



Original Reports

Assessing Family Social Support for Functional
Autonomy and Dependence in Pain: A Psychometric
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Abstract: Assessing family supportive responses to pain behaviors is paramount, as these may help or hinder chronic pain (CP) adjustment. Current self-report measures of pain-specific family supportive dynamics are scarce, covering a limited range of responses. To address this gap, this paper aimed at the psychometric validation of a (revised) novel measure - the Informal Social Support for Autonomy and Dependence in Pain Inventory (ISSADI-PAIN). Three-hundred and three adults participated in this study (53.3% women; $M_{age} = 49.31$), 53.5% with current CP, 20.1% with acute pain (AP) in the previous week and 26.4% with no current pain. All participants completed the revised ISSADI-PAIN. Participants reporting AP/CP in the previous week also filled out measures of pain coping/outcomes. Exploratory and confirmatory factor analyzes supported a 3-factor structure: Perceived Promotion of Dependence (PPD; 5 items; $\alpha = .82$), Perceived Promotion of Autonomy-Emotional (PPA-Emot; 3 items; $\alpha = .78$), PPA-instrumental (PPA-Inst; 3 items; $\alpha = .82$). Higher PPD was associated with higher AP disability and less wellness-focused coping; higher PPA-Emot was associated with more wellness-focused CP coping; PPA-Inst was associated with better/worse AP/CP outcomes and more frequent use of wellness-focused CP coping. Men with AP reported more PPD than women. The revised ISSADI-PAIN is an innovative, valid, and reliable measure of relevant functions of pain-related social support, which may influence pain persistence and adaptation.

Perspective: This article presents a novel self-report measure (ISSADI-PAIN) that assesses family support for functional autonomy and dependence in pain contexts. This measure may contribute to further research on the complexities of family supportive dynamics surrounding individuals with AP/CP, clarifying their role on pain persistence and adaptation processes.

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Key words: Pain, family social support, functional autonomy/dependence, pain coping, scale development and validation.

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Family supportive responses to individuals' pain behaviors may prevent or promote pain chronification^{8,34} and help or hinder chronic pain adjustment.^{9,24} Therefore, evidence-based knowledge on adaptive and effective pain-related social support is paramount. Yet, this topic has been under investigated, partly due to a scarcity of high-quality measures of pain specific (vs general) social support.³ Most current measures rest on operant assumptions, cover a limited range of responses to pain behaviors (eg, solicitousness and distraction) and have been validated in samples of individuals with chronic pain only.³ This may be curtailing research on the

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complexity of pain-related interpersonal dynamics in the adjustment to chronic pain but also in the transition from acute to chronic pain. Addressing these gaps, this paper presents the psychometric validation of a (revised) novel measure - the Informal Social Support for Autonomy and Dependence in Pain Inventory (ISSADI-PAIN).

The development of the ISSADI-PAIN rests on 2 theoretical assumptions. First, as contended by the Fear-avoidance Model of Pain,^{28,45} avoidance behaviors are a major predictor of pain persistence and poor chronic pain adjustment. Second, supportive responses to pain behaviors may enable individuals' activity avoidance/engagement, depending on whether they promote their functional dependence/autonomy,^{29,33} ie, inability to perform daily activities without assistance.²² These contentions have been supported using the Formal Social Support for Autonomy and Dependence in Pain Inventory (FSSADI-PAIN)^{29,33} to assess older adults received social support for functional autonomy/dependence (henceforth, Perceived Promotion of Autonomy/Dependence; PPA/PPD) from staff at formal care institutions. Higher PPD predicted higher pain-related disability 3 months afterwards, which was accounted for by decreases in self-reported physical functioning and pain-related self-efficacy.³¹ Conversely, higher PPA buffered the impact of pain severity on pain disability by increasing pain-related self-efficacy.³²

