africa	0.5	16
Asia	2.5	78
North America	0.3	9
South America	0.4	12
Pacific Island	0.1	4
Other countries	0.1	2

3.2 Variables

3.2.1 Dependent variables

The participants' health status was measured with two different measures of health covered by the questionnaire. The aim was to capture various health dimensions through two different health issues that were complementary. For this reason, one question was chosen that focuses on persistent illness (PI) , and another question that focuses on mental wellbeing (MW).

PI was measured with the question 'Do you have a persistent disease, discomfort, or disability?' The question had 11 response alternatives with listed illnesses, disorders, or disabilities (cardiovascular disease, abnormal blood pressure, asthma/chest irritation/allergy, dermatitis/eczema/allergy, symptom/pain in muscles, joints, connective tissue, rheumatic disease, neurologic disease, psychiatric disorders, endocrine disease (e.g., diabetes, goiter), tumor disease, indigestion, and gynecological disorders), in addition to 'no' and 'other '. If the respondents reported at least one persistent disease, discomfort, or disability they were classified as experiencing PI, whereas responses of non-persistent disease, discomfort, or disability was classified as not experiencing PI. The answering alternative other (illnesses/discomfort/disabilities) was processed and then classified into one of the 11 listed alternatives of illness, disorders or disabilities.

MW was measured with the question 'How have you been feeling over the last week?' followed by ten statements (a. I have felt sad and down, b. I have felt calm and relaxed, c. I have felt energetic, active and enterprising, d. When I woke up, I have felt refreshed, rested and enterprising, e. I have felt happy or satisfied and pleased with my personal life, f. I am satisfied with my life situation, g. I live the kind of life I want to live, h. I have been keen on tackling the work of today or make new decisions, i. I have felt that I can cope with serious problems or changes in my life, j. I have known that life is full of interesting things), with four response alternatives (four graded ordinal scale): 'never' (0),'sometimes' (1), 'often' (2), and 'always' (3). The score from each statement was summed into a total score. Unlike the other statements, statement "a." was negative (subtraction of points), and therefore had a reversed order of the score points. Respondents with a total score between 13 and 30 were classified as having high MW, and scores between 0 and 12 was classified as having poor MW. HAP obtained this questionnaire instrument from the validated WHO-10 Well-Being Index (38).

3.2.2 Independent variables

To measure Job strain (Job demands, Job control and Social support) the Swedish Demand-Control-Support Questionnaire (DCSQ) was used, which conducts three measures/dimensions: demand (5 items), control (6 items), and social support (6 items). These measures are subjectively experienced and reported by the individual, and as such not a measure of the work environment in itself. Each item on demand and control was scored on a four-point ordinal scale from 1 to 4, corresponding to the following response categories: yes, often; yes, rather often; no, seldom; and no, never. The score sums were calculated for each index of questions about demand and control. The scale of demand index ranged from 5 to 20, and was dichotomized by median score into low demand (5–13 score) and high demand (14–20 score). The scale of control index ranged from 6 to 24, and was dichotomized by median score into low control (6–18 score) and high control (19–24 score). According to the job strain model, the index combined the dichotomized variables into four different types of work situations: low strain jobs (low demand, high control), high strain jobs (high demand, low control), passive jobs (low demand, low control) and active jobs (high demand, high control). Social support at work was measured by 6 questions answered on a four-point ordinal scale with the following response categories: agree, totally; agree, rather well; do not agree

particularly well; do not agree at all. The response options were scored from 1 to 4 and summarized. The social support index ranged from 6 to 24, and was dichotomized by median score into low support (6–19 score) and high support (20–24 score) (38).

3.2.3 Confounding variables

As an important cause of potential associations between job strain and health, as well as differences between native Swedes and immigrants, other independent confounding variables were comprised of the measures of socio-demographic characteristics such as sex, age and SEP. The study population was classified as male or female, and also categorized into three age groups (19-30 years, 31-50 years, 51-64 years). HAP´s data of SEP were measured by level of education, occupational status and income (39). In our study, we only selected data of SEP that were measured by occupational status, which was obtained from Statistics Sweden, and categorized according to their classification system: High level non-manual, Medium non-manual, Low non-manual, Skilled manual, Unskilled manual and Others (e.g. farmers). Given the DCS model it seemed more relevant to measure SEP by occupational status as it could give more information about the experienced work environment than measures of income and education. Further, our choice for including the measure of SEP is based on its known impact on both disease and health (32), due to its properties as a potential confounder, which may result in an overestimation of the work environment.

3.3 Statistical analysis

Statistical analyses were done by using Statistical Package for the Social Sciences (SPSS) version 21. Crosstabs with Pearson's chi-square test was used to determine whether there was a significant relationship between independent and dependent variables. All analyses were made with foreign-born and Sweden-born separately. In the statistical hypothesis testing, the p-value was used to study the differences in health (dependent variables) and job strain (independent variable) in native Swedes and immigrants. To determine if there was enough evidence for the results to be statistically significant (reject the null hypothesis) a p-value of less than 0.05 ($p < 0.05$) was chosen as a significance level.

4. Ethics

The study protocol of the HAP was approved by the Regional Ethical Review Board in Gothenburg (reference number 039-08 for ethical review). The obtained information about research participants is confidential and may not be revealed by others. The participants' names were replaced by codes to stay anonymous. To ensure that participants' rights were protected, all parts of the project were conducted after informed consent from participants. It is important to point out that the study sample immigrants are grouped by one common denominator. Identifying individuals that are immigrants as a special group have possible negative effects, such as generalizing and labelling individuals that are immigrants as vulnerable due to being immigrants. Individuals that are singled out as immigrants consist of a

group that is heterogeneous with inter-individual differences, where the within-group variability might be greater than the between-group variability.

