PATHWAYS PROJECT

PArticipation To Healthy Workplaces And inclusive Strategies in the Work Sector

The employment needs of people with chronic diseases in Europe

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Abreviation list

CFA- Confirmatory Factor Analysis

CVD(-s) – Cardivascular disease(s)

COPD - Chronic obstructive pulmonary disease

ESF - European Social Fund

EFTA- European Free Trade Association

EU - European Union

HCP – Health Care Professionals

IHD - Ischemic Heart Disease

ILO - International Labour Organization

ICD-10 International Classification of Diseases version 10th

NCD(-s) - Non-communicable disease(-s)

NGO(-s) – Non-governmental organization(-s)

RTW – Return to Work

WHO - World Health Organization

WHP - Workplace Health Promotion

YLL - Years of life lost

YLD – Years lived with disability

Executive Summary

Chronic health conditions are more and more prevalent in Europe. Only 34% of people with chronic health conditions are employed. If European countries are willing to mantain their social and welfare systems, people with chronic health conditions should be fully included in the work arena. However, the process of integration is complex and requires coordinated actions and consultation of all stakeholders. One of the them is the people who experience these health conditions.

The workpackage number six (WP6) has conducted an e-survey in ten different European countries to ask people with chronic health conditions which factors they perceived as favorable or unfavorable so that they can fully participate in the labour market. The survey included demographic variables, health-related information and a tool aimed at detecting their employment needs. The instrument was systematically created after consulting scientific literature and other relevant sources. It was composed of 40 items grouped into six different employment needs domains (physical adaptations, working conditions, legislative needs, mental & health care needs, self-actualization and enhancing knowlegde of others).

A total of 857 respondents completed the e-survey. Results showed that there were employment needs that were commonly shared across health conditions groups. In turn, there were some health conditions that scored more favorably in specific employment needs. Relevant differences were found when results were analyzed by type of welfare system. Although our sample sizes are very small, we have also provided a specific country analysis.

In conclusion, the results generally support that there are common employment needs across all the health condition groups that can be targeted in general employment (re) integration programs. In addition, the results are in line with country-tailored actions, since type of employment might be related to cultural issues and welfare system related factors rather than to sociodemographic characteristics.

Take-home messages

- ☑ Sparse scientific literature analyzed facilitators and positive values of integrating and maintaining people with chronic health conditions in the labour market.
- ☑ Having the possibility to secure time-off for medical appointments, to have flexible work routine and job security were the specific employment needs most frequently rated as favorable.
- ☑ To allow employers to legally terminate employment contracts in case of productivity decreases due to chronic disease was rejected by almost all participants. New formulas should be found to get a balance between commercial interests and job protection for people with chronic health conditions
- ☑ There were factors similarly favorable for all the chronic health condition groups. These factors are potential targets for designing general workplace (re)integration actions.
- ☑ There were also some health condition that scored more favorably in specific-employment needs. These elements should be particularly considered in health-condition specific interventions.
- ☑ There is a need for country-tailored actions since employment needs were perceived differently in the different EU countries and across the different EU social welfare models.

Introduction

About 28% of Europeans reported having a chronic (longstanding) physical or mental health problem in 2012 (1). Chronic non-communicable diseases (NCDs) account for 86% of deaths in the WHO European Region (2). The World Health Organization considers the rise in chronic diseases an epidemic and estimates that this epidemic will claim the lives of 52 million people in the European Region by 2030 (3).

The rising prevalence of chronic conditions is probably due to several reasons (1). Firstly, life expectancy has increased which is leading to a higher prevalence of age-related health conditions (4). Secondly, the prevalence of unhealthy lifestyles such as smoking, heavy drinking alcohol, drug use, high-fat diet and lack of exercise have increased in the European general population (4). These modifiable risk factors are responsible for almost 80% of all deaths from these health conditions (5). Finally, people with a chronic health condition are more likely to experience an incidence of other chronic health conditions (6). This comorbidity might be due to the same pathophysiological pattern that some of these health conditions share (7) and also because living with a chronic health condition has an impact on daily functioning which makes people more vulnerable to experience further health conditions (8).

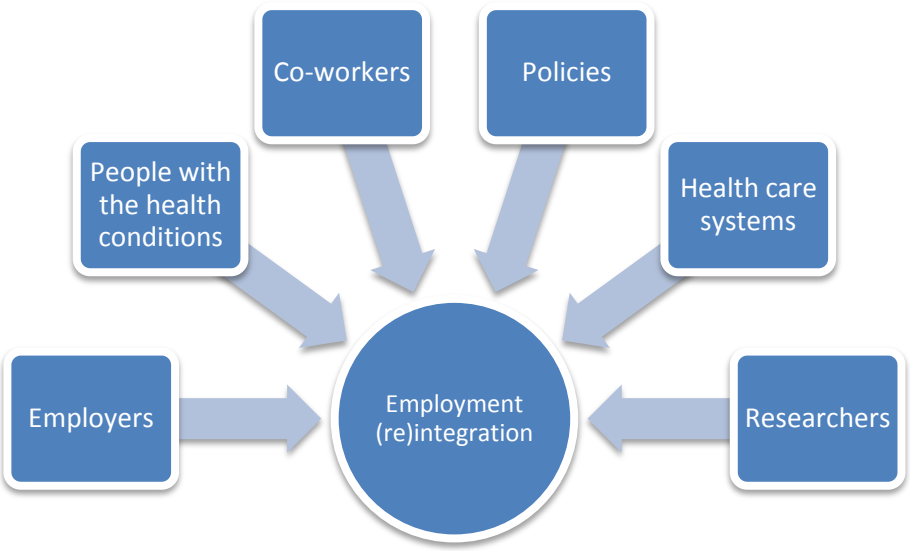
It is estimated that chronic diseases cost the EU economy € 700 billion annually (9). However, the real costs are probably greater because this last number does not include the indirect costs of these health conditions in terms of lost productivity, sickness absences, informal care, and financial resources losses (9).

Poverty and chronic health conditions are probably a cause and a consequence (10). Poor people are more vulnerable to experiencing chronic diseases because of material deprivation, less access to education, psychosocial distress, higher levels of risk behavior, unhealthy living conditions and limited access to high-quality health care (10). On the other hand, living with a chronic health conditions has an impact on a person's economic status (10). People with chronic health conditions are more likely to lose their jobs (11). Once people with chronic health conditions lose a job they have less opportunities to have a new one than those who have better health (12). All these facts might explain why 34% of people with chronic health conditions are employed in Europe (1). The last economic turndown has probably worsened this situation. European people with chronic health conditions increased their risk of being unemployed from 1.5 in 2008 to 2.5 in 2010 (13).

The European commission has proposed as goals for the 2020 that 75% of people aged 20-64 become employed, and that 20 million fewer people will be in or at risk of poverty and social exclusion (14). One effective way to reach these two European commission's goals is to integrate and reintegrate people with chronic health conditions into the labour market.

However, there are elements that should be considered for the integration of chronic health conditions in the labour market (1).

Figure 1: Elements to consider for the integration and reintegration of people with chronic health conditions



Employers are frequently reluctant to hire people with chronic health conditions because they associate chronic health conditions with poor productivity, frequent absenteeism and extra-costs for their company (1). People with chronic health conditions frequently experience fatigue, feelings of depression and loneliness, which makes them more vulnerable to work problems (1). Finally, coworkers might suffer from temporary transfers of workloads which might worsen the general work climate (1).

In addition, many employment policies actions are addressed to employees with disabilities (15). Although people with chronic health conditions do experience disability, some of them may encounter challenges since disability policy systems are sometimes more suited to individuals with acute illnesses than to people whose ability to work can fluctuate overtime (15).

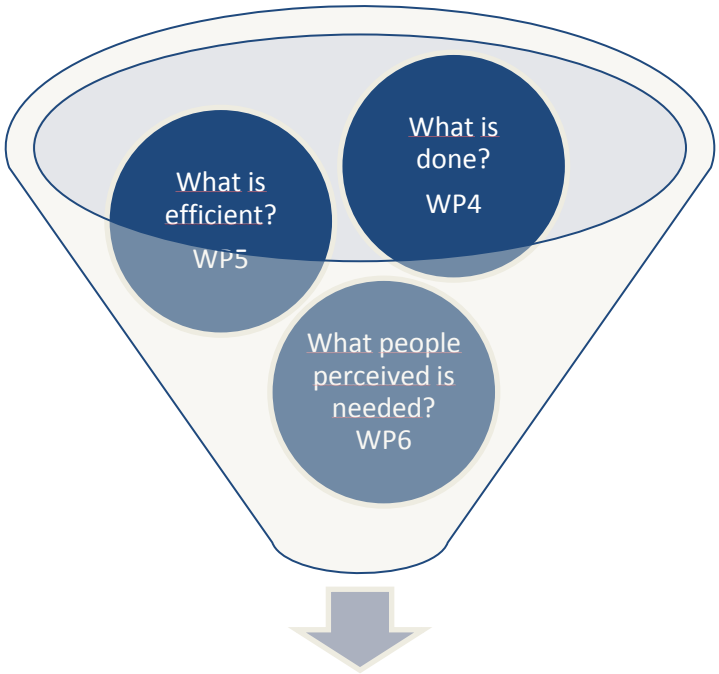
Literature reporting information on employment needs in people with chronic health conditions, although valuable, has some limitations. First of all, existing studies have focused on collecting physical and working accommodations (16, 17), analyzing existing policies and legislation (1) or on improving healthcare services (for example, return to work interventions) (18). However, few studies have jointly collected a comprehensive list of needs and rank their importance to help people with chronic health conditions so that they can fully participate in the workforce. Thirdly, the few existing data reporting employment needs is mainly focused on specific health conditions (19-21). This specific-health condition approach does not provide any information on the impact of comorbidity on the employment needs. The existing studies collecting employment needs in different chronic health conditions groups have been conducted in specific countries with very specific samples characteristics (22) and with qualitative methodology (23). Finally, there have been some previous EU initiatives to provide recommendations to improve employability in people with chronic health conditions (24). However, it is not clear if they have considered the

perspective of people with these health conditions. Finally, the countries hit the hardest by the economic recession have been excluded from these actions (Greece, Portugal, Spain and Italy).

Therefore, a systematic coordinated cross-country effort to systematically collect what has been done, what is efficient and what is perceived as needed is necessary so that people with chronic health conditions can fully participate in the labour market. This action should include a representation of all the EU regions and consider the perspective of different relevant employment stakeholders.

PATHWAYS is a European Project including at least one representative country of the United Nations' regions for Europe (Northern, Western, Eastern and Southern) which is aiming to a) identify integration and re-integration strategies that are available in Europe and beyond, b) to determine their effectiveness, c) to assess the specific employment related needs of persons with chronic health conditions (including mental health problems and d) to develop guidelines supporting the implementation of effective professional integration and reintegration strategies. PATHWAYS will aim to provide first steps to work towards a more inclusive labor market in which persons with chronic health conditions can meaningfully participate.

Figure 2 PATHWAYS project schema



One important goal in PATHWAYS is to assess the employment needs of people with chronic health conditions across different European countries and with different

health conditions. To do this, it is essential to hear the people who experience these health conditions.

The present REPORT is the result of an online survey including structured and non-structured questions which was conducted in the framework of PATHWAYS project across 9 European countries: Austria, the Czech Republic, Germany, Greece, Italy, Norway, Poland, Slovenia and Spain to identify the experienced needs of people with chronic conditions across Europe.

Report objective

The main goal of this report is to provide a comprehensive description of the employment needs that people with chronic conditions perceived as favorable or unfavorable to access and maintain employment in Europe. The report will also provide comprehensive information on the type of employment needs taking into account different type of chronic health conditions, welfare systems, countries, demographic information and other health related factors.

Application Area

Having information on what Europeans with chronic conditions need to be in the labour market will provide a framework to offer European Policy Makers and Member States recommendations on how to minimize the negative impact of chronic conditions at work.

Therefore, the results of the present report are intended to guide political, social and labor interventions, both at national levels and at a European level.

Terminology

Chronic Conditions

The definition of chronic condition varies and has changed with time.

According to the WHO “Non-communicable diseases (NCDs), also known as chronic diseases, are not passed from person to person. They are of long duration and generally slow progression. The four main types of non-communicable diseases are cardiovascular diseases (like heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructed pulmonary disease and asthma) and diabetes.” (http://www.who.int/topics/noncommunicable_diseases/en/).

In the present report we have selected those health conditions that according to this definition are chronic and that have been identified as the six leading causes of disability, measured by Years lived with disability (YLD) in the global burden of disease study (GBD). Data used were collected in 2015 and are specific for European Union countries + European Free Trade Association (EFTA) (25). We selected the first six leading groups of health conditions causing disability in terms of YLD, which accounted for more than 60% of the YLD in Europe. For each group, we selected one/two specific

health conditions according to their prevalence, impact on the workplace and expertise of PATHWAYS partners.

Table 1 Leading causes of YLDs in EU + ETFTA and chronic health conditions selected for the present report

Leading causes of YLDs (% according to the total YLDs)	Specific health conditions selected
Musculoskeletal (23.73%)	Back pain Neck pain
Mental & substance use (18.04%)	Chronic depressive disorder Dysthymia
Neurological disorders (9.37%)	Migraine
Diabetes/Urog./Blood and Endocrine disorders (7.76%)	Diabetes
Cardiovascular diseases (4.22%)	Ischemic Heart Disease
Chronic respiratory (3.31%)	Chronic Obstructive Pulmonary Disease

Migraine and headache disorders

Recurrent headache is among the most common disorders of the nervous system and affects mostly people in their working age (late teens to 50s), being the third highest cause of years lost to disability (YLDs) (26). Migraine is a primary type of headache that affects adults of working age the most. Migraine alone constitutes the sixth highest cause of years lost to disability.

Chronic Depression and dysthymia

Depressive disorders alone led to 11% of all YLD, making it the leading chronic condition in Europe (27). It is estimated that approximately 35–50% of employees with depression will take short-term sick leave at some point during their job tenure (28). Depression is one of the main causes of sick leave in some European countries (29) and has been associated with early retirement (30). When depression is comorbid with some other chronic health conditions, the likelihood to return to work is lower (31).

Ischemic heart disease and coronary infarction

Ischemic heart disease (IHD) is a group of diseases that includes stable angina, unstable angina, myocardial infarction, and sudden cardiac death. YLDs associated with IHD has increased in all of the world regions (32). The risk of certain hazards at work has long been recognized as exacerbating or even causing IHD (33). For patients with IHD, the ability to work therefore includes not only medical aspects, but also environmental and psychological aspects of their occupation (31).

Diabetes

In 2012 diabetes was the direct cause of 1.5 million deaths and high blood glucose was the cause of another 2.2 million deaths (34). Diabetes is among the leading causes of kidney failure and it is responsible for 2.6% of global blindness. Due to the high prevalence of comorbidities and associated disorders, diabetes is responsible for work deprivation, increased absenteeism and retirement (35, 36).

Back and neck pain

Back and neck pain can have different causes and is frequently associated with working postures and repetitive movements with the trunk. Within the category of musculoskeletal disorders, low back pain and neck pain were among the 10th leading causes of YLDs worldwide in 2010 (37).

Chronic Obstructive Pulmonary Disease and Asthma

Chronic obstructive pulmonary disease is a lung disease that is characterized by a persistent reduction of airflow. The symptoms of COPD tend to exacerbate with time. Some cases of COPD are due to long-term asthma.

The European Union (EU) reported that the direct cost from COPD was over 38.6 billion Euros in 2005, representing about 3% of total health care expenditure (38). Within the category of respiratory diseases, chronic obstructive pulmonary disease (COPD) is the main cause of disability, accounting for 2.1 million YLD (3.3%) in 2012 in EU-28 plus Norway and Switzerland.

Employment Needs

There is no agreed standardized definition on the concept of employment needs. For the purpose of our analysis we have therefore created a personalized definition. Employment needs will be the modifiable environmental and/or personal factors that hinder (barriers) or/and facilitate (facilitators) people with chronic health conditions to participate in the labor force.

Welfare Models

The “Welfare State” refers to the set of interventions organized by the state which are aimed at guaranteeing the provision of a minimum level of services to the population via a system of social protection. Citizens of countries belonging to the same Welfare Regime are expected to have similar employments needs. Five different welfare models have been traditionally described in Europe (Scandinavian/Nordic, Mediterranean, Central and Post-communist) (39). This classification has been also previously used in the framework of Pathways WP4. A summary of the characteristics of each model is provided in annex 1.

Considering the participant countries in the project, the Mediterranean welfare model involved Greece, Spain and Italy; the Continental welfare model included Austria, Germany and Slovenia; the Scandinavian model was represented by Norway; and the Post-Communist welfare system comprises the Czech Republic and Poland.

Methods

We used a step-by-step methodology to collect the employment needs/adaptations that people with chronic health conditions consider as more favorable/unfavorable in Europe (Figure 3).

