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MULTIDIMENSIONAL ASSESSMENT OF FATIGUE IN PRIMARY CARE: THE PORTUGUESE CHECKLIST OF INDIVIDUAL STRENGTH (CIS-20P)

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”No man is an *Iland*, intere of it selfe; every man is a peece of the *Continent*, a part of the *maine*; if a *Clod* bee washed away by the *Sea*, *Europe* is lesse, as well as if *Promontorie* were, as well as if a *Mannor* of thy *friends* or of *thine owne were*; any mans *death* diminishes *me*, because I am involved in *Mankinde*; And therefore never send to know for whom the *bell* tolls; it tolls for *thee*.”

—John Donne, Meditation XVII

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Resumo

Propósito: fadiga, reportada por muitos pacientes, leva ao uso de recursos do sistema de saúde e a falta de bem-estar mental. Este estudo visa validar a Checklist of Individual Strength portuguesa (CIS-20P) para pacientes dos cuidados primários e desenvolver a primeira distribuição percentual da escala. **Método:** a amostra deste estudo consiste em 956 participantes: 418 participantes de um centro de cuidados primários (CCP; idades entre 18 e 99; M=55.5; DP=18.82); e 538 participantes de uma amostra online (PO; idades entre 18 e 64; M=39.46; DP=8.43). **Resultados:** análise factorial confirmatória com os adultos da CCP (participantes com menos de 65 anos) foi satisfatória. Com exceção da dimensão motivacional, os índices de fiabilidade foram satisfatórios. Análise de invariância estrutural entre adultos do CCP e PO provou quase total invariância de items, assim como entre adultos e Idosos do CCP. Fadiga e qualidade do sono previram 41.6% da variação do bem-estar mental no adultos do CPP. **Conclusão:** a CIS-20P é uma ferramenta válida para acessar níveis de fadiga em pacientes adultos dos cuidados primários. Contudo, apesar de válida para idosos dos cuidados primários, o seu uso não é recomendado neste momento. Investigação a essa população e suas limitações específicas devem ser realizadas. Distribuição percentual revelou maiores indices de fadiga quando comparada à população Holandesa. Distribuição percentual criou uma linha de base para futuros estudos da população portuguesa. São feitas recomendações para investigações futuras da tetra-dimensionalidade da CIS-20P.

Palavras-chave: fadiga, português, Checklist of Individual Strength, cuidados primários, bem-estar

Abstract

Purpose: fatigue is widely reported by patients, leading to the use of healthcare resources and decreased mental well-being. This study aims to validate the Portuguese Checklist of Individual Strength (CIS-20P) for the primary care patients and develop its first percentile distribution. **Method:** the pool of this study consists of 956 participants: 418 participants from a primary health care center (HCC; aged between 18 and 99; M=55.5; SD=18.82); and 538 participants from an online sample (OP; aged between 18 and 64; M=39.46; SD=8.43). **Results:** confirmatory factor analysis with HCC adults (aged less then 65 years old) was satisfactory. With the exception of the motivation sub-scale, internal consistency estimates were satisfactory. Analysis of structural invariance between the HCC Adults and OP samples proved overall invariance between items as well as between HCC adults and HCC elderly samples. Fatigue and poor sleep predicted 41.6% of the variance in mental well-being in the HCC adults. **Conclusion:** the CIS-20P is a valid tool in assessing fatigue levels in primary care adult patients. Despite also valid with primary care elderly patients, its use is discouraged this time. Further investigation into this population and its particular limitations must be conducted. Percentile distribution created a baseline for future research of fatigue in Portugal. Recommendations for further research into the CIS-20P tetra-dimensional structure are made.

Keywords: fatigue, Portuguese, Checklist of Individual Strength, primary care, well-being

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Introduction

"Fatigue is what we experience, but it is what a match is to an atomic bomb"

— Laura Hillenbrand (Parker-Pope, 2011).

Characterized by the presence of somatic symptoms, somatization is responsible for more than half of all outpatient encounters (Schappert, 1997). Despite lack of consensus to its meaning, symptoms that are not accurately explained by organic causes provide common ground to the different definitions of somatization, with almost one third of cases remaining medically unexplained (De Gutch & Maes, 2006). The presence of such symptoms (e.g. back pain, headaches, shortness of breath), are common in the general population and in all medical settings (Fink, 1992; Kroenke & Price, 1993; Kroenke, 2003). Medically unexplained symptoms lack easily identifiable biomarkers, requiring over-reliance on patient self-report and exclusion of possible organic causes (De Gutch & Maes, 2006). Moreover, these symptoms may be chronic and many times debilitating, associated with poor quality of life and well-being (Kroenke, Spitzer, & Williams, 2002). The patient is lead to the repeated use of the healthcare system and resources, due to the difficulty in diagnosing the possible underlying condition (Afari & Buchwald, 2003; De Gutch & Maes, 2006; Institute of Medicine, 2015). One such symptom that is often reported by patients in primary care is fatigue (Cullen, Kearney, & Bury, 2002).

Fatigue is defined as "an overwhelming sense of tiredness, lack of energy and feeling of exhaustion" (Kalkman, Zwarts, Schillings, van Engelen, & Bleijenberg, 2008, p.238), and it is often related to physiological states (e.g. pregnancy, excessive physical activity), medical or psychiatric disorders (e.g. viral infections, cancer, major depression, anxiety disorders) and treatments (e.g. chemotherapy, benzodiazepines), life-styles (e.g. unstable sleep cycle, caffeine consumption), and psychosocial stressors (e.g. work or marital stress) (Manu, Lane, & Matthews, 1992). When severe, debilitating and persistent over a period of six months, fatigue is classified as chronic (CF), not responding to compensation strategies (e.g. rest, sleep). This experience of fatigue, different from muscle weakness and physiological fatigue, motivates search for treatment (Berrios, 1990), especially when persistent and unexplained (Cope, 1992), related to a decrease in quality of life and well-being (Hardt et al., 2001; Marques, De Gutch, Leal, & Maes, 2013b, Vercoulen et al., 1994). Medically unexplained

chronic fatigue (Idiopathic Chronic Fatigue) is further classified as Chronic Fatigue Syndrome (CFS) if it also includes at least four of the following symptoms: disturbances in concentration; disturbances in memory; sore throat; new or different musculoskeletal pain or headaches; tender cervical or auxiliary lymph nodes; postexertional malaise for over 24 hours; and unrefreshing sleep (Fukuda et al., 1994).

The term, CFS is currently under dispute, with research using Myalgic Encephalomyelitis (ME) interchangeably with CFS despite having different diagnostic criteria and case definitions (e.g. Nacul et al., 2011; Underhill, 2015). The broader designation "ME/CFS" is also used to identify these conditions in which fatigue is a core symptom, though its use is also questioned and the new term "systemic exertion intolerance disease" (SEID) being proposed as a stigma free replacement (Institute of Medicine, 2015).

Confusion over the definitions and its multiple aetiologies (Perry & Santhouse, 2016) has led to issues in measuring fatigue and diagnosing CFS. In fact, epidemiological studies worldwide reveal significantly varying rates of fatigue and fatigue disorders (Jason, Torres-Harding, & Njok, 2006), with diferences attributed to cultural background, physicians knowledge, clinical definitions and instruments used. Review of the literature has revealed that there are currently over 20 different clinical case definitions for CFS, with the Fukuda and colleagues definition (1994) the most widely used (Institute of Medicine, 2015). Nevertheless, the prevalence of fatigue and fatigue disorders have been confirmed by studies carried out across the world. Irish research has revealed that at least 6.5% of patients had fatigue as the primary complain when seeking care (Cullen et al., 2002). American research emphasized the burden on employers, losing over 100 billion dollars with costs associated to the lost of productivity due to fatigue (Ricci et al., 2007). One third of the general Dutch population is estimated to suffer from chronic fatigue while CFS rates near the one percent mark (van't Leven, Zielhuis, van der Meer, Verbeek, & Bleijenberg, 2010). Research has also indicated higher prevalence of fatigue and CFS in women across different countries (e.g. Mens-Verhulst & Bensing, 1998; Jason et al., 2009). Patients suffering from CFS also report more somatic symptoms (e.g. sleep disturbances) with perceived higher severity (Afari & Buchwald, 2003; Allen & Escobar, 2005) Despite disparities in the epidemiological data, prevalence of fatigue disorders are expected to be underrated. It is estimated that approximately 90% of CFS cases are yet to be diagnosed, with long waiting periods

associated with the difficulty in finding the correct diagnosis (Institute of Medicine, 2015). In fact, the decrease in quality of life and psychological functioning, present across cultures (Hardt et al., 2001; Marques et al., 2013b), goes beyond the disabilities brought on by fatigue and CFS, reflecting the toll patients go through when seeking diagnosis and treatment. Mental well-being (Tennant et al., 2007), consistent of both hedonic (subjective well-being) and eudaemonic (positive functioning), is constantly tested by the strain put on not only by the disease, but also by the lack of support provided by the healthcare system. Research has pointed out how unprepared the healthcare staff are, lacking specific information in the curriculum of most medical schools (Peterson et al., 2013) and medical textbooks (Jason, Paavola, Porter, & Morello, 2010). Patients often seek care when unexplained debilitating fatigue is present though diagnosis is often slow. Surveys have indicated that less than one quarter of patients are diagnosed within one year of seeking care, and almost one third takes longer than five years (ProHealth, 2008).

Interest in fatigue was scarce for most part of modern medicine. Often present in many different conditions and commonly reported by individuals, fatigue held little value for diagnosis discrimination (Wessely, 2005). The symptom came to focus during the 1980s, with two American outbreaks of an unknown illness characterized by chronic debilitating fatigue, which caught the attention of the Center of Disease Control and Prevention (CDC) (Holmes et al., 1988; Jason et al., 2006; Institute of Medicine, 2015). During the time that followed, a variety of tools for assessing fatigue were developed (for further information on fatigue assessment see: Christodolou, 2005; Dittner, Wessely, & Brown, 2004; Elbers et al., 2012; Mota & Pimenta, 2006).

Most of the epidemiological data and research relies on self-report questionnaires. The self-report measurements of fatigue are either unidimensional (e.g. Fatigue Severity Scale; FSS; Krupp, LaRoca, Muir-Nash, & Steinberg, 1989) or multidimensional (e.g. Checklist of Individual Strength; CIS-20; Vercoulen et al., 1994). Both, the FSS and the CIS-20, have been translated and validated to the Portuguese population and together with the Chalder Fatigue Questionnaire (CFQ; Chalder et al., 1993), are currently some of the few options available in this language (Cho et al., 2006; Laranjeira, 2012; Marques et al., 2013a). In fact, only the FSS and CIS-20 are currently validated for the Portuguese population. While all can assess fatigue and are easy and fast to fill and to calculate scores, they are not

interchangeable as they differ in content (Hewlett, Dures, & Almeida, 2011). The FSS measures only the impact and burden of fatigue (e.g. “Fatigue interferes with my physical functioning”) and the CFQ measures fatigue severity in two dimensions: physical (e.g. “do you feel weak?”) and mental (e.g. “do you feel sleepy or drowsy?”). Meanwhile the CIS-20 measures the experience of fatigue through four dimensions: subjective experience of fatigue (e.g. “I feel tired”), lack of motivation (e.g. “I am full of plans”), lack of concentration (e.g. “thinking requires effort”), and decrease in physical activity (e.g. “physically I feel in a good shape”). Therefore, the FSS measures impairment, the CFQ measures severity, and the CIS-20 assesses the overall experience of fatigue and CFS, providing a more accurate picture of the different dimensions of fatigue disorders (Koopman, Brehm, Heerkens, Nollet, & Beelen, 2014). Since it is the experience of fatigue that motivates the search for treatment and the experience is reflected in many dimensions by CFS patients, the CIS-20P provides the best fit for assessing fatigue and CFS, with hopes of speeding the diagnosis process.