5. Results

5.1 Socio-demographic characteristics and differences between native Swedes and immigrants.

The majority of the participants in the Swedish group were females, while in the immigrant group the majority were males, although the difference in sex between native Swedes and immigrants was non-significant. The distribution between age groups was similar among native Swedes and immigrants. The largest age group in both the native Swedes and immigrant group were that of 31-50 years, the second largest group were that of 51-65 years, and the smallest age group were that of 19-30. There were significant differences between native Swedes and immigrants with regard to job strain. More immigrants than native Swedes were found in the high strain job category (31.4% and 19.7% respectively), while native Swedes dominantly were found in the passive and active job category as well as in low strain. The opposite relationship was found for native Swedes, which had the smallest proportion in the high strain category. A significantly greater proportion of native Swedes than immigrants reported a high social support. Regarding SEP measured by occupational status, there were significant differences between native Swedes and immigrants. A larger proportion of native Swedes had both low/medium non-manual and skilled/unskilled manual occupations (high SEP), while a larger proportion of immigrants had skilled/unskilled manual occupations (low SEP). For health outcomes, there were significant differences found in MW, but not for PI. MW was reported with a higher proportion in native Swedes (84.1%) than in immigrants (77.4%) (Table 2).

Table 2. Socio-demographic characteristics, independent and dependent variables in a native Swedish population and immigrant population (n=3116).

	Native Swedes, n=2795		Immigrants, n=319		
Sex	**%**	**n**	**%**	**n**	**P-value***
Male	46.1	1288	52.4	167	0.330
Female	53.9	1507	47.6	152	
Age					
19-30 years	15.4	431	12.2	39	0.360
31-50 years	48.0	1342	55.5	177	
51-65 years	36.6	1022	32.3	103	
Job strain					
Low strain (low demand, high control	26.6	704	20.1	55	0.001
High strain (high demand, low control)	19.7	522	31.4	86	
Passive (low demand, low control)	25.4	672	23.7	65	
Active (high demand, high control)	28.2	747	24.8	68	
Social support					
Low social support (6-19 p)	49.2	1271	57.3	160	0.010
High social support (20-24 p)	50.8	1310	42.7	119	
Socio-economic position					
High level non-manual	18.6	520	13.5	43	0.001
Medium non-manual	26.3	736	18.2	58	
Low non-manual	13.6	376	9.7	31	
Skilled manual	18.4	513	20.1	64	
Unskilled manual	20.3	566	32.9	105	
Others (e.g. farmers)	0.6	18	0.3	1	
Persistent illness					
No persistent illness	51.6	1443	55.2	176	0.230
At least one persistent illness	48.4	1352	44.8	143	
Mental wellbeing					
High mental wellbeing (13-30 p)	84.1	2242	77.4	219	0.040
Low mental wellbeing (0-12 p)	15.9	425	22.6	64	

The numbers in each category in the Swedish or immigrant group will not always be consistent if added up. The explanation for this is internal missing values. *The p-value is based on chi2-test.*

5.2 Associations in native Swedes

5.2.1 The association between job strain and mental wellbeing

Individuals with high MW reported a higher percentage of low strain work than did individuals with low MW (91.2% and 8.8% respectively). Individuals with low MW reported the highest proportion of high strain work. Further, individuals with high MW had a higher percentage of both passive and active work than did individuals with low MW (Table 3).

5.2.2 The association between job strain and persistent illness

There were no effects shown on PI due to job strain (Table 3). Consequently, this variable will not be discussed further in the context of job strain.

5.2.3 The association between job strain and socio-demographic confounding variables

Men reported a slightly higher percentage of low strain work than women did, and a lower percentage of high strain work than women did. Men and women reported a similar amount of passive work. Further, men reported a higher percentage of active work than did women.

Ages 51-65 reported the highest percentage of low strain work. The age group 31-50 years reported a slightly higher percentage of low strain work than the youngest age group. The job strain decreases with age.

Individuals with low social support reported a lower percentage of low strain work (17.4%), compared to individuals with higher social support (34.6%). Individuals with low social support reported a higher percentage of high strain work (26.3%) than did individuals with higher social support (14.3%). Further, individuals with low social support had a slightly higher percentage of both passive and active work than did individuals with higher social support. That is, a high social support decreases the experienced job strain.

For SEP, there was a difference in low-strain work between high level non-manual workers (33%) and low non-manual workers (22%), as well as between skilled manual workers (26%) and unskilled manual workers (20.4%). The high level non-manual workers and skilled manual workers had a higher percentage of low-strain work than the low non-manual workers and the unskilled manual workers. The high level non-manual workers had the highest percentage of low-stain work, followed by occupations of others, while the unskilled manual workers had the lowest percent. That is, high-strain work increases with low SEP. High strain occupations had the opposite pattern on all categories of the low-strain occupations, where the high level non-manual workers and others had the smallest percentage of high strain work, and the unskilled manual workers had the highest percentage. Unskilled manual workers had the highest percentage of passive occupations, followed by other occupations. As in the high strain occupations, the pattern is that high level non-manual workers had less percentage of passive work (9.6%) than low non-manual workers did (34.9%), and skilled manual workers (28.3%)

had less percentage than unskilled manual workers did (41.8%). Also, in active occupations the pattern is the opposite of the passive occupations. That is, high level non-manual workers had the highest percentage of active work (47.5%), while the unskilled manual workers had the lowest percentage of active work (8.5%). That is, active work decreases with low SEP (Table 3).

