Journal of Occupational and Environmental Medicine, Publish Ahead of Print

DOI : 10.1097/JOM.0000000000001425

Identifying the employment needs of people with chronic health conditions in Europe

Running title: Employment needs in chronic health conditions

Carolina C. Ávila [a,b,c] PhD, Jose Luis Ayuso-Mateos[a,b,c] MD, PhD, Amalia Muñoz-Murillo[d] MSc, Chiara Scaratti[e] PsyD, Michaela Coenen[f] MHP, PhD, Anastasia Vlachou[g] PhD, Klemens Fheodoroff[h] MD, Aleksandra Pilat[i] MA, Aleksandra Tabaj[j] PhD, Olga Svestkova[k] MD, PhD, Asel Kadyrbaeva[l] MSc, Maria Cabello[a,b,c,*] PhD

[a] Department of Psychiatry, Universidad Autonoma de Madrid, Arzobispo Morcillo, 28029 Madrid, Spain. carolina.avila@uam.es (CCA), joseluis.ayuso@uam.es (JLAM), maria.cabello@uam.es (MCa)

[b]Instituto de Salud Carlos III, Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM), Moforte de Lemos, 28029, Madrid, Spain. carolina.avila@uam.es (CCA), joseluis.ayuso@uam.es (JLAM), maria.cabello@uam.es (MC)

[c] Instituto de Investigación Sanitaria Princesa (IIS-Princesa), Diego de León 62, 28006, Madrid, Spain. carolina.avila@uam.es (CCA), joseluis.ayuso@uam.es (JLAM), maria.cabello@uam.es (MC)

[d] Research Unit, Parc Sanitari Sant Joan de Déu, Universitat de Barcelona, Dr Antoni Pujades 42, 08830, Sant Boi de Llobregat, Spain. a.munoz@pssjd.org (AMM)

[e] Neurology, Public Health and Disability Unit, Neurological Institute "C. Besta" IRCCS, Foundation, Via Celoria 11, 20133, Milan, Italy, chiara.scaratti@istituto-besta.it (CS)

[f] Institute for Medical Information Processing, Biometry and Epidemiology – IBE, Chair for Public Health and Health Services Research, Research Unit for Biopsychosocial Health, Ludwig-

Maximilians-Universität, Marchioninistr. 17, 81377, Munich. Germany, michaela.coenen@med.lmu.de (MCo)

[g] Department of Special Education, University of Thessaly, Argonafton and Filellinon Str, Volos, Greece. anavlachou@uth.gr (AV)

[h]Neurorehabilitation, KABEG Gailtal-Klinik, Radniger Straße 12, 9620, Hermagor, Austria, klemens.fheodoroff@kabeg.at (KF)

[i] Department of Medical Sociology, Chair of Epidemiology and Preventive Medicine. Jagiellonian University Medical College, ul. Kopernika 7a, 31-034 Krakow, Poland, aleksandra.pilat@uj.edu.pl (AP)

[j] Development Unit for Employment Rehabilitation, University Rehabilitation Institute Republic of Slovenia, Linhartova 51, Ljubljana, Slovenia, aleksandra.tabaj@ir-rs.si (AT)

[k]Department of Rehabilitation Medicine. Faculty of Medicine Charles University, Albertov 7, Praha 2, 1280, Prague, Czech Republic, olga.svestkova@lf1.cuni.cz (OS)

[l] European Association of Service providers for Persons with Disabilities, Rue du Commerce 72, Brussels-1040, Brussels, Belgium asel.kadyrbaeva@easpd.eu (AK)

*Corresponding author: Maria Cabello, PhD. Arzobispo Morcillo 4, 28029, Madrid, Spain. Telephone +34 91 4972447. Fax: +34 915204003 Email: maria.cabello@uam.es

ACKNOWLEDGMENTS

We would to acknowledge the participation of the associations, NGOs and organizations which kindly distribute the study questionnaire among people with chronic health conditions as well to the study participants who dedicated time to participate in the study.

ROLE OF THE FUNDING

This study received funding from the European Union's Health Programme (2014-2020) Grant agreement n. 663474. The funding source had not any involvement either in the study design or in the interpretation of results.

CONFLIC OF INTEREST

All the authors declare have no conflict of interest.

CONTRIBUTORSHIP

CCA wrote the first draft of the manuscript, AMM, CS, MCo, AV, KF,, AP, AT and OS participated in the design of the questionnaire and coordinated data collection at national level. AK and JLAM searched patient's associations and made contributions in the selection of the study variables Finally, MCa performed the statistical analyses, conceived the objectives and coordinated the whole process. All the authors made substantial contributions and approved the final version of the manuscript.

ABSTRACT

Objectives The main goal of this study was to compare the employment needs experienced by people with different chronic health conditions and in different welfare systems.**Methods** A total of 688 participants with six chronic health conditions were collected in ninecountries representing four welfare systems in Europe (Continental, Mediterranean, Post-communist and Scandinavian).**Results** Raisingawareness of what is to live with a chronic health condition in the workplace was the area perceived as more favorable. The types of employment needs were different across the social welfare systems but did not vary among the different chronic health conditions groups.**Conclusion** Although diverse, there appear to be some common needs transversal to the working experience of people with chronic health problems. Actions to improve the employability of people with chronic health conditions should be tailored to each welfare system.

KEYWORDSChronic diseases; Employment needs; Survey; Welfare

INTRODUCTION

According to the World Health Organization (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(1).As the global population is aging, chronic health conditions are more and more prevalent worldwide(2).

