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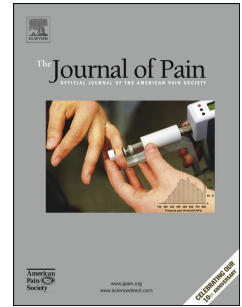
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The revised Formal Social Support for Autonomy and Dependence in Pain Inventory (FSSADI_PAIN): Confirmatory factor analysis and validity

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Title page

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(FSSADI_PAIN): Confirmatory factor analysis and validity.

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ABSTRACT

Pain among older adults is common and generally associated with high levels of functional disability. Despite its important role in elders' pain experiences, perceived (formal) social support (PSS) has shown inconsistent effects on their functional autonomy. This suggests a moderator role of two recently conceptualized functions of PSS: perceived promotion of dependence (PPD) versus autonomy (PPA). The present study aimed at revising and further validating the Formal Social Support for Autonomy and Dependence in pain Inventory (FSSADI_PAIN), which measures these two PSS functions among institutionalized elders in pain.

Two-hundred fifty older adults ($M_{\text{age}}=81.36$, 75.2% women) completed the revised FSSADI_PAIN along with measures of physical functioning (SF-36) and informal PSS (SSS-MOS). Confirmatory factor analyses showed a good fit for a two-factor structure: 1) PPA ($n=4$ items; $\alpha=.89$); 2) PPD ($n=4$ items; $\alpha=.85$). The revised FSSADI_PAIN showed good content, discriminant and criterion-related validity; it discriminated the PSS of male and female older adults, and also of elders with different levels of physical functioning.

In conclusion, the revised FSSADI_PAIN is an innovative, valid and reliable tool that allows us to assess two important functions of PSS, which may play a relevant role in the prevention and reduction of pain-related physical disability and functional dependence among institutionalized older adults.

Perspective: This paper presents a revised version of the FSSADI_PAIN that assesses elders' perceived promotion of functional autonomy/dependence as two independent functions of perceived social support. This measure may contribute to future research on the role of close interpersonal contexts on the promotion of active ageing among elders with (chronic) pain.

Key-words: Perceived Social Support, Autonomy, Dependence, Chronic pain, Older adults

The revised Formal Social Support for Autonomy and Dependence in Pain Inventory

(FSSADI_PAIN): Confirmatory factor analysis and validity

1. Introduction

Chronic pain (CP) affects 50 to 80% of older adults (i.e. aged 60 or above [38]) in community and institutional settings [11,14], which represents an obstacle to active aging, by hindering elders' functional autonomy [13,30,5], i.e., the ability to independently perform physical, cognitive and social activities [12].

Perceived social support (PSS) has been identified as a key factor in overcoming pain-related disability [8], but has also shown deleterious effects on pain disability [8,36], mobility and daily activities' performance (i.e., physical functioning) [6,16,18,29,40,19,35]. We argue that the impact of PSS on pain and pain-related disability might depend on the extent to which it is promoting functional autonomy versus dependence [26]. Our contention is based on the assumptions that: 1) avoidance behaviors represent a main predictor of functional disability in CP, as postulated by fear-avoidance [21,39,20] and diathesis-stress models [37,25]; 2) PSS, by promoting functional autonomy or dependence, may influence the extent to which individuals engage in activity avoidance versus engagement.

To test this contention we developed the Formal Social Support for Autonomy and Dependence in Pain Inventory (FSSADI_PAIN) [26], which measures elders' PSS provided by formal networks (e.g., day-care centers, nursing homes) as promoting functional autonomy (PPA) and/or dependence (PPD), when in pain. The FSSADI_PAIN has previously shown reasonable psychometric qualities [26]. Moreover, PPD (but not PPA) was moderately and positively associated with pain severity/disability among elders with CP, highlighting the importance of differentiating these support functions in the context of pain.

However, the preliminary validation pointed out some limitations [26], setting the path for the present work. First, because inter-judge reliability (Cohen K=.80) showed room for improving content validity, we aimed to revise some of the original items. Second, exploratory factor analysis

extracted two factors – PPA and PPD – which showed, unexpectedly, a moderate positive correlation, raising the need for underlying factor structure confirmation. Consequently, we aimed to test the fit of three alternative models: 1) PPA and PPD as independent factors; 2) PPA and PPD as correlated factors; 3) PSS as a second-order factor with PPA and PPD as first-order factors. Third, instead of using proxy measures of functional autonomy (presence of CP and attendance to nursing home/day-care center), we used a self-report measure of physical functioning to assess the level of (dis)ability in performing daily activities. We expected that self-reported physical functioning would be positively related with PPA (H1) and negatively related with PPD (H2).

Further, we aimed at exploring differences in PPA/PPD between men and women, which was not possible previously [26] due to sampling limitations. Stereotypical representations of masculinity have been associated with autonomy and pain-related stoicism, whereas femininity has been associated with dependence and pain-related expressiveness [1,32,2,7]. Pain-related gender representations influence (wo)men's pain experiences, but also the way others act towards them [1]. As such, caregivers may be more prone to promote men's autonomy and women's dependence. Likewise, wo(men) would elicit and be more receptive of gender congruent support (i.e. men/autonomy; women/dependence). Consequently, assuming that perceptions of received support may, to some extent, reflect provided support, we hypothesized that men would perceive higher PPA than women and women would perceive higher PPD than men (H3). Finally, we aimed to re-test FSSADI_PAIN discriminant validity, expecting low correlations with a measure of informal PSS (H4).