Table 3. The association between job strain and other variables in native Swedes

	Job strain								
	Low strain (low demand, high control		High strain (high demand, low control)		Passive (low demand, low control)		Active (high demand, high control)		
Sex	%	n	%	n	%	n	%	n	p-value
Male	27.6	341	16.9	209	25.3	312	30.2	373	0.004
Female	25.7	363	22.2	313	25.5	360	26.5	374	
Age									
19-30 years	24.9	102	25.2	103	29.1	119	20.8	85	0.001
31-50 years	25.3	325	19.0	244	24.6	316	31.1	399	
51-65 years	29.1	277	18.4	175	24.9	237	27.6	263	
Social support									
Low social support (6-19 p)	17.4	213	26.3	322	27.4	335	28.9	353	0.001
High social support (20-24 p)	34.6	437	14.3	180	24.3	307	26.8	339	
Mental Wellbeing									
High mental wellbeing (13-30 p)	91.2	615	74.2	369	84.4	545	85.0	611	0.001
Low mental wellbeing (0-12 p)	8.8	59	25.8	128	15.6	101	15.0	10.8	
Persistent illness									
No persistent illness	56.0	394	47.1	246	50.4	339	63.8	402	0.120
At least one persistent illness	44.0	316	52.9	276	49.6	333	46.2	345	
Socio-economic position									
High non-manual	33.1	169	9.8	50	9.6	49	47.5	242	0.001
Medium non-manual	29.1	202	16.0	111	17.0	118	37.8	262	
Low non-manual	22.0	80	23.9	87	34.9	127	19.2	70	
Skilled manual	26.0	123	21.8	103	28.3	134	23.9	113	
Unskilled manual	20.4	108	29.3	155	41.8	221	8.5	45	
Others (e.g. farmers)	31.3	43.8	7	12.5	12.5	2	12.5	2	

5.2.4 The association between mental wellbeing and socio-demographic confounding variables

Among the three age categories the results were non-significant. Women reported a higher percentage of low MW than men did. Individuals with high social support reported a higher percentage of MW (90%) and lower percentage of low MW (10.1%), compared to individuals with low social support (high MW 77.9% and low MW 22.1%). High level non-manual

workers had the highest percentage of MW, while the unskilled manual workers had the lowest percentage of MW. That is, low MW increases with low SEP (Table 4).

Table 4. The association between mental wellbeing and socio-demographic confounding variables in native Swedes

	Mental wellbeing				
	High mental wellbeing (13-30 p)		Low mental wellbeing (0-12 p)		
Sex	**%**	**n**	**%**	**n**	**p-value**
Male	87.8	1082	12.2	151	0.001
Female	80.9	1160	19.1	274	
Age					
19-30 years	83.1	344	16.9	70	0.809
31-50 years	84.1	1097	15.9	208	
51-65 years	84.5	801	15.5	147	
Social support					
High social support (6-19 p)	90.0	1131	10.1	126	0.001
Low social support (20-24 p)	77.9	950	22.1	269	
Socio-economic position					
High level non-manual	89.0	453	11.0	56	0.001
Medium non-manual	84.2	595	15.8	112	
Low non-manual	83.2	297	16.8	60	
Skilled manual	83.9	406	16.1	78	
unskilled manual	79.3	422	20.7	110	
Others (e.g. farmers)	100.0	18	0.0	0	

5.2.5 The association between persistent illness and socio-demographic confounding variables

Women reported a higher percentage of PI than men did. Among the three age groups the age of 51-65 years reported the highest PI. There was a slight difference between the age group 19-30 years and 31-50 years (42.2 % and 43.6 % respectively). Individuals with low social support reported a higher percentage of PI, compared to individuals with higher social support. That is, high PI increases with low social support. The results for SEP had a p-value very close to the cut-off (p= 0.051), and as such could be considered to be marginal. High level non-manual workers had the lowest occurrence of PI, while medium non-manual and unskilled manual had the highest occurrence of at least one persistent illness (Table 5).

Table 5. The association between persitent illness and socio-demographic confounding variables in native Swedes

Persistent illness

Sex	No persistent illness		At least one persistent illness		
	%	**n**	**%**	**n**	**p-value**
Male	56.2	724	43.8	564	0.001
Female	47.7	719	52.3	788	
Age					
19-30 years	57.8	249	42.2	182	0.001
31-50 years	56.4	757	43.6	585	
51-65 years	42.8	437	57.2	585	
Social support					
Low social support (6-19 p)	49.5	629	50.2	624	0.001
High social support (20-24 p)	54.5	714	45.5	596	
Socio-economic position					
High level non-manual	57.9	301	42.1	219	0.051
Medium non-manual	49.0	361	51.0	375	
Low non-manual	52.2	198	47.8	181	
Skilled manual	51.3	263	48.7	250	
Unskilled manual	49.8	282	50.2	284	
Others (e.g. farmers)	55.6	10	44.4	8	

5.3 Associations in immigrants

5.3.1 The association between job strain and mental wellbeing

Individuals with high MW reported a much higher percentage of low strain work, than did individuals with low MW. Also, individuals with high MW reported the lowest percentage of high strain work compared to the other work categories (Table 6).

5.3.2 The association between job strain and persistent illness

There were no effects shown on PI due to job strain (Table 6). Consequently, this variable will not be discussed further in the context of job strain.

5.3.3 The association between job strain and socio-demographic confounding variables

The age category 51-65 reported the highest percentage of low strain work and the lowest percentage of passive work among the other age categories. The age category 31-50 years reported the highest percentage of passive work between all age groups.

Individuals with low social support reported a lower percentage of low strain work (8.5%), compared to individuals with higher social support (34.8%). Individuals with low social support reported a higher percentage of high strain work (42.6%) than did individuals with high social support (15.3%). Further, individuals with low social support had a higher percentage of passive work (27%) than did those with high social support (20.5%). Individuals with low social support reported a higher percentage of active work (22%) than did those with high social support (29.5 %). That is, low social support increases the experienced job strain.