People with chronic health problems are frequently unemployed (3). There are probably multiple reasons that account for this: People with chronic health conditions have frequently poorer quality jobs (3), are more likely to lose their jobs(4), andhave less probabilities to be (re)integrated into the work force(5).Unemployment make people with chronic health problems more vulnerable topoverty (6) and to mental health problems(3). On the contrary, people with health problems transitioned from receiving disability benefits to be actively working reported higher mental and physical health in comparison with those whoremained in disability benefits(7).

Scientific literature reporting information on employment needs in people with chronic health conditions has some limitations. Firstly, existing literature has mainly focused on specific needs such as physical adaptations(8),working conditions(9),or factors associated with return to work(10), whereas complete lists ofneedshave been less reported.Secondly, some oftheexisting studies that provide more extensive employment needs information are focused on specific health conditions groups(11-13),which does not help to understand the common needs that people with chronic health conditions might share. Thirdly, the existing studies including people with several chronic health conditions and extensive list of needshave onlycollected data from onecountry(14, 15),so the applicability of their results is probably restricted to their population and country characteristics.Finally, no study to our knowledge has analyzed whetherthe type

ofoccupation and the extension of the country social benefits mighthave an impact on people's workneeds.

Authors generally agree that there are five types of welfare systems in Europe: Scandinavian, Continental, Anglo-Saxon, Mediterranean and Post-communist(16, 17).In summary, the Scandinavian model, which is developed in countries such as Norway, Finland, Denmark and Sweden, is defined by high levels of social protection and universal health services that are supported by high tax rates(18). Scandinavian model promotes active employment policies since people with health problems receive wide social benefits that are made conditional to complete vocational and training programs(16).Therefore, this model promotes people's capabilities and prepares them for paid employment(16).As a result, the participation of people with health problems in the open labor market is generally high (18).On the other hand, the Continental model (Germany, France, Austria, Belgium and Croatia) places emphasis on wide social protection (although less extensive than Scandinavian model) and the existence of population health services that are covered by employers and employees(19).The work strategies for people with health problems are mainly passive since people who receive social benefits have few incentives and even sometimes restrictions to participate in the open labor market (16).Sheltered work and part-time employment are the most frequent employment options for people with health problems in these countries (20). The Anglo-Saxon model is implemented in United Kingdom and Ireland. This model, called also "liberal", is characterized by low public social assistance, allocating most of the social funds to working population sector (17). Active labor policies are developed so that people with health problems participate in the openlabor market (16),which is characterized by high flexibility and wage dispersion (17). People with health problems and unemployed are at higher risk for poverty and underpayment (16).The

Mediterranean model, which is located in Greece, Portugal, Italy and Spain, has been described as a fragmented welfare system that over protects certain population groups (particularly those who reached a certain disability threshold) while under protecting other population sectors(19). Mediterranean model has less generous social provisions in comparison with continental model(20). Family, charitable organizations and informal support become important agents to cover the existing social needs(19). Employment policies are characterized by providing partial and low-wage social benefits to people with health problems with no incentives to participate in the work market. Poverty rate among people with health problems is generally high(21).Finally, Post-communist model has been defined as on-going transition model coming from a collectivist vision to a neoliberal system(22). Post-communist welfare system is characterized by low social spending and poor health service coverage(19). Countries with a Post-communist welfare generally lack of coherent employment policies, services and systems for people with health problems (20). Post-communist welfare system is located in countries such as Slovenia, Czech Republic, Poland, Slovakia and Estonia among others. To our knowledge no previous studies have analyzed whether people with chronic health conditions have different employment needs depending on the type of welfare system they benefit from.

This study is part of an European project which is aimed to systematically collect what has been done in terms of existing employment strategies, what is scientifically effective and what is perceived as needed so that people with chronic health conditions can fully participate at the work market(23). The present study is aimed to gather directly the perspective of people with chronic health conditions on what factors they perceived as favorable or unfavorable to their full participation and performance in the work market as well to compare whether the type of

employment needs vary according to the type of chronic health condition experienced to thetype of social welfare system and to type of occupation.

METHODS

Design

Employment needs were, for the purpose of the project, defined according to the framework of the International Classification of Functioning, Disability and Health (ICF)(24),as 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 and to perform work activities in a similar way as people without chronic conditions.

The project targeted 6 "umbrella chronic conditions groups", representing the leading causes of Years Lived with Disability in Europe in 2015 (i.e. Musculoskeletal disorders; Mental & substance use; Neurological disorders; Diabetes, Urological, blood and Endocrine disorders; Cardiovascular diseases and Chronic respiratory)(25). From these 6 main health conditions groups, one/two specific health conditions were selected because of their high prevalence in the workplace and/or due to the expertise of the participating centers. These specific health conditions are showed in the supplementary material (Table A), http://links.lww.com/JOM/A473.

A step-by-step methodology was developed to firstly design an instrument able to collect the relevant employment needs, to secondlyimplement the questionnaire across the nineparticipating countries and finally, toanalyze the results obtained.

Designing of aquestionnaire to collect the employment needs

Firstly, different systematic mappings of the literature were conducted (one for each chronic health condition) in order to obtain a list of potential needs that were pre-identified in previous

studies and serve asstarting point.The WHO's International Classification of Diseases version 10th codes (ICD-10)(26)were used to operationalize the specific health conditionsselected in literature (see supplementary tables, http://links.lww.com/JOM/A473). All the mappings followed the same general inclusion criteria (i.e. studies including samples of the above mentioned chronic health conditions and reporting employment needs). Electronic searching included sensitive keywords for each health condition and common words for employment needs. Pubmed and PsycInfo were the databases consulted. A secondary manual search including grey literature (reports, books, memories) was also performed for certain health conditions in case the number of articles found waslower than five.Employment needs and other study characteristics (sample size, design, country, and specific health condition/s collected) were extracted for all the articles and aggregated into one common database. Duplicate needs across health conditions were eliminated and similar or related needs were consolidated.