The development and validation of the ISSADI-PAIN will expand research on these novel functions of pain-related social support (PPA/PPD) to a primary system of support – the family. An initial pool of 20 items was developed and its preliminary psychometric properties were tested.¹⁵ Findings showed a 4-factor interrelated structure with good internal consistencies ($.72 < \alpha < .85$): emotional support for functional autonomy (PPA-Emot)/functional dependence (PPD-Emot) and instrumental support for functional autonomy (PPA-Inst)/functional dependence (PPD-Inst). It also showed adequate convergent/discriminant validity using the MOS Social Support Survey³⁷ and criterion validity by differentiating the support received by individuals with acute pain vs chronic pain.¹⁵

This study revises and further tests the ISSADI-PAIN construct and criterion validity. As some items have shown low factor loadings and/or high cross-loadings,¹⁵ we first aimed to test the factor structure of the revised ISSADI-PAIN. It was expected to fit 1 of 2 factorial structures: 1) Four-related factors: PPA-Emot, PPA-Inst, PPD-Emot and PPD-Inst,¹⁵ or 2) 2-related factors: PPA and PPD.³³

Second, criterion validity was analyzed by testing the associations between the ISSADI-PAIN and measures of pain-related outcomes (pain severity, pain disability and physical functioning), coping and participants' sex. As PPA/PPD have shown different associations with pain outcomes depending on whether pain is acute or chronic,^{15,29} the associations were analyzed separately for individuals with acute and chronic pain. We expected that PPD would be associated with more illness-focused coping (eg, guarding, resting)^{25,41} and poorer pain outcomes, mostly for chronic pain. Conversely, PPA would be associated with more wellness-focused coping (eg, relaxation,

Assessing Family Social Support for Functional Autonomy in Pain exercising)^{25,41} and better pain outcomes, mostly for chronic pain. Finally, as gender role expectations often put more pressure on women to keep on fulfilling their household chores despite pain,^{4,35} we expected women would report less/more PPD/PPA than men.

Method

Participants and Study Design

The preliminary validation study of the ISSADI-PAIN was conducted with a sample of individuals with heterogeneous pain experiences, namely, current acute or chronic pain and no current pain.¹⁵ Similarly, this cross-sectional and correlational study sought to include in its sample adult community dwellers (aged over 18 years old) who, in the previous week, had experienced acute or chronic pain or reported no current pain, ie, had no chronic pain history and no acute pain in the previous week (but most likely experienced past acute pain).

Table 1 shows the sociodemographic characteristics of the overall sample and the 3 subsamples of participants. Three hundred and 3 individuals participated in this study; 223 had felt pain in the previous week (162 chronic pain and 61 acute pain) and 80 had not. Overall, participants were adults aged between 18 and 85 years old and around half were women. Most of them were married or living in unmarried partnerships, around 30% were single or divorced and a few were widowed. A large proportion of the participants reported living with their nuclear family, less than 10% lived alone, and the remaining reported other living arrangements (eg, friends or other family members). Participants' years of formal education ranged from 0 to 30, many reported having full-time or part-time jobs, around 1 quarter were retired, and a minority was unemployed. The employed participants reported a very heterogeneous set of professional activities, ranging from unskilled jobs (eg, house cleaners, desk clerks, line operators) to semiskilled (eg, salespersons, bus drivers, waiters, bartenders, cooks, health-care assistants) and skilled jobs (eg, teachers, engineers, managers, marketeers, psychotherapists, lawyers, nurses, architects).

Participants with current chronic pain (53.5%) reported a pain duration ranging from 4 months to 30 years ($Mdn = 3$ years; $M = 6.51$ years; $SD = 7.01$) with moderate levels of pain severity ($M = 4.59/10$, $SD = 1.79$) and interference ($M = 4.27/10$, $SD = 2.40$). Most of these participants suffered from musculoskeletal pain on multiple sites, with back and/or limbs being the most frequent. Participants who reported acute pain episodes in the previous week (20.1%), reported relatively low levels of pain severity ($M = 3.32$, $SD = 1.45$) and interference ($Mdn = 2.43$, $M = 2.89$, $SD = 2.25$), mostly located on their limbs and back.