For SEP, there was a difference in low-strain work between high level non-manual workers (30%) and low non-manual workers (13.3%), as well as between skilled manual workers (21.2%) and unskilled manual workers (6.7%). The high level non-manual workers and skilled manual workers had a higher percentage of low-strain work than the low non-manual workers and the unskilled manual workers. The medium level non-manual workers had the highest percentage of low-stain work, followed by high level non-manual workers, while the unskilled manual workers had the lowest percent. High strain occupations had the opposite pattern on all categories of the low-strain occupations, where the high level non-manual workers had the smallest percentage of high strain work, and the unskilled manual workers had the highest percentage. Unskilled manual workers had the highest percentage of passive occupations, followed by low non-manual workers. As in the high strain occupations, the pattern is that high level non-manual workers had less percentage of passive work (12.5%) than low non-manual workers did (30%), and skilled manual workers (28.8%) had less percentage than unskilled manual workers did (32.6%). Also, in active occupations the pattern is the opposite of the passive occupations. That is, high level non-manual workers had the highest percentage of active work (42.5%), while the unskilled manual workers had the lowest percentage of active work (13.5%) (Table 6).

Table 6. *The association between job strain and other variables in immigrants*

	Low strain (low demand, high control		High strain (high demand, low control)		Passive (low demand, low control)		Active (high demand, high control)		
	Job strain								
Sex	%	n	%	n	%	n	%	n	p-value
Male	21.4	31	33.1	48	22.8	33	22.8	33	0.754
Female	18.6	24	29.5	38	24.8	32	27.1	35	
Age									
19-30 years	25.8	8	35.5	11	19.4	6	19.4	6	0.031
31-50 years	13.1	20	33.3	51	28.8	44	24.8	38	
51-65 years	30.0	27	26.7	24	16.7	15	26.7	24	
Social support									
Low social support (6-19 p)	8.5	12	42.6	60	27.0	38	22.0	31	0.001
High social support (20-24 p)	34.8	39	15.2	17	20.5	23	29.5	33	
Mental wellbing									
High mental wellbeing (13-30 p)	92.6	60	67.6	50	80.7	46	83.1	54	0.005
Low mental wellbeing (0-12 p)	7.4	4	32.4	24	19.3	11	16.9	11	
Persistent illness									
No persisent illness	63.6	35	52.3	45	58.5	38	55.9	38	0.605
At least one persistent illness	36.4	20	47.7	41	41.5	27	44.1	30	
Socio-economic position									
	30.0	12	15.0	6	12.5	5	42.5	17	0.005
Medium non-manual	38.0	19	22.0	11	10.0	5	30.0	15	
Low non-manual	13.3	4	26.7	8	30.0	19	30.0	9	
Skilled manual	21.2	11	26.9	14	28.8	15	23.1	12	
Unskilled manual	6.7	6	47.2	42	32.6	29	13.5	12	
Others (e.g. farmers)									

5.3.4 The association between mental wellbing and socio-demographic confounding variables

The results in MW were non-significant between women and men, among the three age categories, and in SEP. Individuals with high social support reported a higher percentage of MW (88.1 %) and lower percentage of low MW (11.9 %), compared to individuals with low social support (high MW 72.1 % and low MW 27.9 %) (Table 7).

Table 7. The associations between mental wellbeing and socio-demographic confounding variables in immigrants

	Mental wellbeing				
	High mental wellbeing (13-30 p)		Low mental wellbeing (0-12 p)		
Sex	%	n	%	n	p-value
Male	81.3	117	18.8	27	0.114
Female	73.4	102	26.6	37	
Age					
19-30 years	72.7	24	27.3	9	0.691
31-50 years	76.9	120	23.1	36	
51-65 years	79.8	75	20.2	19	
Social support					
High social support (6-19 p)	88.1	96	11.9	13	0.002
Low social support (20-24 p)	72.1	106	27.9	41	
Socio-economic position					
High level non-manual	82.5	33	17.5	7	0.871
Medium non-manual	72.5	37	27.5	14	
Low non-manual	80.0	24	20.0	6	
Skilled manual	79.3	46	20.7	12	
unskilled manual	76.7	69	23.3	21	
Others (e.g. farmers)	100.0	1	0	0	

5.3.5 The association between persistent illness and socio-demographic confounding variables

The results for PI among women and men were non-significant, as was the results for SEP. For the three age groups, the results showed that the higher the age, the greater the proportion who report symptoms. Individuals with low social support reported a higher percentage of PI, compared to individuals with higher social support (Table 8).

Table 8. The association between persistent illness and socio-demographic confounding variables

Persistent illness

	No persistent illness		At least one persistent illness		
Sex	**%**	**n**	**%**	**n**	**p-value**
Male	56.3	94	43.7	73	0.675
Female	53.9	82	46.1	70	
Age					
19-30 years	76.9	30	23.1	9	0.001
31-50 years	61.6	109	38.4	68	
51-65 years	35.9	37	64.1	66	
Social support					
Low social support (6-19 p)	48.8	78	51.3	82	0.001
High social support (20-24 p)	68.1	81	31.9	38	
Socio-economic position					
High level non-manual	67.4	29	32.6	14	0.407
Medium non-manual	56.9	33	43.1	25	
Low non-manual	48.4	15	51.6	16	
Skilled manual	53.1	34	46.9	30	
Unskilled manual	50.5	53	49.5	52	
Others (e.g. farmers)	100.0	1	0.0	0	

6. Discussion

The main purpose of this study was to learn if the connection previously found between the DCS model and health would be applicable to both a native Swedish group and an immigrant group in West of Sweden. Further, we were interested in whether the relationship outcomes from these results would be the same for a Swedish population and for a population consisting of immigrants. Thus, the interest was primarily in the perceived DCS in the workplace and persistent illness and mental wellbeing, and secondary the difference in these variables between native Swedes and immigrants. In health outcomes, analysis showed that there was a significant correlation between DCS and MW: a much greater proportion of both native Swedes and immigrant reported the highest MW in low strain occupations, and the lowest MW in high strain occupations. Social support is incorporated as a variable, and one of the important predictors in health and wellbeing, in the DCS model. Individuals with low strain occupations reported the highest percentage of social support, and individuals with high strain occupations reported the lowest percentage of social support. Further, social support correlated positively with MW, and negatively with PI.
With regard to differences between native Swedes and immigrants, a greater proportion of immigrants than native Swedes reported to experience high strain occupations (31.4% and 19.7% respectively), low MW (22.6% and 15.9% respectively), low social support (57.3% and 49.2% respectively), and low SEP (32.9% and 20.3% respectively).