First developed in hospitals with CFS patients, the CIS-20 is a well validated and widely used multidimensional assessment of fatigue (Dittner et al., 2004). The CIS-20 has stablished cutoff scores for both the total scale (Bültmann, Vries, Beurskens, Bleijenberg, & Vercoulen, 2000) and the subjective experience of fatigue sub-scale (De Vree et al., 2002). The questionnaire has been used within the CFS population (e.g. Knoop, van der Meer, & Bleijenberg, 2008; Vercoulen et al., 1994), healthy working groups (e.g. Beurskens et al., 2000; Bültmann et al., 2000), and it has also been adapted across cultures (e.g. Aratake et al., 2007; Ergin & Yildirim, 2012; Makowiec-Dabroska & Koszada-Wlodarcyk, 2006; Marques et al., 2013a). The CIS-20 is also useful with clinical samples, such as amyotrophic lateral sclerosis patients (Panitz, Kornhuber, & Hanisch, 2015), and leukaemia patients (Abd El Baky, & Adel Elhakk, 2017). The CIS-20P has the ability to distinguish CFS patients in a clinical setting, as well as to determine which individuals from a healthy sample are at risk of developing a fatigue disorder. Early diagnosis is paramount to CFS treatment, so that interventions may be implemented as soon as possible, such as cognitive behaviour therapy or graded exercise therapy (Marques, De Gutch, Leal, & Maes, 2015; White et al., 2011). The sub-scales may be used separately, extending the use of this tool into further characterization of samples and applicable to different contexts. Thus, The CIS-20P is an extremely useful

tool in assessing fatigue and fatigue disorders in different populations, from healthy working individuals, to patients in a hospital.

The Portuguese version (CIS-20P), adapted by Marques and colleagues (2013a), broke ground for the use of a multidimensional assessment of fatigue in Portuguese speaking countries (e.g. Brazil, Portugal). Despite being able to discriminate CF patients from a healthy sample, the tetra-dimensional structure of the CIS-20P has presented issues during the validation process, with reasonable, though poorer then expected, model fit indexes for both the healthy sample (X^2/df=4.731; CFI=.85; RMSEA=.093) and CF sample (X^2/ df=1.739; CFI=.75; RMSEA=.092). Low reliability for the motivational dimension was also observed (healthy sample Cronbach's α=.51; CF sample α=.58). The Portuguese version is yet to be tested with other samples (e.g. primary care) and no percentile distribution has been created. Marques and colleagues (Marques et al., 2013b) have also pointed out the lower quality of life and well-being of the Portuguese participants when compared to a Dutch sample, adding to the well documented close relationship between well-being and fatigue (e.g. Hardt et al., 2001). Fatigue, often medically unexplained (somatic), is part of commonly reported somatic symptoms which are responsible for healthcare use and patient frustration when seeking care (De Gutch & Maes, 2006; Kroenke et al., 2002). It has also been established that Portugal has high rates for both depression and anxiety, when compared to other European countries (Direção-Geral da Saúde, 2014; European Commission, 2010) At this time it is not yet clear how this relationship works, wether the lower well-being is related to the greater experience of fatigue or other somatic symptoms also present.

Fatigue, often reported by patients, lacked empirical research interest due to its non-discriminative nature. Currently, fatigue is understood to be a significant symptom, being at the core of disabling conditions such as CFS, and related with additional somatic symptoms and decreased levels of well-being. In order to reach a greater understanding of fatigue and CFS, as well as to treat those in need, one must be able to rapidly and objectively measure it, specifically in primary care, so that interventions may be promptly developed. Therefore, this study aims to (1) validate the CIS-20P scale on primary health care patients, (2) study its relationship with well-being while considering other somatic symptoms, and (3) develop the first percentile distribution for the CIS-20P. In order to do so, an adult sample of a Portuguese primary health care centre is used to examine the psychometric properties of the CIS-20P, as

well as exploring its relationship with well-being and examining possible predictors of fatigue (age, gender, education, presence of diagnosed chronic disease, the presence of sons and daughters in the household, and work status). Further validation of the tetra-dimensional structure is explored with an independent sample of working adults and elderly primary health care patients. Only then a percentile distribution is created.

Method

Participants

The research was carried out under a broader ongoing study at the Promoting Human Potential Research Group and included two samples of volunteers: 418 patients from a primary Health Care Center (HCC) located in continental Portugal, and 538 online participants (OP). Both samples combined for a total of 956 participants from 18 to 99 years old. While the OP sample did not have any participant over the age of 64, the HCC participants were further divided into two groups: adults (participants under the age of 65) and elderly (participants over and including the age of 65). Table 1 presents the demographic characteristics of all samples (see Appendix H for sociodemographic questionnaire).

Measures

Fatigue (Appendix E): *Checklist of Individual Strength (CIS-20P)* — The CIS-20 (Vercoulen et al., 1994) is a multidimensional instrument divided into four sub-scales: subjective experience of fatigue (8 items), lack of concentration (5 items), lack of motivation (4 items) and lack of physical activity (3 items). Each dimension aims to quantify the complex interaction between different experiences that define and discriminate severe fatigue. Higher experience of fatigue, together with lower capacity to concentrate, lower motivation and less physical activity may be indicative of CF or CFS . Scores are calculate by adding each item which are rated on a 7-point Likert scale ranging from 1-"no, that is not true" to 7-"yes, that is true" with items 2, 5, 6, 7, 8, 11, 12, 15 and 20 hold inverted scores. Composed of 20 items, the total score ranges from 20 to 140, with higher scores indicating higher levels of fatigue. Dimensions may also be analyzed separately, with higher scores indicating higher levels of subjective fatigue (8-56), reduced concentration (5-35), reduced motivation (4-28), and lower levels of physical activity (3-21). A total score over 76 is considered at risk of a fatigue disorder, while 36 provides the cutoff score on the subjective experience of fatigue sub-scale (Bültmann et al., 2000; De Vree et al., 2002). The CIS-20P, translated and validated by Marques and colleagues (2013a), held overall good reliability for both studies samples: healthy (α=.91) and CF (α=.84). Though, during the validation the motivational dimension presented the lowest reliability in both samples: healthy (α=.51), and CF (α=.58). The tetra-dimensional structure also presented issues as the model fit indexes were not ideal for either

sample: healthy (X^2/df=4.731; CFI=.85; RMSEA=.093) and CF (X^2/df=1.739; CFI=.76; RMSEA=.092).

Table 1: Demographic characteristics of the Health Cancer Center (HCC) and Online Participant (OP) samples.

	HCC			OP	Total
	Adults (n = 262)	Elderly (n = 156)	Total (N = 418)	(N = 538)	(N = 956)
Female participants (%)	66.8	56.4	62.9	74.5	69.5
Mean age in years (*SD*)	43.82 (13.14)	75.12 (6.63)	55.50 (18.82)	39.46 (8.43)	46.42 (16.09)
Education (%)					
Primary	10.9	39.7	21.5	5.0	12.1
Secondary	47.3	41.1	45.0	25.5	33.9
Tertiary	41.9	19.2	33.5	69.5	54.0
Working, no. (%)					
Full-time	62.2	5.8	39.7	79.2	62.6
Part-time	29.0	2.6	7.9	20.8	14.5
Not working	8.8	91.7	52.4	0.0	22.9
Chronic disease (%)	33.6	68.4	46.6	15.2	28.8
Marital State (%)					
Married/Civil Union	55.9	66.7	60.0	65.8	63.2
Single	30.3	4.5	20.6	22.7	21.8
Divorced/Separated	11.5	9.0	10.6	11.2	10.9
Widowed	2.3	19.9	8.9	0.4	4.1
With Children (%)	74.6	92.2	81.1	72.3	76.2
Lives with son(s)/daughter(s) (%)	53.4	14.1	38.8	na	na
Self-report presence of fatigue (%)	50.2	52.6	51.1	na	na

Well-Being (Appendix F): *Warwick-Edinburgh Mental Well-Being Scale (WEMWBS)* — Created by Tennant and colleagues (2007), the WEMWBS was developed to measure mental well-being with 14 items rated on a 5 point Likert scale ranging from 1-"none of the time" to 5-" all of the time." Scores are calculated by adding their respective items for a total score ranging from 14 to 70. Higher scores indicate a higher level of mental well-being. Translated and validated to Portuguese (Santos et al., 2015) with good reliability (α=.89).

Somatic symptoms (Appendix G): *Patient Health Questionnaire (PHQ-15)* — Developed by Kroenke and colleagues (2002), the PHQ-15 measures the severity of 15 different somatic physical symptoms (e.g. stomach pain, fainting spells, headaches). Items are score on a 3 point Likert scale, from 1-"not bothered at all", 2-"bothered a little" to 3-"bothered a lot." Scores are calculated by adding their respective items. Total scores range from 0 to 30 with higher scores indicating higher levels of somatic symptoms. The PHQ-15 presents good reliability (α=.80) and is commonly used to assess somatic complains worldwide.

Procedure

The HCC sample was systematically collected by the main researcher from all patients that were able to consent at the time of consultation with their general practitioner. Data was gathered from July through September, 2016.

Online participation was collected through the O*nline Qualtrics* platform. Only the CIS-20P and sociodemographic answers were gathered from participants employed at the time (July to September, 2015). Social networking was used to collect a total of 729 questionnaires, from which 538 met the necessary criteria for inclusion (working Portuguese adult).

For both samples all participants had to be over and including the age of 18, informed consent was obtained for both the HCC (Appendix B) and the OP (Appendix C) samples. Confidentiality of the data was guaranteed by the research team. Participation was on a volunteer basis. This study was approved by the ISPA Ethical Committee and the Administração Regional de Saúde ethics committee.

Data analysis

Confirmatory Factor Analysis (CFA) was utilized with the HCC Adult sample in order to test and explore the validity of the CIS-20P multidimensional model (Maroco, 2014). Univariate and multivariate Skewness (|Sk|<3) and Kurtosis (|Kr|<5) were observed in order to guarantee the use of maximum likelihood method. Internal consistency was observed through Cronbach's coefficient alphas (α) and composite reliability (CR) was also calculated. Model fit adequacy was analyzed through goodness-of-fit statistics. A $X^2/df < 5$; CFI > .90; TLI > .90; PCFI > .60 and RMSEA < .10 P[rmsea ≤ .05] were used as comparative indices for an acceptable model (Maroco, 2014).