2. Method

Participants

Two hundred and fifty elders were recruited to participate in this study, from seven day-care centers and nursing homes in Lisbon. Inclusion criteria were that people would be formally retired from work activities and were users of a day care-centre/nursing home for more than 6 months. Also, we

only included people who were actually able to read and write autonomously (despite years of education) and who did not present any kind of cognitive impairments (information provided by clinical staff of the institutions).

Instruments and Validation Plan

The revised FSSADI_PAIN.

The FSSADI_PAIN is an instrument originally developed in Portuguese that aims to measure formal PSS for autonomy and dependence in pain [26]. The Portuguese and English versions of the revised FSSADI_PAIN are provided in the Supplementary Appendix. Two translators, who were native speakers in Portuguese and English, conducted a forward-backward translation of the items and instructions. Minor discrepancies between the original and back translation were detected, which had no impact on the semantic, idiomatic, experiential and conceptual equivalence between the two versions.

The FSSADI_PAIN was developed to assess two main dimensions, PPA and PPD, both including items reflecting instrumental and emotional/esteem functions of social support [26]. Regarding PPA, instrumental support actions consist of tangible/behavioral help that allows people in pain to accomplish their daily tasks by themselves, while emotional/esteem support actions reinforce peoples' self-esteem, self-confidence to keep on functioning and social/activity engagement. As for PPD, instrumental support actions consist of tangible/behavioral help that substitute the person in pain in his/her activities, while emotional/esteem support actions reinforce lower self-efficacy to keep on functioning and activity/social avoidance.

Revision of the item pool. For the development of the FSSADI_PAIN, ten items were originally created for each of the dimensions (20 items in total), mainly based upon expert consultation on support actions reflecting each dimension and existing questionnaires (e.g. Health Related Formal Social Support Questionnaire [Questionário de Suporte Social Institucional na Saúde] [3], Social Support Inventory [34]). Within each dimension, half of the items reflected instrumental support

and the other half reflected emotional/esteem support [26].

For the revised version of the FSSADI_PAIN, presented in this paper, items that previously had low factor loadings were revised (12 items) and the ones that presented high inter-item correlations were eliminated to avoid redundancies (2 items). Further, five new items were created. Generally, when revising the items, experts' input was taken into account in order to make the notions of autonomy and dependence promotion more explicit and clear and to include items related to physical exercise/activity. Table 1 summarizes the changes made in the item revision process. In sum, participants were presented with twenty-three items. In the dimension of PPA, five items measured instrumental support and six emotional/esteem support. In the PPD scale, five items measured instrumental support and seven items emotional/esteem support.

Table 1 – Summary of item revision process.

(sub) scale	Original Item	Revised Item
PPA Instrumental Support	Help me to arrange transportation to take care of my affairs	Help me to arrange transportation to take care of my affairs by myself
	Help me contact other entities to solve my personal problems	Help me contact other entities so I can solve my personal problems autonomously
	Take care of social outings	Help me to deal with practical aspects (eg, transportation, reservations, tickets) so I can participate in activities/social outings
PPA Emotional/Esteem Support	Encourage me to participate in activities	Encourage me to participate in leisure and fun activities
	----	Motivate me to exercise
PPD Instrumental Support	Substitute me in solving my problems	Solve for me my personal affairs
	Substitute me in solving my personal affairs	
	Arrange transportation for me to go home to rest	Take care of practical aspects for me to go home to rest.

	Ask family members and friends for help on my behalf	Contact for me my family/friends to solve my problems or chores.
	Ask others to help me in my tasks	Take care of tasks that usually are my responsibility
	----	Bring me everything I need so I do not need to move
	Are understanding when I am worried	Show they understand that pain is awful and I feel that it overwhelms me
	Advise me not to participate	Encourage me to avoid any kind of activity
PPD Emotional/Esteem Support	Understand that I need help from others to cope with my pain	Tell me that I need help to cope with my pain
	Advise me to collect myself to decrease my pain's intensity	Advise me to stop whatever I am doing
	----	Tell me not to push myself when I feel unable of handling certain issues
	----	Discourage me to exercise.

Answering scale. In the revised version, the answering scale was simplified to a 5-point Likert-scale, given that in our previous study many elders reported experiencing trouble understanding a 7-point scale [26]. Hence, participants were asked to assess the perceived frequency of each type of support action on a rating scale from 1 (not at all frequent) to 5 (extremely frequent).

Pre-test. Four older adults (2 women and 2 men, aged between 74 and 83 years) assessed the clarity of the items and their opinions were taken into account when revising the items.

Scale validation plan.

Content validity. Ten independent judges (6 women and 4 men, aged between 27 and 58 years old) were asked to assess the face validity of the revised FSSADI_PAIN items. This sample included two directors of a nursing home, 2 directors of day care centers, one expert on elders' physical exercise and functional training, 3 nurses experienced in formal caregiving and 2 laypeople

with no experience in elders' caregiving. All independent judges were given the conceptual definitions of the (sub)dimensions of the measure (see above) and asked to analyze and place each one of the twenty-three items in the corresponding (sub)dimension.