6.1 Demand-control social support and health

6.1.1 Mental wellbeing among native Swedes and immigrant

It was found that job strain correlated with MW similarly for native Swedes and immigrants, the latter reported higher job strain, which may explain differences in MW between native Swedes and immigrants. According to the results of our study unskilled manual work was a more common occupation among immigrants. The significant association between job strain and SEP may indicate a contributing factor behind the higher occurrence of low MW among immigrants. Although, the analysis of MW showed that it had a non-significant relationship with SEP in the immigrant group. One reason why the analysis showed more non-significant results of variables that were tested for the immigrants will be discussed under limitations of the study. Alternatively, low MW may pose difficulties that limit individuals to unskilled manual occupations. Low MW may affect the work situation by restricting other areas of life, such as development of language and supportive social networks. High social support appeared to correlate with high MW similarly for native Swedes and immigrants. Individuals with high social support had the highest proportion of low strain jobs and high MW. It is apparent that job strain and social support were important variables for MW. Low MW can be addressed by moderating influences of a high strain job (19), and build social support (23). Thus, interventions that facilitate social networking constitute an important part in the prevention of low MW. Also, strengthening the social support might increase the chances of counteract a broader range of factors that can cause poor health.

6.1.2 Persistent illness among native Swedes and immigrant

According to our analysis job strain was not related to PI. Job strain is a psychosocial model that measures work-related stress, therefore it could be more likely that it shows a relation to MW, and not to PI. That is, MW could be a more direct measurement of the self-perceived psychosocial stress. Having at least one persistent illness was significantly related to low social support and individual's age. A greater proportion of females in the native Swedish group reported to have at least one persistent disease. Differences may be due to a greater utilization of medical care among native Swedes in general. Immigrants are more likely to refrain from seeking medical care (40). To reduce differences in health care utilization between the groups, and ensure adequate treatment when illness strikes, attention should be given to improve medical care seeking behaviour. Within this improvement in medical care population's confidence in the medical system might increase (40). Possible interventions to increase this positive behaviour, should attend to enabling accessibility, and to reduce the economic pressure of seeking medical care. Given the socioeconomic inequality between native Swedes and immigrants found in the analysis, it may be of importance to address the issue of financial strain. In such case it would be in its place to adjust for socio-economics by regression analysis. In the text under *limitations,* we have explained the reason for not going further in doing a regression analysis, which could be used to exclude the impact of potential confounders.

6.1.3 Potential confounders

As potential confounders influenced our results, we thought it might be useful to mention them even if they are not a part of our main aim. In the native Swedish group more females reportedly had high strain jobs, and poorer health for both PI and MW.
As sex is important for health, but also job strain among the Swedish participants, it is a potential confounder. A gender perspective in public health policy can lead to the improvement of public health by paying attention to gender-related working conditions.

Age was significant for PI in native Swedes and immigrants, where the oldest age group (51-60 years) had the highest percentage of at least one PI, and as such a potential confounder for the association between age and PI. We found a connection to DCS with regard to SEP. With regard to differences between the Swedish group and the immigrant group, a greater proportion of immigrants reported to have low SEP (unskilled manual work).

SEP is a characteristic for the systematic pattern of health disparities between native Swedes and immigrants. Social inequalities in health are considered, almost among all people, as unjust. Low social position increases poor health. Women in unskilled occupations have more than twice the mortality than women who are skilled non-manual workers. There is also a clear class perspective in the form of correlation between the occurrence of illness and occupation, level of education, class and other socio-economic conditions. This is due to people's background, health and health behaviour, as well as on the work content and the organization (41).

Social support was consistently the only variable that was significant to all other variables within both groups. Thus, its importance could be considered as an essential factor in the DCS model when measuring health in job strain, and as such may play a key role in health outcomes. The results in our study may confirm prior research indicating that immigrants suffer from a marginalized status in the labour market (34). Some immigrants in Sweden have bad work conditions with low control and high demand that create a stressed lifestyle and affect their life at home. The higher unemployment rates among immigrants in Sweden forces them to choose occupations with major risk factors for work-related injuries and illness (42). Aligned with previous research (18), the results of our study indicate that social support could act as a buffer in variables that are detrimental to health, such as high job strain. MW was positively correlated to social support (table 7, 8), which means that a low social support is associated to a low MW. Further, social support was negatively correlated to PI (Table 5, 6), signifying that a low social support is associated to a high level of PI. Low social support is linked to having at least one PI, low MW, being an immigrant, and as an immigrant having a high strain occupation. Social support was connected to job strain, and as such, may play a role as a contributing factor to the immigrants reportedly poorer MW. Interventions that facilitate social networking for immigrants could reduce the negative effects of high strain jobs and thereby address low MW. One approach is to have contact families for newly arrived immigrants.