Exploration of the relationship between somatic symptoms, mental well-being and fatigue, was carried out trough Pearson correlation coefficients which were calculated between the CIS-20P (and sub-scales) and both the PHQ-15 and WEMWBS scores for HCC Adult sample (n=262). Detailed correlations between each symptom presented at the PHQ-15 was also observed with WEMWBS and CIS-20P and a stepwise multiple linear regression was carried out in order to determine which, if any, somatic symptoms mostly predict the lack of mental well-being. Stepwise multiple linear regression was also utilized in order to predict CIS-20P scores from age, gender, education, presence of diagnosed chronic disease, the presence of sons and daughters in the household, and work status (full-time, part-time, or not employed) among the HCC Adult sample (n=262). Variance Inflation Factor (VIF) was utilized to diagnose multicollinearity and Durbin-Watson (d) statistic was also observed to determine autocorrelation. The method was chosen due to its strength in selecting predictive variables that might present a moderate to strong correlation, while also eliminating those that do not significantly contribute to the model (Maroco, 2014).

Structural invariance was calculated hierarchically between an stablished structural model with the HCC Adult sample (n=262) and a randomly generated sample (n=260) of the OP pool (N=538). The random sample was generated to approximately 50% of the total OP sample in order to retain similar participant numbers between samples. This was done due to the Chi-Square's sensitivity to sample sizes. The HCC Adult and HCC Elderly samples were also tested for invariance. Comparative indices were calculated between baseline models with no restriction and models in which factor loadings and structural correlations were constrained to remain equal. Invariance is guaranteed when the difference between models

Chi-Squared (ΔX^2) and degrees of freedom (Δdf) are deemed non-significant ($p > .10$) on the Chi-Squared (X^2) distribution table (Byrne, 2016).

The 5^{th}, 25^{th}, 50^{th}, 75^{th} and 95^{th}, percentile scores were calculated for all the samples and total combination of samples. Calculations were carried out with the total CIS-20P scores as well as to each individual dimension: subjective experience of fatigue (S); lack of concentration (C); lack o motivation (M); and decreased physical activity (P).

The statistical packages SPSS v.22 and AMOS v.23 were used for all statistical analysis.

Results

Item analysis

Missing values of the CIS-20P were replaced by mean item scores if at least 90% of the respective questionnaire had been completed. No item had more than 10% of values missing. Table 2 presents the descriptive statistics for all items and sub-scales on the CIS-20P of the HCC Adult sample while Table 3 provides internal consistency data for the items, sub-scales and total score of the CIS-20P for the same sample. No violation of normality was observed and thus the scale was suitable for further analysis and application of the maximum likelihood method. The CIS-20P, as well as the subjective fatigue and concentration sub-scales, held high internal consistency scores (> .80), with the motivation dimension holding the lowest scores (< .70). All items significantly contributed (> .30) to their respective factors (Figure 1).

Factorial validity

Factorial validity of the HCC Adult sample was achieved while keeping adjustments to a minimal, based on modification indices (starting from the highest) and theoretical considerations. The final model with its respective adjustments is presented in Figure 1. Goodness-of-Fit statistics of the adjusted model revealed: $X^2/df=2.789$; CFI=.88; TLI=.86; PCFI=.74; RMSEA=.083 [.074 - .092] (p-value < .000); RMR=.27; and SRMR=.065.

Correlation coefficients between dimensions were strong (> .70) for most, except the correlation between subjective experience of fatigue and physical activity (S-P=.67) which was moderate (Figure 1). Average variance extracted (AVE) from the factors reveals that only the concentration (C) dimension has enough convergent validity between items (≥ .500). While the subjective experience of fatigue (S) and physical activity (P) dimensions provided poor though still reasonable values off AVE (>.400), the motivational (M) dimension revealed worse results (M=.308) (Table 4).

Table 2: Descriptives for the Portuguese Checklist of Individual Strength (CIS-20P) Health Care Center (HCC) Adult sample (n = 262).

Dimension/Items	Min-Max	Mean (*SD*)	Sk	Kr
Subjective Fatigue	8-56	29.86 (13.09)	0.11	-1.09
CIS1	1-7	4.23 (2.36)	-0.15	-1.56
CIS4	1-7	3.42 (2.20)	0.36	-1.31
CIS6	1-7	3.93 (2.08)	0.13	-1.25
CIS9	1-7	3.08 (2.15)	0.61	-1.06
CIS12	1-7	3.78 (2.15)	0.15	-1.34
CIS14	1-7	3.85 (2.22)	0.06	-1.45
CIS16	1-7	3.47 (2.26)	0.37	-1.36
CIS20	1-7	4.09 (2.14)	0.01	-1.36
Concentration	5-35	15.02 (7.87)	0.45	-0.73
CIS3	1-7	3.19 (2.26)	0.49	-1.29
CIS8	1-7	2.70 (1.90)	0.94	-0.23
CIS11	1-7	2.71 (1.94)	0.92	-0.37
CIS13	1-7	2.95 (2.08)	0.65	-0.98
CIS19	1-7	3.46 (2.23)	0.31	-1.40
Motivation	4-28	11.22 (5.39)	0.71	0.28
CIS2	1-7	3.61 (2.07)	0.27	-1.24
CIS5	1-7	1.77 (1.43)	2.25	4.83
CIS15	1-7	3.13 (2.00)	0.64	-0.80
CIS18	1-7	2.75 (2.08)	0.90	-0.61
Physical Activity	3-21	7.87 (4.52)	0.96	0.53
CIS7	1-7	2.50 (2.86)	1.16	0.30
CIS10	1-7	2.56 (1.87)	0.99	-0.22
CIS17	1-7	2.81 (2.01)	0.90	-0.44
CIS-20P total	20-134	64.01 (25.56)	0.33	-0.66

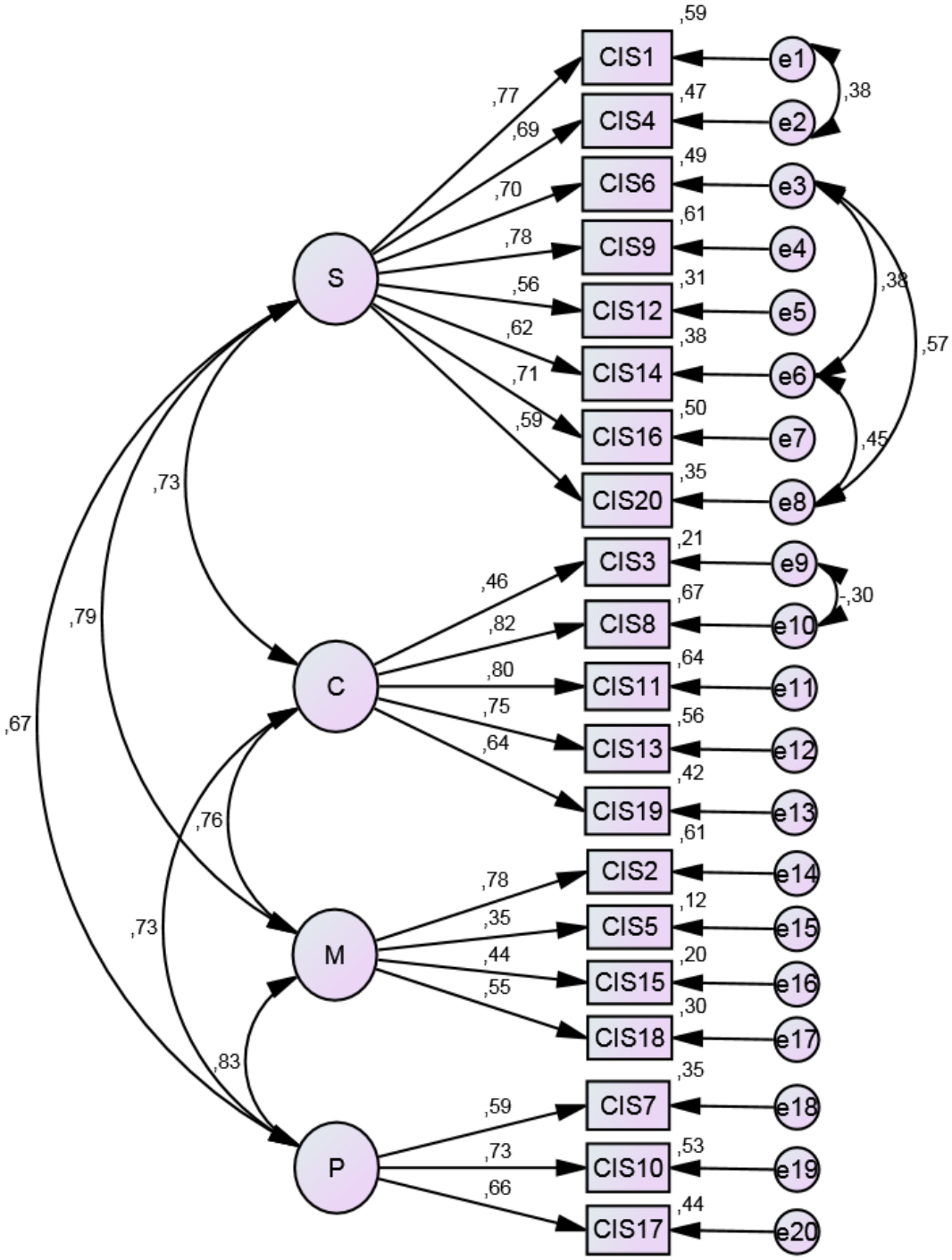
Note:; skewness, Sk; kurtosis, Kr

Table 3: Reliability and factor loading for the Portuguese Checklist of Individual Strength (CIS-20P) Health Care Center (HCC) Adult sample (n = 262).

Dimension/Items	Individual item reliability (R^2)[a]	Cronbachs's α	Composite reliability	Factor Loadings[a]
Subjective Fatigue		.89	.87	
CIS1	.591			.77
CIS4	.608			.69
CIS6	.214			.70
CIS9	.610			.78
CIS12	.313			.56
CIS14	.380			.62
CIS16	.499			.71
CIS20	.349			.59
Concentration		.81	.83	
CIS3	.214			.46
CIS8	.673			.82
CIS11	.642			.80
CIS13	.557			.75
CIS19	.415			.64
Motivation		.64	.62	
CIS2	.608			.78
CIS5	.125			.35
CIS15	.196			.44
CIS18	.304			.55
Physical Activity		.69	.70	
CIS7	.353			.59
CIS10	.534			.73
CIS17	.441			.66
CIS-20P total		.91	.94	

[a]Obtained from the confirmatory factor analysis.

Figure 1: Confirmatory factor analysis structural model for Health Care Center Adults (n=262).



Dimensions are denoted as follows: subjective fatigue, S; concentration, C; motivation, M; and physical activity, P.

Table 4: Average variance extracted (AVE) and correlation coefficients between dimensions of the Portuguese Checklist of Individual Strength (CIS-20P) for Health Care Center (HCC) Adult sample (n=262).