Criterion-related validity. Two criteria were used to assess the revised FSSADI_PAIN concurrent validity: participants' sex and their self-reported physical functioning. Regarding the latter, the Portuguese version of the Physical Functioning Scale of the Medical Outcome Study Short Form – 36 (MOS-SF-36) was used to measure elders' (dis)ability to perform activities of daily living [9,10]. Only items that were relevant to the daily routines of this age group in a nursing home/day care center were presented to participants (5 out of 10), namely, the items assessing elders' ability to a) do moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf; b) climb one flight of stairs; c) bend, kneel, or stoop; d) walk one block; e) bathe or dress. Rating scale was from 1 to 3 (1 = yes, limited a lot; 2 = yes, limited a little; 3 = No, not limited at all). Afterwards, for each participant, items' scores were summed and transformed into a 0-100 range, to get a single and final score for physical functioning [9,10]. A principal axis factor analysis (oblimin rotation) was conducted with the 5 items [KMO = 0.888; Bartlett's χ^2 (10) = 1102.319, $p < .001$]. Based on the Kaiser criterion, one factor was extracted, accounting for 75.4% of the total variance and with excellent internal reliability ($\alpha = .937$).

Discriminant validity. In order to assess the discriminant validity of the revised FSSADI_PAIN, participants were asked to complete some of the tangible and emotional support items from the Portuguese version of the Social Support Scale of Medical Outcomes Study (SSS-MOS; [28]). In line with our previous study [26], we only chose three items with the highest loadings on the factors of perceived tangible and emotional support, respectively. Participants were asked "*How often is each of the following kinds of support available to you if you need it?*" Items for tangible support were: *someone to help you if you were confined to bed; someone to prepare your meals if you were unable to do it yourself; someone to help with daily chores if you were sick.* Emotional support items were: *someone to share your most private worries and fears with; someone who understands*

your problems; someone to confide in or talk to about yourself or your problems. A principal axis factor analysis (oblique rotation) was conducted with the 6 items [KMO = 0.738; Bartlett's $\chi^2_{(15)} = 1844.588, p < .001$]. Based on the Kaiser criterion, the two predicted factors were extracted, accounting for 89.5% of the total variance: 1) perceptions of emotional support (n = 3 items, $\alpha = .98$) and 2) perceptions of tangible support (n = 3, $\alpha = .95$).

Procedure

This study was approved by the Institutional Review Boards of Centro de Investigação e Intervenção Social (CIS-IUL) and the participating nursing homes and day care centers. Participants were approached at the institution they attended and were requested to collaborate on a study on pain-related support.

After individual consent to participate, the data collection protocol was individually administered, including the revised FSSADI_PAIN, and the Portuguese versions of the SF-36, and the SSS-MOS. Furthermore, present pain experience was assessed by yes-or-no questions, following the methodological strategy of several (chronic) pain epidemiological studies (e.g., Torrance, Smith, Bennett & Lee, 2006) by yes-or-no questions. More specifically the questions were the same as those used in our previous study [26]. More specifically participants were asked: (1) 'Have you ever had constant or intermittent pain for more than three consecutive months?' (2) 'Did you feel this pain during the last week?' and (3) 'Did you feel any pain in the last week? According to yes-or-no answers to these questions, when participants answered positively to questions 1 and 2 were categorized as having present chronic pain; when answering positively only to question 3 were categorized as having present acute pain; when answering no to question 2 and 3 were categorized as having no present pain. Only for participants with present pain experience, pain severity were assessed using the pain severity and subscale of the Brief Pain Inventory [4].

Also, participants' socio-demographic characteristics were collected and the anonymity and confidentiality of their data guaranteed. Finally, all participants and institutions were thanked and

debriefed.

Data analysis

First, we started by verifying the absence of missing data and analyzing item distribution for the total sample (N=250). Second, an exploratory factor analysis (EFA) was executed with a random sub-sample of about half of the original sample ($n=122$) using SPSS v20. Due to previous factor correlations [26], we started by conducting a principal axis factor (PAF) analysis with an oblique rotation with all items. However, given that in the present sample no significant correlations between the factors were found, we finally conducted a PAF with an orthogonal rotation to explore the factor structure. Items with high cross-loadings (difference between the loadings on at least two factors below .30) and with the lowest communalities ($<.50$) were progressively eliminated. Given the non-normality of most item distributions, in order to validate the PAF, a non-linear Principal Components Analysis for Categorical Data (CatPCA) was conducted in order to validate PAF results. In CatPCA all items were imputed as ordinal variables.

Subsequently, confirmatory factor analysis (CFA) was performed using maximum likelihood (ML) estimation with the second random sub-sample ($n=128$) using AMOS v20, with no missing data.

CFA was ran to test the underlying structure of the revised FSSADI_PAIN and, more specifically, to test the fit of three alternative models: 1) PPA and PPD as independent factors; 2) PPA and PPD as correlated factors; 3) PSS as a second-order factor with PPA and PPD as first-order factors.

