Cognitive Decline Complaints Scale (CDCS): Validation and Normative Studies for the Adults and Older Adults Portuguese Population

Versão Final Após Defesa

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Resumo Alargado em Português

Introdução

As Queixas Cognitivas Subjetivas (QCS), que resultam da autopercepção de Declínio Cognitivo Subjetivo (DCS; Freitas et al., *in press*), são frequentemente reportadas por pessoas idosas, fruto das alterações cognitivas que surgem quer no envelhecimento normativo quer no patológico (Markova et al., 2017). Apesar de alguns estudos mostrarem que indivíduos com QCS são mais propensos a desenvolver Declínio Cognitivo Ligeiro (DCL) ou Demência (Jessen et al., 2020), sendo estas um critério central para o diagnóstico de DCL e um dos sintomas iniciais da Doença de Alzheimer (Jessen et al., 2014), esta associação entre as QCS e o comprometimento cognitivo objetivo não é consensual. Embora as QCS aumentem o risco de comprometimento cognitivo, a maioria dos indivíduos que as reportam não progride para comprometimento cognitivo objetivo, existindo assim outros fatores que podem estar associados às queixas cognitivas, tais como sintomatologia depressiva, ansiedade (Jessen et al., 2020) e determinados traços de personalidade (Numbers et al., 2020).
Diversos são os instrumentos para avaliar as QCS/DCS (Rabin et al., 2015), contudo apresentam limitações, que a Escala de Queixas de Declínio Cognitivo (EQDC) pretende colmatar, apresentando-se como o único instrumento em Portugal que avalia as queixas de DCS (Freitas et al., *in press*). A EQDC avalia as queixas subjetivas de declínio cognitivo em diversos domínios cognitivos - atenção e concentração, memória, linguagem, funções executivas, orientação temporal e espacial e função visuoespacial – em três níveis de gravidade (Freitas et al., *in press).* A escala apresenta boa validade psicométrica, sendo necessários estudos adicionais psicométricos para consolidar a sua validação e uso adequado e para o estabelecimento de dados normativos para a população adulta e idosa de Portugal. Este estudo pretende: (1) examinar a validação psicométrica considerando a Teoria Clássica dos Testes e (2) estabelecer dados normativos para a população adulta e idosa Portuguesa.

Metodologia

A amostra foi constituída por adultos e idosos Portugueses cognitivamente saudáveis, recrutados em grupos de apoio ao envelhecimento e associações. Os critérios de inclusão do estudo foram: ter idade igual ou superior a 50 anos; ter o português como língua materna; ter pelo menos um ano de escolaridade formal em Portugal; ser cognitivamente saudável e autónomo nas atividades de vida diária; não apresentar défices motores, visuais ou auditivos significativos que possam influenciar o

desempenho nos testes; ausência de historial de alcoolismo ou abuso de substâncias e perturbações neurológicas, psiquiátricas e patologias crónicas ou farmacoterapia que possa ter impacto no funcionamento cognitivo.

Todos os participantes responderam a um questionário sociodemográfico completo e a um inventário do atual estado clínico de saúde, de hábitos anteriores e histórico médico aplicado em entrevista por um psicólogo. Para fazer uma avaliação global de cada participante e garantir os critérios de inclusão, foi administrada uma bateria de avaliação neuropsicológica, que incluiu os seguintes instrumentos: o Mini-Mental State Examination (MMSE), o Montreal Cognitive Assessment (MoCA), o Teste do Desenho do Relógio (TDR), o Teste de Leitura de Palavras Irregulares (TeLPI), o Inventário de Avaliação Funcional de Adultos e Idosos (IAFAI), a Escala de Depressão Geriátrica (GDS-30), o Questionário de Declínio Cognitivo Subjetivo (QDCS) e a Escala de Queixas de Declínio Cognitivo (EQDC). Todos os participantes tinham de apresentar desempenho normal nestes testes, considerando os pontos de corte para a população portuguesa, para serem incluídos no estudo.