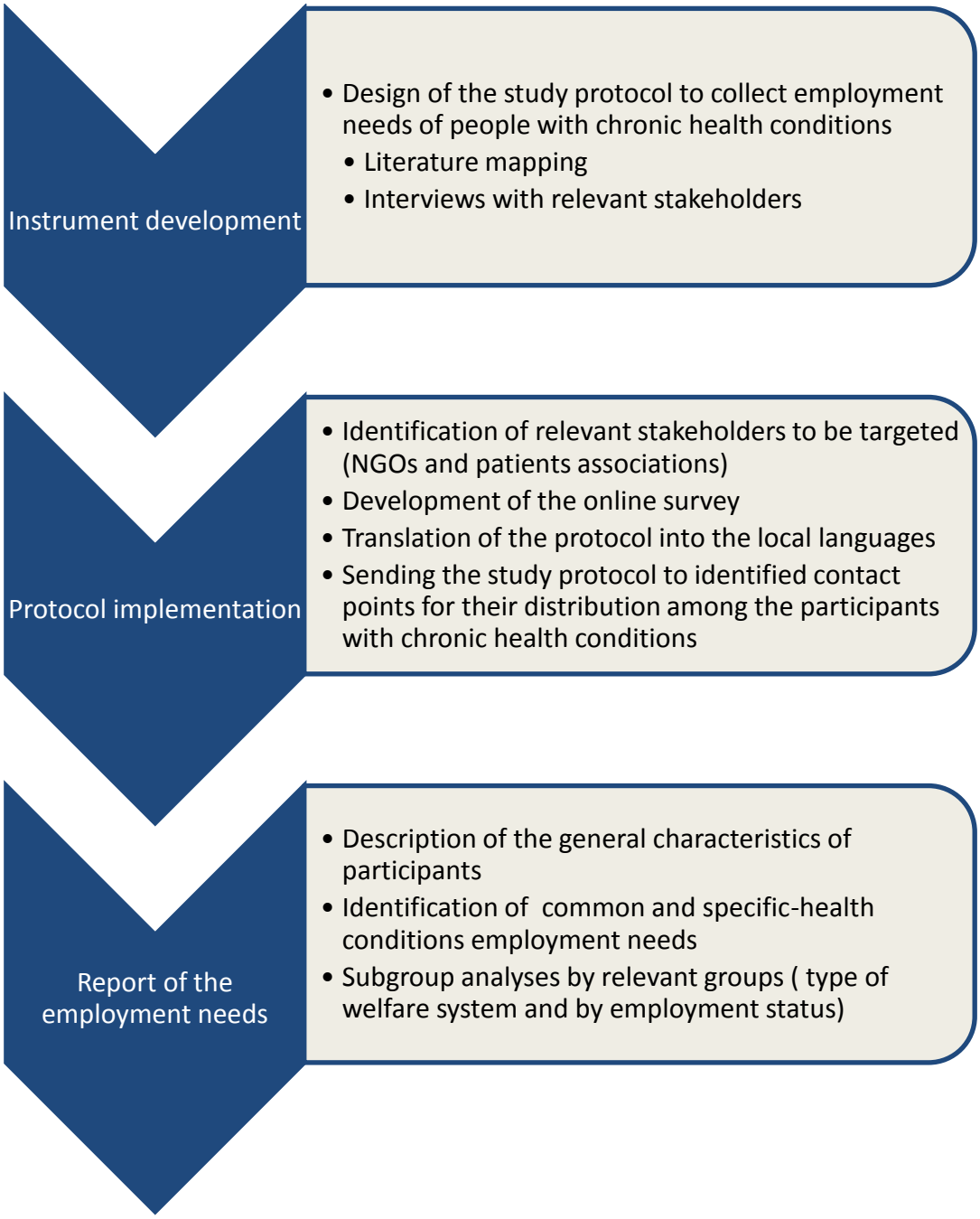


Figure 3. Steps and tasks conducted in Work package 6

i) The instrument development

A systematic mapping of the literature on Employment needs for the six different "umbrella conditions", which were representing the leading causes of LYDs in Europe (see Table 1), was conducted to explore the employment needs collected in literature,

The systematic mappings of the literature followed several steps. In the initial phase, the review questions were defined.

The primary question was: *Which are the employment needs of people with chronic diseases across Europe reported in the literature?*

Secondary questions included:

-*What is the nature of this evidence?*

-*Is it qualitative or quantitative?*

-*Which countries performed this research?*

-*What are the main topics?*

Key variables included employment needs and specific disorders. The specific chronic health conditions considered in the literature mapping are displayed in table 2. The WHO's International Classification of Diseases version 10th codes (ICD-10) were used to operationalize the data collection.

Table 2 ICD-10 chronic health conditions considered

Specific health condition	ICD-10 codes
Depression	F33 Major depressive disorder, recurrent F34.1 Dysthymia
Migraine:	G43.0 Migraine without aura G43.1 Migraine with aura G43.3 Chronic Migraine G44.4 Headache medication overuse
Back & Neck Pain	M45 Ankylosing spondylitis M46 Other inflammatory spondylopathies M47 Spondylosis M48 Other spondylopathies M50 Cervical disc disorders M51 Other intervertebral disc disorders M53 Other dorsopathies, not elsewhere classified M54 Dorsalgia
Diabetes	E10 - Type 1 diabetes mellitus E11 - Type 2 diabetes mellitus E13 - Other specified diabetes mellitus E08 - Diabetes mellitus due to underlying condition E09 - Drug or chemical induced diabetes mellitus E12-Malnutrition-related diabetes mellitus E14 - Unspecified diabetes mellitus
Chronic Obstructive Pulmonary Disease	J44.9 Chronic obstructive pulmonary disease J45.909 Asthma

	J84.10 Other interstitial pulmonary diseases with fibrosis G47.33 Sleep apnoea C34.90 Bronchus or lung neoplasm/cancer
Ischemic Heart Disease	I20 Angina pectoris I21 Acute myocardial infarction I22 Subsequent myocardial infarction I23 Certain current complications following acute myocardial infarction I24 Other acute ischaemic heart diseases I25 - Chronic ischaemic heart disease

Search terms and strategy were based on key variables, following the principle: (condition (Title/Abstract) OR second name for condition (Title/Abstract)) AND (employment variables)

Specific inclusion criteria included:

-Academic peer-reviewed papers published 2009-2014

-English language

-Set in any of the EU-28 countries, EEA or Switzerland

-Publications of the database that included an abstract

-Age (18-64 years of age)

-Published in English

A systematic electronic searching was conducted using Pubmed and PsycInfo databases. A secondary manual searching including grey literature (reports, books, memories) was also performed.

All articles obtained were screened for inclusion by two independent researchers. The inter-rater reliabilities of inclusion were assessed using the kappa statistic (κ) for categorical data. Should a peer of researcher achieve a low kappa, inclusion and exclusion criteria should be reviewed and, if necessary, a third person should be consulted. Disagreements regarding inclusion were solved by consensus between the raters and the third reviewer.

ii) The protocol implementation

An online survey on Employment Needs of people with chronic conditions in Europe was conducted. Firstly, relevant advocacy groups were identified by country (Table 3). In total, 96 organizations and NGOs from 9 different European countries were contacted (Table S2)

The study protocol was sent to these contact points. These contact points distributed the study protocol among the people who experienced the above-mentioned health conditions.

Inclusion criteria for participating in the survey were: having one of the chronic diseases and being of working age at the time of participation, living either in an EU country or in a Country of EEA or Switzerland.

The needed sample size was calculated pre-hoc using the formula described in Cochran (40). Since the prevalence estimates for chronic conditions vary and depend on several aspects, such as the conceptual definition of chronic conditions and measuring methods, the most conservative scenario was considered, for which a number of participants higher than 385 in the overall sample would be needed in order to conduct the statistical analysis. Since data collection was conducted by eleven research teams located in nine European countries and a certain number of missing values was anticipated, it was decided to gather at least 60 participations in each of the nine countries, accounting for a minimum of 540 participants in the overall sample. The employment needs mentioned in those articles were extracted and computed for inclusion in the survey questionnaire.

iii) Analyses of employment needs

Descriptive analyses of the 40 questionnaire items were conducted and graphically displayed. In addition, no parametric tests (χ^2) were used to check whether there were statistical differences between demographic characteristics, work-related variables and the different health condition groups. After that, three confirmatory factors analyses (CFA) were conducted assuming different structures of the questionnaire. A first CFA checked one-factor structure, i.e. whether the questionnaire was measuring one common dimension (namely employment needs) which means the 40 items could be added into a global total score. A second CFA was conducted to verify whether the questionnaire was measuring one factor but composed by six different employment needs areas, therefore whether questionnaire could be added into a total score and also into six different subdomain scores. Finally, a third model was also tested which considered PATHWAYS questionnaire as composed by six different independent Employment needs dimensions inter-related (six factor model). The fit indexes i.e. root mean square error of approximation (RSME), comparative fit index (CFI) and Tucker-Lewis index (TLI) were calculated for the three models. The model with the better fit was the chosen one.

Internal consistency was calculated for all these subdomains by Cronbach's alpha. As each subdomain was composed by a different number of items, the subdomain scores were transformed into a 0-100 range so that all the domains had the same range score and therefore were comparable with each other. In case there was just one missing item in the domain, the missing value was substituted by the corresponding domain

mean score. In case the subdomains scores were not normally distributed, non-parametric tests (i.e. Kruskal–Wallis test) would be conducted to make comparisons between the different employment needs subdomains and the different health conditions groups. These last analyses were run to check whether there was any health condition-specific employment needed or, on the contrary, whether the employment subdomains were similarly favorable/unfavorable for all the health conditions groups (i.e. common employment needs). When one general comparison was significant (associated p value ≤0.05), pairwise comparisons were conducted to check which groups these differences were significant among (Tukey tests). The same comparison analyses were also conducted to check whether employment needs were differently considered in different European welfare models (Mediterranean, Continental, Scandinavian or Post-communist), working situations (employed vs no employed), number of comorbid problems (None, One, Two, More than two) and perception of income (Earning less, more or same than others). All the group comparison analyses were also visually represented by box plots. Finally, descriptive analyses of the employment needs were showed for the countries which had at least 20 participants in the survey. The two CFAs were conducted using M-Plus. The rest of the statistical analyses were conducted using STATA.

Main results

The instrument development

In order to identify relevant contents to be included in the questionnaire on employment needs, a systematic mapping of the literature from 2009 to 2014 was performed. Information collected by mapping literature was not very comprehensive. In addition, existing studies had some limitations. Most studies focused on difficulties in work functioning (including both limitations that are inherent to health conditions and attitudinal aspects of the environment) or on the effect of return-to-work (RTW) interventions. For some health conditions disorders it was difficult to obtain “real employment needs” from the literature.

Here are some of the limitations found by health conditions:

- **Depression:** some needs were expressed (e.g. Reduced working hours) but many articles focused on general difficulties (e.g. difficulties in dealing with stress)
- **Migraine:** no needs were found; new variable focused on “work difficulties” was created (e.g. slowness or difference in the way of carry out activities)
- **COPD:** Most papers do not focus on employment needs but suggest things that should be addressed and assessed to improve working conditions. Some needs are mentioned (e.g. Improving ventilation system at work to reduce aerosols)
- **Back & Neck pain**: none of the chosen papers is straightforwardly describing employment needs, however some needs were extracted (e.g. Tailored workplace exercise program for women at risk for neck and upper limb musculoskeletal disorders.”), as well as some difficulties (e.g. "Outdoor work in a cold environment may increase the risk of low back and neck pain.“)

- **Diabetes:** Four out of five included papers focus on the management of diabetes at work and getting support to do it. Not always formulated as needs, but some needs are expressed “Time for diabetes management activities”

After considering these results, we decided to consult extra sources of information for the health conditions where less «needs» were reported (migraine and depressive disorders).

Migraine:

Criteria for migraine were adjusted because otherwise almost no articles were selected and now include papers from outside the EU. FINCB proposed to look into the work of 2 major European organizations dealing with the headache: European Headache Alliance (http://www.europeanheadachealliance.org/about-us/ and European Headache Federation (http://ehf-org.org/)

In particular, the European Headache Alliance had a report on migraine at work *(“An investigation into the potential for migraineurs to be protected by employment laws in the European Union”*).

Depressive disorders

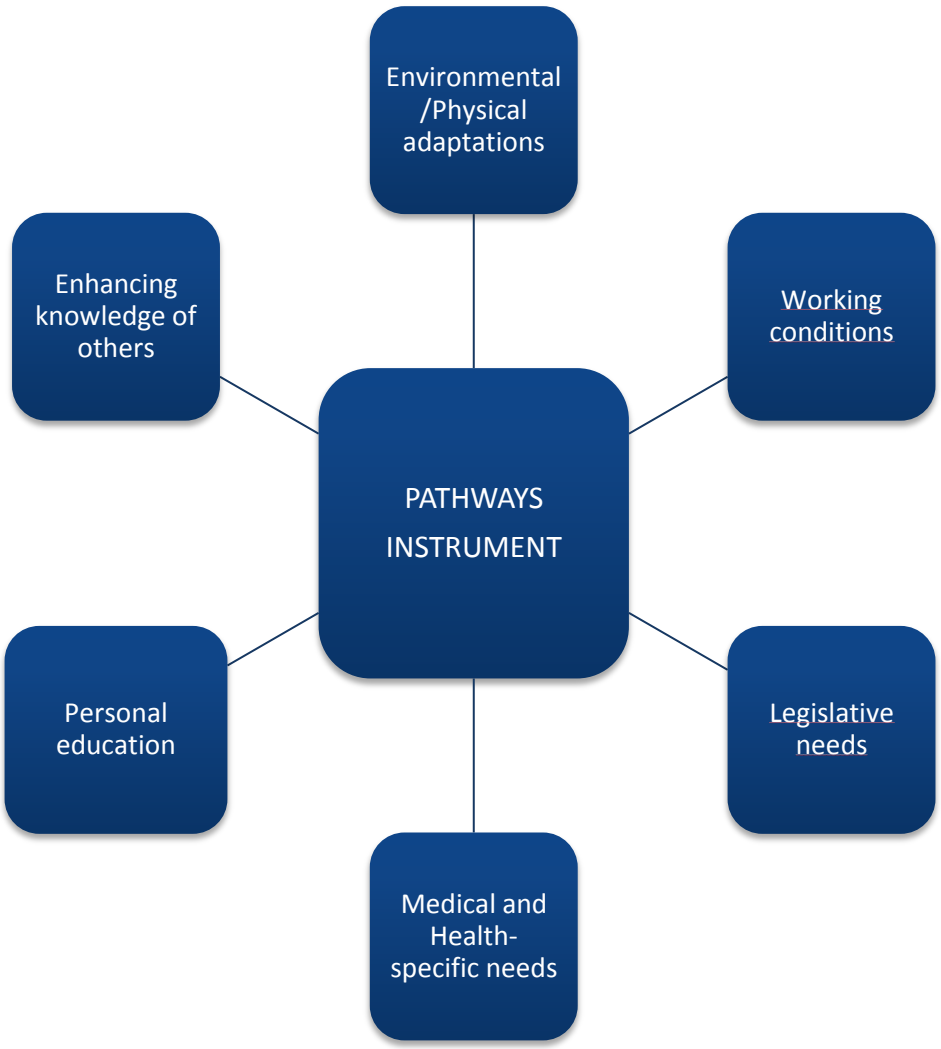
We decided to include the work of associations and service providers which are considered “good practices” in the field of labor market integration of re-integration of persons (Fundación Manantial).

Employment needs were gathered and grouped to design a study protocol collecting employment needs. The main outcomes of the consulted papers were grouped into overarching categories and these categories were grouped into main domains. This structure was inspired by the results reported in the PATHWAYS Workpackage 4 deliverable.

The final version of the questionnaire on employment needs contained the following sections: 1- Demographic and Employment information; 2- Perception of Income situation; 3- Health Information; 4 – Perception on Employment Situation. The first part collected basic demographic and health-condition information from participants. Among other information, the second level of the ISCO-8 (41) classification was selected to collect information on the current and the highest occupation achieved by participants.

The second section of the questionnaire included the list of employment needs of people with chronic conditions. The employment needs were identified and selected in order to cover the whole spectrum of chronic conditions and to address both employed as unemployed participants. A total of 40 employment needs aggregated into 6 different overarching categories were finally extracted. The main six domains were as follows: (1) Environmental physical adaptation of the workplace; (2) Working Conditions; (3) Legislative needs; (4) Medical and Health-specific needs; (5) Self-actualization and (6) Enhancing knowledge of others (Figure 3).

Figure 3: Main domains of PATHWAYS instrument



- **Environmental/physical adaptation of the workplace.** This domain is related to having specific physical spaces or special equipment to manage issues related to the health condition in the workplace. This domain also includes the idea that the workplace has to be physically designed to facilitate healthy lifestyles and to prevent negative environmental factors.
- **Working conditions (working arrangements).** The domain is comprised by issues related to day-to-day work arrangements and that have something to do with flexibility, supervision, teleworking, adaptations of tasks and schedules under specific circumstances, and facilitating the return to work after a period of absenteeism.
- **Legislative needs.** This domain includes law and policy actions that make compatible people with chronic health conditions work in the mainstream market and also grant economic support. The domain also includes the need for legislation so that employees may have special protections (for example against dismissal) under specific circumstances related to the health condition.
- **Medical and Health-specific needs** includes several actions of promoting health and mental healthcare within the workplace. In addition, this domain contains

the importance of enhancing communication between the healthcare system, occupational staff, employers and social services.