CIS-20P	AVE	Subjective experience	Concentration	Motivation	Physical activity
Subjective experience	0.443	1			
Concentration	0.500	0.73	1		
Motivation	0.308	0.79	0.76	1	
Physical activity	0.462	0.67	0.73	0.83	1

Fatigue and well-being

Pearson correlation coefficients between PHQ-15 (α=.79), WEMWBS (α=.93) and CIS-20P, for the the HCC Adult sample, are presented in Table 5. All correlations between total scale scores are significant at the 2-tailed level. Further analysis of each item/symptom of the PHQ-15 revealed that only the item thirteen ("feeling tired or having low energy") had a strong correlation with the experience of fatigue dimension (.718). Item thirteen also revealed a strong correlation with the WEMWBS (-.615), lack of concentration dimension (. 504) and CIS-20P total score (.668), while all other items of the PHQ-15 had smaller, though significant, correlations (<.5) with both the WEMWBS and the CIS-20P.

Such correlations lead to the exploration of how much of mental well-being is explained by each somatic symptom presented in the PHQ-15. A stepwise multiple linear regression in which mental well-being (WEMWBS total score) was a dependable variable of the 15 different predictive symptoms on the PHQ.

Linear regression provided two significant (p<.001) models (VIF=1.248; d=1.976). The first model held one item related to the presence of tiredness and fatigue (β= -.615; item 13: "feeling tired or having low energy") and explained 37.8% of mental well-being: R^2=. 378; F(1,251)=152.462; p <.001. The second model retained item 13 (β= -.519) and added a second item (β= -.219; item 14: "trouble sleeping"), explaining a total of 41.6% of the variance in mental well-being: R^2=.416; F(2,250)=89.161; p< .001.

Table 5: Pearson correlations between Patient Health Questionaire (PHQ), Warwick-Edinburgh Mental Well-Being Scale (WB) and Checklist of Individual Strength (CIS-20P) for the Health Care Center Adult sample (n=262).

	PHQ																WB	CIS-20P				
	Total	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		Total	S	C	M	P
PHQ																						
Total	1																					
1	.449**	1																				
2	.612**	.143*	1																			
3	.551**	.172**	.485**	1																		
4	.617**	.280**	.286**	.225**	1																	
5	.386**	.220**	.103	.218**	.223**	1																
6	.558**	.192**	.240**	.210**	.364**	.248**	1															
7	.104	.147*	.004	-.039	.140*	.037	.115	1														
8	.551**	.115	.372**	.176**	.327**	.156*	.334**	.047	1													
9	.508**	.169**	.289**	.294**	.253**	.218**	.324**	.018	.293**	1												
10	.302**	.108	.144*	.081	.041	.140*	.207**	.056	.074	.143*	1											
11	.554**	.200**	.249**	.204**	.306**	.142*	.227**	-.016	.267**	.197**	0.11	1										
12	.565**	.390**	.239**	.199**	.206**	.198**	.230**	.018	.228**	.283**	.215**	.451**	1									
13	.713**	.278**	.403**	.383**	.374**	.221**	.322**	.052	.325**	.258**	.130*	.345**	.335**	1								
14	.543**	.179**	.265**	.280**	.225**	.175**	.177**	-.051	.229**	.188**	.117	.245**	.213**	.444**	1							
15	.408**	-0.007	.147*	.026	.257**	.018	.164**	-.067	.170**	.131*	.066	.147*	.109	.241**	.119	1						
WB	-.500**	-.166**	-.308**	-.247**	-.291**	-.176**	-.188**	.023	-.249**	-.158*	-.167**	-.242**	-.164**	-.615**	-.449**	-.168**	1					
CIS-20P																						
Total	.627**	.232**	.398**	.309**	.384**	.249**	.261**	.052	.315**	.269**	.172**	.285**	.262**	.668**	.476**	.182**	-.777**	1				
S	.645**	.245**	.408**	.355**	.387**	.227**	.305**	.052	.303**	.290**	.162**	.302**	.258**	.718**	.425**	.218**	-.672**	.907**	1			
C	.464**	.170**	.254**	.127*	.313**	.193**	.197**	.098	.273**	.181**	.146*	.210**	.210**	.504**	.375**	.172**	-.658**	.827**	.625**	1		
M	.379**	.112	.335**	.247**	.210**	.160**	.066	-.039	.183**	.170**	.124*	.122*	.126*	.395**	.407**	.054	-.604**	.745**	.552**	.500**	1	
P	.409**	.176**	.234**	.211**	.259**	.225**	.169**	.02	.218**	.165**	.102	.232**	.225**	.360**	.331**	.035	-.587**	.718**	.498**	.543**	.573**	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Predictors of fatigue

stepwise multiple linear regression with the HCC Adult sample (n=262) was carried out with age, gender, education, presence of diagnosed chronic disease, the presence of sons and daughters in the household, and work status (full-time, part-time, or not employed) as predictors of total CIS-20P score. The model with did not retain any variable as a predictor of CIS-20P score.

Structural invariance

The tetra-dimensional structure validity was explored with two additional samples: the independent sample of working adults (OP); and elderly primary health care patients (HCC Elderly).

The HCC Adult sample structural model created in the CFA (Figure 1) was maintained as the standard model for invariance against a randomly generated 50% sample (n=260) of the OP total pool (N=538) and the HCC Elderly sample (n=156). The baseline models were stablished with the previously created structural model and considered acceptable (Table 6). Invariant models were then created and compared with a pre-established unconstrained model through the differences in Chi-Square (X^2) and degrees of freedom (df). The resulting differences (ΔX^2; Δdf) were analyzed through the probabilities distribution where $p < .10$ was deemed significant, and therefore, non-invariant.

Table 6: Goodness-of-fit Statistics for measurement models of Health Care Center (HCC) Adult (n=262) and Online Participants (OP) Random samples (n=260).

Model	X^2	df	X^2/df	CFI	TLI	RMR	PCFI	RMSEA
Baseline models								
HHC Adults	443.391	159	2.789	.884	.861	.272	.739	.083
HCC Elderly	315.661	159	1.985	.851	.822	.427	.712	.80
OP Random	484.424	159	3.047	.858	.831	.192	.718	.089

Table 7 illustrates the summary of model comparisons between the HCC Adult sample (n=262) and the OP Random sample (n=260). First, an unconstrained model (Model 1) was created as a reference for further comparison with invariant models. Model 2 was created with all factor loading weights were held equal and compared to the unconstrained

model established (Model 1). Results deemed the model non-invariant (ΔX^2=32.924; Δdf=16). A dimension analysis was followed by an item-by-item analysis. Model 3 was created with the respective factor loadings of the subjective experience of fatigue (S) dimension held as equal and then compared to the unconstrained model 1 (ΔX^2=6.421; Δdf=7). The same was done with the subsequent dimensions: concentration (C; Model 4); motivation (M; Model 5); and physical activity (P; Model 6). Results revealed that the motivational dimension was non-invariant as it is statistically significant at a probability value <.001 (ΔX^2=16.149; Δdf=3). Further models focused on exploring item non-invariance within the motivational dimension, which revealed that item eighteen was non-invariant. Holding all but item eighteen measurement weight as equal (Model 9) produced an invariant solution (ΔX^2=21.341; Δdf=15).

Holding all structural covariances and factor loadings with the exception of item eighteen, held a non-invariant solution (Model 10; ΔX^2=45.564; Δdf=21). Further analysis revealed that all structural dimensions were non invariant, though the motivational dimension held the most significant invariances ($p < .001$). When not holding any structural covariances with the motivational dimension, significance of non-invariance dropped ($p < .025$).

The comparison between the HCC Adult and HCC Elderly samples is presented in Table 8. The same steps as the precious comparison were followed. When the model with all factor loading her equal provided a non-invariant solution (ΔX^2=31.767; Δdf=16) a dimensional analysis followed by an item-by-item analysis revealed that item 12 held non-invariable solution (ΔX^2=26.190; Δdf=13). A model without its respective factor loading restriction was created and held invariance (Model 12; $1\Delta X^2$=14.433; Δdf=15). When holding structural covariances equal (Model 13), the solution held non significant values (ΔX^2=24.901; Δdf=21).

Despite these results, it is important to note that neither the HCC Elderly or the OP Random sample presented significant factor loadings for all items in the baseline models (Table 9).

Table 7: Goodness-of-fit Statistics for Test of Multigroup Invariance between Health Care Center (HCC) Adult (n=262) and Online Participants (OP) Random (n=260) samples.

				Comparison with unconstrained model			
Model	X^2	df	CFI	ΔX^2	Δdf	Statistical significance	ΔCFI
1.Unconstrained	927.815	318	.871				
2.Factor loadings weights constrained	960.739	334	.868	32.924	16	p<.005	.003
3. S factor loadings constrained	934.236	325	.871	6.421	7	not significant	0
4. C factor loadings constrained	935.439	322	.871	7.624	4	not significant	0
5. M factor loadings constrained	943.964	321	.869	16.149	3	p<.001	.002
6. P factor loadings constrained	932.195	320	.871	4.380	2	not significant	0
7. Factor loadings constrained (except item 5)	956.357	333	.868	28.542	15	p<.01	.003
8. Factor loadings constrained (except item 15)	959.322	333	.868	31.507	15	p<.005	.003
9. Factor loadings constrained (except item 18)	949.156	333	.870	21.341	15	not significant	.001
10. Model 9 with structural covariances constrained	973.379	339	.866	45.564	21	p<.001	.005
11. Model 9 with SC, SM, SP covariances constrained	968.720	336	.866	40.905	18	p<.001	.005
12. Model 9 with SC, CM, CP covariances constrained	966.989	336	.866	39.174	18	p<.001	.005
13. Model 9 with SM, CM, MP covariances constrained	969.910	336	.866	42.095	18	p<.001	.005
13. Model 9 with SP, CP, MP covariances constrained	964.017	336	.867	36.202	18	p<.005	.004
13. Model 9 with SP, CP, MC covariances constrained	958.525	336	.869	30.710	18	p<.025	.002

Dimensions are denoted as follows: subjective fatigue, S; concentration, C; motivation, M; and physical activity, P.

Table 8: Goodness-of-fit Statistics for Test of Multigroup Invariance between Health Care Center (HCC) Adult (n=262) and HCC Elderly (n=156) samples.

				Comparison with unconstrained model			
Model	X^2	df	CFI	ΔX^2	Δdf	Statistical significance	ΔCFI
1.Unconstrained	759.052	318	.874				
2.Factor loadings weights constrained	790.819	334	.869	31.767	16	p<.01	.005
3. S factor loadings constrained	781.704	325	.869	22.652	7	p<.001	.005
4. C factor loadings constrained	763.130	322	.874	4.078	4	not significant	0
5. M factor loadings constrained	761.027	321	.874	1.975	3	not significant	0
6. P factor loadings constrained	761.656	320	.874	2.604	2	not significant	0
7. M, C, and P factor loadings constrained	767.933	327	.874	8.881	9	not significant	0
8. Model 7 with item 4 factor loading constrained	768.981	328	.874	9.929	10	not significant	0
9. Model 8 with item 6 factor loading constrained	769.244	329	.874	10.192	11	not significant	0
10. Model 9 with item 9 factor loadings constrained	769.397	330	.874	10.345	12	not significant	0
11. Model 10 with item 12 factor loadings constrained	785.242	331	.870	26.190	13	p<.01	.004
12. Factor loadings constrained (except item 12)	773.485	333	.874	14.433	15	not significant	0
13. Model 12 with structural covariances constrained	783.953	339	.873	24.901	21	not significant	.001

Dimensions are denoted as follows: subjective fatigue, S; concentration, C; motivation, M; and physical activity, P.