Secondly, aset of employment needs questions was designed based on the information extracted from the systematic mappings of the literature. All the questions were formulated so that participants had to rank to what extent a particular need was relevant for 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). The list of employment needs questions is included in the supplementary table B, http://links.lww.com/JOM/A473.

Additionally to the employment need questions, thestudy protocol included information onbasic demographics such as age (in years), gender, living situation (living with own family; living with family of origin; living alone; living in a shared apartment; living in a residence of facility), occupational situation (employed for pay; not employed for pay), employment situation(working under a mainstream contract, working under special regimen or at sheltered employment,

independent worker or entrepreneur without benefits for health condition, independent worker or entrepreneur with benefits for health condition), andcurrent occupation, which was collected into 10 different categoriesaccording to the International Standard Classification of Occupations (ISCO) (Managers, Professional, Technicians and associate professionals, Clerical support workers, Service and sales workers, Skilled agricultural, forestry and fishery workers, Craft and related trades workers, Plant and machine operators, and assemblers, Elementary occupations and Armed forces occupations)(27).Since people with chronic conditions usually experience more than one health condition, participants were asked to provide their answers taking into consideration the health condition they identified as primary. Moreover, information on other comorbid chronic conditions and other known medical or psychological conditions, genetic syndromes, allergies or intolerances was also collected.

Type of welfare system was also included. The project collected participants from four different welfare systems in Europe: Continental (people living in Germany, Austria, and Slovenia), Mediterranean (participants from Greece, Italy and Spain), Nordic/Scandinavian (Norway) and Post-communist (Czech Republic and Poland)(20).

Implementation of an online survey in nine European countries

All the study questions were originally created in English and translated into their respective national languages by the project researchers (Czech, Italian, German, Greek, Norwegian, Polish, Slovene and Spanish). Each of the nine recruiting countries (Austria, Czech Republic, Germany, Greece, Italy, Norway, Poland, Slovenia and Spain) established different Google Forms® platforms for their corresponding national language. The first page of the online survey informed participants about scope, content and the kind of information collected. A national contact was available in all the online forms in case of questions or further information. The submission of

answers implied the consent of people to participate. The study was locally approved by the Ethics Committees of the following institutions:Gailtal Klinik – Neurologische Rehabiliation (Austria), Ludwig-Maximilians-Universitataet Muenchen (Germany), PanepistimioThessalias (Greece), Fondazione IRCSS IstitutoNeurologico Carlo Besta (Italy), Uniwesrytet Jagiellonski (Poland), University Rehabilitation Institute (Slovenia), ParcSanitari Sant Joan de Déu (Spain) and Universidad Autónoma de Madrid (Spain). Following the local rules, data collected from Czech Republic and Norway did not require local ethical approvals since the study had already been approved by the study coordinator. Helsinki declaration principles of anonymity and confidentiality were met in all the cases.

Sample

The study inclusion criteria were adults (18-66 years old), who had been diagnosed of any of the six chronic health conditions above mentioned. A two-stage sampling process was used. Firstly, the researchers identified a list of relevant organizations(for example, NGOs, patients associations) for each participating country. In total, 91national and regional organizations were identified. A responsible person from each organization was contacted by mail so that they could disseminate the questionnaire among the people with the selected chronic health conditions. The email included the link to participate in the survey, a summary of the study objectives along with the request to contact members of the patient organizations and to inform them about the survey. A total of 55 (60%) organizations answered and agreed to distribute the study by means of their usual disseminating procedures (newsletter, information published on websites, contact via e-mail).Final sample were thosepatients who met the inclusion criteria and wereinterested to participate in the online survey.Data collection was conducted between August and October 2016.

Statistical analyses

Two types ofstatistical analyses were conducted. One of them was addressed to check the properties of the questionnaire. The second ones were aimed to describe and compare the employment needs across the different chronic health condition groups.

Firstly,one confirmatory factor analysis (CFA) was run using the Weight Least Square Mean (WLSM) estimation to check whether latent structure of the scale fitted with a six-factor model (ad hoc hypothesized). The fit of the model was assessed considering the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA). Standards proposed by Hu and Bentler (1999) were considered as indicators of an acceptable fit: CFI>0.90; TLI>0.90; RMSEA<0.08. The reliability of the six different employment domains was also estimated using the Cronbach's alpha Coefficients. Interpretation of Cronbach's alpha was done according to Cohen's recommendations (28).

Secondly, a general profile comprising socio-demographic,healthand the specific employment needs characteristics of the sample was obtained. Mean and Standard deviation (SD) for continuous variables and frequencies and percentages for qualitative ones, were calculated. Items were added into their respective employment need domain to obtain six different employment domain scores. As each employment domain included different number of items, raw total scores were transformed them into a 0-100 range so that the six domains scores were comparable. Higher scores meant the domain was perceived as more favorable. Chi-squared tests for qualitative variables and ANOVA for quantitative variables were conducted to check differences in demographic, health characteristics and employment needs domainsacrossthe sixmain health condition groups (Depression, Ischemic Heart Disease, Diabetes, Chronic Obstructive Pulmonary disease, Migraine and Low & Back Pain). In addition, ANOVA analyses were run to

see whether the employment need domains were differently perceived across the four welfare system groups (Nordic, Continental, Mediterranean and Eastern). Effect sizes (Cohen's d and Cramer's V for quantitative and qualitative variables, respectively) and Post-hoc Bonferroni comparisons were calculated in case the results of the group comparisons were significant. Statistical significance was considered with a p-value ≤0.05. Missing cases were not imputed. All the statistical analyses were conducted with STATA version 14(29)and Mplus version 7(30).