Instruments

The Revised ISSADI-PAIN

The ISSADI-PAIN assesses what has been termed by social support researchers as received social support, ie,

Table 1. Sociodemographic and Clinical Characteristics of the Overall Sample and Subsamples of Participants With Acute Pain, Chronic Pain, and no Current Pain

		NO PAIN (N = 80)	ACUTE PAIN (N = 61)	CHRONIC PAIN (N = 162)	OVERALL SAMPLE (N = 303)
Age <i>M(SD)</i>		55.1 (12.1)	42.1 (17.0)	49.1 (14.6)	49.3 (15.1)
Years of education <i>M(SD)</i>		9.3 (5.0)	12.6 (3.8)	10.9 (5.3)	10.8 (5.1)
Sex (%)	Female	42.5	47.5	60.9	53.3
	Male	57.5	52.5	39.1	46.7
Civil Status (%)	Single	13.8	41.0	18.5	21.8
	Married/Civil Union	80.0	45.9	64.2	64.7
	Divorced	2.5	11.5	13.0	9.9
	Widowed	3.8	1.6	4.3	3.6
Cohabitation (%)	Friends	—	1.7	0.6	0.7
	Extended family	6.3	6.7	9.3	7.9
	Nuclear family	90.0	80.0	78.4	81.8
	Lived alone	3.8	11.7	11.7	9.6
Work status (%)	Employed	52.5	77.6	64.6	63.9
	Unemployed	13.8	8.6	13.7	12.7
	Retired	33.8	13.8	21.7	23.4
Pain location (%)	Upper limbs	—	18.0	5.6	6.6
	Lowers limbs	—	19.7	16.0	12.5
	Head	—	9.8	7.4	5.9
	Chest/thorax	—	1.6	1.2	1.0
	Back	—	24.6	30.9	21.5
	Pelvis	—	1.6	1.9	1.3
	Visceral	—	8.2	2.5	3.0
	Multiple locations	—	16.4	34.0	21.5

individuals' self-reports of supportive actions received in the past.^{38,44} More specifically, it taps into individuals' overall impression of the frequency of support received from their family members when they are in pain, regardless of its type (acute vs chronic) or recency (current vs past experiences). As most individuals can report their pain histories (even if only of acute pain), which often occur within and are shaped by their familial interactions,^{8,9,13} we assumed that any person with a past or present experience of acute or chronic pain could fill out the ISSADI-PAIN. Hence, the inclusion in this study of community dwellers with different pain histories including people with past acute pain experiences only. The development of a valid and reliable measure able to differentiate family received social support to different types of pain experiences (eg, acute vs chronic) is in need, and it may be very useful in future prospective studies on the role of interpersonal interactions in the transition from acute to chronic pain.^{9,12}

The ISSADI-PAIN initial pool of 20 items was developed in a previous study¹⁵ based on: 1) a review of the literature and the items of existing measures of general informal social support (eg, The Social Support Inventory⁴²; Duke-UNC Functional Social Support Questionnaire⁶), so as to identify a broad diversity of family daily actions of support; and 2) a comparison and adaptation to family contexts of some of the items used to develop and validate the FSSADI-PAIN.^{29,33} FSSADI-PAIN items assess the extent to which older adults in formal care institutions (eg, day care centers, nursing homes) report receiving social support for functional autonomy/dependence from staff (eg, *When I am in pain,*

employees at this institution encourage me to participate in leisure and fun activities). Only the items reflecting actions of support that could also be received from family in a domestic context were adapted ($n = 7$), by changing the source of support (eg, *When I am in pain, my family members encourage me to participate in leisure and fun activities*). The items were assessed for clarity and face validity by 5 adults aged between 25 and 59 (3 women), who reported no need for improvements. The items were also analyzed by 2 independent specialists in pain and functional autonomy,¹⁵ showing excellent content validity (K Cohen = 1).