Resultados

A amostra final é constituída por 199 participantes cognitivamente saudáveis (média de idade = 68.19 ± 8.581 [50-99]; média de escolaridade = 8.57 ± 4.574 [2-22]). As características psicométricas da EQDC revelaram-se, no geral, adequadas para esta amostra comunitária. A presente amostra apresentou 20 pontos de média no score total da EQDC. A escala não apresentou correlação estatisticamente significativa com a idade e a escolaridade. Contudo, foram verificadas diferenças significativas na região geográfica, que podem ser explicadas por diferenças observadas nos níveis de sintomatologia depressiva entre o continente e a ilha de Portugal (Açores). Em relação ao funcionamento cognitivo e emocional, a EQDC não mostrou correlações significativas com as provas cognitivas (MMSE e MoCA), mas evidenciou uma correlação significativa com a sintomatologia depressiva (GDS). Como não se observaram correlações significativas, nem diferenças significativas, entre os scores da CDCS e a idade e a escolaridade, os dados normativos não foram estabelecidos tendo em conta estas variáveis., mas considerando toda a amostra.

Discussão/Conclusões

A EQDC apresenta-se como uma escala com boas evidências de validade psicométrica, para a população portuguesa adulta e adulta idosa, que vem preencher uma lacuna na avaliação neuropsicológica ao proporcionar uma visão mais abrangente das queixas de declínio cognitivo subjetivo ao incluir diversos domínios cognitivos. Os dados normativos estabelecidos permitem avaliar se as queixas de declínio cognitivo subjetivo

da pessoa se encontram acima ou abaixo da média normativa. Assim, os pontos de corte determinados podem constituir-se como um importante sinalizador, nos casos em que a pontuação se encontre acima da média, para que se proceda a uma avaliação neuropsicológica mais extensa para despiste de possíveis défices cognitivos e/ou sintomatologia depressiva. Deste modo, preconiza-se que a EQDC se constitua como um instrumento adicional com contributo para o diagnóstico do envelhecimento patológico (DCL ou demência).

Palavras-Chave

Queixas de declínio cognitivo subjetivo; avaliação neuropsicológica; dados normativos; envelhecimento; comprometimento cognitivo

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Introduction

Subjective Cognitive Complaints (SCC), which result from the self-perception of Subjective Cognitive Decline (SCD), are frequently reported by elderly people as a result of cognitive alterations that occur in normative and pathological aging. Although some studies show that individuals with SCC are more likely to develop Mild Cognitive Impairment (MCI) or Dementia, which are a central criterion for the diagnosis of MCI and one of the early symptoms of Alzheimer's Disease, this association between SCC and objective cognitive impairment is not consensual. Although SCC increase the risk of cognitive impairment, most individuals who report this type of complaint do not seem to exhibit objective cognitive decline, which rises questions regarding other factors that may be associated with these complaints (e.g., depression, anxiety, personality traits, etc.).

There are several instruments to assess the SCC/SCD, despite them having several limitations. The Cognitive Decline Complaints Scale (CDCS) appears in order to overcome them, presenting itself as the only instrument in Portugal that assesses SCD complaints. The CDCS assesses subjective complaints of cognitive decline in various cognitive domains - attention and concentration, memory, language, executive functions, temporal and spatial orientation, and visuospatial function - through three levels of severity. The scale has good psychometric validity, however, further psychometric studies are necessary to consolidate its validation and proper use, as well as to establish normative data for the adult and elderly population of Portugal.

This dissertation, developed within the scope of the Master's Degree in Clinical and Health Psychology, aims to examine the psychometric validation of the scale in the light of the Classic Test Theory and to establish preliminary normative data of the CDCS for the Portuguese adult and elderly population.

The study sample consists of cognitively healthy adults and older adults of the community, stratified within the various sociodemographic variables according to the distribution observed in the Portuguese population.

The present investigation is divided essentially into four main parts: introduction, methodology, results and discussion. The introduction includes a brief framework, based on the most recent bibliographical literature, on the theme of complaints of subjective cognitive decline and its relationship with other variables, as well as the instruments most used to assess them. In addition, the scale that is the subject of study, the CDCS, and the objectives of this study are also presented. The methodology includes a brief description of the study participants and procedures, the presentation and characterization of the various instruments that compose the

neuropsychological assessment battery used in the study, the definition of the sociodemographic variables by which the sample was stratified and the statistical analysis. Finally, the obtained results are presented, and a discussion is carried out, also exposing the limitations, potentials and implications of this study.

This dissertation, in accordance with the regulation of the 2nd cycle of studies leading to the master's degree in Clinical and Health Psychology, was prepared as an article for submission to the journal *Health & Social Care in the Community* and is awaiting a response.