RESULTS

Designing of a questionnaire to collect the employment needs

PubMed and PsychInfo databases revealed 1249 unique publications (12 for Migraine search terms, 232 for Depression, 249 for COPD, 125 for Back and Neck pain, 325 for Diabetes and 306 for Ischemic Heart Disease) for the 5 previous years. After applying exclusion and inclusion criteria by two independent researchers, a total of 122 articles were included in the mapping (3 for Migraine, 26 for Depression, 71 for COPD, 14 for Back and neck pain, 5 for Diabetes, 3 for Ischemic heart disease) and the needs mentioned in those articles were extracted and computed for inclusion in the survey questionnaire.

A total of 40 needs aggregated into 6 different categories were identified and selected in order to cover the whole spectrum of the six chronic health conditions and address both employed as unemployed participants.

The six domains were named as follows: 1) Environmental& Physical adaptations of the workplace; 2) Working Conditions; 3) Legislative needs; 4) Medical and Health Care needs; 5) Personal Education and Training and 6) Raising Awareness in the Workplace.This six-factor model adjusted properly (RMSEA=0.05; TFI=0.92; CFI; 0.93). The specific factor loadings (Supplementary table B, http://links.lww.com/JOM/A473) ranged from 0.36 to 0.81 indicating a

significant contribution of all the items on their corresponding domains. Only item 15 from domain “working conditions” and item 24 from “legislative needs” domain obtained factors lower than 0.05. These two items were notconsidered in the respectiveemployment domain scoring. The Cronbach alpha coefficients of the six domains ranged from 0.79 to 0.84 indicating a moderate-to-high internal consistence.

Implementation of an online survey in nine European countries

Basic characteristics of the sample

A total of 857 participants completed the survey. After excluding participants who did not have as main chronic health condition one of the six selected diagnoses, answers from 686 (80.04%) participants were analyzed. From these, 69% (70%) were female, and mean age was 45 years (SD 0.44). Table 1 shows the main characteristics of the study population. More than 80% of the participants (n=564) reported to have at least a secondarycomorbid health condition. There were significant differences across health conditions in the variables: gender, age, level of education, employment situation and presence of comorbid problems. However, sizes effects of these differences weremoderate to small.

Description of the specific employment needs

Descriptive analyses of the 40 items showed that more than half of the items were rated “very favorable” to at least 50% of the participants (Supplemental material, http://links.lww.com/JOM/A473). The items more frequently rated as favorable were those related to Working conditions i.e. “Having the possibility to secure time-off for medical appointments” considered as favorable or very favorable by 90% of participants, and “Having a flexible work routine with the possibility to manage timings in an independent way and to adjust breaks and schedules” which was considered as favorable or very favorable by 87% of

participants (n=562). On the contrary, “Giving the company the possibility lo legally terminate the job in case productivity decreases due to chronic condition” was rated as unfavorable/very unfavorable by 75% (n=468) of participants.

--Insert Table 1--

Employment needs categories by chronic health conditions groups

Mean scores for each employment need domain by the different health condition groups and in the total sample are showed in table2.The employment need domain with higher scores (rated more frequently as favorable) wasraising awareness in the workplace, whereas the domains with lower scores (rated less frequently as favorable) were specific medical & health care and legislative actions.All the employment domain mean scores were considered similarly favorable across the different health condition groups. Only the working condition domain reported significantly differences mean scores across the six chronic health condition groups. However, effect size of these differences was small. In fact, pairwise comparisons revealed that only participants with migraine scored higher in comparison withpeople with diabetes mellitus.

--Insert Table 2--

Employment needs categories by type ofwelfare system

With the exception of the Working Conditions domain, allthe employment need domains were differently perceived inthe four welfare system groups (Table 3). In general, participants from Continental and Mediterranean countries perceived morefavorablyemployment needs related to Personal Education & Training, Raising Awareness in the Workplaceand Health and Medical carein comparison with participants from Scandinavian system (Table 3). The Raising Awareness in the Workplacedomain also obtained higher scores in Continental (Mean diff=11.35; $p \leq 0.001$) and Mediterranean countries (Mean diff= 11.53; $p \leq 0.001$) in comparison

with Post-Communist countries. Effect sizes of these differences were small-to-moderate. The Legislative needs domainwas more helpful for Post-Communist groupin comparison with participants from Scandinavian (Mean diff=12.51; $p \leq 0.001$) andfrom Mediterraneanmodels (Mean diff=8.28; p=0.029).However,effect sizes of differenceswere small.

--Insert table 3--

Employment needs categories by main type of occupation (only employed)

Employment needs mean sores for each occupational group are showed in table 4. No significant differences were found for type of employment needs among the differentISCO occupation groups.

--Insert table 4--

DISCUSSION

The present study has reported relevant findings and constitutes a first step towards the creation of meaningful strategies to promote employabilityof people with chronic health conditions as it allowed us to directly collect opinions amongst the real users of employment strategies.