Based on the preliminary findings of an exploratory principal axis factoring analysis,¹⁵ in this study we have used the 12 items with the lowest cross-loadings and the highest loadings in their respective dimensions of family pain-related social support, namely: 1) instrumental/tangible support for functional dependence (PPD-Inst; 3 items; eg, *When I am in pain my family members take care of my household chores*); 2) emotional/esteem support that promotes functional dependence (PPD-Emot; 3 items; *When I am in pain my family members encourage me to avoid any kind of activities*); 3) instrumental/tangible support for functional autonomy (PPA-Inst; $n = 3$ items; *When I am in pain my family members help me to take care of practical aspects (eg, transportation) so that I can participate in activities/social outings*) and 4) emotional/esteem support for functional autonomy (PPA-Emot; $n = 3$ items; *When I am in pain my family members encourage me to participate in leisure and fun activities*). Noteworthy, only 3 out of the 12 items were adapted from the FSSADI-PAIN³³ (see

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items 8, 9 and 10 in Table 2). Participants were asked to rate the frequency with which their family members provided them each type of support when they were in pain, on a Likert scale ranging from (1) not at all frequent to (5) extremely frequent. It should be stressed that the construct of family support for functional autonomy (PPA) differs from the self-determination theory-based construct of family autonomy support for physical activity,²¹ as the latter encompasses behaviors that support opportunities for choice, independent problem-solving and decision making aligned with personal preferences and values regarding physical activity that, ultimately, satisfy individuals' psychological need for autonomy.

The Portuguese and English final versions of the revised ISSADI-PAIN can be found in the Supplementary Files. Two independent translators, fluent in English and in Portuguese, conducted a translation-back translation process of the instrument. Any discrepancies between the translations and back translations were discussed and resolved by consensus; only minor discrepancies were found, which did not influence the semantic, idiomatic, conceptual, and experiential equivalence between the original version in Portuguese and its English version.

The Chronic Pain Coping Inventory

The Portuguese version of the Chronic Pain Coping Inventory (CPCI)² was used. The CPCI was originally developed by Jensen and colleagues²⁵ to assess the frequency with which individuals' have used several behavioral and cognitive pain-related coping strategies in the last week (rated in number of days, from 0 to 7). It is composed by 65 items distributed by 3 subscales measuring illness-focused coping (guarding, resting, and asking for assistance) and 5 subscales measuring wellness-focused coping (relaxation, task persistence, exercising/stretching, coping self-statements, and seeking social support). The original CPCI is a reliable and valid measure,^{19,25,41} mostly used in populations with chronic pain but also with individuals with (sub-)acute pain.⁴³

Like its original version, the Portuguese version of the CPCI has shown good psychometric properties.² In this study, to avoid an excessively lengthy data collection protocol, we have only included the 4 items with highest loadings for 3 illness-focused and 3 wellness-focused coping subscales, namely: 1) guarding – limiting or restricting movement of a body part; 2) Resting – engaging in resting activities when in pain (eg, lying or sitting down); 3) Asking for assistance – asking for help with some activity when in pain (eg, household chores); 4) Relaxation – engaging in relaxation activities when in pain (eg, meditation); 5) Task persistence – keep on going with their activities despite pain and 6) Exercising/stretching – engaging in muscle strengthening and stretching activities.

A confirmatory factor analysis (CFA) was used to test the 6-factor structure with the 24 items. The overall fit of the model tested was within the range of adequate fit^{23,27,36}: $\chi^2(238) = 416.43$ $P < .001$; $\chi^2/df = 1.79$; CFI = .91; TLI = .89; RMSEA = .06, and SRMR = .08. The

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Cronbach alphas showed good internal consistency: guarding ($\alpha = .75$), resting ($\alpha = .76$), asking for assistance ($\alpha = .85$), relaxation ($\alpha = .71$), task persistence ($\alpha = .80$), exercising/stretching ($\alpha = .78$). The scores for the 6 factors were obtained by averaging all items of each factor; the higher the scores the higher the frequency of use of the pain-related coping strategies.