Multiple fit indexes were chosen reflecting different features of model fit [15]. Therefore, absolute fit indexes - χ^2 and Root Mean Square Error of Approximation (RMSEA) were used to determine how well the *a priori* model fit the data [25]. Also, incremental fit indexes - Incremental Fit Index (IFI), the Normed Fixed Index (NFI) and the Comparative Fit Index (CFI) indicated the fit of the model when compared to the baseline model [15]. Criteria for good fit were established by $CFI>0.9$; $NFI>0.9$; $IFI>0.9$; $RMSEA >0.05$ [24,16,32]. Finally, a non-parametric method

(bootstrap) with 5000 subsamples was used in order to validate the results obtained by the parametric method (ML).

Subsequently, using SPSS v20, we explored the relationship between PPA/PPD and participants' sociodemographic characteristics. Only participants' years of education were significantly positively associated with PPD therefore we controlled for this variable in subsequent analyses. Then, we tested the association between PPA/PPD and physical functioning with Pearson correlations. To explore sex-related differences in PPA and PPD we ran a t-test and a univariate analysis of covariance with years of education as a covariate, respectively. Finally, Pearson correlations were run to ascertain the relationship between the subscales of the FSSADI_PAIN and SSS-MOS.

3. Results

Participant characteristics

Two hundred and fifty older adults (75.2% women), aged between 53 and 99 years ($M = 81.36$, $SD = 8.54$) participated in this study. This was a multicenter study: participants were recruited from four different day-care centers (46.8%) and three nursing homes (53.2%) in Lisbon. Regarding marital status, 67.2% of the participants were widowed, 14% were married, 10.4% were single and 8.4% were divorced. Years of education ranged from 0 to 20 ($M = 4.71$, $SD = 3.93$). Almost half of the participants (47.2%) reported experiencing CP (*i.e.*, persistent or intermittent pain for more than 3 months [27]), 17.2% reported acute pain (*i.e.*, having felt pain during the previous week), and 35.6% reported no current pain. Participants that reported present pain experiences ($n=161$) also rated pain severity ($\text{min}=0$, $\text{max}=10$, $M=4.02$, $SD=2.23$). Finally, there were significant sex-related differences in pain experiences ($\chi^2_{(2)}=9.254$, $p=.010$); a higher percentage of women reported chronic pain (52.7%) than men (30.6%); men reported more acute pain (21% vs. 16% in women) and more absence of current pain (48.4% vs. 31.4% in women). Also, 27.6% of the participants reported no physical limitations in performing daily tasks and 16% reported to be fully physically

restricted in performing such tasks (min=0, max=100, $M=42.0$, $SD=36.02$).

Content validity

Ten independent judges assessed the content validity of the 23 items, by matching each one to the respective sub-dimension of the FSSADI_PAIN. The inter-judge reliability index was very good (Cohen's $K=0.9$).

Item descriptive analysis and sensitivity

The analysis of the distribution of the items on the total sample ($N=250$) showed that participants' responses covered the scale range for every item (min = 1 and max =5). The means ranged between 1.46 and 3.00, and standard deviations ranged between .87 and 1.50 (Table 2). Most of the items did not present a normal distribution, showing high levels of skewness (skewness/SD error of skewness $> |1.96|$) and kurtosis (kurtosis/SD error of kurtosis $> |1.96|$).

Table 2 - Descriptive analysis of the items for the global sample (N=250).

Item	<i>M</i>	<i>SD</i>	Kurtosis/Std error of kurtosis	Skewness/Std error of skewness
Encourage me to participate in leisure and fun activities	2.91	1.50	-.08	-4.65
Encourage me to socialize	3.00	1.46	-.75	-4.29
Encourage me to trust in my ability to keep on going	2.46	1.40	2.60	-3.87
Help me to deal with practical aspects so I can participate in activities/social outings	1.97	1.27	5.93	-1.72
Advise me to stop doing whatever I am doing	1.46	.87	13.42	12.97
Bring me everything so that I don't need to move	1.68	1.20	10.55	4.38
Tell me that I need help from others to cope with my pain	1.51	.94	12.28	9.10
Tell me not to push myself when I feel unable of handling certain issues	1.62	1.04	9.74	3.82

Construct validity and Reliability

Exploratory factor analysis. The sampling adequacy was guaranteed ($KMO = 0.713$; Bartlett's $\chi^2(28) = 587.064, p < .001$). Based on the Kaiser criterion, two factors were extracted accounting for 62.3% of the variance: (1) perceptions of promotion of autonomy (PPA; $n = 4$ items) and (2) perceptions of promotion of dependency (PPD; $n = 4$ items) (see Table 3). A CatPCA also corroborated this two-factor structure; both factors accounted for 72.9% of the explained variance and the loadings distribution was very similar to the one presented in Table 3. Finally, it should be noted that both factors showed very good internal reliability.