Our study has collected a list of specific employment needs perceived as veryfavorable or very unfavorable by people with six differentchronic health condition groups in nine different countries whichrepresent four types of social welfare systems.In general, participants of our study scored very favorablyto have a flexible work routine, which is line with previous studies conducted at country level(14, 15). In addition, peoplerated very positively the fact of securing time to attend medical appointments, which to our knowledge had not been reported by previous literature.

On the other hand, this study also showed that people with chronic health conditions scored very unfavorably the fact of being laid-off should their productivity decreased because of their

chronic health condition issues. This is a challenging situation if we consider that one the reasons that employers have frequently reportedfor not hiring people with health problems is the fear of legal liability (31).However, existing evidence suggests that hiring people with health problems is actually a win-win action for employer and employees (32).Some authors argue these actionsshould beadditionally accompanied by the availability ofemployment services thatincorporate theemployer interests and do not only appeal "charitable" causes(33).

At global level, this studyhas alsounderlined that people with chronic health conditionsperceived actions aimed atraising awareness of chronic health conditionsin the workplace as the area more favorable. Lack of understanding of employers and of colleagues has been frequently reported as one of the problems that people with chronic health conditions usually experience in the workplace (14, 15).Raising awareness of chronic health conditions in the workplace might prevent episodes of stigma and discrimination that some workers experience as they disclose they have a health condition at the workplace(34).Previous studies have suggested that employees are more willing to receivehealth-related knowledge if there is a high coworker support (35).Interventions addressed to raise the awareness of chronic health conditions in the workplace should probably include actions at individual and organizational levels.

In addition, the present workhas also conducted comparisons of employment needs across different health condition groups. The lack of differences found across the health condition groupssuggest that there might be a common experience of suffering from a chronic health condition in the workplace which is beyond the specific type of chronic health condition.This result is line with the idea that it could be possible to launchcommon strategies, targeting factors that are relevant across different chronic health condition groups. The lack of differencesbetween chronic health conditions also suggests that it might be worth trying to transfer certain

interventions that have proven effective on one chronic health condition to others. For example, workplace ergonomic interventions, very frequently applied in people with musculoskeletal problems(36) might be also beneficial for people with migraine, whereas individual placement support frequently used in mental conditions(37) might be also suitable for people with diabetes or chronic obstructive pulmonary disease.

To our knowledgethis is the first study that has compared the type of employment needsexperienced by people with chronic health conditions in different social welfare systems. The results indicated that the perception of employment needs varied considerably from one welfare system to another. Several reasons might account for these differences. The first explanation is related to the fact that some welfare systems do notcover the employment needs of people with chronic health conditions(20). It is possible that the employment needs reported as more favorablyare those ones that are perceived as frustrated or unmet(38). Post-communist welfare model is defined by a lower development of employment policies and systems in comparison with Continental or Scandinavian countries(39). This might explain why people from Post-Communist countries perceivedneeds related to legislationas very favorably. Another explanation for these differences is given by the social-constructivist perspectives(40). According to these theories, people's opinions are heavily influenced by the amount of demands, obstacles, and reinforcements experienced within each culture.For example, continental countries are characterized by having high-quality vocational training and education systems (41). This might explain why the participants fromthe continental model scored very favorably the needs related toeducation and training. Therefore, our study underlines that the type ofemployment needs perceivedmight depend on what is considered as unmet but also on what is consideredvaluable to a society. Althoughsome specific occupations have been related to higher

incidence of diseases(42), the findings ofthe present study suggest that type of occupation was not related to experience different employment needs. It is possible that corporate cultures are related to employment needs rather than type of occupation(43).Nonetheless, further studies are necessary since there were some occupations such as armed forces and agricultural, forestry and fishery workers, that were underrepresented in the sample.

The main strengths of the present study were the application of a systematic process of the relevant employment needs to evaluate, the harmonized process of data collection in a range of different European countries and the selection of the chronic health conditions that are associated with higher disability in the European regions. However, there are also some weaknesses which should be considered to interpret our study results. One limitation is the fact that we only collected opinions from individuals pertaining to patient associations and with a literacy and technological level that allowed them to answer the online questionnaire. In addition,diagnoses were self-reported and could be not be confirmed by expert's information.Moreover, information on the participant's workplace characteristics was not collected. Specific workplace conditions and their relationship with employment needs in people with chronic health problems should be further analyzed. Finally, we acknowledge that although the countries comprising the welfare system groups share cultural and political characteristics there are also probably differences within thesewelfare system groups that have not been analyzed.

In spite theselimitations, the present work has provided a wide list of main factors that were considered as very favorable by people chronic health condition for their fully (re)integration in the workplace. Our results suggest that there is probably a common experience of living with a chronic health condition beyond the specific type of health condition suffered from.Our study also suggests that employment needs are strongly related to the type of social welfare system.

The characteristics of each Europeanwelfare system should be consideredto enhance the participation of people with chronic health conditions in the European workforce.

REFERENCES

1. World Health Organization. Health topics. Noncommunicable diseases. http://www.who.int/topics/noncommunicable_diseases/en/ Accessed in January 17, 2018; 2017.

2. Suzman R, Beard JR, Boerma T, Chatterji S. Health in an ageing world—what do we know? *The Lancet*. 2015;385:484-486.

3. Milner A, Krnjacki L, Butterworth P, Kavanagh A, LaMontagne AD. Does disability status modify the association between psychosocial job quality and mental health? A longitudinal fixed-effects analysis. *Social Science & Medicine*. 2015;144:104-111.

4. Schuring M, Burdorf L, Kunst A, Mackenbach J. The effects of ill health on entering and maintaining paid employment: evidence in European countries. *Journal of Epidemiology & Community Health*. 2007;61:597-604.