The Medical Outcome Study-Short Form 36

The Portuguese version of the Medical Outcome Study-Short Form 36v2^{17,18} was used. Its original version^{37,48} is a 10-item scale that measures the extent to which participants' health is limiting their ability to perform daily physical activities (eg, climbing stairs, walk, bend, kneel, or stoop, bathe or dress, vigorous or moderate activities), on a scale ranging from 1 to 3 (1 = *yes, limited a lot*; 2 = *yes, limited a little*; 3 = *No, not limited at all*). The Portuguese version of this scale has good psychometric properties ($\alpha = .87$).¹⁸ A CFA for ordinal variables was performed to test the 1-dimensionality of this scale, which showed a good fit: $\chi^2(31) = 97.78$, $P < .001$; $\chi^2/df = 3.15$; CFI = .96; TLI = .95; RMSEA = .08; and SRMR = .06. The scale's internal consistency was excellent ($\alpha = .91$). Following Ferreira's guidelines,¹⁷ participants' item answers were transformed into a final score that ranged from 0 (lowest ability) to 100 (highest ability) to perform daily physical activities.

The Brief Pain Inventory

Participants were requested to fill out the pain severity and pain interference scales of the Portuguese version of the Brief Pain Inventory (BPI),² which was originally developed by Cleeland.¹¹ Pain severity was assessed with a 4-item scale, asking participants to rate their pain at its worst/least/average and "at the moment", on a rating scale ranging from 0 (no pain) to 10 (pain as bad as you can imagine). Pain interference was assessed with a 7-item scale asking participants to rate how pain had interfered with their general activity/mood/walking ability/normal work/relations with other people/sleep and enjoyment of life, on a rating scale ranging from 0 (does not interfere) to 10 (completely interferes).

The Portuguese version of the BPI has shown good psychometric properties.² A CFA supported the original structure of this scale, providing a good model fit: $\chi^2(35) = 68.86$, $P < .001$; $\chi^2/df = 1.97$; CFI = .98; TLI = .97; RMSEA = .07; and SRMR = .04. Also, both factors presented very good internal consistency indices: pain severity ($\alpha = .85$) and pain interference ($\alpha = .92$). The scores for pain severity and pain interference were obtained by averaging all items of each factor; the higher the scores the higher the pain severity/interference.

Procedures

This study followed the ethical principles of the World Medical Association (WMA) Declaration of Helsinki⁴⁹ and complied to the guidelines for approval of the

Institutional Review Board of Iscte-University Institute of Lisbon. Participants were invited to participate in a study on pain-related social support. After giving their informed consent to participate, they were asked to fill out the revised ISSADI-PAIN. As the measure seeks to assess individuals' overall impression of the support received from their family members when they are in pain regardless of its type or recency, all participants were requested to fill out the revised ISSADI-PAIN. Then, in order to screen for pain experiences, they were asked 3 yes-or-no questions³³: Q1) "Have you ever had constant or intermittent pain for more than 3 consecutive months?"; Q2) [If yes to Q1] "Did you feel that pain last week?" and Q3) [If "no" to Q1 or Q2] "Did you feel any pain last week?". Participants with chronic pain experiences answered affirmatively to Q1, and if also said "yes" to Q2, their pain was considered current. Participants with acute pain answered "no" to Q1 but "yes" to Q3. Participants with no current pain experiences answered negatively to all questions. Afterwards, participants who reported current chronic or acute pain were asked to report on their pain duration, pain location(s), fill out the pain severity and interference scales of the BPI, the CPCI and the physical functioning scale of the MOS-SF36. Finally, participant sociodemographic information was collected (sex, age, civil and work status, years of education, professional activity, and household arrangements).

The protocol was administered with the support of the online survey software Qualtrics. Two strategies were used to disseminate the online protocol: 1) a snowball strategy, where individuals receiving the online questionnaire were asked to forward it to their personal and/or professional networks and 2) a strategy targeting pain patient associations, where the respective boards were requested to forward the protocol to their members. The latter strategy accounted for the high proportion of participants reporting current chronic pain experiences in the present sample.