List of Tables

List of Acronyms

CDCS	Cognitive Decline Complaints Scale
MCI	Mild Cognitive Impairment
SCC	Subjective Cognitive Complaints
SCD	Subjective Cognitive Decline
AD	Alzheimer's Disease
MAC-Q	Memory Complaint Questionnaire
ECog	Everyday Cognition
GDS	Geriatric Depression Scale
MMSE	Mini-Mental State Examination
MoCA	Montreal Cognitive Assessment
CDR	The Clock Drawing Test
TeLPI	Irregular Word Reading Test
SCD-Q	Subjective Cognitive Decline Questionnaire
NUTS-II	Nomenclature of Territorial Units for Statistics
PUA	Predominantly urban areas
MUA	Moderately urban areas
PRA	Predominantly rural areas
SPSS	Statistical Package for the Social Sciences
ANOVA	Analysis of variance
*SD*s	Standard Deviations
M	Mean
IRT	Item Response Theory
SMC	Memory Complaints Scale

Cognitive Decline Complaints Scale (CDCS): Validation and Normative Studies for the Adults and Older Adults Portuguese Population

Abstract

Subjective Cognitive Complaints (SCC), which result from the self-perception of Subjective Cognitive Decline (SCD), are frequently reported by older adult people. The Cognitive Decline Complaints Scale (CDCS) assesses subjective complaints of cognitive decline in several cognitive domains - attention and concentration, memory, language, executive functions, temporal and spatial orientation and visuospatial function - through three levels of severity. This study aims to psychometrically validate this instrument considering the Classical Test Theory, and to establish preliminary normative data of the CDCS for the elderly Portuguese population. The community-based sample consisted of 199 cognitively healthy Portuguese adults and older adults, stratified according to several sociodemographic variables with a distribution similar to that observed in the Portuguese population. All participants responded, in addition to the CDCS, to an extensive neuropsychological assessment protocol. The psychometric characteristics of the CDCS were generally adequate for this community sample. As for the sociodemographic variables analyzed, only the geographic region had differences in the CDCS scores, which can be explained by differences observed in the levels of depressive symptoms between the mainland and the island of Portugal (Açores). There were no significant correlations or differences between the CDCS scores and age and educational level and, therefore normative data were explored considering the total sample. The CDCS is a scale that allows the detailed assessment of subjective cognitive complaints and the determination of whether or not such complaints are considered normative, which will facilitate an empirically based understanding of this dimension of psychological functioning and also provide indications as to the need for a more extensive neuropsychological assessment.

Keywords: Complaints of subjective cognitive decline, neuropsychological assessment, normative data, aging, cognitive impairment.

1. Introduction

During the aging process it is expected to observe changes at a cognitive level, that may turn into pathological as presented in Mild Cognitive Impairment (MCI) and in the Dementia spectrum (Harada et al., 2013). These cognitive changes often have negative impacts on the daily living and may be reported as Subjective Cognitive Complaints (SCC) by elderly people (Markova et al., 2017; Ribeiro & Guerreiro, 2002; Slavin et al., 2010).

The SCC are a result of Subjective Cognitive Decline (SCD) (Freitas et al., *in press*), which is the self-perception of a worse performance in various cognitive domains when compared to a previous cognitive performance (Jessen et al., 2014). When the SCC occur in cognitively healthy individuals (Lee et al., 2020), usually they are related to the expected cognitive changes of the aging process (Jessen et al., 2014; Markova et al., 2017; Mendonça et al., 2016). Although it could also be reported by patients with objective cognitive impairment (e.g., MCI), in both cases (healthy vs. pathological aging) the SCC can be detected by through neuropsychological assessment (Lee et al., 2020).

Although In spite of several studies have shown that individuals with SCC are more likely to develop MCI or Dementia (e.g., Gifford et al., 2014; Jessen et al., 2020; Mitchell et al., 2014; Parfenov et al., 2020; van Harten et al., 2018), assuming SCC as an indicator (Mitchell et al., 2014) and predictor of future objective cognitive decline (Dufouil et al., 2005; Si et al., 2020; Snitz et al., 2012), the association between SCC and cognitive impairment is not consensual. On one hand, some studies highlight the association of SCC with objective cognitive impairment (e.g., Lee et al., 2020; Nicholas et al., 2017), indicating them as: (i) a central criterion for the diagnosis of MCI (e.g., Albert et al., 2011; Jessen et al., 2014; Petersen, 2004) and prodromal dementia (e.g., Jessen et al., 2014); (ii) one of the first symptoms of Alzheimer's Disease (AD) in the preclinical phase (Jessen et al., 2014), or of an incipient neurodegenerative disease (Jessen et al., 2020). On the other hand, studies have found that self-reported SCC are not predictive of objective cognitive decline (e.g., Edmonds et al., 2018; Slavin et al., 2015), and therefore should not be included in the diagnosis of MCI (Edmonds et al., 2018). However, with the worsening progress of cognitive impairment, the self-reported SCC become less and less relevant, due to the person's increasing difficulty in insight and communication (Edmonds et., 2018; Molinuevo et al., 2017). In turn, the reports of informants or caregivers become more relevant (Edmonds et., 2018; Molinuevo et al., 2017), being considered by several authors as the best predictor of the patients' objective cognitive performance (e.g., Edmonds et al., 2018; Juncos-Rabadán