5. Stewart JM. The impact of health status on the duration of unemployment spells and the implications for studies of the impact of unemployment on health status. *Journal of health economics*. 2001;20:781-796.

6. Pinilla-Roncancio M. The reality of disability: Multidimensional poverty of people with disabled and their families in Latin America. *Disability and health journal*. 2017.

7. Curnock E, Leyland AH, Popham F. The impact on health of employment and welfare transitions for those receiving out-of-work disability benefits in the UK. *Social Science & Medicine*. 2016;162:1-10.

8. Schur L, Nishii L, Adya M, Kruse D, Bruyère SM, Blanck P. Accommodating employees with and without disabilities. *Human Resource Management*. 2014;53:593-621.

9. Ihara E. Workers affected by chronic conditions: How can workplace policies and programs help? . In: Institute HP, ed. Washington D.C: Health Policy Institute at Georgetown University; 2004.

10. Xiong C, Martin T, Sravanapudi A, Colantonio A, Mollayeva T. Factors associated with return to work in men and women with work-related traumatic brain injury. *Disability and health journal*. 2016;9:439-448.

11. Rosenheck R, Leslie D, Keefe R, et al. Barriers to employment for people with schizophrenia. *American Journal of Psychiatry*. 2006;163:411-417.

12. Ruston A, Smith A, Fernando B. Diabetes in the workplace-diabetic's perceptions and experiences of managing their disease at work: a qualitative study. *BMC Public Health*. 2013;13:386.

13. Egmond M, Duijts S, Loyen A, Vermeulen S, Beek A, Anema J. Barriers and facilitators for return to work in cancer survivors with job loss experience: a focus group study. *European journal of cancer care*. 2015.

14. Varekamp I, Van Dijk F. Workplace problems and solutions for employees with chronic diseases. *Occupational medicine*. 2010;60:287-293.

15. Vooijs M, Leensen MC, Hoving JL, Wind H, Frings-Dresen MH. Perspectives of People with a Chronic Disease on Participating in Work: A Focus Group Study. *Journal of occupational rehabilitation*. 2017:1-8.

16. European Association of Service Providers for Persons with Disabilities (EASPD). Social welfare systems across Europe http://www.easpd.eu/sites/default/files/sites/default/files/SensAge/d4-social_welfare_systems_across_europe.pdf Accessed in July 17, 2018; 2016.

17. Sapir A. Globalization and the reform of European social models. *JCMS: Journal of Common Market Studies*. 2006;44:369-390.

18. Dahl E. Disability and employment: sustainability of 'the Nordic model'. *European journal of public health*. 2010;20:370-371.

19. Eikemo TA, Bambra C, Joyce K, Dahl E. Welfare state regimes and income-related health inequalities: a comparison of 23 European countries. *The European Journal of Public Health*. 2008;18:593-599.

20. Scaratti C, Leonardi M, Silvaggi F, et al. Mapping European Welfare Models: State of the Art of Strategies for Professional Integration and Reintegration of Persons with Chronic Diseases. *International journal of environmental research and public health*. 2018;15:781.

21. Europa Caritas. The Future of the Welfare State: A Comparative Study in EU-countries. In: Lambertus-Verlag, ed. *Available at: https://wwwcaritaseu/sites/default/files/publication_caritas_europa_-_future_welfare_state_0pdf*. Breisgau, Germany; 2012.

22. Mladenov T. Postsocialist disability matrix. *Scandinavian Journal of Disability Research*. 2017;19:104-117.

23. European Commission. PArticipation To Healthy Workplaces And inclusive Strategies in the Work Sector. PATHWAYS Project. European Union's Health Programme (2014-2020) Grant agreement n. 663474. 2015.

24. World Health Organization. *International Classification of Functioning, Disability and Health (ICF)*. Geneva, Switzerland: World Health Organization; 2001.

25. Institute for Health Metrics and Evaluation. Global Burden of Disease Study 2015 (GBD 2015) Incidence, Prevalence, and Years Lived with Disability 1990-2015. Data Visualization. USA: University of Washington; 2015.

26. World Health Organization. *ICD-10: international statistical classification of diseases and related health problems: tenth revision*. Geneva: World Health Organization; 2004.

27. International Labour Organization. 88: International Standard Classification of Occupations (ISCO). Geneva, Switzerland: International Labor Organization; 1990.

28. Cronbach LJ. Coefficient alpha and the internal structure of tests. *psychometrika*. 1951;16:297-334.

29. StataCorp LLC. Stata Statistical Software: Release 14. . In: College Station TSL, ed. College Station, Texas 77845-4512, United States America (USA); 2015.

30. Muthén LK, Muthén, BO. Mplus User's Guide. Sixth Edition. In: Muthén. M, ed. Los Angeles, CA; 1998-2011.

31. Kaye HS, Jans LH, Jones EC. Why don't employers hire and retain workers with disabilities? *Journal of occupational rehabilitation*. 2011;21:526-536.

32. Lindsay S, Cagliostro E, Albarico M, Mortaji N, Karon L. A Systematic Review of the Benefits of Hiring People with Disabilities. *Journal of occupational rehabilitation*. 2018:1-22.

33. Luecking RG. Emerging employer views of people with disabilities and the future of job development. *Journal of Vocational Rehabilitation*. 2008;29:3-13.

34. Toth KE, Dewa CS. Employee decision-making about disclosure of a mental disorder at work. *Journal of occupational rehabilitation*. 2014;24:732-746.