- **Personal education (self-actualization)** is a domain that covers needs related to receiving training, self-management skills, education, and vocational support during career development and professional life as well as enhancing self-employment options.
- **Enhancing knowledge others** is related to promoting educational training for both coworkers and employees about what it is like to live with the health condition as well as to know how to deal with specific urgent situations. This domain also includes the idea that human resources have to receive training to manage mental and general health issues.

The structured questions were formulated so that participants had to rank to what extent a particular employment need was relevant to them. A 5-point scale was used to rate the interest of each possibility or strategy proposed to facilitate employment, ranging from "very unfavorable" (1) to "very favorable" (5). In addition, participants could select the option "not applicable".

Since comorbidities are very common among people with chronic conditions, participants were asked to provide their answers taking into consideration the health condition that they identified as primary or main in the first part of the questionnaire. Moreover, information on other chronic conditions and other known medical or psychological conditions, genetic syndromes, allergies or intolerances was also collected at the beginning of the survey. Finally, an open question to collect any other employment need that participants think of as important to be considered and that had not been collected in the previous questions.

All the questions were originally created in English. The nine participant research centers translated the questionnaire into their respective national languages (Spanish, Italian, German, Polish, Greek, Czech, Norwegian and Slovene).

Finally, an open final question was included to collect other important aspects that might have not been otherwise considered in the structured questions.

"Is there anything else you need in order to be able to work and reach your full potential as a professional?" Table 5 shows where the information of the different items was collected from.

Table 5. Where the information was collected from to build PATHWAYS questionnaire items

Main domain	Items	Literature	Advocacy groups	Results of the Work package 4
Environmental adaptation of the workplace	Having a job that can be performed in a specific environment (for example having a job that does not require working outside or having reduced exposure to	COPD Back & Neck Pain		

	chemicals)	
	Having a workplace that is structurally/architectonically adapted (for example, specific assistive technology is provided or there are appropriate ventilation systems)	COPD Back & Neck Pain
	Having access to special equipment for personal use in relation to disorder (for example respiratory masks or ergonomic chairs specific for people with health conditions)	COPD, Diabetes
	Having a healthy workplace that promotes healthy habits (for example nutritious food is accessible and the building is clean)	COPD, Diabetes, Back & Neck pain, IHD
	Having rooms to perform management activities or control symptoms (for example a quiet room to rest, to be by oneself or to administer treatment)	Diabetes
	Having a workplace that is geographically located near home or near specific services (such as hospitals, emergency rooms, therapies, public transportation, etc.)	Depression
Working conditions/ arrangements	Having the possibility of working also partially from home	Back & Neck pain
	Having reduced working hours (for example having a part-time job and working 4 hours a day)	Back & Neck pain, Depression
	Having a structured routine at work (for example having predefined deadlines and breaks or little need to travel)	Diabetes
	Having a flexible work routine with the possibility to	Back & Neck Pain,

	manage timings in an independent way and adjust breaks and schedules (for example being allowed to make a break whenever certain symptoms occur or you need to take a therapy)	Diabetes
	Having an adaptation period after prolonged sick leave, during which working hours are incremented until normal working hours are achieved (for example a person that normally works 8-hours/day , comes back from sick leave and works only 4 hours on the returning day, 6 hours the next day and 8 hours on day 3)	Depression
	Having the possibility to secure time off for medical appointments	Diabetes
	Having the possibility to change job roles/duties or perform different tasks within the same company (for example after coming back from sick leave or when symptoms are acute)	COPD
	Having high supervision from managers	Depression
	Having low supervision from managers	Back & Neck Pain
	Having a low stress work environment	Back & Neck Pain,
	Having a certain level of job security (this might arise from a certain type of employment contract or from characteristics of the employer)	COPD
Legislative needs	To allow persons with chronic conditions or some type of treatment to perform certain professional activities associated with specific risks (such as commercial piloting	COPD, Diabetes

	or surgery) under controlled situations (for example, having a colleague available or undergoing a controlled disease management program)		
	To allow work-absences related to the disease but other than attending conventional treatment appointments (for example being allowed to be absent in order to attend patient association meetings or staying at home to prevent the worsening of symptoms without having to visit the doctor)	Depression	
	To allow people to combine a part-time job with a social benefit/compensation to account for the impossibility to work a full-time job	Diabetes	All the health conditions
	Being legally protected against being dismissed due to discrimination (for example the law forbids termination of contract during or after sick leave)	Depression	All the health conditions
	Companies hiring people with chronic disease are able to legally terminate employment contracts in case productivity decreases due to chronic disease		All the health conditions
Medical and Health-specific needs	Having health surveillance at work (might be guaranteed by the presence of a physician or other health care professionals, such as nurses or psychologists)	COPD	
	Possibility of undergoing physical exercise programs such as low-intensity sport, strength training or yoga at the workplace	Back & Neck pain, Diabetes	
	Possibility of undergoing	Back &	

	mental health promotion programs such as meditation classes or mindfulness groups at the workplace (partners can adapt slightly, if for example mindfulness is not typical use relaxation or something typical in your country).	Neck pain
	Being offered professional psychological support during the transition phase after getting a new job or going back after a larger period of sick leave/being temporary considered unable to work	Depression
	Having medication adjusted in order to make working easier (for example reducing medication that produces certain side effects; having special medication for side-effects management or extra medication to reduce functioning limiting symptoms at work)	Diabetes
	Health services are provided outside of typical working hours (including visits to the Doctor, Psychologist or laboratory exams)	Depression
	Possibility of acquiring portable medical equipment in order to reduce visits to the health services or pharmacies (might include portable devices to measure glucose, FeNU levels, lithium)	Diabetes
	Possibility of establishing positive relationships with healthcare professionals, social security or employment officers (includes having experts available to offer support on demand and having individual professionals	Back & Neck Pain, IHD

	assigned, so that a closer contact and follow-up are possible)		
Personal education	Having access to training on how to deal with the disorder at work (might include training on how to deal with symptoms, fatigue, workload and stress)	Back & Neck Pain, Diabetes	
	Having access to advice or written documents, aiming to reduce unsustainable job choices and to prevent career impairment in chronic patients	COPD, Diabetes	
	Having access to vocational education	Depression, Diabetes	
	Having access to a specific certification of skill by an authority such as a labor rehabilitation center, a university or a professional accreditation center	Back & Neck Pain	All the health conditions
	Having access to consulting and financial services supporting and providing training on the development of a company or own business		All the health conditions
Enhancing knowledge of co-workers and superiors	Co-workers or colleagues receive training on disease, including symptoms, management activities and work-related difficulties (includes actions in order to reduce stigma)	Diabetes, Depression	
	Superiors receive training on disease, including symptoms, management activities and work-related difficulties (includes actions in order to reduce stigma)	Diabetes, COPD	
	Co-workers and managers receive training or practical instructions on how to help with every-day activities or on emergency (for example,	Diabetes	

	how to administer medication in case of crises or when to call 112)	
	Human Resources personnel – such as recruitment and selection team or training officials – have a background in general health	All the health conditions
	Human Resources personnel – such as recruitment and selection team or training officials – have a background in mental health	All the health conditions

The protocol implementation

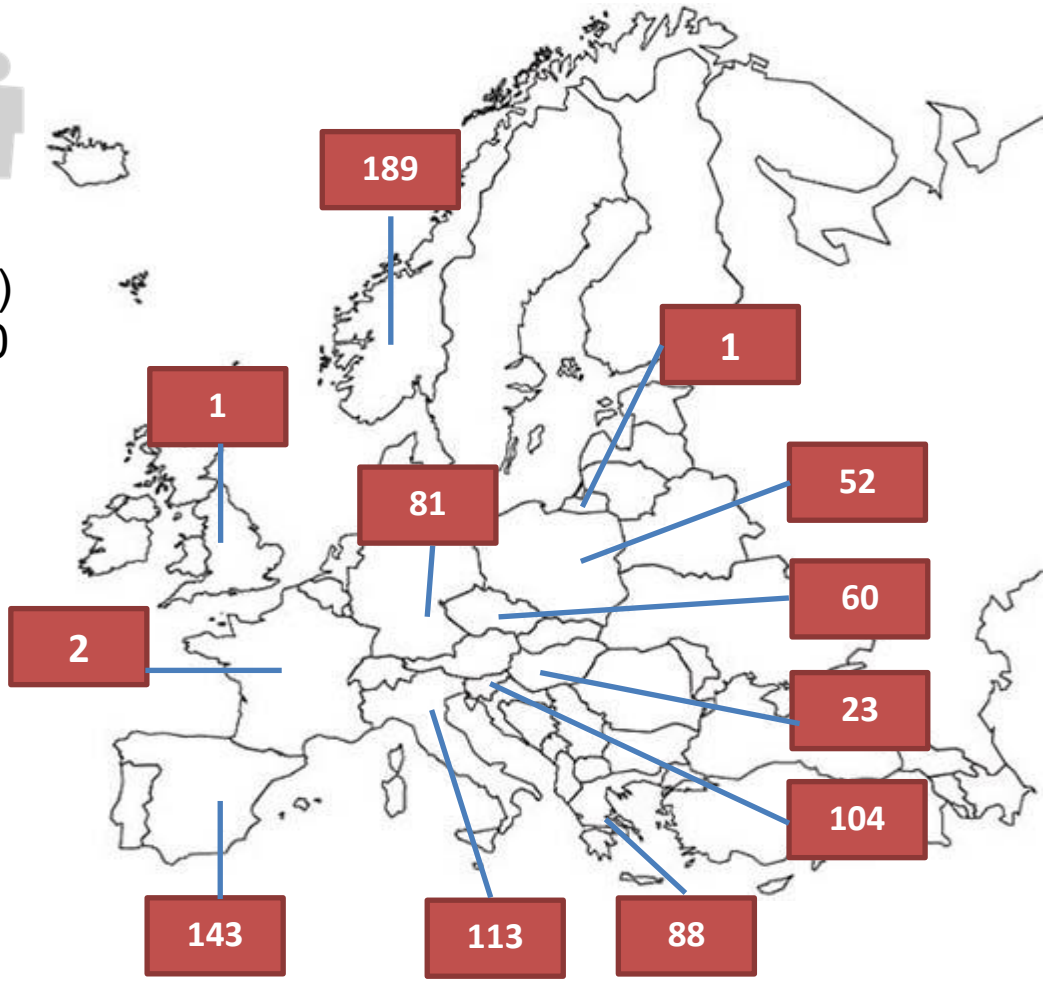
An online survey was designed by means of Google Forms. Each of the 9 recruiting countries established a google platform in their national language.

Partners of the Pathways Consortium identified local and national NGOs which were relevant to the chronic conditions included in the survey. In total, 55 organizations were identified. The list of these organizations is provided in annexes

No personal identifiers on participants were collected. The first page of the online survey informed participants about scope, content and the kind of information collected. The project's objective and procedures were explained at the beginning of the questionnaire in the local language. This page also included a national contact of a researcher responsible for the local study. Submitting answers to the questionnaire implied consent. The project was locally approved by the following Ethics Committees: Gailtal Klinik – Neurologische Rehabiliation (Austria), Vseobecna Fakulti Nemocnice V Praze (Czech Republic), Ludwig-Maximilians-Universitataet Muenchen (Germany), Panepistimio Thessalias (Greece), Fondazione IRCSS Istituto Neurologico Carlo Besta (Italy), Hogskolen I Oslo Og Akershus (Norway), Uniwesrytet Jagiellonski (Poland), University Rehabiliation Institute (Slovenia), and Universidad Autónoma de Madrid (Spain)

Analyses of employment needs

AGE (16-68)
Mean: 44.60
SD: 0.39



857 participants from 12 different European countries

General Employment needs

A GENERAL OVERVIEW

People with other health conditions (n=171) were not included for the employment needs analyses for comparison reasons with the rest of PATHWAYS work packages. Our analytical sample for reporting employment needs was 686 participants.

Descriptive pictures for all the questionnaire items are displayed in figures 7, 8, 9 and 10