et al., 2014; Numbers et al., 2020; Ryu et al., 2020; Slavin et al., 2015), carrying a higher weight in the prognosis than the individual's self-report (Molinuevo et al., 2017).

Although SCC increase the risk of cognitive impairment, most individuals who report this type of complaints do not progress to objective cognitive impairment (Jessen et al., 2020; Mendonça et al., 2016). Actually, the SCC may not be associated with objective cognitive performance, but rather with psychopathological symptoms such as of depression (e.g., Jessen et al., 2020; Lee et al., 2020; Markova et al., 2017; Numbers et al., 2020; Salem et al., 2015) and anxiety (e.g., Jessen et al., 2020; Numbers et al., 2020; Stites et al., 2018), and personality traits, such as neuroticism (e.g., Numbers et al., 2020; Slavin et al., 2010; Snitz et al., 2015). The SCC can also be related to different psychiatric and medical conditions such as neurological disorders, substance abuse and medication intake with impact on cognitive performance (Jessen et al., 2014; Jessen et al., 2020), as well as other personal characteristics as culture (Jessen et al., 2014).

Besides the existence of several terms to designate SCC (Jessen et al., 2014), there is also high diversity of methods used to evaluate them, which jeopardizes the comparison of results from different studies (Rabin et al., 2015). The assessment of SCC/SCD ranges from a single question to several items (Molinuevo et al., 2017), focusing either in one single domain (usually memory; e.g., Nicholas et al., 2017; Picón et al., 2019), or in several cognitive domains (e.g., Numbers et al., 2020; Slavin et al., 2015). Rabin and colleagues (2015) identified 34 self-report measures to assess SCC/SCD (from the analysis of 19 international studies), concluding that the Memory Complaint Questionnaire (MAC-Q) and Everyday Cognition (ECog) were the most used measures to investigate this subject. These authors also found a great variation in the form and options of response, as well as in the content of the items, where the memory domain was the most recurrent among the analyzed items (Rabin et al., 2015). The main limitations identified in the existing scales were the fact that these evaluations covered concerns related to only a few cognitive domains, mainly memory, and did not present a severity gradient (Freitas et al., *in press*).

To overcome the limitations of the existing instruments, Freitas and colleagues (*in press*) developed the Cognitive Decline Complaints Scale (CDCS), which assesses the subjective complaints of cognitive decline in several cognitive domains - attention and focus, memory, language, executive functioning, temporal and spatial orientation, and visuospatial functioning - through a severity gradient. A previous study using Item Response Theory (IRT) supports the final version of the CDCS, which showed overall adequacy, good fit considering items and persons, reduced differential item functioning effects and discriminant validity between healthy controls and clinical conditions. Even

though this scale showed good psychometric validity, further psychometric studies are necessary to consolidate its validation and clinical usefulness. It is also equally necessary to establish normative data for the elderly population. The aims of this study are (i) to examine the psychometric validation considering the Classical Test Theory, and (ii) to establish preliminary normative data of the CDCS for the elderly Portuguese population.

2. Methodology

2.1. Participants and procedures

From the initial sample composed of 235 participants, only 199 meet the inclusion criteria for the present study: (i) being 50 years old or older; (ii) having Portuguese as the native language; (iii) having at least one year of formal schooling performed in Portugal; (iv) being cognitively healthy and autonomous in the activities of daily living; (v) not having significant deficits (motor, visual or auditory) with potential influence on test performance; (vi) absence of history of alcoholism or substance abuse and neurological, psychiatric, chronic unstable systemic disorders or pharmacotherapy that may impact on the cognitive functioning. A total of 36 participants were excluded due to the presence of clinically significant depressive symptoms and/or cognitive impairment, according to their performance on the neuropsychological assessment battery and the respective cutoff points stablished for the Portuguese population.