35. Meng L, Galyardt AK, Robinson KT, et al. Factors Associated With Interest in Worksite Health-Related Discussions/Events Among Employed Adults With Chronic Conditions. *Journal of occupational and environmental medicine*. 2017;59:e145-e149.

36. Arnetz BB, Sjögren B, Rydéhn B, Meisel R. Early workplace intervention for employees with musculoskeletal-related absenteeism: a prospective controlled intervention study. *Journal of occupational and environmental medicine*. 2003;45:499-506.

37. Whitworth A. The economic case for well-considered investment in health-related employment support: Costs and savings of alternative modified Individual and Placement Support (IPS) models. *Disability and health journal*. 2018.

38. Sheldon KM, Gunz A. Psychological needs as basic motives, not just experiential requirements. *Journal of personality*. 2009;77:1467-1492.

39. Bloom D, Michalopoulos C. How Welfare and Work Policies Affect Employment and Income: A Synthesis of Research. 2001.

40. Buttle F. The social construction of needs. *Psychology & Marketing*. 1989;6:197-210.

41. Hemerijck A. The self-transformation of the European social model (s). *Internationale Politik und Gesellschaft*. 2002:39-67.

42. Corral AD, J.; Isusi, I.;. *Employment opportunities for people with chronic diseases: Loughlinstown: European Foundation for the Improvement of Living and Working Conditions* European Foundation for the Improvement of Living and Working Conditions (Eurofound); 2014.

43. Schur L, Kruse D, Blasi J, Blanck P. Is disability disabling in all workplaces? Workplace disparities and corporate culture. *Industrial Relations: A Journal of Economy and Society*. 2009;48:381-410.

Table 1 Main demographic data for total sample and by type of health condition

Variables	Total sample* (n=686)	Migraine (n=137)	Back & Neck pain (n=95)	COPD (n=86)	Depression (n=122)	Diabetes Mellitus (n=191)	Ischemic Heart Disease (n=55)	$\chi 2$ / F* (p)	E.S †
Gender: females n, %	470 (68.81)	122 (89.71)	73 (76.84)	46 (54.12)	89 (73.55)	120 (62.83)	20 (36.36)	70.51 (p<0.001)	0.32
Age: mean (SD)	45.39 (0.44)	43.18 (0.87)	45.91 (1.13)	49.41 (1.32)	43.57 (1.01)	44.35 (0.86)	51.41 (1.24)	7.57 (p<0.001)	0.22
Paid employment: yes n, %	467 (68.08)	100 (72.99)	55 (57.89)	54 (62.79)	71 (58.20)	150 (78.53)	37 (67.27)	4.56 (p<0.001)	0.16
Employment situation (only employed) n, %								26.46 (p=0.055)	0.13
Mainstream employed	386 (79.42)	90 (85.71)	48 (80)	42 (70)	58 (79.45)	120 (80.54)	28 (71.79)		
Quota/Shelter/Other special	44 (9.05)	7 (6.67)	4 (6.67)	5 (8.33)	7 (9.59)	16 (10.74)	5 (12.82)		
Mainstream self-employed	42 (8.64)	3 (2.86)	7 (11.67)	11 (18.33)	5 (6.85)	13 (8.72)	3 (7.69)		
Special regimen self-employed	14 (2.88)	5 (4.76)	1 (1.67)	2 (3.33)	3 (4.11)	0	3 (7.69)		
Education, n %								45.49 (p<0.001)	0.15
Secondary education or less	133 (19.39)	21 (15.33)	24 (25.26)	31 (36.05)	23 (18.85)	21 (10.99)	13 (23.64)		
High school/Professional Diploma	274 (39.94)	44 (32.12)	46 (48.42)	25 (29.07)	51 (41.80)	85 (44.50)	23 (41.82)		
Bachelor degree	114 (16.62)	28 (20.44)	14 (14.74)	11 (12.79)	22 (18.03)	30 (15.71)	9 (16.36)		

University completed	165 (24.05)	44 (32.12)	11 (11.58)	19 (22.09)	26 (21.31)	55 (28.80)	10 (18.18)		
Income perception, n %								7.37 (p=0.69)	
I earn the same than others	292 (42.88)	48 (35.29)	37 (39.78)	35 (41.67)	39 (31.97)	105 (54.97)	28 (50.91)		
I earn less than people with my educational level/profession	355 (52.13)	81 (59.56)	53 (56.99)	43 (51.19)	79 (64.75)	75 (39.27)	24 (43.64)		
I earn more than others	34 (4.99)	7 (5.15)	3 (3.23)	6 (7.14)	4 (3.28)	11 (5.76)	3 (5.45)		
Comorbid problems, n %								69.94 (p<0.001)	0.23
None	122 (17.78)	16 (11.68)	15 (15.79)	9 (10.47)	8 (6.56)	65 (34.04)	9 (16.36)		
.. Two	302 (44.02)	61 (44.53)	29 (30.53)	45 (52.53)	62 (50.82)	72 (37.70)	33 (60.00)		
.. More than two	262 (38.19)	60 (43.80)	51 (53.68)	32 (37.21)	52 (42.62)	54 (28.27)	13 (23.64)		

* χ^2 :Chi-squared test; F: ANOVA.

†E.S: Effect size measure. Cramer's V for Chi-squared tests and Cohen's d for Anova.