Table 3 – EFA factor loadings and internal reliability ($n=122$)

Item	Factor Loadings	
	PPA	PPD
<i>When I am in pain, in general, the employees at this institution...</i>		
Encourage me to participate in leisure and fun activities	.963	-.031
Encourage me to socialize	.912	.009
Encourage me to trust in my ability to keep on going	.748	.004
Help me to deal with practical aspects so I can participate in activities/social outings	.593	.092
Advise me to stop doing whatever I am doing	-.135	.810
Bring me everything so that I don't need to move	.068	.747
Tell me that I need help from others to cope with my pain	.092	.740
Tell me not to push myself when I feel unable of handling certain issues	.051	.714
	Cronbach α	
	.879	.825

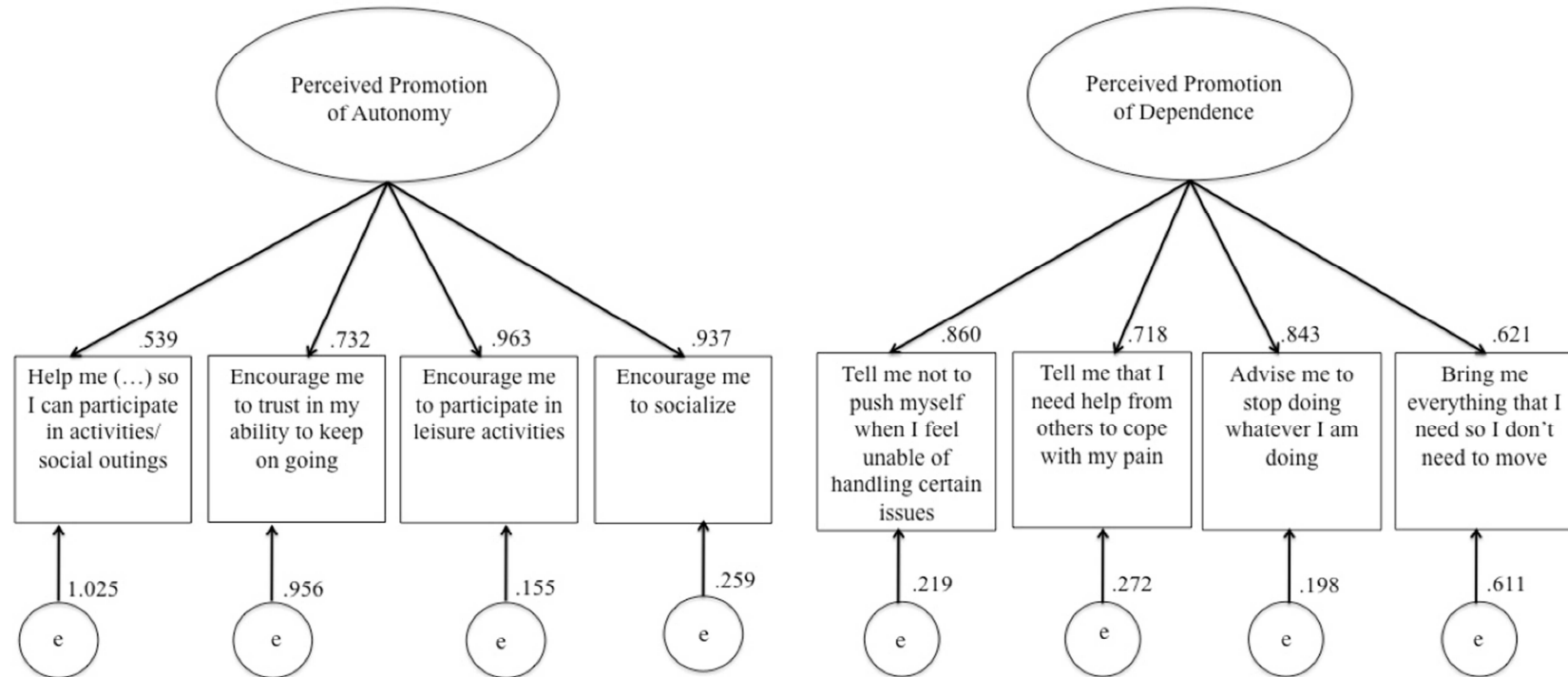
Factor descriptive analysis and sensitivity. The PPA factor presented a mean value ($M=2.58$, $SD=1.19$), corresponding to a moderate perceived frequency of autonomy promotion. Total scores did not have a normal distribution, but showed an acceptable level of skewness (0.844), whereas the kurtosis (- 3.631) level evidenced a flatter than normal distribution (i.e., platykurtic) [33].

The PPD factor presented a low mean value ($M=1.57$, $SD=.83$), showing that participants perceived

low promotion of dependence. This factor presented a rather skewed (10.285) and leptokurtic distribution (6.299) [33].

Confirmatory factor analysis. The first model tested was the one obtained from the previous EFA – the two independent factors model (Model 1; Figure 1). The latent variables' variance was constrained to 1 and maintained uncorrelated, errors were kept fixed, observed variables were free and $df > 0$. The model was identified and included two latent variables: PPA and PPD. Four items were associated to each latent variable (standardized coefficients provided in Figure 1).

Figure 1 – Confirmatory factor analysis of the FSSADI_PAIN



In order to examine the fit of the first model, five maximum likelihood-based fit indexes were chosen. The CFI (.953), the NFI (.915) and the IFI (.954) were all higher than the established cutoff of 0.9 [24,16,32], which showed a very good fit. Also, the RMSEA (.092) showed a good fit to the data. Finally, we conclude that there is an acceptable fit between the model and the observed data ($\chi^2(20) = 41.382, p = .003$). Subsequently, two alternative models were tested – a) two correlated factors model (model 2); b) one second-order factor of general perceived formal social support linked to two first-order factors (PPA and PPD; model 3).