Figure 7 items distribution for the first domain

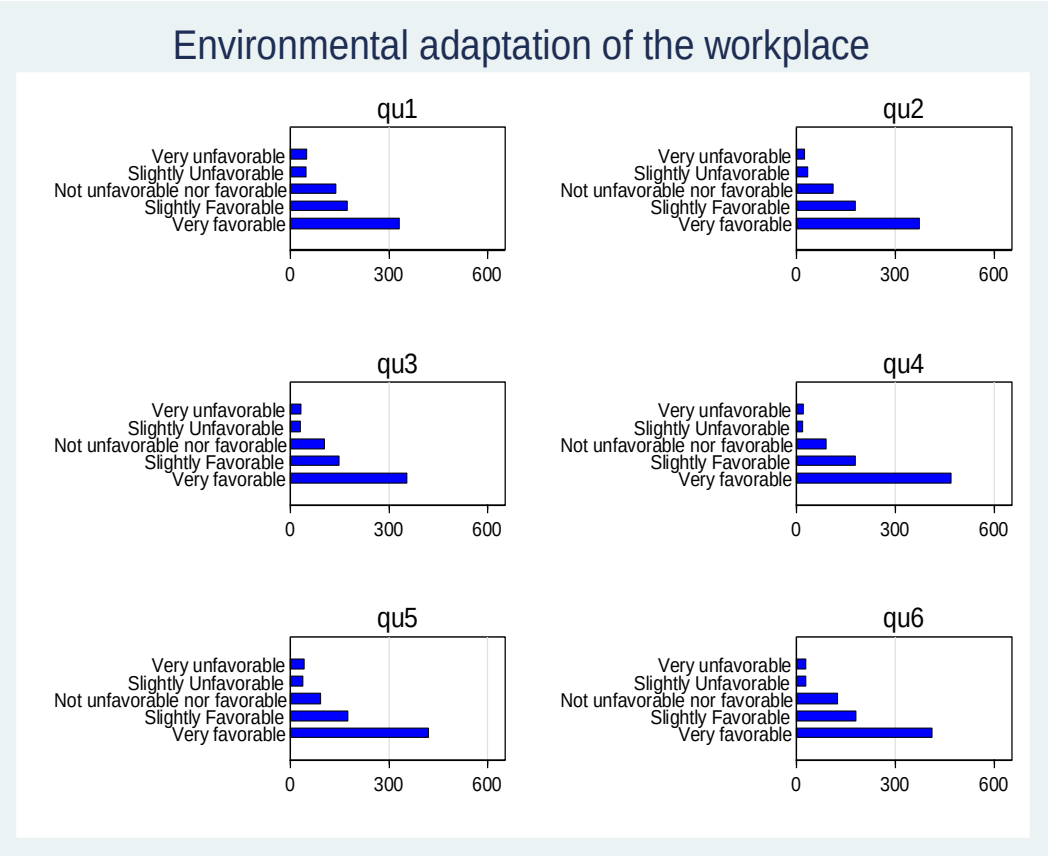


Figure 8 items distribution for the second domain

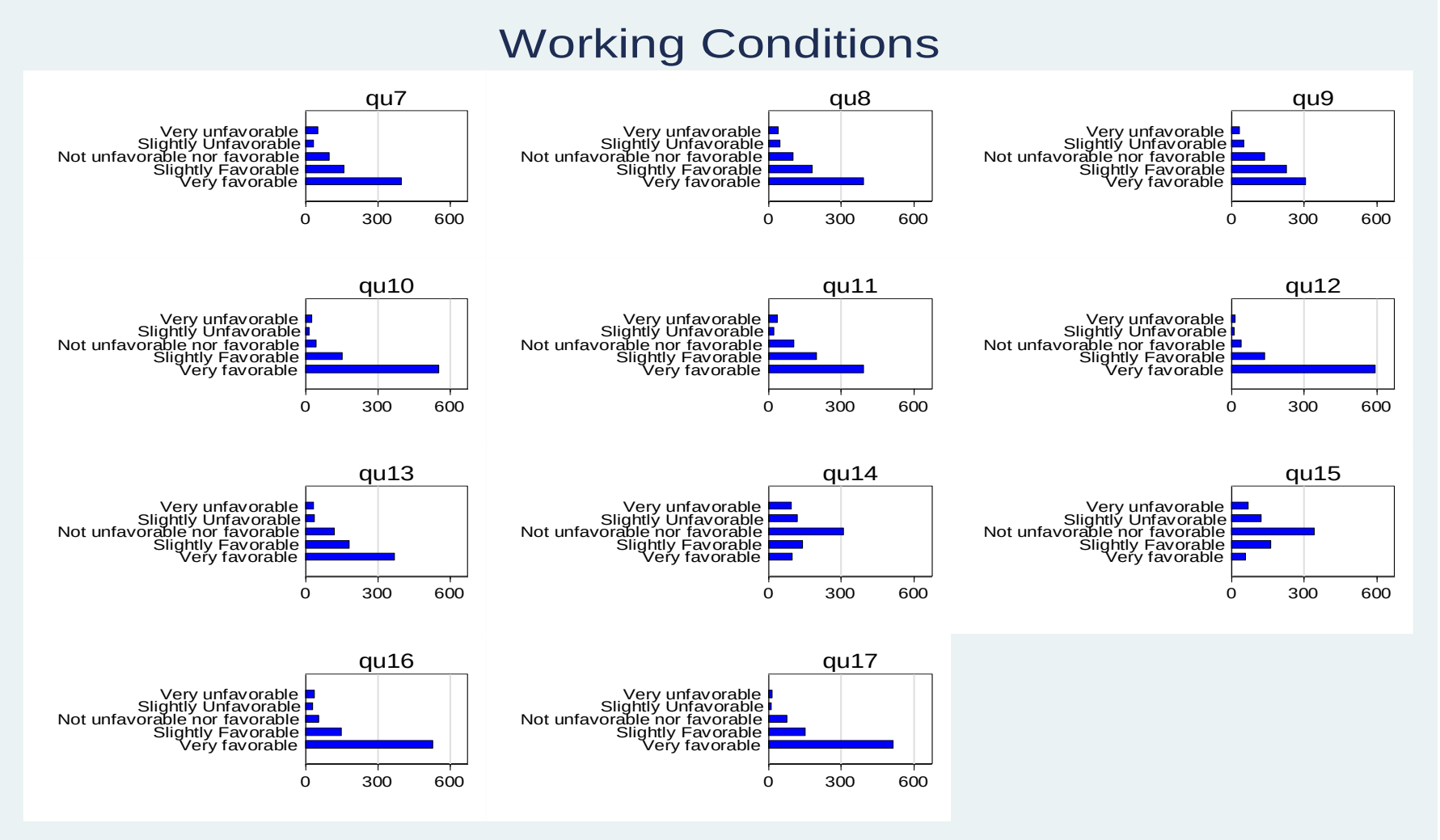


Figure 9 items distribution for the third domain

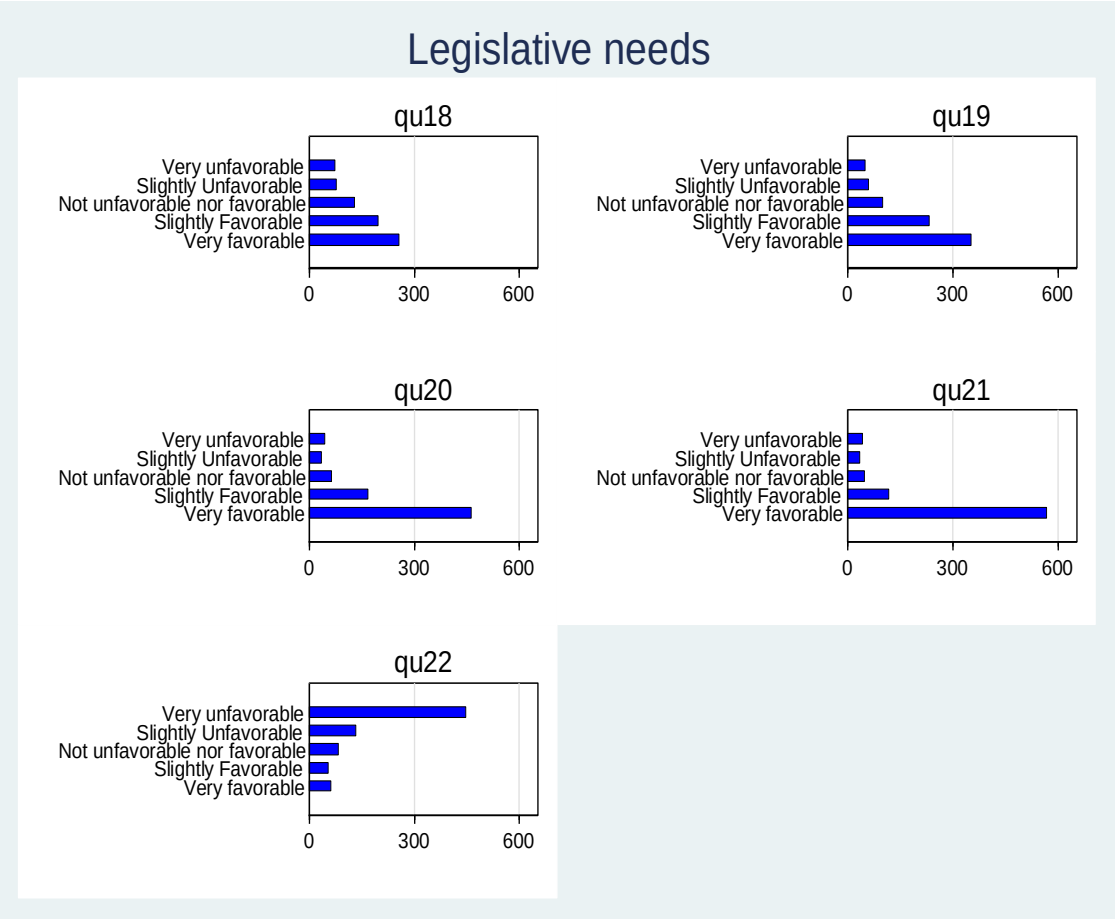


Figure 10 items distribution for the fourth domain

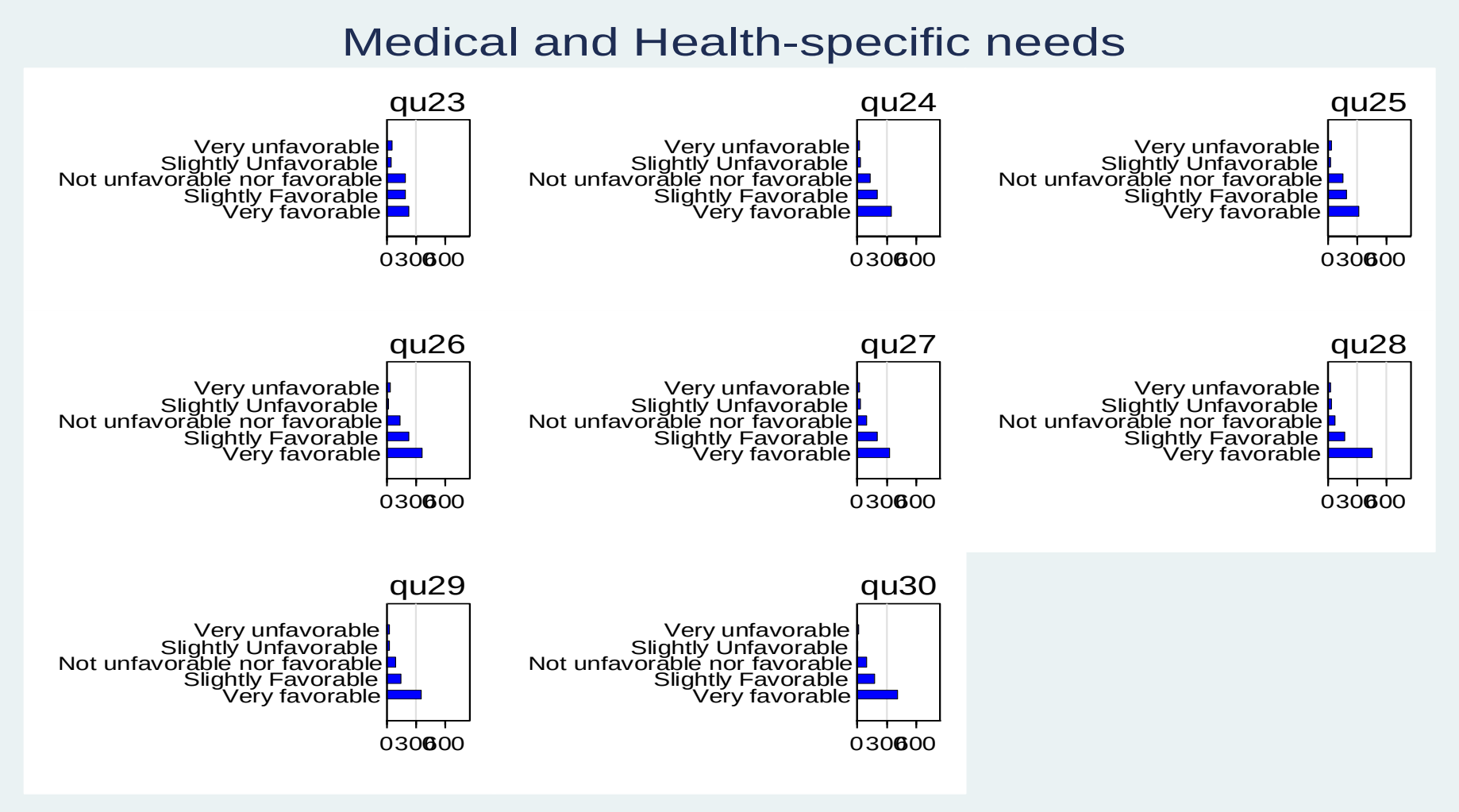


Figure 10 items distribution for the fifth domain

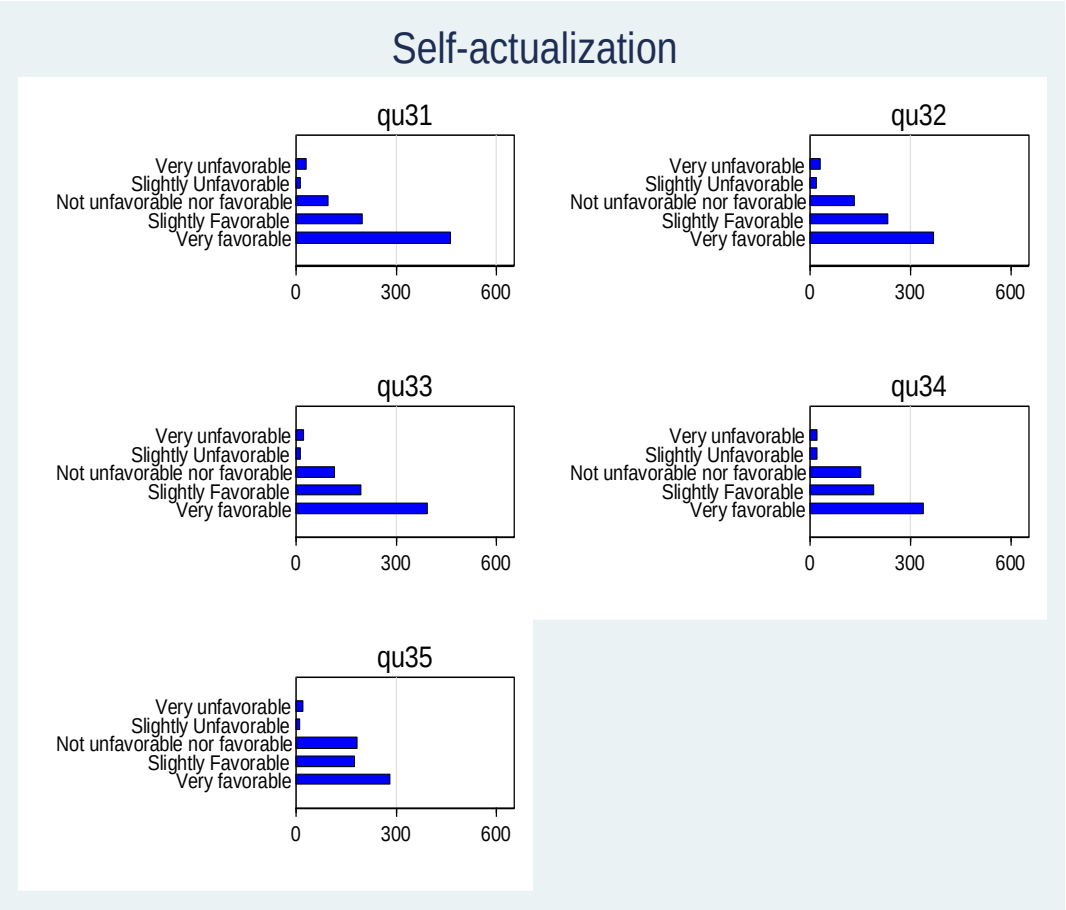


Figure 11. Items distribution for the sixth domain

CREATION OF EMPLOYMENT NEEDS DOMAIN SCORES

Three different confirmatory factor analyses (CFA) were hypothesized to fit the structure of the PATHWAYS questionnaire. The first CFA assumed one factor model (all of the items weighting for one dimension, called employment needs), the second model consisted of a bi-factor model, including a general factor composed by six different dimensions and the third model was a six-factor model (figure 12). The item *"Having low supervision from managers"* in the Working conditions domain and the item "*Companies are able to legally terminate employment contracts in case productivity decreases due to chronic disease*" in the legislative domain did not fit well in their respective domains or in other domains, so it was decided to consider them descriptively but not for creating the six global domains scores. Once deleted, these two items CFAs were conducted.

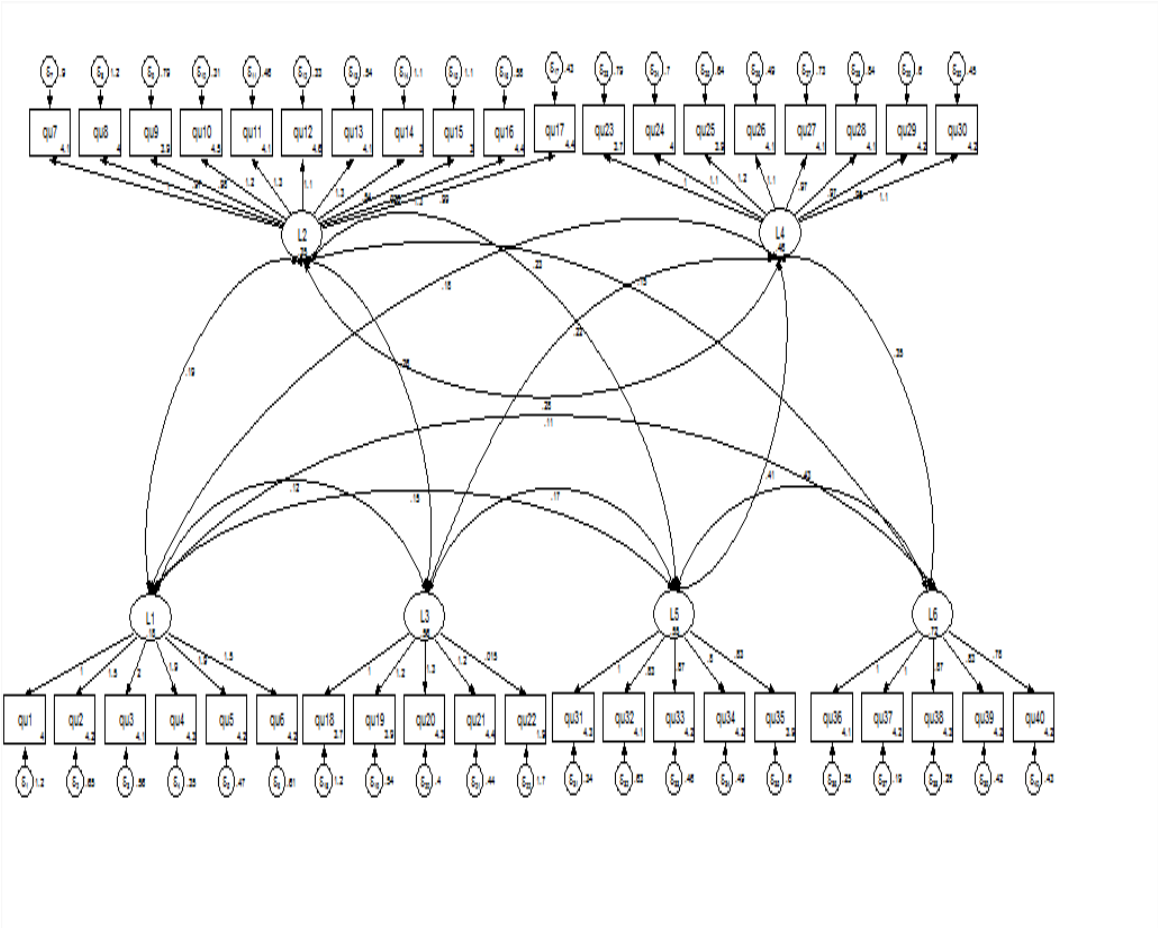
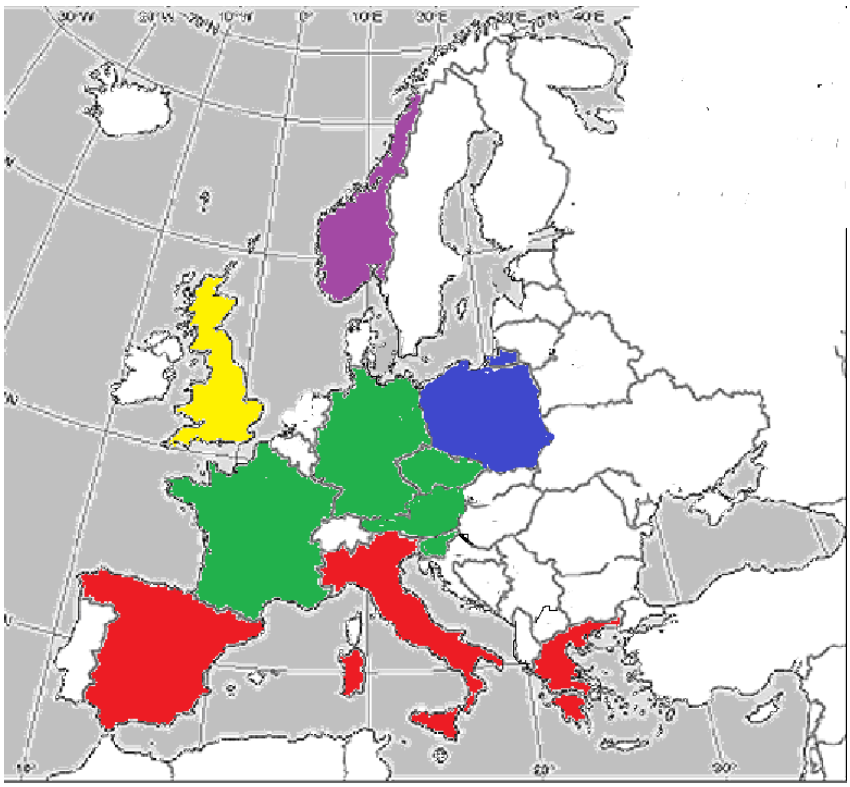