All participants answered a complete sociodemographic questionnaire, an inventory of current clinical health status and past habits, and medical history, applied in an interview by an experienced psychologist. In order to globally assess each participant and ensure the inclusion criteria, all participants were evaluated through an extensive assessment battery (see “Materials”). Only participants with a normal cognitive performance (Freitas et al., 2011, Freitas et al., 2015; Santana et al., 2013) and absence of clinically significant depressive symptoms (≤ 20 points in the Geriatric Depression Scale - GDS-30) were included in this study. The data used in this study were collected in a pre-pandemic period.

This investigation was approved by the Ethics Council and Scientific Committee of the Faculty of Psychology and Educational Sciences. All ethical principles for experimentation on humans, present in the Declaration of Helsinki, have been fulfilled and respected. The Free and Informed Consent Form was signed by all participants, after the aims, procedures and confidentiality of the data collected were explained, and

all this information was also provided to legal representatives, companions or caregivers involved in the study.

2.2. Materials

The neuropsychological assessment battery used in the present study included:

a. A complete sociodemographic questionnaire and inventory of current clinical health status and past habits, and medical history;
b. The Adults and Older Adults Functional Assessment Inventory (IAFAI; Sousa et al., 2013) to prove the maintenance of functionality;
c. The Mini-Mental State Examination (MMSE; Folstein et al., 1975; Guerreiro et al., 1994), which is a brief cognitive screening instrument that assesses six domains - orientation, retention, attention and calculation, evocation, language, constructive ability - through 30 questions (maximum score: 30 points);
d. The Montreal Cognitive Assessment (MoCA; Nasreddine et al., 2005; Simões et al., 2008), which is a brief cognitive screening instrument that evaluates memory, visual-spatial capacity, executive function, language, orientation, and attention, concentration and working memory. The maximum score is 30 points, with higher scores indicating better cognitive performance;
e. The Clock Drawing Test (CDT; Battersby et al., 1956; Santana et al., 2013), a screening instrument for dementia that assesses visuoconstructive, visuospatial and executive dysfunction (maximum score = 18 points). This test consists of drawing a round clock with numbers and hands, and marking the time of 11 hours and 10 minutes;
f. The Irregular Word Reading Test (TeLPI; Alves et al., 2009), which is a tool that consists of a list of 46 irregular words that the participant reads that allow the estimative of premorbid intelligence;
g. The Geriatric Depression Scale (GDS-30; Barreto et al., 2008; Yesavage et al., 1983) to assess emotional and behavioral symptoms of depression in older adults. This scale is composed of 30 dichotomous response questions (maximum score = 30);
h. The Subjective Cognitive Decline Questionnaire (SCD-Q; Freitas et al., 2018; Rami et al., 2014), which is a dichotomous questionnaire composed of 24 questions that assess the presence of complaints of cognitive decline (maximum score: 24 points).
i. The Cognitive Decline Complaints Scale (CDCS; Freitas et al., 2018), which assesses the subjective complaints of cognitive decline in various cognitive domains: attention and concentration, memory, language, executive functions,

visuospatial functioning and temporal and spatial orientation. It is an instrument composed of 49 items with a three-level *Likert* response scale that corresponds to a gradient of severity of the difficulties, these being "No/Never", "Rarely/Sometimes" and "Always". The total score ranges from 0 to 98 points, with higher scores indicating more subjective complaints of cognitive decline.

2.3. Variable Definitions and Samples Stratification

The present sample was stratified according to the following sociodemographic variables:

1. Age (two age intervals: 50-64 and greater than or equal to 65 years);
2. Gender (female and male);
3. Educational level (four education levels were considered, considering the number of school years successfully completed in Portuguese educational system and according to its division: 1-4 years [primary education], 5-9 years [middle school], 10-12 years [high school], and more than 12 years of education [university/college]);
4. Marital status (classified into five categories: single, married, divorced, widowed and other);
5. Geographic region (according to the Nomenclature of Territorial Units for Statistics [NUTS-II] classification [Instituto Nacional de Estatística, 2021], the Portuguese territory is divided into six geographic regions: North, Center, Lisbon, Alentejo, Algarve and Açores);
6. Residence area (according to the Types of Urban Areas [Instituto Nacional de Estatística, 2021], categorized into predominantly urban areas [PUA], moderately urban areas [MUA], and predominantly rural areas [PRA]).