6.1.4 Intervention

Different approaches to tackle these crucial issues are partly by interventions that act from high levels in the society, and partly building specific strategies for injury prevention with special focus on exposed groups. When it comes to health interventions, it is common that a program is found to give different effects. One of several reasons for this is due to the characteristics of the participants (42). Therefore, it may be crucial to study and understand the effects of a specific program for various populations, groups and individuals. For that reason it is essential to develop good methods for selecting and describing the program participants. The chosen methods are preferably based on the health status of the population for whom the prevention is addressed (16). It is favourably to integrate health thinking in organizations to better adapt the work based on the conditions of the individual. Thus, intervention programs could ideally be based on multimodal reference frames. The most common stress prevention intervention strategies used to classify interventions are individual level interventions, individual/organizational level interventions, and organizational level interventions. According to a study, organization level interventions focusing to reduce stress in health care, based on the DCS model, have been shown to have the greatest potential in creating good working environments of the entire work group that in turn have positive effects on individuals. The organizational level intervention included the following: 1) Having a work that ensure that the worker have the right skills to work effectively, 2) Training and education programs that updates employees skills and knowledge, 3) Increasing job autonomy, control, or both by giving employees more space to make decisions around their work, and increasing skills estimation by allowing employees to use their skills, knowledge and ability to perform complex tasks, 4) The redistribution of power between all staff to create a more democratic working environment and increase employees feeling of control. In addition to the organizational level

interventions, it is important to point out that interventions on individual levels may have a very positive impact on health with employees participating in the decision-making processes (43). One of the most important psychosocial factors that are identified to contribute to a healthy workplace is that employees experience control through participation in decision-making. Employee participation is a key success factor in the most efficient work environment interventions (44). Regardless of positive effects, there could be a danger in focusing on the individual level, as it ignores the occupational factors that could result in employee's poor health. Various interventions on individual levels could create tendencies to endure stress that originates from organizational and societal levels. It may also allow bad occupational conditions to continue. Among various psychosocial factors linked to protection and promotion for well being in adults are secure attachment, an optimistic outlook on life with a sense of purpose and direction, effective strategies control over life outcomes, emotionally rewarding social relationships, expression of positive emotion, and social integration (45). Considering the psychosocial well-being factors in adults, it is reasonable that the behavioural science of positive psychology (such as job satisfaction, commitment, manageability, and control) is leading the research and development pertaining to interventions for work-related stress. However, continued research is necessary in various aspects of a healthy work environment. Important aspects are concerned with the development of assessment instruments, the testing of complex models for healthy work environments, as well as methods of implementation (46). In summary, interventions that facilitate environmental settings at work to create control, autonomy, skill adapted work, as well as reducing feelings of loneliness by supportive co-workers, social integration, could be an approach for reducing work-related stress.

6.1.5 Limitations

There are many reasons interpreting our study results with modesty. A statistical significant result does not have to imply an important difference if it does not consider generalizability, in this case, being applied to a broader understanding of public health. Generalizability is particularly important, in this case, when involving people that are divided into two groups based on having immigrated or not. This leads to the question of to what extent this kind of grouping of immigrants could be generalized to an otherwise heterogeneous group. In our study, we were not able to differentiate immigrants with varied backgrounds, and therefore unable to tell how conditions of DCS could affect highly educated immigrants and low educated immigrants, as well as labour immigrants and refugees, whose conditions differ. The Chi2-test used in our study does not provide information about the difference between the groups within a variable. To obtain such information a different type of test is required. One of the biggest limitations of our study was the potential effect of the confounding variables. There are multifactorial causes and complex relationships behind the occurrence of poor health. We could go further in doing a regression analysis to exclude potential confounders, although we chose not to do so because of space limitations for our study. A regression analysis could influence the results by diminishing the relationship between the DCS and health. Time was also a determinant that limited our work. Restricted sample size of immigrants could have an effect on the statistical power, decreasing the credibility of measures to detect existing statistically significant associations between variables and between-group differences. Thus,

the non-significant variables among immigrants may be due to the small study population. Furthermore, in addition to the variables that we chose to include in this study, there are other variables that could affect both health and job strain. The immigrant group was not differentiated between different types of immigrants. Thus, we have no information about past conditions of the country of birth, earlier life events, and the reasons for migrating.

Disadvantages of using the DCS model are that it can be difficult to measure objectively, and do not include gender or ethnic aspects. The advantages are that it has epidemiological evidence for work-related stress connections (16), and is simple and pedagogical. Data from a cross-sectional study design, with two groups of surveyed respondents, provided information about how native Swedes and immigrants differed in the variables of our study. Nevertheless, association does not imply causality, and does not show how health could develop in the population samples over time. Finally, a strength of the study is that it is based on a population sample with a complete data register from Statistics Sweden.

7. Conclusion

We have not only described the relationship between the variables but maybe also gained the ability to anticipate health status from the knowledge of job strain, SEP, with sex and age in the context of job strain. It has emerged that there are many possible theories behind the immigrants' more profound work-related health problems. It's obvious that health in general, nevertheless work-related health, is complicated. This complexity is influenced by various factors with dynamic interactions. Low SEP is a controlling factor that affects health among immigrants. The majority of immigrants that were included in the HAP study experienced a high strain job, which according to our analysis may be interpreted as a correlation to work-related poor health. The majority of native Swedes experienced a low strain job that correlated to a relatively good health compared to the immigrants. Using the DCS model as a preventive tool, might be a successful concept from a public health perspective. According to the DCS model, social support had a positive correlation with MW, and a negative correlation with PI. In other words, social support is remarkably important for individual's health and wellbeing. Work-related stress cannot be eliminated, it can be managed. As the "father of stress" Hans Selye implied, stress is an unavoidable consequence of life, and therefore an unavoidable consequence of organizations" (47). A healthy work according to the DCS model can have positive effects on the population in terms of fewer incidents of various diseases affecting both morbidity and mortality and hence a reduced sickness absence (48). There are more confounding variables that could be taken into account when studying health. We suggest that future studies of health and occupational environment should include variables such as level of education, country of birth with previous experiences, reason for immigrating, civil status, salary, labour market sector (public, private), permanent or temporary employment, Body Mass Index, and ergonomic exposure. Finally, we suggest that future studies attend to occupational and societal levels of the outcome of ill work-related health. Our destiny is not, as previously thought, determined by our birth heritage. Studying epidemiology and work-related poor health, it is revealed that disease is more about society than the development of the human being itself (25).