Table 2. Employment need domains scores for total sample and by type of health condition

Employment needs Mean (SD)	Total sample (n=686)	Migraine (n=137)	Back & Neck pain (n=95)	COPD* (n=86)	Depression (n=122)	Diabetes Mellitus (n=191)	Ischemic Heart Disease (n=55)	F† (p)	E.S‡
Physical adaptations	78.55 (19.22)	82.07 (18.86)	76.19 (19.76)	73.82 (19.94)	79.04 (18.63)	79.36 (18.59)	77.76 (20.31)	1.95 (p=0.084)	0.09
Working conditions	77.84 (17.50)	81.49 (15.61)	75.91 (19.94)	75.69 (16.40)	80.35 (15.86)	74.70 (18.43)	75.97 (17.15)	3.28 (p=0.006)§	0.13
Legislative needs	76.83 (23.61)	73.07 (25.44)	78.67 (22.97)	78.07 (19.39)	78.27 (25.09)	76.90 (23.69)	77.28 (21.77)	0.86 (p=0.51)	<0.01
Medical & Health Care needs	76.64 (18.87)	77.27 (15.88)	73.68 (22.09)	75.07 (17.35)	79.12 (19.76)	77.49 (19.89)	73.55 (14.72)	1.21 (p=0.30)	0.04
Personal education & training	78.30 (20.33)	77.25 (20.19)	75.71 (23.02)	77.79 (17.56)	79.79 (21.19)	80.91 (19.08)	73.92 (21.13)	1.39 (p=0.23)	0.06
Increasing awareness in the workplace	78.71 (20.89)	77.70 (21.24)	79.80 (18.72)	76.56 (17.92)	79.84 (21.81)	79.80 (22.75)	75.41 (18.22)	0.64 (p=0.67)	<0.01

* Chronic Obstructive Pulmonary Disease

† F: ANOVA

‡ E.S: Effect size measure. Cohen's d for ANOVA.

§ Bonferroni post-hoc comparisons. Significant differences were found between migraine and diabetes scores (Mean difference=-6.78; p=0.01).

Table 3 Employment need domains scores by type of welfare system

Employment needs Mean (SD)	Scandinavian (n=144)	Continental (n=184)	Mediterranean (n=270)	Post-communist (n=87)	F* (p)	E.S †	Bonferroni Comparisons ‡
Physical adaptations	78.93 (20.75)	74.05 (22.27)	82.04 (18.05)	76.19 (11.89)	5.85 (≤0.001)	0.16	MED > CONT
Working conditions	78.09 (22.80)	78.99 (16.70)	76.32 (17.28)	76.64 (9.15)	0.88 (0.45)	--	--
Legislative needs	71.48 (28.45)	79.10 (24.48)	75.71 (22.87)	83.99 (10.65)	5.61 (≤ 0.001)	0.15	POST > SCAN and MED CONT > SCAN
Medical & Health Care needs	68.62 (24.74)	78.09 (15.88)	80.34 (17.39)	72.65 (11.73)	11.36 (≤0.001)	0.23	CONT and MED > SCAN MED > POST
Personal education & training	70.02 (25.63)	80.37 (22.29)	81.66 (16.98)	75.51 (14.51)	9.21 (≤0.001)	0.21	CONT and MED > SCAN
Increasing awareness in the workplace	70.54 (28.40)	81.89 (17.50)	82.07 (20.58)	72.19 (11.95)	11.88 (≤0.001)	0.23	CONT and MED > SCAN CONT and MED > POST

* F: ANOVA

† E.S: Effect size measure. Cohen's d for ANOVA.

‡ Bonferroni comparisons: SCAN Scandinavian; MED Mediterranean; CONT Continental; POST Post-Communist

Table 4 Employment need domains scores by type of occupation (only for employed participants)

Occupation (ISCO)	Employment need domains MD (SD)					
	Physical adaptations	Working conditions	Legislative needs	Medical & Health Care needs	Personal education & training	Increasing awareness in the workplace
Managers	76.85 (18.94)	76.01 (18.86)	85.10 (18.95)	78.79 (18.64)	81.1 (18.54)	79.39 (22.70)
Professionals	80.50 (17.74)	78.11 (17.23)	79.31 (21.73)	79.52 (15.94)	79.81 (16.60)	78.88 (20.17)
Technicians	76.53 (24.27)	77.54 (18.65)	73.68 (26.04)	75.71 (19.47)	72.01 (25.62)	77.42 (19.55)
Clerical	81.77 (19.08)	75.70 (20.19)	71.21 (27.64)	74.77 (19.46)	75.92 (24.84)	74.57 (27.97)
Service &sales	78.76 (16.85)	76.28 (17.68)	78.77 (21.71)	75.63 (17.08)	79.10 (16.76)	74.05 (16.84)
Agricultural, forestry and fishery	72.54 (28.40)	55.71 (22.22)	54.17 (28.18)	70.48 (15.60)	76.25 (16.34)	80.00 (18.03)
Craft & related trades	64.96 (21.41)	67.01 (18.06)	74.37 (28.18)	72.13 (21.36)	76.37 (14.21)	76.82 (23.73)
Plant and machine operators	76.18 (17.35)	75.81 (18.82)	77.77 (20.78)	70.55 (17.01)	73 (21.78)	79.68 (16.92)
Elementary occupations	75.67 (13.65)	73.19 (13.39)	68.23 (11.50)	69.94 (17.08)	67.32 (30.18)	78.18 (16.92)
Armed forces	91.67 (5.89)	83.75 (8.84)	96.87 (4.42)	96.87 (4.42)	92.5 (10.61)	100 (0)
F (p)*	1.83 (0.06)	1.17 (0.31)	1.86 (0.056)	1.33 (0.22)	1.15 (0.32)	0.52 (0.81)

* F: ANOVA