2.4. Statistical Analysis

All data analyzes were performed using the IBM Statistical Package for the Social Sciences (SPSS) for Windows, version 27 (IBM Corp., Armonk, N. Y., USA, 2020). Descriptive statistics were calculated for all sociodemographic and health variables. Internal consistency of the CDCS was measured by Cronbach's alpha. Pearson's correlation coefficients were conducted to explore the concurrent and construct validities. The differences in CDCS scores were observed between the subgroups using the *student's t* test, analysis of variance (ANOVA), and the Tukey post hoc test. Analysis of variance (ANOVA) allowed to examine the influence of sociodemographic variables on the CDCS scores. Eta squared ($\eta 2$) was used as an

estimate of the effect size (Cohen, 1988). The correlations between CDCS scores, age and education were analyzed using Pearson's correlation coefficient (*r*; Cohen, 1988). In order to analyze the differences between the mainland and island regions, and later between the depressive symptoms and these two regions, an ANOVA was performed. Finally, the normative data are presented as means ± standard deviations (*SDs*) and those of the distributions are expressed as means below 1 *SD*, 1.5 *SD*, and 2 *SDs*.

3. Results

3.1. Sociodemographic characterization

The final sample was composed by 199 cognitively healthy participants (mean age = 68.19 ± 8.581 years [50-99]; mean education = 8.57 ± 4.574 [2-22]). Most of these participants were married (60.8%), while 48 (24.1%) were widows, 17 (8.5%) divorced, 10 (5%) single, and 3 (1.5%) reported to have other marital status. The sociodemographic characterization of the study participants is shown in Table 1. The distribution of the sample through the different strata is comparable to the distribution of the target Portuguese population.

Table 1 – Sociodemographic characterization and stratification of the sample.

Variables	*Levels*	*Sample n (%)*	*Portugal*[a] *n (%)*
Age (years)	50-64	67 (33.7)	20.6%
	≥65	132 (66.3)	21.7%
Educational level	Primary	76 (38.2)	19.6%
	Middle	41 (20.6)	28.2%
	High	46 (23.1)	25%
	University	36 (18.1)	23.3%
Gender	Female	157 (78.9)	52.8%
	Male	42 (21.1)	47.2%
Geographic region	North	47 (23.6)	35.6%
	Center	73 (36.7)	22%
	Alentejo	12 (6.0)	7%
	Açores	65 (32.7)	2.5%
Residence area	PUA	94 (47.2)	73.2%
	MUA	44 (22.1)	14.3%
	PRA	60 (30.2)	12.5%

Note. PUA = predominantly urban areas; MUA = moderately urban areas; PRA = predominantly rural areas.

[a] The values (*n*) of the Portuguese population are expressed in thousands and represent data of the resident population in Portugal aged over 50 years (Instituto Nacional de Estatística, 2021).

3.2. Psychometric Analysis of the CDCS

The CDCS showed an internal consistency of .936 measured by the Cronbach's alpha. In order to explore the indicators of construct validity, we carried out correlations between all the items of the scale and the total score of the CDCS. The results show that all items were positively and significantly correlated with the total

score of the scale, with correlation values ranging between r = .228 and r = .652 (p <.01). To examine the convergent validity, the correlation between the total SCD-Q and the total CDCS scores were calculated. The result was significant and positive for the total sample (SCD-Q vs. CDCS: r = .773, p <.01), which suggests convergency of performances between both scales.

3.3. Characterization of the CDCS

The total sample exhibited an average of 20 points (20.24±12.91) for the total score of the CDCS. The CDCS did not show statistically significant correlations with age (r = .091, p = .203) and education level (r = .032, p = .656). Table 2 presents the analysis of the differences between the sociodemographic subgroups.

Table 2 - Analysis of the differences on the CDCS scores.

Variables	*CDCS (M±SD)*	*F* *p*	*Effect Size*
Age (years)			
50-64	19.93 ± 14.99	$F_{(1, 199)}$ = .060	*null*
≥65	20.40 ± 11.77	p = .806	η^2 = .000
Educacional level			
Primary	19.59 ± 11.90		
Middle	20.49 ± 12.90	$F_{(3, 199)}$ = .161	*Small*
High	21.24 ± 14.24	p = .922	η^2 = .002
University	20.06 ± 13.62		
Gender			
Female	20.69 ± 13.25	$F_{(1, 199)}$ = .916	*Small*
Male	18.55 ± 11.52	p = .340	η^2 = .005
Marital status			
Single	17.10 ± 10.27		
Married	20.38 ± 12.58	$F_{(4, 199)}$ = .555	*Small*
Divorced	21.47 ± 16.98	p = .695	η^2 = .011
Widowed	20.67 ± 13.04		
Other	11.33 ± 5.03		
Geographic region			
North	19.04 ± 12.32		
Center	17.15 ± 12.32	$F_{(3, 197)}$ = 5.063	*Medium*
Alentejo	18.42 ± 15.73	p = .002	η^2 = .073
Açores	25.17 ± 12.27		
Residence area			
PUA	20.81 ± 12.16	$F_{(2, 198)}$ = 1.558	*Small*
MUA	22.23 ± 15.90	p = .213	η^2 = .016
PRA	17.95 ± 11.51		