Figure 12 Visual overview of PATHWAYS questionnaire structure (six factor model)

Employment needs and European welfare systems



Anglo-Saxon=1

Continental=184

Post-communist=87

Scandinavian=144

Mediterranean=270

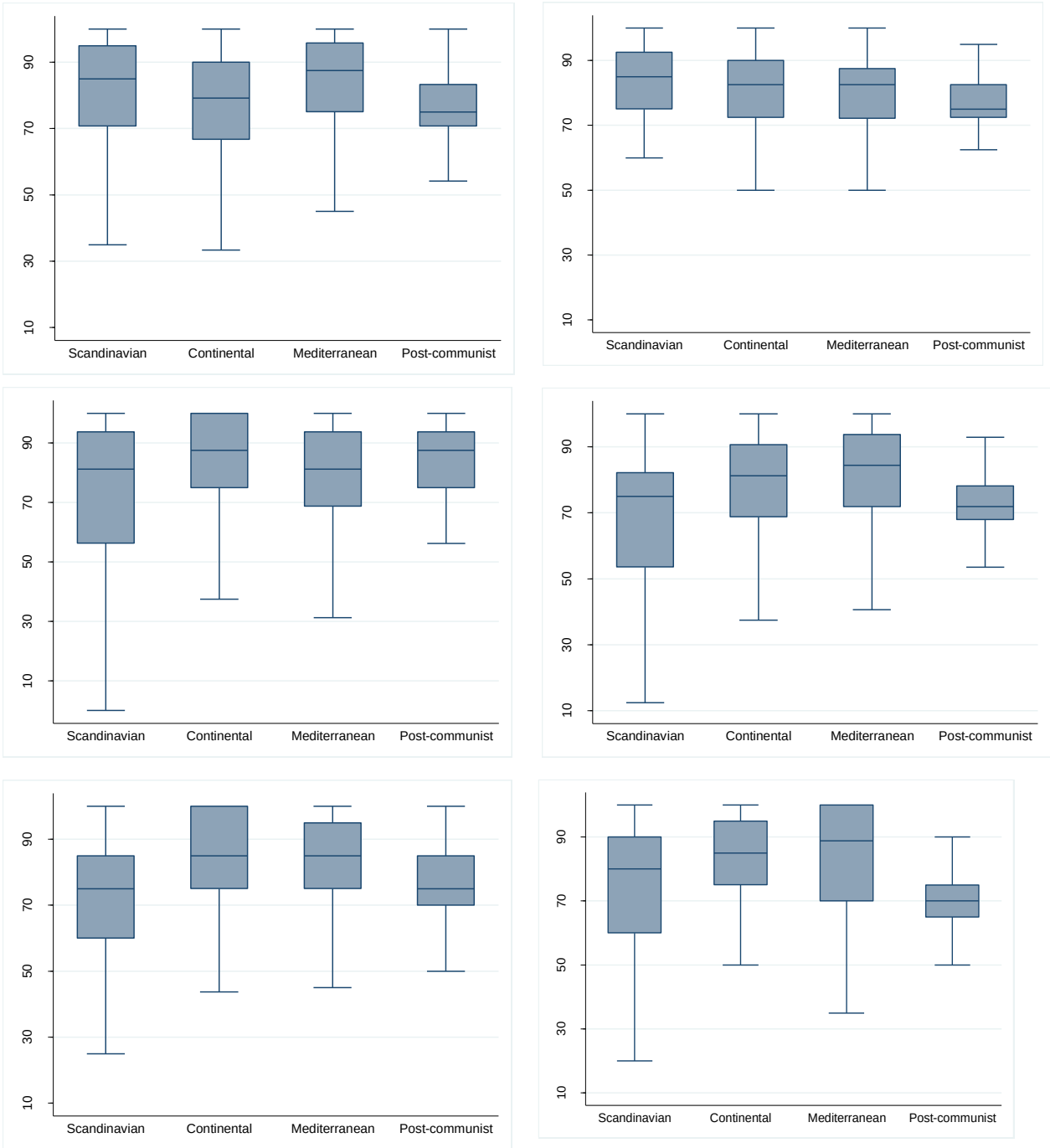
Anglo-Saxon model included just one participant so it was excluded from the welfare analyses. Comparisons were only conducted among Continental, Post-communist, Scandinavian and Mediterranean countries.

Results showed that, there were significant differences between type of employment needs and welfare system (Figure 14).

For example, Physical/environmental adaptations were more relevant for Mediterranean countries in comparison with Continental countries (Mean diff=3.97;

p<0.001) and Post-communist welfare countries (Mean diff=4.62; p<0.001). In turn, Working conditions were more important for Scandinavian participants in comparison with Mediterranean (Mean diff=2.37; p=0.009), and Post-communist countries (Mean diff=3.90; p<0.001). Participants from Continental countries considered legislative needs more relevant than people from Scandinavian (Mean diff=2.35; p=0.009) and Post-communist welfare models (Mean diff=1.91; p=0.028).

Figure 14. Employment needs and welfare systems



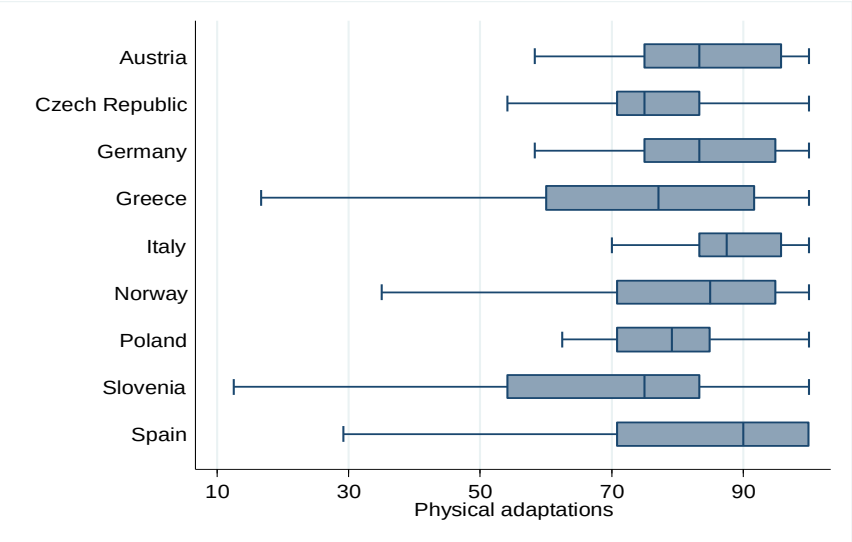
Mediterranean countries considered having Mental & Health care needs covered more favorable in comparison with Scandinavian (Mean diff=3.18; p=0.007) and Post-communist (Mean diff=5.47; p<0.0001) participants. In addition, people from Continental countries also considered having Specific mental & health care needs favorable more frequently in comparison with Post-communist (Mean diff=4.06 ; p<0.001) and with Scandinavian countries (Mean diff=3.18; p=0.0007).

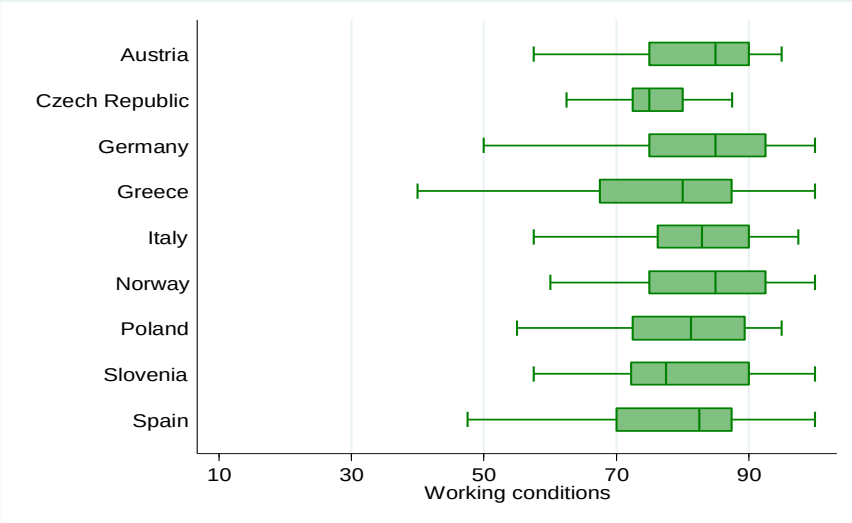
Self-actualization needs were perceived more favorably for Continental countries than for Post-communist (Mean diff=3.53; p=0.0002) and for Scandinavian countries (Mean diff=4.08; p<0.0001). Mediterranean countries also considered this last domain as more favorable in comparison with Post-communist (Mean diff=3.44; p=0.003) and Scandinavian countries (Mean diff=4.80; p<0.0001). Finally, Mediterranean countries considered Enhancing knowledge of others as more favorable in comparison with Scandinavian (Med diff=3.82; p=0.0001) and with Post-communist countries (Mean diff=6.16; p<0.001). After Mediterranean countries, Continental countries also considered enhancing knowledge of others as relevant in comparison with Post-communist countries (Mean diff: 5.09; p<0.0001) and with the Scandinavian model (Mean diff: 2.84; p=0.0002).

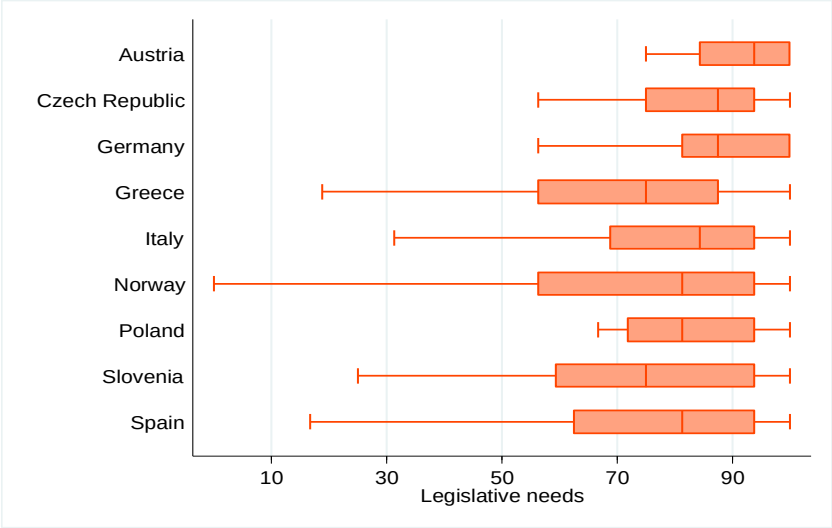
Country-specific employment needs

Finally, some country specific analyses were conducted to check whether there could be different employment needs within the participant country (Figure 15). These countries were as follows: the Czech Republic (n=59), Germany (n=44), Greece (n=41), Italy (n=61), Norway (n=60), Slovenia (n=62) and Spain (n=98). Preliminary analyses were also presented for countries with at least 20 participants (Austria and Poland). All of these analyses should be considered very cautiously since the participants are probably not representative for the chronic health population in the country.

Figure 15. Employment needs by countries







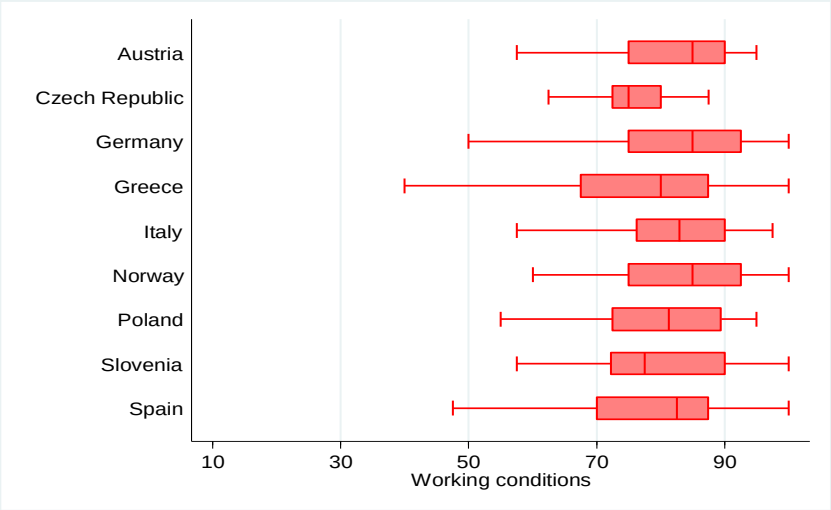
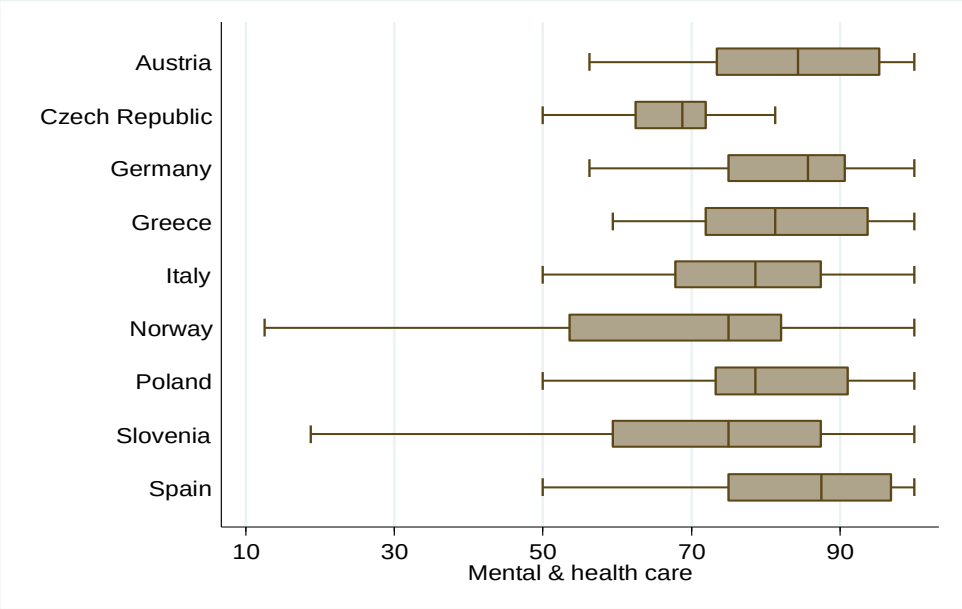
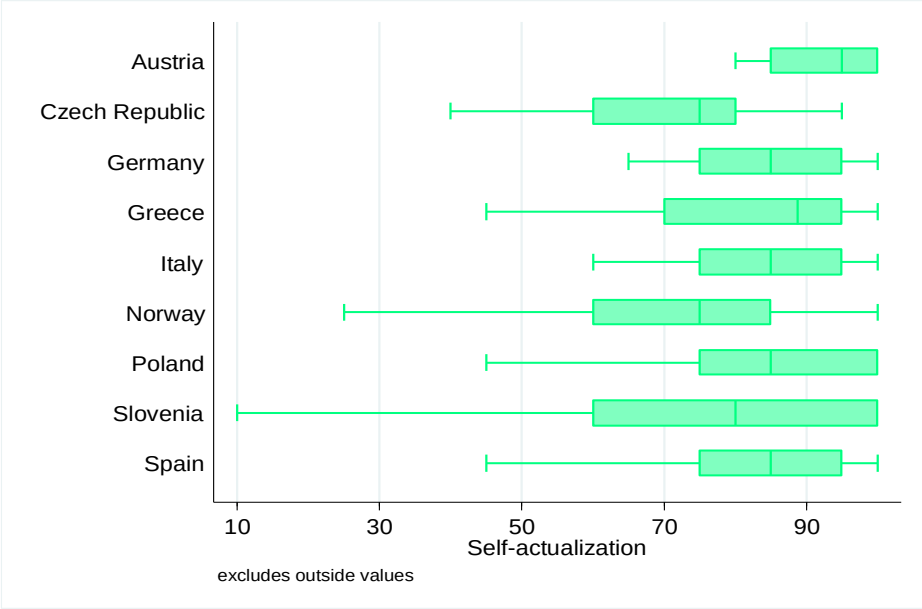
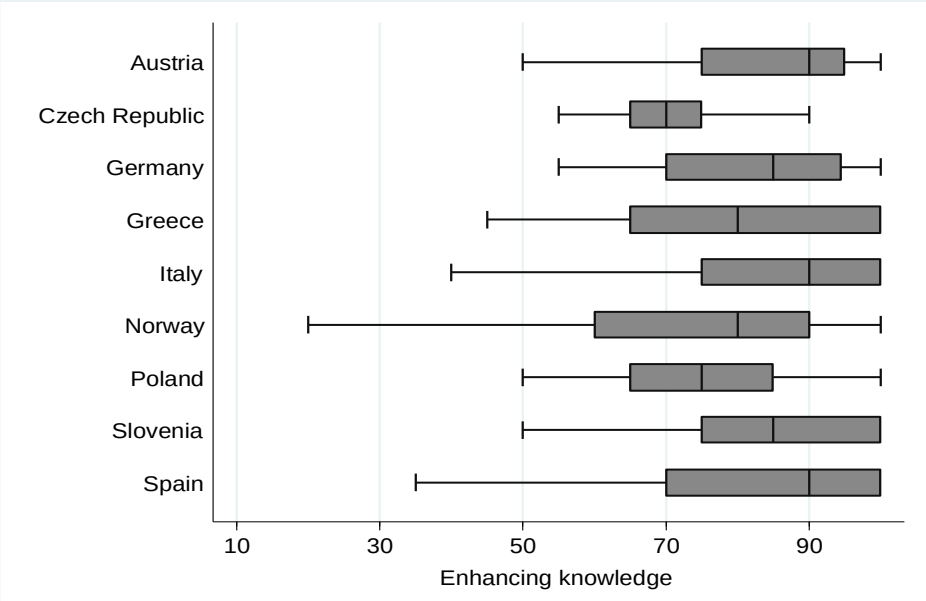