Table 9: Reliability and factor loadings for the Portuguese Checklist of Individual Strength (CIS-20P) Health Care Center (HCC) Elderly (n=156) and OP Random sample (n = 262).

	OP Random (n=260)		HCC Elderly (n=156)	
Dimension/Items	Cronbachs's α	Factor Loadings[a]	Cronbachs's α	Factor Loadings[a]
Subjective Fatigue	.88		.86	
CIS1		.68		.71
CIS4		.71		.72
CIS6		.61		.72
CIS9		.79		.71
CIS12		.57		.18
CIS14		.62		.67
CIS16		.77		.75
CIS20		.56		.74
Concentration	.75		.66	
CIS3		.31		.38
CIS8		.71		.74
CIS11		.77		.75
CIS13		.76		.55
CIS19		.69		.39
Motivation	.41		.43	
CIS2		.52		.58
CIS5		.10		.12
CIS15		.20		.37
CIS18		.56		.46
Physical Activity	.75		.64	
CIS7		.55		.65
CIS10		.81		.55
CIS17		.77		.62
CIS-20P total	.89		.87	

[a]Obtained from the confirmatory factor analysis.

Percentile analysis

Percentile distribution was created for the 5th, 25th, 50th, 75th and 95th marks. Scores were calculated for all the samples and total combination of samples — HCC Adult (n=262), HCC Elderly (n=156), HCC total (n=418), OP (n=538), and total sample (N=956). A total adult sample was also calculated for percentile distribution (N=800; Mean age = 40.82 ± 10.42; 72% female, 73.1% childless, 62.6% married, 25.2% single, 11.3% divorced or separated, 60.3% completed higher education, 73.6% work full time, 9.5% unemployed, and 78.8% did not have a chronic illness).

Calculations were carried out with the total CIS-20P scores as well as to each individual dimension: subjective experience of fatigue (S); lack of concentration (C); lack of motivation (M); and decreased physical activity (P). Table 10 presents the percentile distributions calculated.

Table 10 presents all percentile distributions calculated.

Table 10: Percentile and mean values for Portuguese Checklist of Individual Strength (CIS-20P) in the Health Care Center (HCC) Adults (n=262), HCC Elderly (n=156),Online Participants (OP; n=538), combined adult samples (N=800) HCC total sample (n=416), and total (N=956).

	HCC Adult					OP					Adult Total				
	P_5	P_{25}	P_{50}	P_{75}	P_{95}	P_5	P_{25}	P_{50}	P_{75}	P_{95}	P_5	P_{25}	P_{50}	P_{75}	P_{95}
Subjective fatigue	9	19	30	41	51	12	21	29	38	48	11	20	30	38	50
Concentration	5	8	14	21	29	6	11	16	20	26	5	10	15	20	27
Motivation	4	7	10	14	22	5	8	10	13	18	4	7	10	13	19
Physical activity	3	4	7	11	17	3	4	7	10	15	3	4	7	10	15
Total score	26	43	63	83	108	33	49	63	78	98	30	48	63	79	101

	HCC Elderly				
	P_5	P_{25}	P_{50}	P_{75}	P_{95}
Subjective fatigue	8	18	29	40	51
Concentration	5	11	16	21	29
Motivation	6	10	14	18	22
Physical activity	3	6	11	15	21
Total score	31	49	69	88	112

	HCC Total					Total				
	P_5	P_{25}	P_{50}	P_{75}	P_{95}	P_5	P_{25}	P_{50}	P_{75}	P_{95}
Subjective fatigue	9	18	30	40	51	10	20	30	39	50
Concentration	5	9	15	21	29	5	10	16	20	28
Motivation	4	8	12	16	22	4	8	11	14	20
Physical activity	3	5	9	12	21	3	5	8	11	17
Total score	28	46	65	85	110	30	48	64	80	104

Discussion

The present study aimed to (1) validate the CIS-20P scale on primary health care patients, (2) study its relationship with well-being while considering other somatic symptoms, and (3) develop the first percentile distribution for the CIS-20P. In order to do so, an adult sample of a Portuguese primary health care centre was used to examine the psychometric properties of the CIS-20P, as well as its relationship with well-being and possible predictors of fatigue (age, gender, education, presence of diagnosed chronic disease, the presence of sons and daughters in the household, and work). Further validation of the tetra-dimensional structure was explored with an independent sample of working adults and elderly primary health care patients. Only then a percentile distribution was created.

Validation of the CIS-20P in primary care

The main objective of this study, to validate the CIS-20P use with primary health care patients, has been partially achieved. We found evidence to support the use of the overall CIS-20P with adults, though the use of its separate sub-scales is not yet validated for all dimensions. Results from the CFA indicate that the CIS-20P is a valid instrument in assessing overall fatigue levels and experience of fatigue in adult primary care patients. Despite CFA not indicating an ideal model, RMSEA, least affected by degrees of freedom and thus deemed most reliable, has held results under 0.10 (Toyoda, 1998). Subjective experience of fatigue, concentration, and physical activity dimensions are reliable, with the motivation dimension presenting lower levels of reliability, which is consistent with previous validation research (Makowiec-Dabrowska & Koszada-Wlodarczyk, 2006; Marques et al., 2013a). Another recurrent observation in cross-cultural validation is the high correlation between motivation and physical activity which was also seen in a previous study (Aratake et al., 2007), possibly indicating some confounding latent meaning among the items, where motivation might be interpreted as related to strictly physical activities.

Results of the structural invariance analysis between HCC Adult and OP samples, found that almost all items are invariant (except item eighteen), confirming further applicability of the overall scale. On the other hand, the tetra-dimensional structure was non-invariant, with the motivational sub-scale correlations holding higher and more significant levels of non-invariance ($p < .001$). Moreover, out of the four items present in this dimension,

it was item eighteen (“I feel no desire to do anything”) that was deemed non-invariant across samples, while item five (“I feel like doing all kind of nice things”) held the lowest factor loading (.35) and, despite not violating normality parameters, had the highest values of skewness (2.26) and kurtosis (4.83). This dimension also presented the lowest rate of AVE, failing to reach acceptable convergent validity among its items (AVE=.308)

When analyzing the OP sample alone, the motivation sub-scale had poor reliability (α=.41) with item five failing to significantly load its respective factor (.10), as also did item fifteen (“I am full of plans”). It is clear that within adults, the motivation dimension presents issues across cultures.

The CIS-20P is, therefore, valid for use with adults in a primary health care setting. While its validity to other adult samples is confirmed for the overall use of the scale and sub-scales, with the exception of the motivation dimension.

When analyzing the HCC Adults against the HCC Elderly, it seemed that invariance was achieved with the exception of item twelve (“I feel rested”) from the subjective experience of fatigue sub-scale. Structural invariance was achieved when comparing these samples.

A closer look at the HCC Elderly reliability revealed lower reliability in the concentration (α=.66) and physical activity (α=.64) sub-scales, as well as poor reliability in the motivational dimension (α=.43). Items five (.eighteen) and twelve (.12) failed to load their respective factors significantly.

Beyond the statistical issues, participants over the age of 64 presented difficulties when completing the questionnaire. Informally observed by the researcher during data collection, issues included longer then expected completion times (with some taking over half an hour for the completion of the CIS-20P) and reactivity during items of the concentration dimension, often interpreted as an assessment of cognitive impairment. Elderly participants also seemed to compare their current physical activity to a younger more active self, ignoring what would be normative or comfortable for their respective age. Another limitation of this sample was the lack of previous assessment of cognitive capacities, and therefore we can not at this time guarantee that all participants had the necessary capacities to understand and complete the questionnaire adequately. Thus it appears that the use of the overall CIS-20P is

appropriate for elderly patients in primary care, though its use is discouraged until further analysis.

Table 11: Proposed translations for items 5, 15 and 18 of the Portuguese Checklist of Individual Strength (CIS-20P).

Item		
5	Original sentence	I feel like doing all kind of nice things.
	Current translation	Sinto vontade de fazer coisas agradáveis, que me façam sentir bem.
	Proposed translation	Sinto vontade/apetece-me de fazer qualquer coisa agradável.
15	Original sentence	I am full of plans.
	Current translation	Tenho muitos projetos.
	Proposed translation	Faço muitos planos.
18	Original sentence	I feel no desire to do anything.
	Current translation	Sinto-me sem vontade de fazer coisa alguma.
	Proposed translation	Sinto-me sem desejo de fazer coisa alguma.

While elderly participants demonstrated issues in all dimensions of the CIS-20P, adults demonstrated issues within the motivational dimension only. Nevertheless, the motivation sub-scale has repeatedly demonstrated te need for reassessment.

In order to remedy this dimension, three new translations to items are proposed in Table 11. New translations are expected to elicit the original latent meaning proposed by Vercoulen and colleagues (1994). While the motivational dimension needs to be tested with different populations, we strongly advice the use of new items in order to achieve the desired reliability and validity. A different approach may lead to the evaluation of the CIS-20P without the motivational dimension due to its poor outcomes.

Fatigue and well-being

As expected, fatigue was positively correlated to other somatic symptoms, though moderately at best. Lower levels of mental well-being were also correlated with higher scores of fatigue. Furthermore, the subjective experience of fatigue dimension had the strongest correlation with both: the experience and severity of other somatic symptoms, and decreased mental well-being. Building on previous research (Afari & Buchwald, 2003; Marques et al., 2013b), these correlations add to the body of literature that emphasizes the possible toll patients go through when searching for diagnosis and treatment of somatic symptoms, many which become chronic and severely debilitating (Lehman, Lehman, Hemphill, Mandel, & Cooper, 2002).

A closer look at the correlations revealed that lower values of mental well-being were more strongly correlated to the subjective experience of fatigue when compared to any other somatic symptom. The total score on the CIS-20P was also strongly associated with decreased mental well-being. The multiple linear regression revealed that poor sleep, as well as fatigue, were the only significant predictors of poor mental well-being when compared to other somatic symptoms. In fact, fatigue alone explained almost one third of the variation in mental well-being scores. Moreover, the results corroborate the link between sleep quality and fatigue, already established in the Fukuda definition of CFS (1994).

Thus, despite the possible presence of other somatic symptoms, it appears that it is fatigue that most heavily influences mental well-being. Furthermore, the subjective experience of fatigue corroborates that fatigue experience is more strongly associated with lack of mental well-being among the four dimensions of the CIS-20P.