Note. According to Cohen (1988), values of .01, .06, and .14 are considered small, medium, and large effect sizes, respectively. CDCS = Cognitive Decline Complaints Scale; PUA = predominantly urban areas; MUA = moderately urban areas; PRA = predominantly rural areas; *M* = mean; *SD* = standard deviation; *F* = analysis of variance (ANOVA) values.

Considering the observation of significant differences in the variable of geographic region, we proceeded with further analysis and found significant differences between the regions of mainland and island ($F_{(1, 196)}$ = 14.617, p <0.01). In order to better understand this result, we explored the differences on Geriatric Depression Scale (GDS) to observe if the depressive symptomatology had an impact in the report of

subjective cognitive decline complaints. There was significant differences on the GDS scores ($F_{(1, 196)}$ = 8.068, p = .005) between mainland and island, suggesting that the differences observed in terms of geographic region may be better explained by differences on depressive symptomatology between mainland and island of Portugal.

3.4. Characterization of cognitive and emotional functioning and CDCS correlations

Table 3 presents the cognitive and emotional profile of the total sample. There were no significant correlations observed between the CDCS and objective cognitive performances indexed by the MMSE/MoCA. On the other hand, the observed correlation with depressive symptomatology was positive and statistically significant.

Table 3 - Characterization of cognitive and emotional functioning and CDCS correlations.

	Sample (*M*±*SD*)	*CDCS* correlation	
		r	*p*
MMSE	28.58 ± 1.35	-.041	.563
MoCA	22.78 ± 4.03	-.042	.552
GDS	7.39 ± 4.81	.362	*p<.001*

3.5. Normative Data

Since we did not find significant correlations between CDCS scores and the sociodemographic variables of age and education, nor significant differences between the strata (respectively: $F_{(1, 199)}$ = .060, p = .806; $F_{(3, 199)}$ = .161, p = .922), theoretically it is not necessary to establish normative according to these variables. Nevertheless, considering that no other demographic variable is transversal to all participants, we decided to explore the normative data considering the total sample, similarly to what was performed in similar studies (Ginó et al., 2015). The table 4 presents the normative values.

Table 4 – Normative values.

	Total Sample (N=199)			
	Min.-Max.	Mean	*SD*	*Cutoff Points* [1]
CDCS	[0-60]	20.24	12.91	33.15 39.61 46.06

Note. [1]CDCS values above 1 *SD*, 1.5 *SDs*, and 2 *SDs*, respectively.

4. Discussion

In this study, the psychometric validation of the CDCS scale was performed, analyzing the relationship between sociodemographic variables and the total CDCS score and establishing normative data for the adult and older adult population of

Portugal. The normative sample consisted of cognitively healthy adults and older adults living in the community, stratified according to the various sociodemographic variables with a distribution similar to that observed in the Portuguese population.

The psychometric characteristics of the CDCS were generally adequate for this community sample. The scale showed a very good internal consistency. All items were significantly correlated with the total score of the scale, suggesting the presence of construct validity. The CDCS was previously analyzed by the IRT (Freitas et al., *in press*), that is, items that are not representative of the construct have already been removed. In the present study, a positive correlation was also observed between the scores of the two scales that assessed complaints of subjective cognitive decline, that is, between the CDCS and SCD-Q, indicating convergent validity.

The results of this study indicate that age, educational level and gender do not have a significant association with CDCS, which is in agreement with the study of Freitas and collaborators (*in press*). In addition to these sociodemographic variables, marital status and residence area did not show significant differences either, considering taking into account the scores of the scale. The fact that there was no statistically significant associations between CDCS and age and educational level may be explained by the own nature of the instrument, since the CDCS is not a performance test, but rather a report of the individual's perception of their perceived cognitive decline, and supports the results of other studies (e.g., Bernardes et al., 2017; Ginó et al., 2015; Lee et al., 2020; Markova et al., 2017; Mendes et al., 2008; Rami et al., 2014). However, previous research also indicates that complaints are more present in the aged population (Ginó et al., 2010; Rhör et al., 2020), which may be due to the various cognitive changes that occur in normal aging (Jessen et al., 2014; Markova et al., 2017; Mendonça et al., 2016; Slavin et al., 2010). For instance, Montejo and collaborators (2011), in a study with people of 64+ years old, reported that memory complaints gradually increase with age, and are more frequent in people with lower levels of education.