Figure 15 Employment needs by countries







CZECK REPUBLIC

The basic characteristics of participants from the Czeck Republic are summarized in table 8

Variables (n=60)	MD (SD)	n (%)
Gender (female)		34 (56.67%)
Age	46.4 (1.60)	
Work situation (employed)		40 (66.67%)
Income perception		
I earn as much as money as others		3 (15.0%)
I earn less money than others		14 (70.0%)
I earn more money than others		0 (0%)
Chronic health condition groups		
Migraine		11 (18.33%)
Back & Neck		10 (16.67%)
COPD		10 (16.67%)
Depression		9 (15.0%)
Diabetes		11 (18.33%)
IHD		9 (15%)
Other comorbid health conditions (yes)		31 (51.67%)

According to the participants from the Czeck Republic, employment needs related to **Legislative needs** were frequently rated as favourable/very favorable. Conversely, Enhancing knowlegde of others was less frequently rated as favourable (Figure 15).

Within the Legislative needs domain, the item more frequently rated as favourable/very favourable was the possibility to "***Combine part time job and social benefit***" (96%).

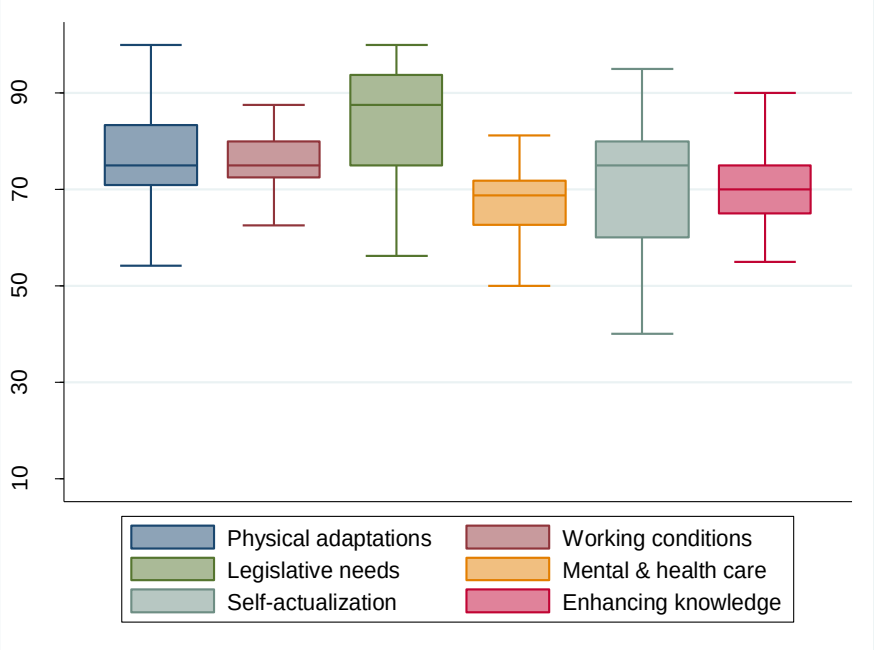


Figure 16 Employment needs domains in the Czech Republic

GERMANY

Variables (n=79)	MD (SD)	n (%)
Gender (female)		62 (78.48%)
Age	45.86 (1.33)	
Work situation (employed)		40 (66.67%)
Income perception		
I earn as much as money as others		34 (57.63%)
I earn less money than others		22 (37.29%)
I earn more money than others		3 (5.08%)
Chronic health condition groups		
Migraine		6 (22.78%)
Back & Neck		6 (7.59%)
COPD		10 (12.66%)
Depression		37 (46.84%)
Diabetes		8 (10.13%)
Other comorbid health conditions (yes)		79 (100%)

Table 9 shows the main characteristics of the German participants. Participants from Germany rated as something favorable/very favorable employment needs related to Self-actualization. In turn, Employment needs domains related to Enhancing knowledge of others were less frequently considered as favorable (Figure 16). Within the Self-actualization domain, the item most frequently rated as more favorable was "***Having access to training on how to deal with the disorder at work***" (85%).

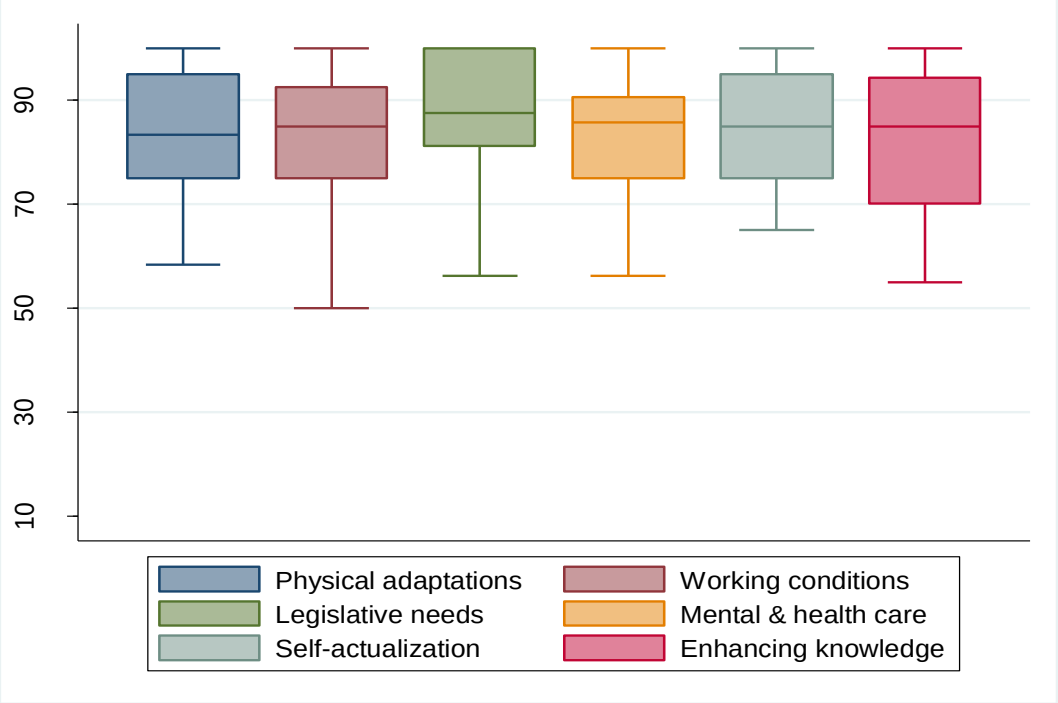


Figure 17 Employment needs domains in Germany

GREECE

Variables (n=62)	MD (SD)	n (%)
Gender (female)		56 (70.89%)
Age	47.56 (1.29)	
Work situation (employed)		28 (45.16%)
Income perception		
I earn as much as money as others		19 (67.86%)
I earn less money than others		9 (32.14%)
I earn more money than others		0 (0%)
Chronic health condition groups		
Migraine		4 (6.45%)
Back & Neck		10 (16.13%)
COPD		14 (22.58%)
Depression		9 (14.52%)
Diabetes		15 (24.19%)
IHD		10 (16.13%)
Other comorbid health conditions (yes)		67 (84.81%)

Characteristics of the participants from Greece are summarized in table 10. Needs related to Self-actualization were considered frequently as something favorable by Greek participants. Within the Self-actualization domain, "***Having access to training on how to deal with the disorder at work***" was the most frequently rated as favorable (83.33%). Conversely, Legislative needs domain was the domain with the lowest scores (less frequently rated as favorable).

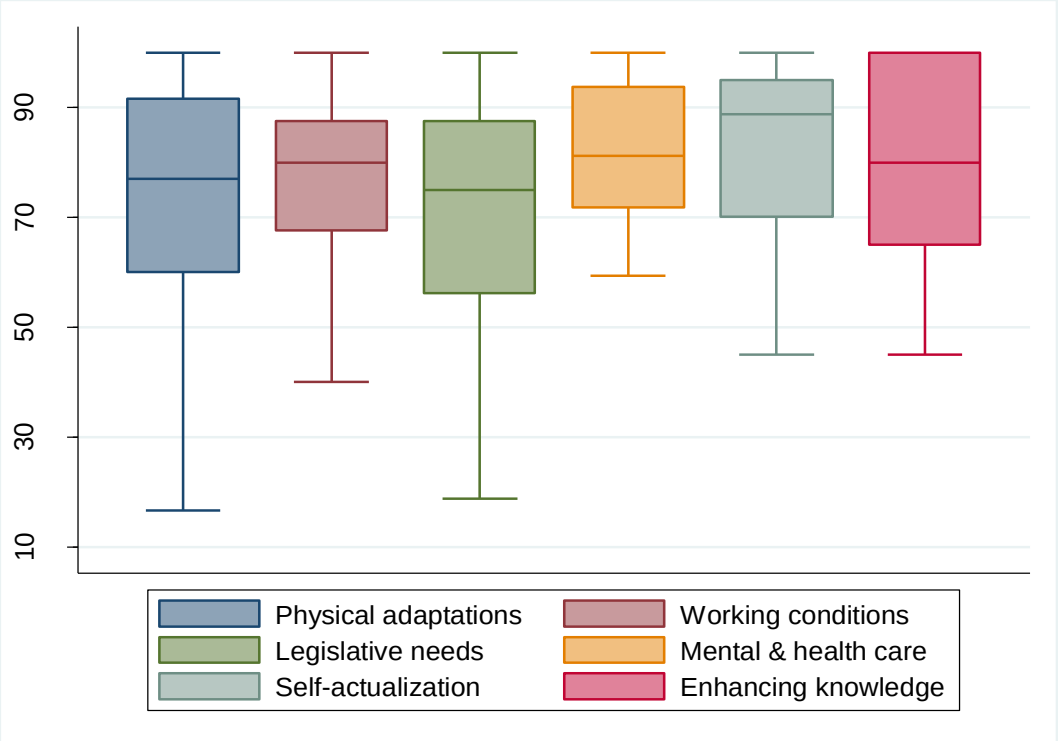


Figure 18 Employment needs domains in Greece

ITALY

Variables (n=79)	MD (SD)	n (%)
Gender (female)		37 (59.68%)
Age	45.96 (1.25)	
Work situation (employed)		63 (79.75%)
Income perception		
I earn as much as money as others		43 (68.25%)
I earn less money than others		18 (28.57%)
I earn more money than others		2 (3.17%)
Chronic health condition groups		
Migraine		7 (12.96%)
Back & Neck		13 (24.07%)
COPD		4 (8.86%)
Depression		4 (15.19%)
Diabetes		1 (36.71%)
IHD		2 (12.66%)
Other diseases		23 (42.59%)
Other comorbid health conditions (yes)		54 (31.65%)

Table 11 displays the main characteristics of the Italian participants.

Physical/Environmental factors were frequently rated as favorable in Italy. Particularly, ***"Having a healthy workplace that promotes healthy habits"*** was considered as favorable by at least 97% of participants. In turn, Legislative and Specific mental and health care needs were the domains with the lowest scores (less frequently considered as favorable).

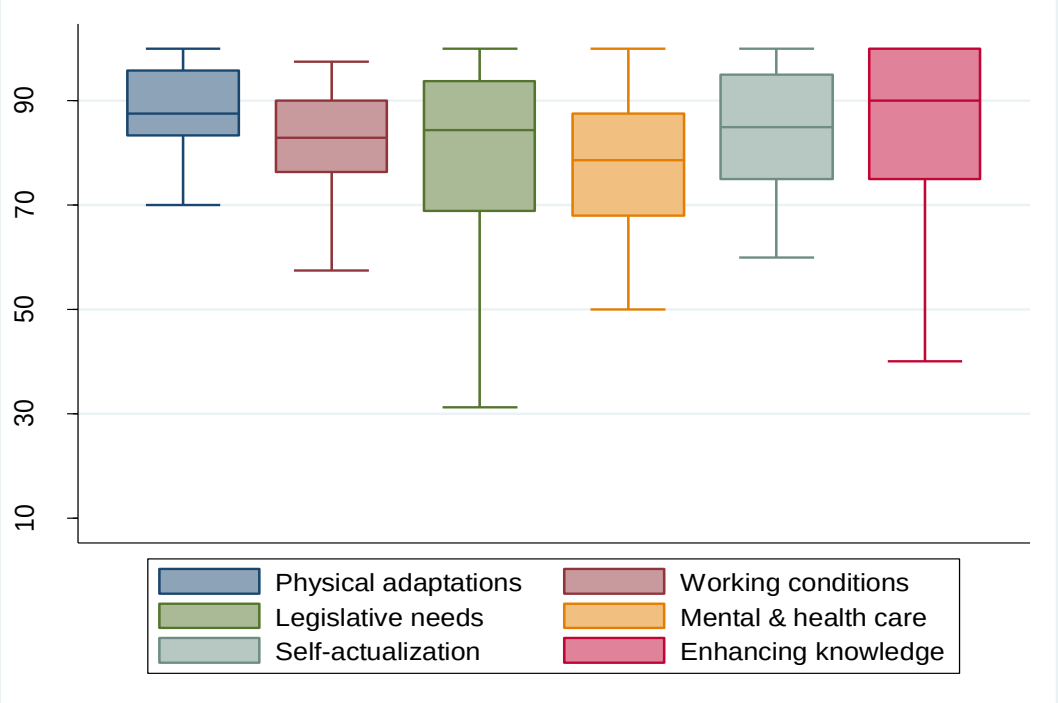


Figure 19 Employment needs domains in Italy

NORWAY

Table 12 displays the main characteristics of the respondents from Norway

Variables (n=144)	MD (SD)	n (%)
Gender (female)		144 (79.17%)
Age	44.30 (0.89)	
Work situation (employed)		107 (74.31%)
Income perception		
I earn as much as money as others		77 (71.96%)
I earn less money than others		22 (20.56%)
I earn more money than others		8 (7.48%)
Chronic health condition groups		
Migraine		56 (38.89%)
Back & Neck		18 (12.50%)
COPD		15 (10.42%)
Depression		23 (15.97%)
Diabetes		20 (13.89%)
IHD		12 (8.33%)
Other comorbid health conditions (yes)		144 (100%)

Physical/Environmental characteristics and Working conditions were the domains most frequently rated as favorable. Considering these two domains, ***"Having a healthy workplace that promotes healthy habits"*** and "**Having the possibility to secure time off for medical appointments**" were rated as favorable by more than 80% of participants. The presence of comorbidity was 100%.