These findings add to the body of literature that explores the relationship between somatic symptoms and fatigue. As previously stated, somatic symptoms are responsible for repeated healthcare use and patient frustration (De Gutch & Maes, 2006; Kroenke et al., 2002). The relationship between the lower mental well-being experienced in Portugal, when compared to other European countries (Direção-Geral da Saúde, 2014; European Commission, 2010), might be more closely related to higher levels of fatigue severity, rendering the individuals incapable or handicapped.

Percentile distribution

Percentile distribution has revealed that both independent adult samples had similar scores, proving to be consistent results across samples and more accurate when assessing Portuguese adults. Previous research had demonstrated no significant difference in scores between Dutch and Portuguese samples despite slightly higher scores for the Portuguese participants, which were possibly explained by the Dutch's participants higher educational level and lower working rates (Marques et al., 2013b). Compared to the general adult Dutch population (Total CIS-20 P_{50}=38; Schulte-van Maaren et al., 2014) the Portuguese sample in the present study had higher scores (Total CIS-20P P_{50}=63). Difference between samples may explain the higher levels of fatigue. The Dutch sample had similar mean age (40.0 ± 12.6), though fewer females (62.5%), higher education (78.7% completed higher education) and higher unemployment (15.6%) when compared to the adult samples (Total adult sample: mean age = 40.82 ± 10.42; 72% female; 60.3% completed higher education; 9.5% unemployed). Previous research has stablished that women, as well as less educated individuals, have higher levels of fatigue and CFS (e.g. Mens-Verhulst, & Bensing, 1998; Nijrolder, van der Windt, & van der Horst, 2008). Despite differences, cultural background may also sustain further explanation for the difference in scores. The Portuguese population has consistently demonstrated higher levels of anxiety and depression when compared to most European countries, such as the Netherlands (Direção-Geral da Saúde, 2014; European Commission, 2010). Levels of anxiety and depression might have been solicited by the questionnaire instead of the proposed constructs defined by the original study (e.g. motivation). This might also be the case with the elderly sample.

The elderly presented similar scores as the adults, though they have significantly lower rates of work (91.7% unemployment) and females (56.4%), and higher rates of diagnosed chronic disease (68.4%), when compared to the adult samples (HCC Adults: 8.8% not working; 66.8% female; 33.6% chronic disease). These differences, together with the difficulties when completing the questionnaire, might be affecting the rates of fatigue in the elderly. Other possible confounding variables might include the presence of children in the household and marital state, which might create a heavier burden on working women that also maintain the household and children's school schedule (Kitai, Blumberg, Golan-Cohen, Levi, & Vinker, 2015).

Limitations

While the scale as a whole has been validated, limitations of the current study must be discussed. As previously stated, there are stablished higher rates of fatigue and CFS for women and less educated individuals (e.g. Mens-Verhulst & Bensing, 1998; Nijrolder et al., 2008). This study did not support the existing literature and no predictive variable tested was significant in determining fatigue levels. Sociodemographic characteristics, such as age, gender, education, presence of diagnosed chronic disease, the presence of sons and daughters in the household, and work status did not predict fatigue levels. This finding reflects a major limitation of the study. All samples were collected during the European summer and vacation times. Recent research (Nacul, et al., 2011; Kitai et al., 2015) has pointed out that the incidence of fatigue, specifically in women, peaks in the months of October and November, when children go back to school as well as when there are significant changes in temperatures (e.g. change of seasons). Thus, the present study has gathered data in the months when temperatures are more stable in Portugal and during the time when mothers do not have the added responsibility of their children's school life. The presence of sons and daughters in the household did not take into account their age, and therefore, it was not possible to determine if the household has school aged children, or independent young adults.

Another limitation originated at the collection of data, which may have compromised the validation of the scale for the elderly. Future research should assess cognitive capacity beforehand, ensuring that the data for the sample is reliable. The data collection, though systematic and further guaranteeing a representative sample of the primary health care center studied, does not consist a representative sample of the Portuguese population, nor of the Portuguese primary care system. The sample was collected in one primary health care center and thus the results may not be generalized for the entire country. Online participants were selected for a previous study, therefore limiting the possibility of analysis in the present research as not all relevant questionnaires were administered. Limitations regarding online participation are also applicable to this sample, such as selection bias due to social networking recruitment which relied on a snowball (non-probabilistic) sampling, not guaranteeing a random representative sample.

Conclusion

Despite these limitations, the findings presented here are significant. The CIS-20P is a valid tool in assessing fatigue levels in primary care patients, though at this time the use of it with the elderly must be with done with attention to the limitations imposed by this specific population. This study ads to the already existing pool of possible uses for this tool though we cannot condone at this time the separate use of its sub-scales, with the motivational dimension in need of urgent reassessment. Fatigue is related to different somatic symptoms, thought it has been pointed out as the most prevalent somatic symptom associated with lack of well-being. Percentile distribution revealed that fatigue assessment must be aware of, not only cultural diferences, but also climate and seasonal changes. Nevertheless, a baseline for future research of fatigue in Portugal has been established.

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Appendix A: Extended review of literature.

Introduction

Fatigue is an important symptom worldwide, with patients often reporting it and with outcomes related to poorer quality of life and high costs of society (Jason, et al., 2006; Ricci, et al., 2007; van't Leven, et al., 2010). It is the objective of the present study to explore fatigue levels in a Portuguese sample, as well as its association to well-being, through further validation of the Portuguese Checklist of Individual Strength (CIS-20P). In order to do so, fatigue and fatigue conditions must first be defined. A brief analysis of the history of fatigue will also be presented so that the relevance of epidemiological data can be discussed. The relevant assessment tools of fatigue are also presented under the light of the importance in precisely measuring fatigue and fatigue conditions. Support for the use of the CIS-20P is considered, as well as the detailed objectives of the study.

Somatization and fatigue

Characterized by the presence of somatic symptoms, somatization is responsible for more than half of all outpatient encounters (Schappert, 1992). Despite lack of consensus to its meaning, symptoms that are not accurately explained by organic causes provide common ground to the different definitions of somatization, with almost one third of symptoms remaining medically unexplained (De Gutch & Maes, 2006). The presence of such symptoms (e.g. back pain, headaches, shortness of breath), are common in the general population and in all medical settings (Fink, 1992; Kroenke & Price, 1993; Kroenke, 2003). Medically unexplained symptoms lack easily identifiable biomarkers, requiring over-reliance on patient self-report and exclusion of possible organic causes (De Gutch & Maes, 2006). Moreover, these symptoms may be chronic and many times debilitating, associated with poor quality of life and well-being (Kroenke, Spitzer, & Williams, 2002). One such symptom that is often reported by patients in primary care is fatigue (Cullen, Kearney, & Bury, 2002). The patient is lead to the repeated use of the healthcare system and resources, due to the difficulty in diagnose and treatment (Afari & Buchwald, 2003; De Gutch & Maes, 2006; Institute of Medicine, 2015).

Definition

"Fatigue is what we experience, but it is what a match is to an atomic bomb"

— Laura Hillenbrand (Parker-Pope, 2011).

Fatigue, as well as any other subjective construct (e.g. depression, anxiety), relies heavily on individual definition and interpretation of the experience. Early research used different definitions for fatigue, such as "feeling tired," "tiredness," "weak in part of the body," or experiencing "everything as an effort," lacking consensus and eliciting different answers influenced by social, cultural and educational backgrounds (Cope, 1992). These subjective and broad definitions lead many researchers and individuals to confuse fatigue with tiredness, burnout, or depression. In order to differentiate from sleepiness or tiredness, fatigue has been further defined as "extreme and persistent tiredness, weakness or exhaustion — mental, physical or both" (Dittner et al., p.157). This interpretation expands the experience of fatigue to accommodate the difference between mental and physical fatigue. It also defines fatigue as persistent, and not just as extreme tiredness, which would place fatigue at the end of a continuum with "energized" at the other end. Thus, fatigue goes beyond tiredness that is susceptible to compensation strategies (e.g. rest, sleep). The current definition of fatigue emphasizes experience and severity: "an overwhelming sense of tiredness, lack of energy and feeling of exhaustion" (Kalkman et al., 2008, p.238). More akin to the experience illustrated by award winning writer, Laura Hillenbrand (Parker-Pope, 2011), the definition responds to what fatigued individuals suffer, explaining the burden and impairment caused by the feeling. It is also useful in differentiating it from other conditions, such as burnout, in which its onset is associated with stress, or depression, which may present lack of motivation and concentration commonly associated with fatigue.

When severe, debilitating and persistent over a six months period, fatigue is classified as chronic. Chronic Fatigue (CF) does not respond to compensation strategies (e.g. rest, sleep). Medically unexplained chronic fatigue (Idiopathic Chronic Fatigue) is further classified as Chronic Fatigue Syndrome (CFS) if it also includes at least four of the following symptoms: disturbances in concentration or memory; sore throat; new or different musculoskeletal pain or headaches; tender cervical or auxiliary lymph nodes; postexertional

malaise for over 24 hours; and unrefreshing sleep (Fukuda et al., 1994). The term, CFS is currently under dispute, with research using Myalgic Encephalomyelitis (ME) interchangeably with CFS despite having different diagnostic criteria and case definitions (e.g. Nacul et al., 2011; Underhill, 2015). In fact, a review of literature has revealed that there are currently over 20 different clinical case definitions for CFS (Institute of Medicine, 2015). The broader designation "ME/CFS" is also used to identify these conditions in which fatigue is a core symptom, though its use is also questioned and the new term "systemic exertion intolerance disease" (SEID) being proposed as a stigma free replacement (Institute of Medicine, 2015).

History

Much of the confusion in the field may be in part a result of its age. Interest in fatigue was scarce for most part of modern medicine. Often present in many different conditions and commonly reported by individuals, fatigue held little value for diagnosis discrimination (Wessely, 2005), thus being ignored by researchers and physicians. The symptom only came to focus during the 1980s, with two American outbreaks of a unknown illness characterized by chronic debilitating fatigue (Jason et al., 2006; Institute of Medicine, 2015).

At the time CFS was unknown and the condition was associated with Epstein-Barr virus syndrome, in which fatigue was a symptom. The term CFS was created after the Center of Disease Control and Prevention (CDC) was involved, rejecting a Epstein-Barr hypothesis for the outbreaks and providing the first case definition (Holmes et al., 1988), today revised and known as the widely used Fukuda definition (Fukuda et al., 1994). The outbreaks lead researchers to also question the origin of the condition, and as such, theories from virus infection to somatic disorder have been elaborated. One possibility is that there is no unique cause for CFS, being a condition with multiple aetiologies (Perry & Santhouse, 2016) and its often related to a myriad of conditions. Physiological states (e.g. pregnancy, excessive physical activity), medical or psychiatric disorders (e.g. viral infections, cancer, major depression, anxiety disorders) and treatments (e.g. chemotherapy, benzodiazepines), life-styles (e.g. unstable sleep cycle, caffeine consumption), and psychosocial stressors (e.g. work or marital stress) are all related to fatigue (Manu, Lane, & Matthews, 1992).