8. References

1. Folkhälsomyndigheten. Hälsoekonomi för folkhälsoarbete – introduktion och debatt. [Internet] Stockholm: Statens folkhälsoinstitut (FHI). FHI-report, 2003:11. [cited 12 oct 2014] Available from: http://www.folkhalsomyndigheten.se/pagefiles/11961/r2003-11-halsoekonomi-for-folkhalsoarbete.pdf

2. Lidwall U, Marklund S, Skogman Thoursie P. Sickness Absence in Sweden. In: Gustafsson RÅ, Lundberg I, editors. Worklife and Health in Sweden. Stockholm: National Institute for Working Life; 2004. pp. 183-204.

3. Marmot M, Feeney A, Shipley M, North F, Syme SL. Sickness absence as a measure of health status and functioning: From the UK Whitehall II study. Journal of Epidemiology and Community Health. 1995;49(2):124-130. DOI:10.1136/jech.49.2.124

4. North FM, Syme SL, Feeney A, Shipley M, Marmot M. Psychosocial work environment and sickness absence among british civil servants: The Whitehall II study. American Journal of Public Health. 1996;86(3):332-340. DOI:10.2105/AJPH.86.3.332

5. Wikman A. Indicators of Changed Working Conditions. In: Gustafsson RÅ. Lundberg I, editors. Worklife and Health in Sweden. Stockholm: National Institute for Working Life; 2004. pp. 39–77. Dewey: 616.9803

6. Niedhammer I, Chastang J, Sultan-Taïeb H, Vermeylen G, Parent-Thirion A. Psychosocial work factors and sickness absence in 31 countries in europe. European Journal of Public Health. 2013;23(4):622.

7. Stansfeld S, Candy B. Psychosocial work environment and mental health a meta-analytic review. Scandinavian Journal of Work Environmental Health. 2006;32:443–62.

8. Gimeno D, Benavides FG, Amick BC, Benach, J, Martínez JM. Psychosocial factors and work related sickness absence among permanent and non-permanent employees. Journal of Epidemiology and Community Health. 2004;58(10):870-876. DOI:10.1136/jech.2003.016634

9. Karasek RA. The impact of the work environment on life outside the job [PhD dissertation]. Cambridge, MA; Massachusetts Institute of Technology, National Technical Information Service, US Department of Commerce, Springfield VA 22161. 1976. Thesis order number 263–073.1976.

10. Theorell T. New directions for psychosocial work environment research. Scandinavian Journal of Public Health. 2006;34(2):113-115. DOI:10.1080/14034940600607657

11. Bjarte S, Johnson JV, Hall EM. Job strain, workplace social support and cardiovascular disease: A cross-sectional study of a random sample of the Swedish working population. American Journal of Public Health. 1988;78:1336–42.

12. Oxenstierna G, Ferrie J, Hyde M, Westerlund H, Theorell T. Dual source support and control at work in relation to poor health. Scandinavian Journal of Public Health 2005;33:455–63.

13. Kivimaki M, Virtanen M, Elovainio M, et al. Work stress in the etiology of coronary heart disease – a meta-analysis. Scandinavian Journal of Work Environmental Health. 2006;32:431-42.
14. Folkhälsomyndigheten. Den höga sjukfrånvaron – sanning och konsekvens. [Internet] Stockholm: Statens folkhälsoinstitut (FHI). FHI-report, 2004:15. [cited 3 oct 2014] Available from: http://www.folkhalsomyndigheten.se/pagefiles/12045/R200415denhogasjukfranvaron.pdf
15. Aronsson G, Berglind H. Handling och handlingsutrymme. Lund: Studentlitteratur; 1990.
16. Orth-Gomér K, Perski A. Preventiv medicin: Teori och praktik. Lund: Studentlitteratur AB; 2008.
17. Theorell T. Psykosocial miljö och stress. Lund: Studentlitteratur AB; 2003.
18. Malinauskiene V, Theorell T, Grazuleviciene R, Azaraviciene A, Obelenis V, Azelis V. Psychosocial factors at work and myocardial infarction among men in Kaunas, Lithuania. Scandinavian Journal of Work Environmental Health. 2005;31(3):218-223. DOI:10.5271/sjweh.872
19. Magnusson Hanson LL, Theorell T, Bech P, Rugulies R, Burr H, Hyde M. Psychosocial working conditions and depressive symptoms among Swedish employees. International archives of occupational and environmental health. 2009;82(8):951-60
20. Bonde JP. Psychosocial factors at work and risk of depression: a systematic review of the epidemiological evidence. Occupational and Environmental Medicine. 2008;66(7):438-445.
21. Schnall P, Belkić K, Landsbergis P, Baker D. Why the workplace and cardiovascular disease? Journal of Occupational Medicine. 2000;15(1):1-5.
22. Kuper H, Marmot M. Job strain, job demands, decision latitude, and risk of coronary heart disease within the Whitehall II study. Journal of Epidemiology and Community Health. 2003;57(2):147-153. DOI:10.1136/jech.57.2.147
23. Berkman LF, Glass T, Brissette I, Seeman TE. From social integration to health: Durkheim in the new millennium. Social Science and Medicine. 2000;51:843-857. [PubMed: 10972429])
24. Kompier MA. New systems of work organization and workers' health. Scandinavian Journal of Work Environmental Health. 2006;32(6):421–430.
25. Theorell T. Är ökat inflytande på arbetsplatsen bra för folkhälsan? Stockholm: Statens Folkhälsoinstitut; R 2003:46.
26. Hansson A. Health promotion in the workplace. Malmö: Studentlitteratur AB; 2004.
27. Dunlavy AC, Rostila M. Health inequalities among workers with a foreign background in sweden: Do working conditions matter? International Journal of Environmental Research and Public Health. 2013;10(7):2871-2887. DOI:10.3390/ijerph10072871
28. Fujishiro K, Landsbergis PA, Diez-Roux AV, Stukovsky KH, Shrager S, Baron S. Factorial invariance, scale reliability, and construct validity of the job control and job demands scales for immigrant workers: The multi-ethnic study of

atherosclerosis. Journal of Immigrant and Minority Health / Center for Minority Public Health. 2011;13(3):533-540. DOI:10.1007/s10903-010-9364-2