As shown in Table 4, the fit indices of model 2 and model 1 were quite similar, due to the lack of significant covariance ($p=.013$) and correlation ($r=-.156$) between both latent variables. Model 3 showed the worse fit to the data. As shown in Table 4 none of the alternative models improved the data fit.

Table 4 – Fit indexes comparison between hypothesised and alternative models.

Structural models	Description	χ^2	<i>df</i>	χ^2/df	CFI	NFI	IFI	RMSEA
Hypothesised model	Figure 1	41.38	20	2.07	.953	.915	.954	.092
Alternative model 1	Figure 1 plus correlation between factors	39.01	19	2.05	.956	.920	.957	.091
Alternative model 2	One second-order factor of general perceived formal social support linked to two first-order factors	217.78	22	9.90	.574	.553	.579	.265

Due to underlying non-normality of the items, a non-parametric method (bootstrap) was subsequently used in order to validate the results obtained by the parametric method (maximum likelihood). As it can be seen in Table 5, the bias between the two methods was minimum.

Table 5 – Comparison of the estimates obtained from maximum likelihood and bootstrap methods.

Items	Maximum likelihood standardized estimates	Bootstrap standardized estimates	Bias
Help me to deal with practical aspects so I can participate in activities/social outings	.485	.483	-.001
Encourage me to trust in my ability to keep on going	.701	.701	.000
Encourage me to participate in leisure and fun activities	.909	.909	.000
Encourage me to socialize	.923	.924	.001
Tell me not to push myself when I feel unable of handling certain issues	.786	.786	-.001
Tell me that I need help from others to cope with my pain	.724	.726	-.001
Advise me to stop doing whatever I am doing	.775	.766	-.010
Bring me everything so that I don't need to move	.690	.683	-.007

Criterion-related validity

The relationship between PPA/PPD and physical functioning.

Physical functioning was positively correlated with PPA ($r=.274, p<.001$) and negatively with PPD ($r=-.248, p=.002$).

The relationship between PPA/PPD and participants' sex.

Tests (ANCOVA) showed that participant's sex only had a significant effect on PPD ($F_{(1, 247)} = 7.223, p = .008, \eta^2 = 0.028$), indicating that females perceived higher promotion of dependence ($M = 1.62; SD = .879$) than males ($M = 1.39; SD = .648$). No significant differences were found between women ($M = 2.63; SD = 1.237$) and men ($M = 2.46; SD = 1.016$) for PPA ($t_{(248)} = .959, p = .339$).

Discriminant validity

No significant correlations were found between PPA/PPD and the SSS-MOS' instrumental subscale ($r=.052/.012, p=.410/.856$) or emotional subscale ($r=.081/-.074, p=.200/.243$).

4. Discussion

The present study aimed at the revision and psychometric improvement of a previously developed measure of perceived formal social support for the promotion of functional autonomy (PPA) versus promotion of dependence (PPD) of older adults in pain – the FSSADI_PAIN [26]. The results of the preliminary validation study [26], its implications and limitations have set the path for the present work. More specifically, the present objectives were to: (1) improve FSSADI_PAIN content validity by revising some of its original items; (2) test the underlying factorial structure of the revised FSSADI_PAIN; (3) assess its criterion-related validity by exploring its relationship with

participants' sex and physical functioning; and, (4) reassess its discriminant validity by exploring its relationship with a measure of informal (PSS).

Content validity

In order to improve the instrument's content validity, items were revised taking into consideration former results, namely, item factor loadings and correlations [26] and experts' input (e.g., day-care center and nursing home directors/other employees and nurses). As a result, two original items were dropped, twelve were revised and five were newly created, resulting in a total of twenty-three items. These items were presented to a broader and more heterogeneous sample of expert judges, in terms of their background. The revised FSSADI_PAIN showed very good content validity. Moreover, the revised FSSADI_PAIN showed a higher inter-judge reliability index (Cohen's $K=0.9$) than its original form (Cohen's $K=0.8$) [26]. This suggests that the revised items are better representatives of the underlying conceptual (sub)dimensions of the instrument.

Construct validity and reliability

As in our former study on the development and preliminary validation of the FSSADI_PAIN [26], two factors were extracted by an exploratory factor analysis, showing good levels of internal reliability – 1) PPA and 2) PPD. The fact that, in our previous study [26], both factors unexpectedly showed a moderate and positive correlation [26], suggesting the presence of a general underlying factor of PSS, raised the need to confirm the instrument's underlying structure by a confirmatory factor analysis. Consequently, in the present study we aimed at testing and comparing the fit of three alternative models: 1) PPA and PPD as independent factors; 2) PPA and PPD as correlated factors; 3) PSS as a second-order factor with PPA and PPD as first-order factors. The confirmation of two independent factors (model 1) ruled out the possibility of an underlying second order factor of general formal PSS, suggesting that PPA and PPD are independent functions of PSS, which may bear different influences on elders' pain experiences. As argued, this may actually account for the

inconsistent effects of PSS on pain disability [7,36,5,17], although this contention still remains to be directly tested. We believe that the higher content validity of the current revised scales might have accounted for the fact that PPA and PPD showed no significant correlation in the present study as opposed to the positive correlation found in our former study [26].