Epidemiology

It is under different definitions and origins that research tried to assess the relevance of fatigue and CFS since its definition by the CDC in 1988. Nevertheless, the prevalence of fatigue and fatigue disorders have been confirmed by studies carried out across the world. Irish research has revealed that at least 6.5% of patients had fatigue as the primary complain while seeking care (Cullen, Kearney, & Bury, 2002). American research emphasized the burden on employers, losing over 100 billion dollars with costs associated to the lost of productivity due to fatigue (Ricci et al., 2007). One third of the general Dutch population is estimated to suffer from chronic fatigue while CFS rates near the one percent mark (van't Leven et al., 2010). Research has also indicated higher prevalence of fatigue and CFS in women from different countries (e.g. Mens-Verhulst & Bensing, 1998; Jason et al., 2009).

Despite disparities, prevalence of fatigue disorders are expected to be underrated. It is estimated that approximately 90% of CFS cases are yet to be diagnosed, with long waiting periods associated with the difficulty in finding the correct diagnosis and worse prognosis (Institute of Medicine, 2015). In fact, the decrease in quality of life and mental well-being, present across cultures (Hardt et al., 2001; Marques et al., 2013b), goes beyond the disabilities brought on by fatigue and CFS, reflecting the toll patients go through when seeking diagnosis and treatment. Research has pointed out how unprepared the healthcare staff are, lacking specific information in the curriculum of most medical schools (Peterson et al., 2013) and medical textbooks (Jason et al., 2010). Patients often seek care when unexplained debilitating fatigue is present and diagnosis is often slow with surveys indicating that less than one quarter of patients are diagnosed within one year and almost one third taking longer than five years (ProHealth, 2008).

Even with epidemiological studies worldwide revealing significantly varying rates (Jason, Torres-Harding, Njok, 2006), most researchers agree to the importance and relevance of fatigue and fatigue disorders. Diferences in rates may be attributed to cultural background, physicians knowledge, clinical definitions and instruments used.

Measuring

History of the fatigue and CFS field in health sciences have been marked from the beginning with confusion on its definition, expression, assessment and origin, not to mention

treatment and prognosis. For as many definitions and theories of its onset are available, so are tools for its assessment. Since the experience of fatigue and CFS does not provide an organic biomarker, researchers developed psychological tests. Some of which relied on muscular strength and reflex time, trying to objectify as much as possible fatigue, though these tests did not rely on the experience of fatigue but on a lack of output muscle capacity. Since it is the experience of fatigue, different from muscle weakness and physiological fatigue, that motivates search for treatment (Berrios, 1990) especially when persistent and unexplained (Cope, 1992), researchers developed many different to self-reports questionnaires.

The time that followed the CDC definition of CFS, a variety of tools for assessing fatigue were developed (for further information on fatigue assessment see: Christodolou, 2005; Dittner et al., 2004; Elbers et al., 2012; or Mota & Pimenta, 2006).

The self-report measurements of fatigue are either unidimensional (e.g. Fatigue Severity Scale; FSS; Krupp et al., 1989) or multidimensional (e.g. Checklist of Individual Strength; CIS-20; Vercoulen et al., 1994). In order to determine the most adequate tool a database search was conducted.

Searching for a self-report questionnaire

All searches were conducted using the *b-on* database, which, among other data, includes *EBSCO* and *Web of Knowledge*.

First search string:

1. fatigue
2. instrument* OR psychometric* OR valid*
3. systematic review
4. self-report

The search was restricted to peer reviewed articles (35,120 through November 2015). Systematic reviews were selected in order to provide the most amount of studied instruments possible for the research. In order to restrict the search, articles in which the term "fatigue" appeared in the title were selected from the already existent pool. Further restrictions were made by selecting articles that had the term "self-report" in the title. Two articles were

eligible: Mota and Pimenta (2006) and Elbers et al., (2012). Mota and Pimenta (2006) presented a total of 18 instruments while Elbers et al. (2012) presented a total of 31 instruments. For further research, the instruments that were duplicated were eliminated, as well as the instruments in which the title presented a specific illness (e.g. Cancer-Related Fatigue Distress Scale). The main version of the instruments were kept in order to research Portuguese validations (e.g. only the term FIS was kept from D-FIS, FIS, U-FIS). Following the criteria established, 26 different instruments were eligible for further research.

The second search string:

1. Portuguese or Portugal
2. BFI or BMFQ or *CIS or CIS* or DEFS or DUFS or EMIF-SEP or FACIT-F or FAI or FAS or *FIS or FS or FSI or FSMC or FSS* or MFI or MFIS* or NHP-E or *PFS or POMS-F or PS-F or RFS or SF-36-V or SOFA* or SOFI or VAS*

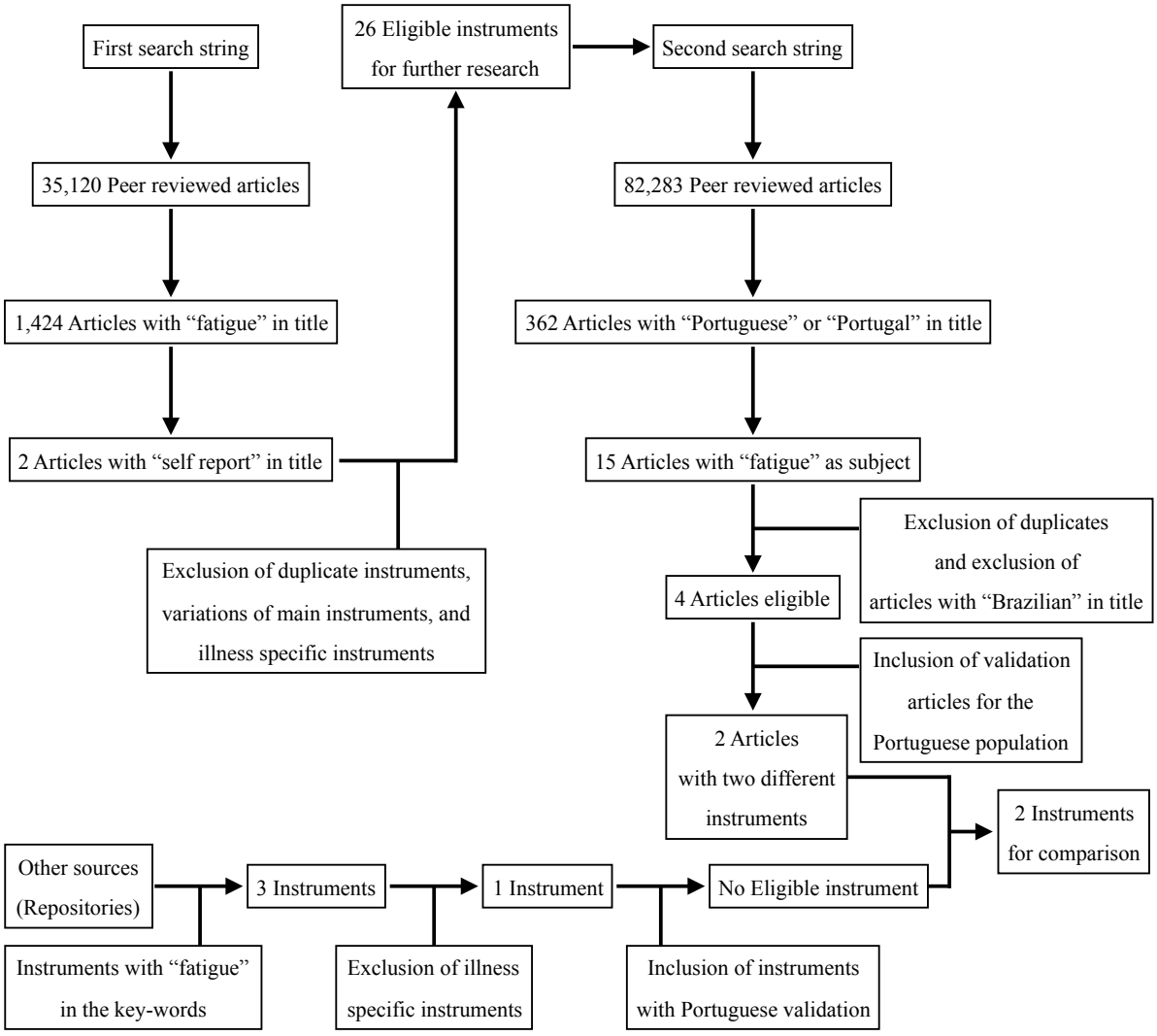
3. Fatigue

The search was restricted to peer review articles (82,283 through November 2015). In order to further restrict the search, articles in which the term "Portuguese" or "Portugal" appeared in the title were selected from the already existent pool. In order to limit the search to fatigue specific articles, only articles in which the term "fatigue" was among the subject were selected. Duplicated studies and articles with term "Brazilian" in the title were eliminated in favour of the Portuguese population. Out of the four remaining articles, two were focused on the validation and adaptation of different fatigue scales to the Portuguese population (Marques et al., 2013; Laranjeira, 2010).

Besides the online databases, Portuguese repositories *Repositório de Instrumentos de Avaliação Psicossocial* (RIAP) and *Repositório de Medição e Avaliação em Saúde* (RIMAS) were also researched. The criteria for inclusion was limited to any instrument with the term "fadiga" (fatigue) among the key-words. No instrument was found in RIAP (through November 2015) while three instruments were relevant in RIMAS (through November 2015). From the three instruments two were excluded for being specific to an illness. Therefore, one instrument was eligible (Fatigue Impact Scale Version 2.0). Unfortunately, this instrument

has no Portuguese validation and must be eliminated for that reason. Figure 2 illustrates the flow diagram for the research methodology.

Figure 2: flow diagram of search strategy for self-report questionnaires validated for the Portuguese population



Both, the FSS and the CIS-20, have been translated and validated to Portuguese and together with the, are currently the only options validated for the Portuguese population (Laranjeira, 2012; Marques, De Gutch, Gouveia, Cordeiro, Leal, & Maes, 2013a). While both can assess fatigue and are easy and fast to fill and to calculate the score, they are not interchangeable as they differ in content (Hewlett, Dures, & Almeida, 2011). The FSS measures only the impact and burden of fatigue (e.g. "Fatigue interferes with my physical

functioning"). Meanwhile the CIS-20 measures the experience of fatigue through four dimensions: subjective experience of fatigue (e.g. "I feel tired"), lack of motivation (e.g. "I am full of plans"), lack of concentration (e.g. "thinking requires effort"), and physical activity alterations (e.g. "physically I feel in a good shape"). Therefore, the FSS measures impairment, and the CIS-20 assesses the overall experience of fatigue (Koopman et al., 2014). Since it is the experience of fatigue that motivates the search for treatment and the experience is reflected in many dimensions, the CIS-20P provides the best fit for assessing fatigue. Beyond the measurement of fatigue experience, the CIS-20P may more accurately predict CFS by tapping into the other experiences associated with the disorder (e.g. lack of concentration).

Checklist of Individual Strength (CIS-20)

First developed in hospitals for CFS patients, the CIS-20 is a well validated and widely used multidimensional assessment of fatigue (Dittner et al., 2004). The CIS-20 was created by Vercoulen and Colleagues when determining the most significant dimensions of CFS in a study which included cognitive, behavioural, social and emotional aspects related to CFS. From the original nineThe success of the scale is seen as the widespread use of the questionnaire and its sub-scales, successfully discriminating CFS patients and individuals at risk.