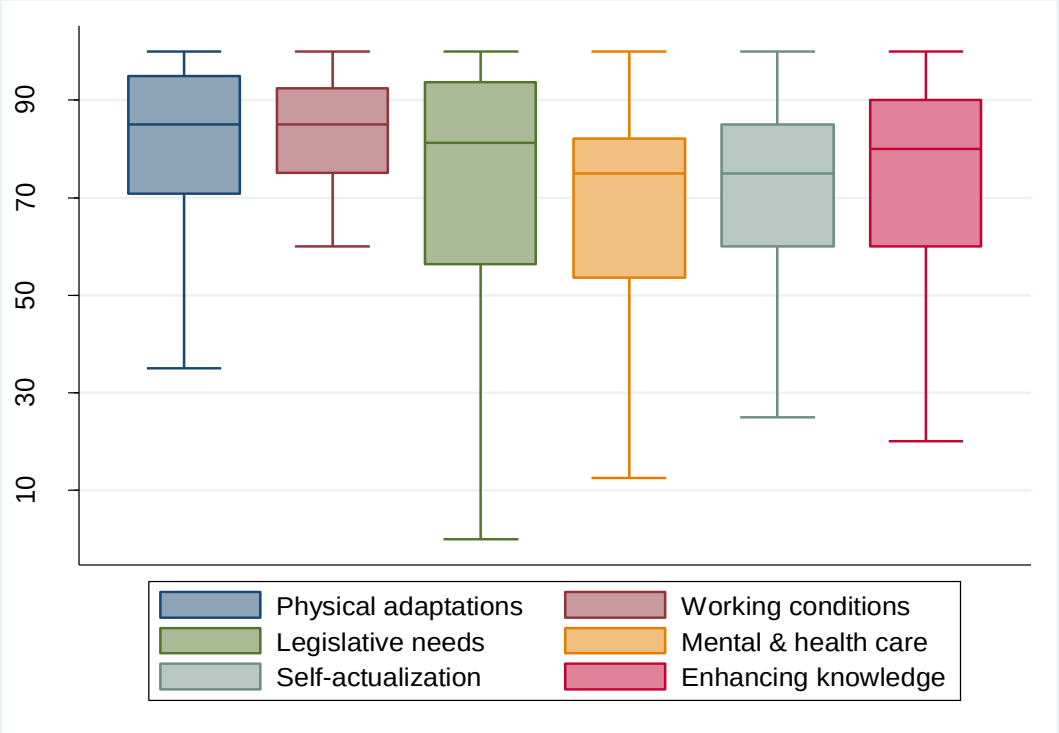


Figure 20 Employment needs domains in Norway

SLOVENIA

Variables (n=82)	MD (SD)	n (%)
Gender (female)		49 (59.76%)
Age	45.13 (1.32)	
Work situation (employed)		39 (47.56%)
Income perception		
I earn as much as money as others		25 (58.14%)
I earn less money than others		17 (39.53%)
I earn more money than others		1 (2.33%)
Chronic health condition groups		
Migraine		12 (14.63%)
Back & Neck		25 (30.49%)
COPD		11 (13.41%)
Depression		11 (13.41%)
Diabetes		13 (15.85%)
IHD		10 (12.20%)
Other comorbid health conditions (yes)		56 (68.21%)

Table 13 shows the characteristics of the sample collected from Slovenia. Enhancing knowledge of others was the domain with the highest mean scores. Within this domain the item "***Having a certain level of job security***" was considered as favorable by a total of 90.79% of the Slovenian participants. Physical/Environmental domain was in turn the domain less frequently rated as favorable.

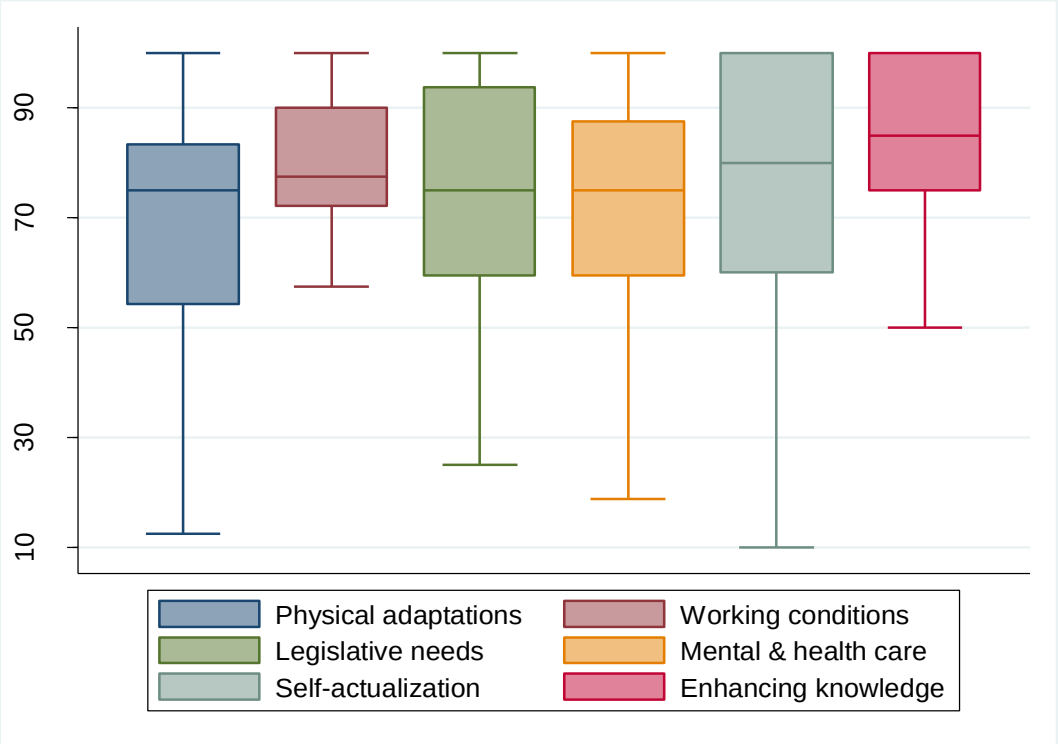


Figure 21 Employment needs domains in Slovenia

SPAIN

Variables (n=125)	MD (SD)	n (%)
Gender (female)		84 (65.12%)
Age	45.26 (0.94)	
Work situation (employed)		39 (47.56%)
Income perception		
I earn as much as money as others		25 (58.14%)
I earn less money than others		17 (39.53%)
I earn more money than others		1 (2.33%)
Chronic health condition groups		
Migraine		21 (16.28%)
Back & Neck		7 (5.43%)
COPD		9 (6.98%)
Depression		9 (6.98%)
Diabetes		82 (63.57%)
IHD		1 (0.78%)
Other comorbid health conditions (yes)		76 (58.91%)

Table 14 shows the characteristics of the Spanish sample. Physical/Enviromental factors was the domain that Spanish participanst rated most frequenly as favorable. Within this domain, the item "***Having the possibility to secure time off for medical appointments"*** was rated as favorable/very favorable by 90% of the participants. Covernsely, legislative needs was the domain considered as favorable the least frequently.

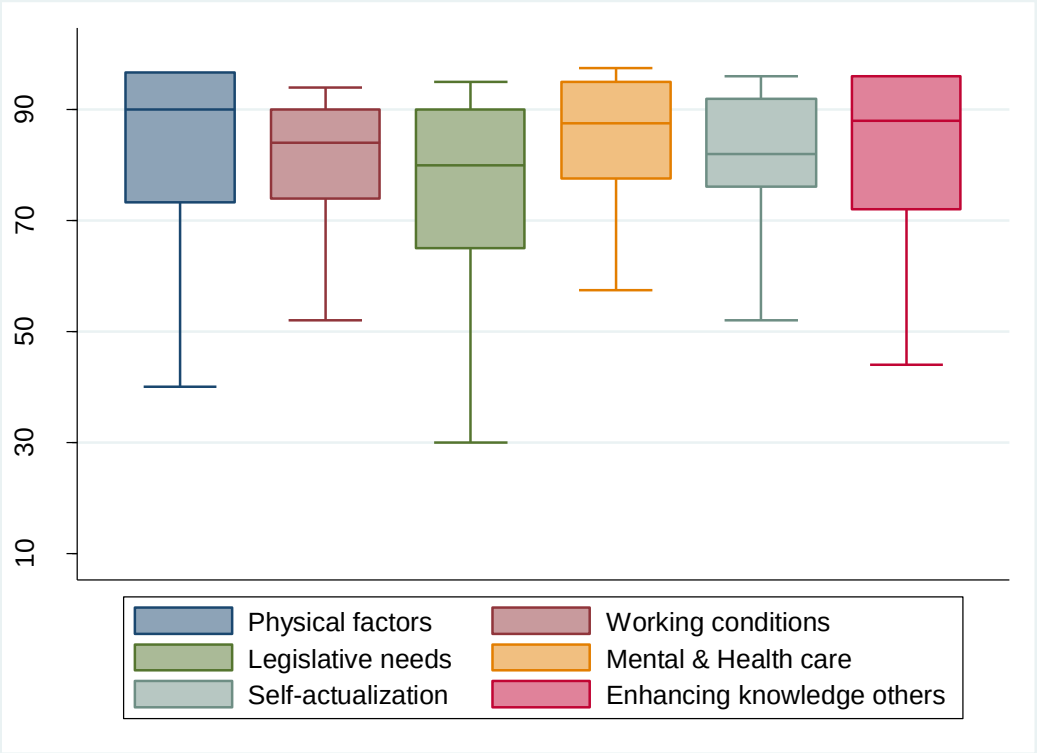


Figure 21 Employment needs domains in Spain

AUSTRIA

Variables (n=21)	MD (SD)	n (%)
Gender (female)		15 (71.43%)
Age	50.0 (3.31)	
Work situation (employed)		15 (71.43%)
Income perception		
I earn as much as money as others		3 (50%)
I earn less money than others		2 (33.33%)
I earn more money than others		1 (16.67%)
Chronic health condition groups		
Migraine		0 (0%)
Back & Neck		5 (23.81%)
COPD		6 (28.57%)
Depression		2 (9.52%)
Diabetes		6 (28.57%)
IHD		2 (9.52%)
Other comorbid health conditions (yes)		15 (71.43%)

Table 15 reported the charactersitics of the participants from Austria. Self-actualization needs was the domain rated most frequently as favorable. On the other hand, enhancing knowlegde of others was the domain with the lowest scores (meaning that it was considered the least frequently as favorable)[1].

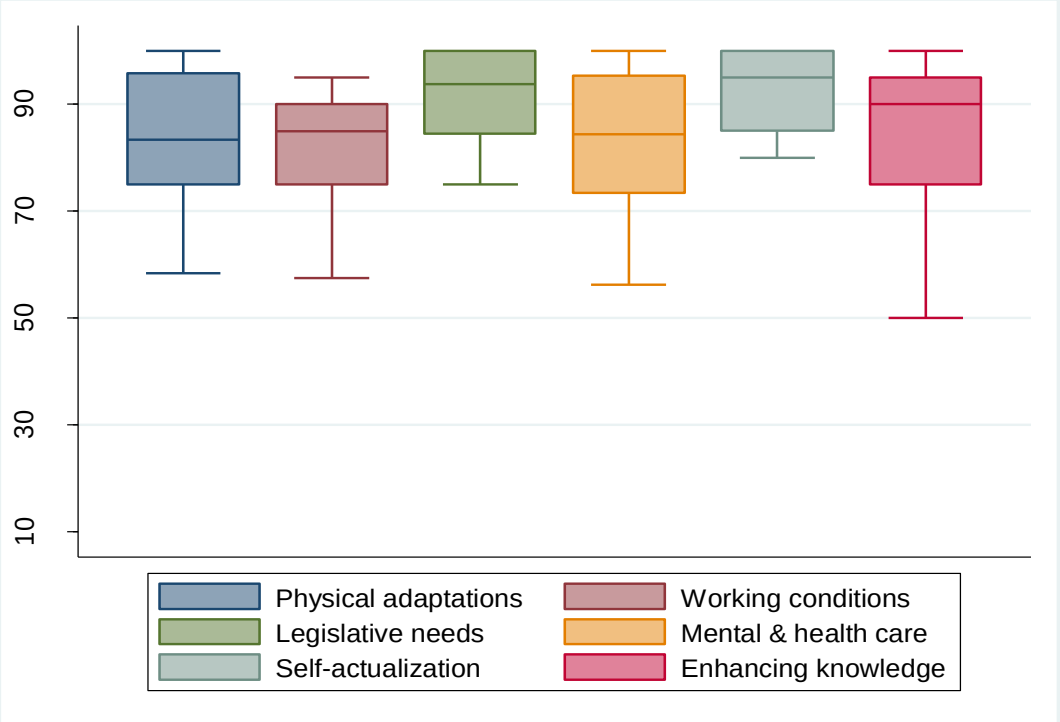


Figure 22 Employment needs domains in Austria

[1] Due to the small number of cases items analyses were not showed

POLAND

Variables (n=26)	MD (SD)	n (%)
Gender (female)		17 (65.38%)
Age	38.96 (2.36)	
Work situation (employed)		18 (69.23%)
Income perception		
I earn as much as money as others		4 (50.00%)
I earn less money than others		4 (50.00%)
I earn more money than others		0 (0%)
Chronic health condition groups		
Migraine		4 (15.38%)
Back & Neck		4 (15.38%)
COPD		3 (11.54%)
Depression		10 (38.46%)
Diabetes		5 (19.23%)
IHD		0 (0%)
Other comorbid health conditions (yes)		16 (61.53%)

The domain with the highest scores (i.e. the items more frequently rated as favorable) was legislative domains. In turn, the Enhancing knowlegde of others domain was considered as favorable the least frequently[2].

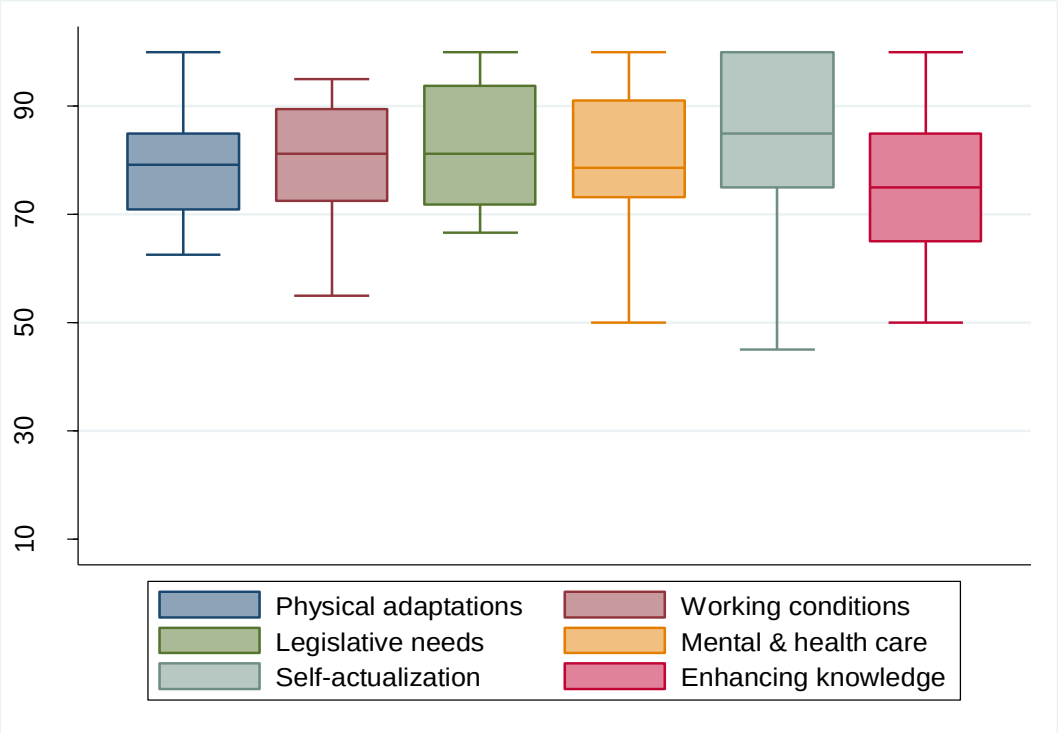


Figure 23 Employment needs domains in Poland

[2] Due to the small number of cases items analyses were not showed

Employment needs and work situation

Figure 24 and table 15 showed there were no significant differences between type of employment needs and working situation (employed vs no employed).