As for the instrument's reliability and sensitivity, both factors showed very good internal consistency indices and were sensitive to participants' differences concerning PPA and PPD. It should be noted that, as in our former study [26], elders showed, on average, lower PPD than PPA. In fact, participants' PPD were again much more skewed to the lower end of the scale (low perceived frequency), where most item distributions deviated from normality. However, despite item non-normality, our results were validated by the use of a non-parametric approach, which indicated a robust solution for the factorial structure confirming a good fit to the data. Hence, we may conclude that PPD item asymmetry may be somehow related with the nature and/or meanings of what is being measured, instead of reflecting poor item/factor quality. First, low PPD may either be reflecting elders' reluctance to report support behaviors that, by emphasizing lack of functional autonomy, may hinder self-esteem. Second, low PPD may also be accounted for by the fact that our sample showed, on average, a reasonable level of physical and cognitive functioning, thus, not eliciting as much promotion of dependence as highly disabled elders would. Finally, it may also reflect good quality practices in the seven participating institutions. Of course, one could argue for a selection bias, i.e, only institutions with very good practices would give permission to run the study. However, given that none of the institutions that were approached refused to participate, we believe this interpretation is unwarranted.

Criterion-related validity

As expected, perceived physical functioning was positively correlated with PPA (H1) and negatively correlated with PPD (H2). These results are congruent with fear-avoidance [21,39,20] and diathesis-stress models [37,25] that postulate a positive association between avoidance and disability, on one hand, and confrontation and recovery, on the other hand. Nevertheless, it should

be noted that the cross-sectional nature of this study restrains us from assuming a causal relationship between PPD/disability and PPA/recovery. In fact, it is possible that elders with worse (perceived) physical functioning might display more cues eliciting support behaviors that promote dependence, accounting for the higher PPD. On the other hand, elders with better (perceived) physical functioning might display more cues eliciting support behaviors that reinforce their ability to function autonomously, accounting for the higher PPA. Further research will be needed to explore the causal relationship between PPA/PPD and physical functioning.

Also, the current study aimed at exploring differences in PPA/PPD between men and women. We hypothesized that men would perceive higher PPA than women; and women would perceive higher PPD than men (H3). Our expectation was only partially met. Only for PPD (but not PPA) there were significant differences between men and women (females scored higher than men). Although the reasons explaining the lack of sex-related differences in PPA are unclear. The fact that stereotypical representations of femininity are widely associated with dependence [31,2,6] may well have accounted for differences in PPD. It is possible that women, by feeling more comfortable eliciting and accepting dependence promotion support than men, turn out to receive more of this type of support from caregivers.

Discriminant validity

In line with previous findings [26], no significant relationship was found between the revised FSSADI_PAIN and SSS-MOS scales. This may be accounted for by the fact that these instruments measure different sources of support - informal support provided by family/friends vs. formal support provided by formal caregivers. However, both instruments include emotional and instrumental functions of PSS. But, as indicated by the confirmatory factor analysis, as opposed to the SSS-MOS, the revised FSSADI_PAIN structure does not revolve around the emotional/instrumental functions. This might also account for the low relationship between these

measures. As such, we conclude that the revised FSSADI_PAIN shows good **discriminant validity**.

Limitations, implications and directions for future research

The findings demonstrate that the revised FSSADI_PAIN is an innovative instrument in conceptualizing and operationalizing PPA and PPD, as different functions of PSS. Also it is a valid, reliable and sensitive tool to measure elders' perceived support for autonomy/dependence in (chronic) pain. However, some limitations should be addressed. First, participant's reluctant willingness to report PPD rather than PPA raises the need to explore, with a qualitative methodology, the meanings associated to PPD/PPA. Also, this result highlights the relevance of considering the influence of social desirability in participants' responses, especially when the scales are being administered inside the institutions they attend.

Second, the direction of causality between PPA/PPD and pain-related functioning remains to be tested with longitudinal designs.

Third, although the revised FSSADI_PAIN is a valid and reliable measure of the frequency of PPA/PPD, it does not provide information about elders' support preferences. Not knowing about whether participants prefer autonomy vs. dependence promotion, when in pain, may constraint our knowledge about the influence of (chronic) pain relevant-support [22]. It is possible that preferences for the promotion of autonomy or dependence might moderate the effects of PPA/PPD on pain experiences. For example, will the effects of PPA on pain and pain-related disability be the same for elders who prefer promotion of autonomy than for the ones who prefer promotion of dependence? This is a question that remains unanswered. Hence, in line with other authors [22], focusing on preferences for pain-related support could be a future line of research.

Furthermore, two important challenges to the generalization of our findings lie in participants' low educational level and high physical/cognitive functioning. Regarding educational level, since our results showed that years of education were positively correlated with PPD, it would be reasonable

to expect that a more educated sample would report higher PPD, than present sample. In fact, a more heterogeneous sample in terms of level of education could, eventually, increase the variance of PPD items and, consequently, minimize skewness. Hence, future studies should include elders with higher educational levels. Low levels of PPD might also be accounted for participants' high levels of physical/cognitive functioning, which also raises the question of whether such results could be generalized to a more disabled sample of elders. Future studies should, at least, strive to include elders with different physical functioning status.