The CIS-20 has stablished cutoff scores for both the total scale (Bültmann et al., 2000) and the subjective experience of fatigue sub-scale (De Vree, Van der Werf, Prins, Bazlmans, Vercoulen, & Servaes, 2002). The questionnaire has been used within the CFS population (e.g. Knoop, van der Meer, & Bleijenberg, 2008; Vercoulen et al., 1994), healthy working groups (e.g. Bültmann et al., 2000), and it has also been adapted across cultures (e.g. Aratake et al., 2007; Makowiec-Dabroska & Koszada-Wlodarcyk, 2006; Marques et al., 2013). The CIS-20 is also useful with clinical samples, such as amyotrophic lateral sclerosis patients (Panitz, Kornhuber, & Hanisch, 2015), and leukaemia patients (Abd El Baky, & Adel Elhakk, 2017). The Portuguese version (CIS-20P), adapted by Marques and Colleagues (2013), broke ground for the use of a multidimensional assessment of fatigue in Portuguese speaking countries (e.g. Brazil, Portugal). Despite being able to discriminate CF patients from a healthy sample, the tetra-dimensional structure of the CIS-20P has presented issues

during the validation process. Though reasonable, both the healthy sample (X^2/df=4.731; CFI=.85; RMSEA=.093) and CF sample (X^2/df=1.739; CFI=.75; RMSEA=.092) did not hold the expected model fit indexes, performing poorer then expected. Low reliability for the motivational dimension was also observed (healthy sample α=.51; CF sample α=.58). The Portuguese version is yet to be tested with other samples (e.g. primary care) and no percentile distribution has been created. Marques and colleagues (Marques et al., 2013b) have also pointed out the lower quality of life of the Portuguese participants when compared to a Dutch sample.

Well-Being and fatigue

Links between CFS and quality of life (e.g. Marques et al., 2013b), depression and anxiety (e.g. Lehman et al.,2002) have been established, though its relationship is not yet understood. In fact, well-being has been identified as an dimension of CFS in the original CIS-20 development (Vercoulen et al., 1994).

It has been well documented the close relationship between well-being and fatigue (e.g. Hardt et al., 2001). Fatigue, often medically unexplained (somatic), is part of commonly reported somatic symptoms which are responsible for healthcare use and patient frustration when seeking care (De Gutch & Maes, 2006; Kroenke et al., 2002). Mental well-being (Tennant et al., 2007), consistent of both hedonic (subjective well-being) and eudaemonic (positive functioning), is constantly tested by the strain put on not only by the disease, but also by the lack of support provided by the healthcare system. It has also been established that Portugal has high rates for both depression and anxiety, when compared to other European countries (Direção-Geral da Saúde, 2014; European Commission, 2010). At this time it is not yet clear how these variables interact.

Objectives

Early diagnosis is paramount to CFS treatment, so that interventions may be implemented as soon as possible, such as cognitive behaviour therapy or graded exercise therapy (Marques, De Gutch, Leal, & Maes, 2015; White et al., 2011). Thus, The CIS-20P is an extremely useful tool in quickly assessing fatigue levels and possible fatigue disorders in different populations, from healthy working individuals, to patients in a hospital.

Fatigue, often reported by patients, lacked empirical research interest due to its non-discriminative nature. Currently, fatigue is understood to be a significant symptom, being at the core of disabling conditions such as CFS, and related with additional somatic symptoms and decreased levels of well-being. In order to reach a greater understanding of fatigue and CFS, as well as to treat those in need, one must be able to rapidly and objectively measure it, specifically in primary care, so that interventions may be promptly developed. Therefore, this study aims to (1) validate the CIS-20P scale on primary health care patients, (2) study its relationship with well-being while considering other somatic symptoms, and (3) develop the first percentile distribution for the CIS-20P. In order to do so, an adult sample of a Portuguese primary health care centre is used to examine the psychometric properties of the CIS-20P, as well as exploring its relationship with well-being and examining possible predictors of fatigue (e.g. sex, age, presence of chronic disease). Further validation of the tetra-dimensional structure is explored with an independent sample of working adults and elderly primary health care patients. Only then a percentile distribution is created.

Appendix B: Informed consent (Health Care Center sample).

Consentimento Informado, Livre e Esclarecido para participação em investigação

de acordo com a Declaração de Helsínquia e a Convenção de Oviedo

Por favor, leia com atenção a seguinte informação. Se achar que algo está incorrecto ou que não está claro, não hesite em solicitar mais informações. Se concorda com a proposta que lhe foi feita, queira assinar este documento.

Título do estudo: Estamos a convidá-lo para participar numa investigação sobre Fadiga percebida, percepção de sintomas e estado de saúde na população adulta portuguesa.

Enquadramento: Este estudo é realizado no âmbito de um projecto de investigação que resulta da colaboração entre o Grupo Investigação *Promoting Human Potential*, do ISPA-Instituto Universitário e a Unidade de Saúde Familiar Conde de Oeiras, tendo a coordenação cientifica da Professora Doutora Maria João M. Gouveia.

Explicação do estudo: Este questionário pretende recolher **a sua opinião** sobre a sua saúde, problemas de fadiga, actividades diárias e outros aspectos relevantes do seu bem-estar, pelo que é muito importante que responda sinceramente **a todas as questões** que lhe são solicitadas.

Condições e financiamento: Este estudo é apoiado pelo ISPA-instituto Universitário, no âmbito do financiamento anual atribuído ao grupo de investigação *Promoting Human Potential.* O protocolo desta investigação já foi avaliado e aprovado pela Comissão de Ética do ISPA-Instituto Universitário de Ciências Psicológicas, Sociais e da Vida. **O estudo não tem quaisquer riscos**. A sua participação é voluntária e o seu acompanhamento médico na USF-CO continuará como habitualmente não dependendo da sua disponibilidade para participar. É por isso livre de interromper a sua participação se e quando o desejar.

Confidencialidade e anonimato: Todos os dados fornecidos são **anónimos e confidenciais**, e não serão usados para quaisquer outros fins que não a presente investigação.

A Equipa de Investigação

Maria João Morais Gouveia, PhD – ISPA – Instituto Universitário
Cristina Bastos, Médica USF Conde Oeiras
Sara Andrade, Médica USF Conde Oeiras
Ana Rita Jesus Maria, Médica USF Conde Oeiras
Marta Marques, PhD – FMH - UL
Matheus Lourenço – ISPA – Instituto Universitário

A Coordenadora da Investigação:

_____
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Declaro ter lido e compreendido este documento, bem como as informações verbais que me foram fornecidas pela/s pessoa/s que acima assina/m. Foi-me garantida a possibilidade de, em qualquer altura, recusar participar neste estudo sem qualquer tipo de consequências. Desta forma, aceito participar neste estudo e permito a utilização dos dados que de forma voluntária forneço, confiando em que apenas serão utilizados para esta investigação e nas garantias de confidencialidade e anonimato que me são dadas pelo/a investigador/a.

Nome: _____
Assinatura: _____ Data: ____/____/____

Este documento é composto de 1 página e feito em duplicado:
uma via para o/a investigador/a, outra para a pessoa que consente

Appendix C: Informed consent (Online Participant sample).

Caro(a) colaborador(a),

Gostaríamos de convidá-lo(a) a participar neste Projeto de Investigação, inserido no Mestrado em Psicologia Social e das Organizações no ISPA-IU.

O estudo que seguidamente lhe apresentamos visa aferir se Funcionamento Familiar tem um efeito mediador na Fadiga e no Bem-estar.

Deste modo agradecemos que respondam única e exclusivamente pessoas que sejam trabalhadores no ativo.

Se concordar em participar, ser-lhe-ão apresentadas várias afirmações que refletem sentimentos e opiniões em relação ao seu Bem-estar e Fadiga. Para uma análise mais abrangente necessitamos, igualmente, de conhecer qual o tipo de perceção que tem sobre o seu Funcionamento Funcionamento.

Solicitamos que responda com a maior sinceridade e espontaneidade possíveis (estamos interessados na sua primeira resposta). Não existem respostas corretas ou erradas, apenas a sua opinião pessoal.

O questionário tem uma duração aproximada de 15 minutos.

Os dados recolhidos são confidenciais, sendo que apenas a equipa de investigação terá acesso aos mesmos. Os participantes deste estudo não serão identificados em qualquer análise ou apresentação do relatório final.

Informações adicionais poderão ser recolhidas junto de Andrea de Sousa e Brito (andreadesousaebrito@gmail.com). Teremos todo o gosto em fornecer esclarecimentos adicionais que considerar necessários.

Nota - Todas as questões são de caracter obrigatório

Appendix H: Sociodemographic information questionnaire

Informações gerais e sobre a sua fadiga:

1. **Sexo:** ○ Masculino ○ Feminino
2. **Idade:** ____
3. **Número de filhos:** ____
4. **Concelho onde reside:** _____
5. **Estado Civil:**

○ Casado(a)/União de Facto ○ Solteiro(a) ○ Divorciado(a)/Separado(a) ○ Viúvo(a)

6. **Com quem vive:**

○ Só ○ Pais ○ Filhos ○ Parceiro(a) ○ Amigos ○ Outros familiares

6. **Habilitações literárias:**

○ Ensino básico ○ Ensino secundário (ou equivalente) ○ Ensino Superior

7. **Profissão:**

_____

8. **<u>Presentemente</u>, tem sintomas de fadiga?** ○ Sim ○ Não

SE SIM,

(a) Há quanto tempo tem estes sintomas de fadiga?

____semanas **OU** ____meses **OU** ____anos

(b) A fadiga sentida levou a uma redução significativa das suas actividades diárias anteriores? ○ Sim ○ Não

(c) A fadiga sentida melhora com repouso? ○ Sim ○ Não

9. **Sofre de alguma <u>doença crónica diagnosticada</u>?** ○ Sim ○ Não

SE SIM,

(a) Qual?_____

(b) Há quanto tempo foi diagnosticada?

____semanas **OU** ____meses **OU** ____anos

10. **<u>Nos últimos 6 meses:</u>**

(a) Foi a quantas consultas médicas (médico de família)? _____

(b) Foi a quantas consultas médicas de especialidade? _____

•Quais especialidades? _____

_____

11. **<u>Actualmente</u>, faz algum tipo de medicação?** ○ Sim ○ Não

SE SIM,

(a) Qual?_____

12. **<u>Actualmente</u>, está a receber algum tipo de apoio psicológico?** ○ Sim ○ Não

13. **<u>Actualmente</u>, encontra-se a trabalhar?** ○ Sim ○ Não

SE SIM,

(a) Trabalha quantas hora por semana? ____horas/semana

(b) Trabalha a <u>meio tempo</u> devido aos seus problemas de fadiga? ○ Sim ○ Não

(c) Devido aos seus problemas de fadiga, quantas vezes teve que faltar ao seu emprego, <u>nos últimos 6 meses</u>? ___dias

SE NÃO,

(a) deixou de trabalhar por causa dos seus problemas de fadiga? ○ Sim ○ Não