29. Bhattacharya G. Global contexts, social capital, and acculturative stress: Experiences of Indian immigrant men in New York City. Journal of Immigrant and Minority Health / Center for Minority Public Health. 2011;13(4):756-765. DOI:10.1007/s10903-011-9444-y

30. Putnam, R.D. Bowling Alone: The Collapse and Revival of American Community. New York: Simon & Schuster publications; 2000.

31. Hammond WP, Gillen M, Yen I. H. Workplace discrimination and depressive symptoms: A study of multi ethnic hospital employees. Race and Social Problems. 2010;2:19–30.

32. Blas E. Sivasankara Kurup A (editors). Equity, social determinants and public health programmes. [Internet] Geneva: World Health Organization's Commission on Social Determinants of Health (CSDH), World Health Organization (WHO); 2010. [Cited 24 aug 2014] Available from: http://whqlibdoc.who.int/publications/2010/9789241563970_eng.pdf?ua=1

33. Agudelo-Suárez A, Gil-González D, Ronda-Pérez E, Porthé V, Paramio-Pérez G, García AM, Garí A. Discrimination, work and health in immigrant populations in Spain. Social Science & Medicine. 2009;68(10):1866-1874. DOI:10.1016/j.socscimed.2009.02.046

34. Rydgren J. Mechanisms of exclusion: Ethnic discrimination in the Swedish labour market. Journal of Ethnic and Migration Studies. 2004; 30(4):697-716. DOI:10.1080/13691830410001699522

35. Akhavan S, Bildt C, Wamala S. Work-related health factors for female immigrants in Sweden. Work (Reading, Mass.). 2007;28(2):135.

36. Rostila M, Fritzell J. Mortality differentials by immigrant groups in sweden: The contribution of socioeconomic position. American Journal of Public Health. 2014;104(4):686.

37. Steiner KH, Johansson SE, Sundquist J, Wändell PE. Self-reported anxiety, sleeping problems and pain among turkish-born immigrants in Sweden. Ethnicity & Health. 2007;12(4):363-379. DOI:10.1080/13557850701300673

38. Love J, Andersson L, Moore CD, Hensing G. Psychometric analysis of the Swedish translation of the WHO well-being index. 2014;23(1):293-7. doi: 10.1007/s11136-013-0447-0.

39. Holmgren K, Fjällström Lundgren M, Hensing G. Hälsoresursprojektet. [Internet] Göteborg: Göteborgs Universitet, enheten för socialmedicin; 2010. [Cited 5 sep 2014] Available from: http://socmed.gu.se/digitalAssets/1324/1324857_h--lsoresursprojektet--bakgrund--metod---resultat-fr--n-baslinjem--tningen.pdf

40. Andersson HI, Ejlertsson G, Leden I, Scherstén B. Impact of chronic pain on health care seeking, self-care, and medication. Results from a population-based Swedish study. Journal of Epidemiology and Community Health. 1999;53(8):503-509. DOI:10.1136/jech.53.8.503

41. Pellmer K, Wramner B. Grundläggande folkhälsovetenskap. Stockholm: Liber; 2007.

42. Hage SM, Romano J, Conyne RK, Kenny M, Matthews C, Schwartz JP, Waldo M. Best practice guidelines on prevention practice, research, training, and social advocacy for psychologists. The Counseling Psychologist. 2007;35(4):493-566. DOI:10.1177/0011000006291411

43. Bergerman L, Corabian P, Harstall C. Effectiveness of Organizational Interventions for the Prevention of Workplace Stress. [Internet] Canada: Institute for health economics: 2009. [Cited 29 jan 2015] Available from: http://www.ihe.ca/documents/Interventions_for_prevention_of_workplace_stress.pdf

44. Burton J. Healthy Workplace Framework and Model: Background and Supporting Literature and Practices. [Internet] Geneva: World Health Organization (WHO): WHO-report, 2010. [Cited 29 jan 2015] Available from: http://www.who.int/occupational_health/healthy_workplace_framework.pdf

45. World Health Organisation. Investing in mental health. [Internet] Geneva: World Health Organization (WHO): WHO-report, 2003. [Cited 1 feb 2015] Available from: http://www.who.int/mental_health/media/investing_mnh.pdf

46. Arbetsmiljöverket. Den goda arbetsmiljön och dess indikationer. [Internet] Arbetsmiljöverket (AV): AV-report, 2012:7). [Cited sep 2014] Available from: http://www.av.se/dokument/aktuellt/kunskapsoversikt/RAP2012_07.pdf

47. Katherine M. Effects of occupational stress management intervention programs: A meta-analysis. Journal of Occupational Health Psychology. 2008;13(1):69-93. DOI:http://dx.doi.org.ezproxy.ub.gu.se/10.1037/1076-8998.13.1.69

48. Griffiths J, Maggs H, George E. Stakeholder Involvement' Background paper prepared for the WHO/WEF Joint Event on Preventing Non-communicable Diseases in the Workplace. [Internet] Dalian, China: World Health Organization (WHO): WHO-report, 2003. [Cited 1 feb 2007] Available from: http://www.who.int/dietphysicalactivity/griffiths-stakeholder-involvement.pdf