Finally, regarding sex-related differences in PPD, the small effect size may raise some questions regarding its clinical significance. Future studies will be needed in order to further explore the role of sex and gender on PPD and PPA to understand whether such differences may, to some extent, account for the sex-related differences in pain experiences.

Relevant implications can be drawn from the validation of the revised FSSADI_PAIN. At a theoretical level, the conceptualization and operationalization of PPA and PPD, assumes that PSS might not always translate into positive pain-related outcomes. Specifically the identification of PPA and PPD as orthogonal dimensions, as opposed to two opposite poles of one dimension, suggests that PSS in pain is not a homogeneous construct with linear implications on pain experiences. Also, and as we have argued elsewhere [26], this feature allows the identification of individuals that perceive ambivalent (high PPA and high PPD) and undifferentiated support (low PPA and low PPD) for the promotion of functional autonomy/dependence in pain. These findings are central to our contention that PSS, by promoting functional autonomy/dependence, might influence individual's engagement/avoidance in/of activities, therefore being less/more disabled. From a practical perspective the development of the revised FSSADI_PAIN might be useful for caregivers, institutions and policy makers because there is a lack of instruments measuring formal social support, especially, pain-related support; it might help promoting good practices of providing support to elders suffering from (chronic) pain. For example, institutions may be able to signal at-risk individuals, namely, elders with low physical functioning, high PPD and low PPA. In

conclusion, the FSSADI_PAIN is an innovative, useful, valid and reliable tool to measure the promotion of autonomy/dependence as functions of PSS of elders with pain. Its inclusion in future research will contribute to unravel the role of close interpersonal contexts on the promotion of active ageing among elders with (chronic) pain.

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APPENDIX

1) PORTUGUESE VERSION

Durante toda a vida, a maior parte das pessoas sente dor de vez em quando. A dor pode ser uma experiência que dificulta o nosso dia-a-dia e a realização de várias tarefas quotidianas. Nestas circunstâncias, o apoio recebido nas instituições, como os Lares e Centros de Dia, pelas pessoas que aí trabalham pode ter um papel muito relevante no auxílio aos utentes com dores.

No presente questionário, estamos interessados em conhecer a sua noção sobre a frequência com que, no geral, os funcionários desta instituição lhe prestam assistência quando têm dores.

Não existem respostas certas ou erradas. Não estamos interessados em avaliar a sua instituição ou as pessoas que aí trabalham. Estamos apenas interessados na sua noção sobre o apoio que recebe quando tem dores.

Abaixo estão indicadas diferentes situações de apoio prestadas em contextos de dor.

Por favor, para cada situação, faça um círculo num dos números de 1 a 5, mostrando com que frequência os funcionários desta instituição lhe dão o tipo de ajuda que é descrita.

Muito obrigada pela sua colaboração!

1.1. Quando eu estou com dores, no geral, os/as funcionários/as desta instituição...

	Nada Frequente	Pouco Frequente	Moderadamente Frequente	Muito Frequente	Extremamente Frequente
1. Incentivam-me a participar nas actividades de lazer e diversão.	1	2	3	4	5
2. Incentivam-me a conviver socialmente.	1	2	3	4	5
3. Incentivam-me a confiar na minha capacidade para continuar a funcionar.	1	2	3	4	5

4. Ajudam-me a tratar de aspectos práticos (ex., transporte, reservas, bilhetes) para que consiga participar em actividades/saídas sociais.	1	2	3	4	5
5. Aconselham-me a parar tudo o que estou a fazer.	1	2	3	4	5
6. Trazem-me tudo o que eu necessito para que não precise de me mexer.	1	2	3	4	5
7. Dizem-me que eu preciso da ajuda de outros para lidar com a dor.	1	2	3	4	5
8. Dizem-me para não insistir quando não me sinto capaz de tratar de alguns problemas.	1	2	3	4	5

2) ENGLISH VERSION

Throughout life, most people feel pain from time to time. Pain can be a difficult experience that challenges the performance of various daily tasks. In these circumstances, the support received in institutions, such as Nursing Homes and Day Centres, by the people who work there can have a very important role in helping clients with pain.

In this questionnaire, we are interested in understanding your notion about the frequency with which, in general, employees of this institution assist when you have pain. There are no correct or wrong answers. We are not interested in evaluating the institution or the people who work there.

We are only interested in your notion about the support you receive when you are in pain.

Below are listed different situations in which support is provided in the context of pain.

For each situation please circle a numbers from 1 to 5, indicating how often the staff of this institution will give you the kind of help that is described.

Thank you for your collaboration!

1.1. When I am in pain, the employees at this institution...

	Not at all frequent	Infrequent	Moderately frequent	Frequent	Extremely frequent
1. Encourage me to participate in leisure and fun activities.	1	2	3	4	5
2. Encourage me to socialize	1	2	3	4	5
3. Encourage me to trust in my ability to keep on going.	1	2	3	4	5
4. Help me to deal with practical aspects (eg, transportation, reservations, tickets) so I can participate in activities/social outings.	1	2	3	4	5
5. Advise me to stop doing whatever I am doing.	1	2	3	4	5
6. Bring me everything so that I don't need to move.	1	2	3	4	5
7. Tell me that I need help from others to cope with my pain.	1	2	3	4	5
8. Tell me not to push myself when I feel unable of handling certain issues	1	2	3	4	5