As for the sociodemographic variables analyzed in this study, only the geographic region showed significant differences in the CDCS scores, noting that these differences can be better explained by the differences that occur in the pattern of depressive symptoms between the mainland and island of Portugal (Açores). The greater number of complaints of subjective cognitive decline in the Açores region may be due to the presence of higher levels of depressive symptoms found in the islands, a matter important to be explored in future studies to understand the specificities of the socio-psychological configurations of the island regions. This association between cognitive complaints and depressive symptoms corroborates what is commonly found

the literature (e.g., Balash et al., 2013; Brigola et al., 2015; Ginó et al., 2010; Hill et al., 2020; Mendes et al., 2008; Slavin et al., 2010). According to the perspective of Beck's cognitive triad of depression, depressive symptomatology leads to a biased and negative perception of the world, the future, and the self (DeRubeis et al., 2006) and, in this case, high levels of depressive symptomatology may influence the global self-perception and of more specific domains, such as the own cognitive functioning.

Furthermore, the CDCS did not show a significant correlation with the cognitive tests used in this study, which corroborates different studies that demonstrate that subjective cognitive complaints are more associated with depressive symptoms than with objective performance or cognitive decline (e.g., Markola et al., 2017, 2019; Salem et al., 2015). It should be noted that, in the present study, people with GDS scores above 20 points were not included, that is, this association was found in a population whose scores on the depression scale (GDS-30) are not indicative of symptomatology that can be considered clinical/pathological.

Since no significant correlations and significant differences were observed between the CDCS scores and age and educational level, normative data were not established considering these variables. However, taking into account that no other demographic variable is transversal to all participants, so it was decided, as in other studies with the Subjective Memory Complaints Scale (SMC; Ginó et al., 2015), to explore the normative data considering the whole sample. In addition, cutoffs of 1 *SD*, 1.5 *SD*, and 2 *SD* were also used to define the norms.

The normative data established in this study allow to assess whether the person's complaints of subjective cognitive decline are above or below the normative mean. In this line, if the score is above the average, a more extensive neuropsychological assessment is recommended to screen for possible cognitive deficits and/or depressive symptoms. According to the study by Freitas and collaborators (*in press*), the scale allows to distinguish clinical conditions from healthy aging, since the clinical group had more complaints of SCD than the group of cognitively healthy individuals (control group). However, this scale is not a diagnostic tool, only a characterization tool for SCD complaints. Thus, it is recommended for the CDCS be considered as an additional tool with a contribution to the diagnosis of pathological aging (MCI or dementia). It should be noted, however, the need for further validation studies with clinical groups of MCI and of the dementia spectrum, and for the establishment of the respective normative data.

This study has some limitations. Firstly, the sample is of a small size and does not include participants from the geographical regions of Lisboa, Algarve and the Região Autónoma da Madeira, to ensure representativeness of all territorial units

demarcated from NUTS II. Finally, the extension (49 items) of the scale may constitute a limitation for some individuals, as it requires a reasonable level of reading and may generate fatigue. Therefore, it may not be applicable in some contexts and conditions. Although the education level is not significant in the reporting of complaints, it would be important, in future studies, to include illiterate participants in studies to validate the scale.

This main contribution of this study is the establishment of normative data for subjective complaints of cognitive decline for the Portuguese adult and older adult population, which makes it an important neuropsychological assessment tool. It is a scale that allows the detailed assessment of cognitive complaints and the determination of whether or not they are normative, which will facilitate an empirically based understanding of this dimension of psychological functioning and the obtainment of indications regarding the application of cognitive screening tests. In this line, it is suggested that in future validation studies, cut-off points must be established in relation to complaints for each cognitive domain, in order to provide more specific and comprehensive data.

In conclusion, the CDCS is a scale with good evidence of psychometric validity for the Portuguese adult and older adult population. The CDCS fills a gap in neuropsychological assessment by providing a more comprehensive view of subjective complaints of cognitive decline, since it considers several cognitive domains, besides memory, which, ultimately, allows for a more global and integrated understanding of this important dimension of neuropsychological functioning.

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