MD (SD)	Employed	Unemployed	χ^2 (p)
Physical adaptations	78.81 (19.04)	77.76 (19.63)	0.56 (0.46)
Working conditions	77.60(17.39)	79.32(16.30)	1.32 (0.25)
Legislative needs	77.35 (23.48)	75.69 (23.89)	1.29 (0.25)
Mental & Health care	76.91 (17.95)	75.30 (21.14)	0.14 (0.71)
Personal education	77.75 (20.07)	79.41 (20.85)	1.77 (0.18)
Enhance knowledge	77.98 (21.45)	80.26 (19.62)	1.24(0.26)

Table 15 Employment needs and work situation

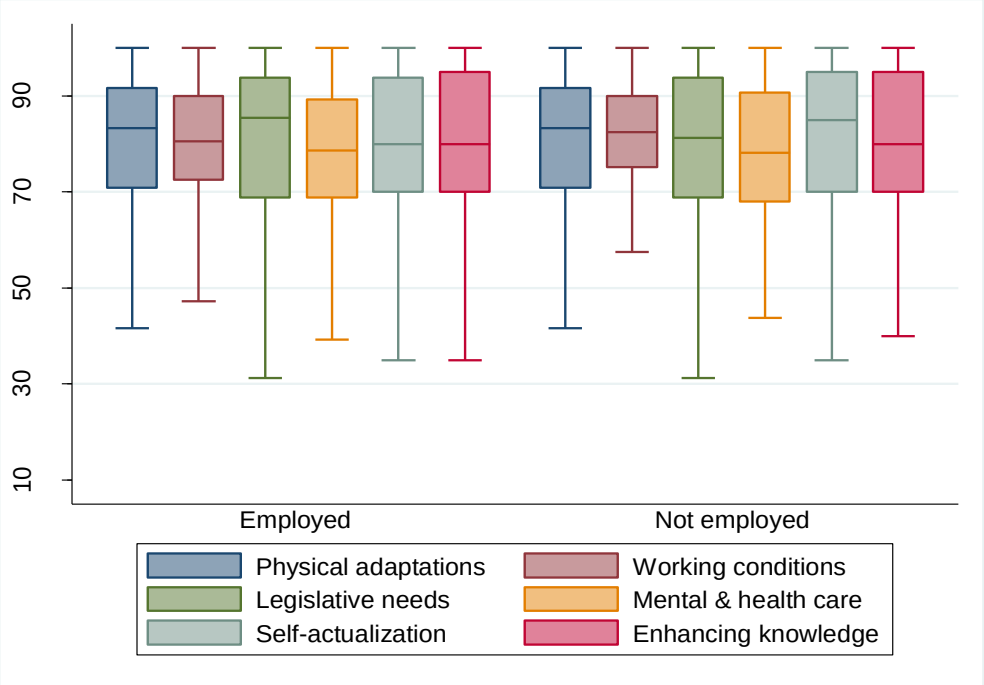


Figure 24 Employment needs and working situation

Discussion

This study has reported the employment needs perceived as most favorable by people with six different health conditions (identified as the leading causes of years lived with disability) in nine different European countries.

The results showed that the specific employment needs rated as more favorable were as follows: *"Having the possibility to secure time-off for medical appointments", "Having a flexible work routine" and "Having a certain level of job security"*.. All these results are in line with a previous study where the participants also reported factors related to working conditions i.e. fewer hours work, teleworking and more autonomy as the most preferable actions (22). One study also showed that both people with and without disabilities globally experienced the same employment accommodations and that frequently have to do with flexible working conditions (16).

In addition, our study also showed employment needs perceived as less favorable. *"Having the possibility to legally terminate job in case productivity decrease due to chronic condition"* was rated as unfavorable by most of the study participants. Although job positions are less and less permanent in the current job market, new formulas should be found to get a balance between commercial interests and maintaining people's job although their productivity decrease because of their health condition. Temporal financial incentives to employers might be appropriated during these situations.

"Having high supervision from managers" was also reported as unfavorable by many participants. The idea that people with chronic health conditions need excessive supervision is not scientifically supported by our study. This finding is important to be disseminated among employers who might think people with health problems require high supervision (42, 43).

Mixed strategies that allow people to work and receiving benefits were generally approved by participants. Although there are some EU strategies that are in line with this idea, there are still EU countries that do not allow people with permanent disability pension to receive income (See PATHWAYS deliverable 4.1).

In contrast to previous studies, this study has quantitatively collected a variety of employment needs which have been systematically selected using information from three different sources: scientific literature, reports from relevant organizations and patient's associations. These accommodations were not only related with physical adaptations and work arrangements, but also with educational programs, health care services and legislation. This wide list of elements underlines that employment (re)integration of people with chronic health conditions requires different elements and organizations, as well coordination between them.

The first part of the study, consisting of a scientific literature mapping, revealed that studies were mainly focused on the negative factors of suffering from chronic health conditions. For example, several studies reported that people with chronic health conditions frequently experience fatigue, depression, absenteeism, and lack of productivity (44-50). There were also several studies about the economic costs of these health conditions (51). Only 12% of the studies identified by the electronic searching did report the factors that allow people with chronic health conditions to

participate in the workplace. In addition, this evidence was mainly collected in specific health conditions such as Diabetes (52), Back & Neck Pain (53) and IHD (54). However, literature reporting facilitators was sparse in other health conditions such as Migraine or Depression. In addition, no study analyzed the positive values of having workers with chronic health conditions. It is hard to convince employers to include people with chronic health conditions if no evidence has proven their benefits at individual, company and societal level. Several companies and enterprises in Europe are good practices for the integration of workers with chronic health conditions. However, a few of them have analyzed their results systematically (See PATHWAYS Deliverable 5.1). Further researcher should be invested in checking whether inclusion of chronic health conditions is not only a need, but also brings benefits in terms of creating more personalized and high-valued workplaces.

One important aim of this study was also to analyze a variety of health conditions to check which employment needs were commonly shared and which were more health-condition specific. Our results reported that there were employments needs that were similarly perceived as favorable across all the health conditions groups. Our results suggest that these factors might be potentially targeted in general employment integration actions regardless type of health condition.

On the other hand, there were employment needs that participants with some health condition scored more favorably than people with other health condition groups. It is important to note that almost 70% of the total sample experienced a secondary health condition. Further studies should confirm these findings.

One important added value of our study is that it has been conducted in nine different countries with different welfare systems and culture characteristics. In this line, our results suggest that there is a need for welfare-specific actions. For example, participants from Mediterranean countries scored physical/environmental adaptations and enhancing knowledge of others about the health condition very favorably in comparison with other welfare systems modes. In turn, Scandinavian countries rated favorable to have flexible working conditions. Legislative protection and self-actualization actions were perceived as favorable in continental countries. Finally, post-communist countries perceived as favorable to have legislative protection. Relevant differences were also found when results were analyzed at country level.

Our results also showed that even countries that shared similar welfare systems reported differences in the employment needs. In this line, Italy and Spain highlighted as favorable physical and environmental adaptations. Germany and Slovenia were scoring needs related to enhancing knowledge of others about the health condition very favorably. Needs related to legislative protection were scored favorably in the Czech Republic and in Poland. Finally, Greece and Austria showed high scores in needs related to self-actualization programs. Unfortunately, the reduced sample size in some countries ($n<40$) did not allow us to provide recommendations about what are the country-specific employment needs. Nonetheless, the results of this study suggest that employment policies in Europe should be country-tailored. In addition, these results suggest that employment needs might also be associated with societal and cultural issues and not only with economic system models. Further studies with greater sample sizes are necessary to corroborate the results obtained here.

Our study also checked whether other health-related information and demographic factors were related to the type of employment needs. Our results showed that a higher number of comorbid conditions was not associated with employment needs. Only people with one or with two comorbid health conditions scored higher than people without comorbidity in the working conditions domain. It is possible that people with comorbid health conditions particularly require more flexibility in the work arrangements than people with a single condition. Evidence has showed that adaptations in this area are not expensive and can be conducted in all the companies (17). Further studies should check whether specific comorbid health conditions combinations require specific employment needs

Finally, we checked whether working situation and perception of income were related to employment needs. The results indicated no significant differences between the employed and the unemployed in terms of employment needs. It was expected that results would show that unemployed people would have been perceived more favorably self-actualization services. However, employed people also scored favorably in this area. This might be due to both employed and unemployed people needing a permanent self-actualization in the current job market. Perception of income did not impact on employment needs perceived as more favorably either.

Limitations

Our study should be analyzed considering the following limitations. Systematic mapping of literature only analyzed four years of evidence, so if we had selected other inclusion criteria for the studies, results would have probably been different. In spite of this, we think we reached a comprehensive list of 40 employment needs that previous studies have not collected. Regarding the e-survey, the sample consisted of voluntary participants. Therefore our sample is probably not representative of European population with chronic health conditions. In spite of this limitation, we have obtained interesting information about the employment needs. Moreover, health conditions groups were created by self-reported diagnoses and were not confirmed by health professional opinions. Nonetheless self-reported diagnoses have been widely used by epidemiological studies. There was probably a high-risk of acquiescence bias in the questionnaire (considering all the items as favorable or as very favorable). Results reported by welfare models have to consider that there was an over-representation of the Mediterranean welfare model. However, this report include countries that had been infrequently analyzed in previous European reports (i.e. Spain, Italy, Czech Republic and Slovenia) (24). The number of participants was not similar in the different health conditions groups and as was beforehand reported, sample sizes from some countries were very small. Further studies should solve these limitations.

For all these reasons, this study should be considered as a first step to report employment needs in people with chronic health condition in Europe. Further research on the employment needs is warranted.

Conclusions

In spite of these limitations, this study has reported the employment needs that people with chronic health conditions perceive as more favorable. Results indicated that some common employment needs were shared across the different health condition groups. Our results also underline that country-specific actions are probably necessary to implement professional integration strategies.

In a further step, we will harmonize: the employment needs perceived by people, the employment needs targeted by existing strategies and the employment needs covered by interventions to know what are the existing employment unmet needs so that people with chronic health conditions in Europe can fully participate in the work arena.

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Annexes

Table S1 .Summary of welfare model as conceptualized in WP4

Model name	Features	Country examples
Scandinavian model	• Emphasis on egalitarianism and universal welfare provision (Popova & Kozhevnikova, 2013); • Universal and generous benefits and a strong redistributive social security system (Eikemo et al., 2008b and Fenger, 2007); • Extensive fiscal intervention through the use of active labour market policies, strong employment orientation (Midttun, 2006).	DN, FI, NL, NO, SE
Continental model	• Benefits tied to employment, financed mainly by employer and employee (Eikemo et al., 2008b); • Minimal redistribution (ibid) • Social security is organized as insurance system (Caritas, 2012)	AT, BE, DE, FR, SI
Anglo-Saxon model	• Relatively large social assistance of the last resort (Midttun, 2006); • Cash transfers are mainly oriented to people in working age (Midttun, 2006); • Schemes conditioning access to benefits to regular employment and emphasis on activation measures (Midttun, 2006); • A low level of government spending on social protection, modest benefits, usually means-tested (Eikemo et al., 2008a and Fenger, 2007); • Little redistribution of incomes (Fenger, 2007) • High incidence of low-pay employment (Midttun, 2006).	UK
Mediterranean model	• A dualist system of welfare provision, which strongly protects part of the population while under-protecting another (Campos-Matos and Kawachi, 2015); • High segmentation of entitlements and conditioned access to social provisions (European Association of Service providers to Persons with Disabilities (EASPD), 2014); • Welfare and social policies in fighting poverty are ineffective and fragmented (Caritas, 2012); • Less generous benefits in comparison to the Continental model and not all the branches of social insurance are equally developed (Caritas, 2012); • High dependence on informal, charitable and family care (Eikemo et al., 2008a).	EL, ES, IT, PT

"Post-Communist" model	• Generally low governmental spending on social programs, mostly financed through social contributions (Campos-Matos and Kawachi, 2015) • Relatively limited health service provision and poor overall population health system (Eikemo et al., 2008a). • On-going transition process from institutional to community-based care (EASPD, 2014); • Insufficient implementation and monitoring of the developed legislation, plans and strategies concerning the wellbeing of persons with disabilities (EASPD, 2014); • Lower levels of governmental programmes and the social situation (Fenger, 2007); • Generally incoherent legal framework.	BG, CZ, EE, HR, HU, PL, SK, LT, LV

Table S2. NGOs and patients associations identified which distributed the e-survey among study participants

Countries	Number	Associations names
Austria	**7**	Österreichische Diabetikervereinigung - Sektion Kärnten Herzverband Österreich - Landesverband Kärnten Pro mente Kärnten SHG Kopfweh Selbshilfe Grueppe - Kopfweh SHG Wirbelsäule, Beckenboden, Gelenke SHG Atemwegserkrankte
Czech Republic	**8**	Czech society for mental health Union of patients with diabetes in the Czech Republic Life without barriers Czech association of patients Czech society of cardiology Czech headache society Czech initiative for chronic obstructive pulmonary disease Czech society of internal medicine
Germany	**26**	Deutsches Bündnis gegen Depression e.V. Bundesarbeitsgemeinschaft Gemeindepsychiatrischer Verbünde e.V. DiabetesDE Deutsche Diabetes Hilfe Aktion gesunder Rücken (AGR) e.V. Forum gesunder Rücken COPD Selbsthilfe Gemeinschaft Deutsche PatientenLiga Atemwegserkrankungen - DPLA e.V. Patientenorganisation Lungenemphysem-COPD Deutschland Deutsche Migräne- und Kopfschmerzgesellschaft e.V. (DMKG) Deutsche Herzstiftung e.V. Deutsche Gesellschaft für Kardiologie – Herz- und Kreislaufforschung e.V. Deutsche Gesellschaft für Prävention und Rehabilitation von Herz-Kreislauferkrankungen e.V. (DGPR) Bundesverband Niedergelassener Kardiologen (BNK) e.V. Aktion Psychisch Kranke e.V. Deutsche Depression Liga Deutsche Gesellschaft für Psychiatrie und Psychotherapie, Psychosomatik und Nervenheilkunde (DGPPN) Deutsche Diabetes Gesellschaft Deutscher Diabetiker Bund e.V. Wirbelsäulenliga e.V. COPD - Deutschland e.V. COPD & Lunge Deutschen Lungenstiftung e.V. Deutsche Gesellschaft für Pneumologie und Beatmungsmedizin e.V.

		Deutsche Sauerstoff Liga LOT e.V. MigräneLiga e.V. Deutschland Cluster Kopfschmerzen CSG e.V.
Greece	**10**	Ελληνική Εταιρία Κεφαλαλγίας Σύλλογος Ρευματοπαθών Κρήτης Ελληνικό Ίδρυμα Καρδιολογίας Ελληνική Εταιρία Καρδιολογίας Σύλλογος Καρδιοπαθών (Λάρισας) Ελληνική Ομοσπονδία για τον Διαβήτη (ΕΛΟΔΙ) Πανελλήνια Ομοσπονδία Σωματείων - Συλλόγων ατόμων με Σακχαρώδη Διαβήτη Π.Ο.Σ.Σ.Α.Σ.ΔΙΑ. Ομάδα ΧΑΠ – Σύλλογος (Ελληνική Πνευμονολογική Εταιρεία) Ελληνική Πνευμονολογική Εταιρεία Σωματείο Ληπτών Υπηρεσιών Ψυχικής Υγείας «Αυτοεκπροσώπηση»
Italy	**10**	DPI – Disabled Peoples' International Italia Associazione Italiana per la lotta contro le Cefalee AIC ENIL Italia Onlus – European Network on Independent Living UNASAM – Unione Nazionale delle Associazioni per la Salute Mentale FISH (Federazione italiana superamento handicap) Fondazione Idea – istituto per la ricerca e la prevenzione della depressione e dell'ansia Fondazione ISAL Associazione Italiana Pazienti BPCO Onlus FAND – associazione italiana diabetic Conacuore (Coordinamento Nazionale Associazioni del Cuore)
Norway	**8**	Mental Helse Diabetesforbundet Foreningen for kroniske smertepasienter Landsforeningen for hjerte- og lungesyke (LHL) Funksjonshemmedes Landsforbund (FFO) The Norwegian Association of Migraine The Norwegian Association of Back Pain The Norwegian Association for Whiplash Injuries
Poland	**15**	PFON - Polskie Forum Osób Niepełnosprawnych Fundacja Pomocy Osobom Niepełnosprawnym Stowarzyszenie Przyjaciół Integracji i Fundacja Integracja Stowarzyszenie Aktywnie Przeciwko Depresji TPN - Towarzystwo Przyjaciół Niepełnosprawnych Polskie Towarszystwo Kardiologiczne Polskie Towarzystwo Diabetologiczne Polskie Stowarzyszenie Diabetyków Państwowy Fundusz Rehabilitacji Osób Niepełnosprawnych PFRON (PTBG) Polskie Towarzystwo Bólów Głowy Stowarzyszenie Chorych na Klasterowe Bóle Głowy

		Stowarzyszenie Chorych na ZZSK i Osób ich Wspierających Stowarzyszenie Reumatyków i ich Sympatyków im. Hanki Żechowskiej Polskie Towarzystwo Chorób Płuc Polska Federacja Stowarzyszeń Chorych na Astmę i Choroby Alergiczne i Przewlekłe Obturacyjne Choroby Płuc
Slovenia	**5**	Nacionalni svet invalidskih organizacij Slovenije Šent - Slovensko združenje za duševno zdravje Zveza delovnih invalidov Slovenije Sklad SILVA, Društvo za kakovostno življenje ljudi s posebnimi potrebami Zveza invalidskih društev ILCO Slovenije
Spain	**7**	Foro Español de Pacientes Fundació Avedis Donavedian (Incorpora) Federació d'Associacions, Fundacions i Patronats de les Persones amb Discapacitat, Persones amb Trastorn Mental i Persones amb Intel · ligència Límit del Baix Llobregat Cordibaix Agrupació Catalana d'Entitats per la inserció laboral de persones amb trastorn mental - Ammfeina Associació d'oci inclusiu - Sarau Servei d'Inserció Laboral Esplugues Fundacion Manantial