Data Analysis

The overall sample ($n = 303$) was used to conduct the descriptive analyzes of the revised ISSADI-PAIN items, to investigate its factorial structure and analyze factor distribution and reliability. The descriptive analysis of the revised ISSADI-PAIN items was conducted using mean, standard deviation, skewness coefficient and respective standard error. To assess the measure's construct validity, namely, its factor structure, we have first conducted an exploratory factor analysis (EFA) with a random half sample ($n = 156$). Then, to test the measure's underlying latent structure, a confirmatory factor analysis (CFA) was performed with the second random half sample ($n = 147$).^{7,50} In the first random half sample, a principal axis factoring (PAF) was conducted with oblique rotation, since, considering theory and the previous findings, it was expected that the ISSADI-PAIN dimensions were intercorrelated. Although the Kaiser criterion is commonly used, the parallel analysis^{13,27} and Scree test criteria¹⁰ were privileged to extract the factors, as these

have been shown to be more accurate. Then, in the second subsample, a CFA was performed using the maximum likelihood (ML) method. The presence of outliers was analyzed by the square Mahalanobis distance (D2) and 13 outliers were eliminated as their value exceeded the limits.⁴⁰ The assessment of normality was checked through the critical ratio and multivariate normality was guaranteed.

To evaluate how well the model fit the data, multiple fit indices were used: the chi-square (χ^2) and the normed chi-square (χ^2/df), which indicated a good fit if $\chi^2/df \leq 2$ ³⁶; 2 indices of incremental close-fit, the Comparative Fit Index (CFI > .95) and the Tucker–Lewis Index (TLI > .95), the root mean square error of approximation (RMSEA $\leq .06$) and the standardized root mean square residual (SRMR $\leq .08$).²³ Along with fit validity, construct validity was also analyzed by convergent validity, which was assessed via factor loadings and average variance extracted (AVE). The scale's internal consistency was assessed by calculating the composite reliability (CR), and the Cronbach's alpha. A descriptive analysis of the ISSADI-PAIN factors was done using mean, standard deviation, skewness coefficient and respective standard error. Steiger's z test¹⁴ was used to compare the magnitude of the correlations between the ISSADI-PAIN factors.

Correlations and analyses of variance (with the overall sample) were used to test the associations between the scale's factors and sociodemographic variables (age, employment status and years of education). As none of the associations were significant at $P < .01$, these were not included in subsequent analyses. Concurrent validity was tested with the subsamples of participants reporting pain in the previous week only, as participants with no current pain experiences did not fill out the pain outcome/coping measures. Concurrent validity was assessed by calculating the bivariate correlations between the ISSADI-PAIN factors and the Chronic Pain Coping Inventory (CPCI) subscales, the Physical functioning, the Pain interference, and the Pain severity scales. Point-biserial correlations were also calculated between the ISSADI_PAIN factors and participants' sex. Correlations were performed separately for participants with current chronic pain and acute pain. Correlations were assessed in line with Cohen's guidelines¹²: low correlations range from 0.10 to 0.29, moderate correlations from 0.30 to 0.49, and high correlations from 0.50 to 1.

Results

Item Descriptive Analysis

The descriptive analysis showed that the item means were around the scale's midpoint (3) with standard deviations ranging between 1.22 and 1.43 (Table 2). The item 12 (...) *advise me against physical exercise* showed the lowest mean (1.92). Except for item 12, no outliers were detected in item distributions, and they presented symmetrical distributions given that the ratio skewness/standard error (SK/SE) was approximately $<|z|^{20}$. This

Table 2. Item and Factor Descriptive Analysis, Principal Axis Factoring and Internal Reliability

ITEMS	DESCRIPTIVE ANALYSIS OF THE ISSADI_PAIN ITEMS*				PRINCIPAL AXIS FACTORING ANALYSIS WITH OBLIMIN ROTATION†	
	M	SD	SKEWNESS / SE	PPD	PPA_EMOT	PPA_INST
When I am in pain my family members...						
11. ...do my shopping so that I do not need to leave the house.	2.78	1.38	.8	.78	-.09	.08
3. ...take care of my household chores.	2.93	1.32	-.40	.77	.17	-.06
7. ...make my meals for me so that I don't need to cook.	2.91	1.43	1.74	.77	-.11	-.02
8. ...advise me to stop everything I am doing.	2.49	1.23	2.68	.74	.03	.00
4. ...encourage me to avoid any kind of activities.	2.62	1.27	1.92	.49	-.04	.19
6. ...encourage me to visit other family members or friends.	2.67	1.27	1.74	.01	.87	-.05
10. ...encourage me to participate in leisure and fun activities.	2.91	1.22	-.10	.09	.69	.04
2. ...motivate me to exercise.	2.91	1.27	-.27	-.17	.66	.12
1. ...give me a lift or help me arrange transportation so that I can handle my personal affairs autonomously.	3.07	1.42	-.92	-.02	-.03	.97
9. ...help me to take care of practical aspects (e.g., transportation) so that I can participate in activities/social outings.	2.75	1.34	1.36	.25	.25	.52
5. ...assist me in contacting entities (e.g., bank, social security) so that I can solve my personal problems autonomously.	2.84	1.37	.69	.27	.27	.41
12. ...advise me against physical exercise.	1.92	1.20	8.63			
Cronbach Alphas*				.82	.78	.82
M (SD)*				2.75 (1.01)	2.83 (1.04)	2.89 (1.19)
Skewness/SE*				1.07	.53	.56

Abbreviations: PPD = perceived promotion of dependence; PPA_Emot = perceived promotion of autonomy (Emotional/esteem support); PPA_Inst = perceived promotion of autonomy (Instrumental support)

*Overall sample N = 303.

†Random half sample N = 156.

initial examination led to the exclusion of item 12 due to its extreme asymmetry (SK/SE = 8.56).

Construct Validity and Reliability

Exploratory Factor Analysis

The factor model adequacy was checked by the Kaiser-Meyer-Olkin (KMO = .84) and the measure sampling adequacy (MSA) for each item (MSA ranged between .74 and .90). The Bartlett's test of sphericity was also obtained with a significant result ($\chi^2(55) = 782.94, P < .001$). The EFA (n = 156) showed that only 2 factors with eigenvalues above 1 (Kaiser's criterion) would be extracted, explaining 51.21% of variance. However, the results of the parallel analysis and the scree test converged on a 3-factor solution. Consequently, a PFA was conducted with an *oblimin* rotation to extract 3 factors. The final factorial structure can be found in Table 2: Factor 1- PPD (5 items), PPA-Emot (3 items) and PPA-Instr (3 items).

Confirmatory Factor Analysis

Two models were tested with CFA: (model 1) the 3-factor model extracted by the EFA, and (model 2) a 2-factor model. The CFA results indicated a good fit between the 3-factor model and the observed data: $\chi^2(40) = 72.85, P = .001; \chi^2/df = 1.82; CFI = .95; TLI = .93; RMSEA = .08$ and $SRMR = .07$. The 2-factor model was tested in line with the Kaiser criteria and yielded a worse fit: $\chi^2(41) = 90.95, P < .001; \chi^2/df = 2.22; CFI = .92;$

$TLI = .89; RMSEA = .09$ and $SRMR = .08$. Furthermore, the Chi-Square Difference Test (χ^2_D) was significant ($\chi^2_D(1) = 18.10, P < .001$), thus, the 3-factor model fit better the data²⁷.

The 3-factor model is depicted in Fig. 1. All items loaded significantly on their corresponding factor, the standardized factor loadings were above .50, except for a single item with 0.40, while the remaining ranged between .58 and .85.²⁰ The average variance extracted (AVE) of PPD (.43) was close to the .50 criterion proposed by Hair²⁰ and exceeded this cutoff for the other 2 factors (PPA-Emot = .54 and PPA-Instr = .64,). The square root of AVE of all constructs was larger than their intercorrelations supporting the measure's discriminant validity.

Factor Reliability, Descriptive Analysis, and Intercorrelations

All factors showed good internal consistency indices (Table 2). The factor descriptive analysis (Table 2) showed that their means were around the scale's midpoint (3) with standard deviations ranging between 1.01 and 1.19. Factors presented symmetrical distributions given that the ratio skewness /standard error (SK/SE) was approximately <|2|. ²⁰

PPD showed a low positive correlation with PPA-Emot (r = .20, P < .001) but a high positive association with PPA-Inst (r = .53, P < .001); the magnitude of these correlations was significantly different (Steiger's Z = -6.42, P < .001). Despite its low association with PPD, PPA-Emot showed a moderate positive association with PPA-

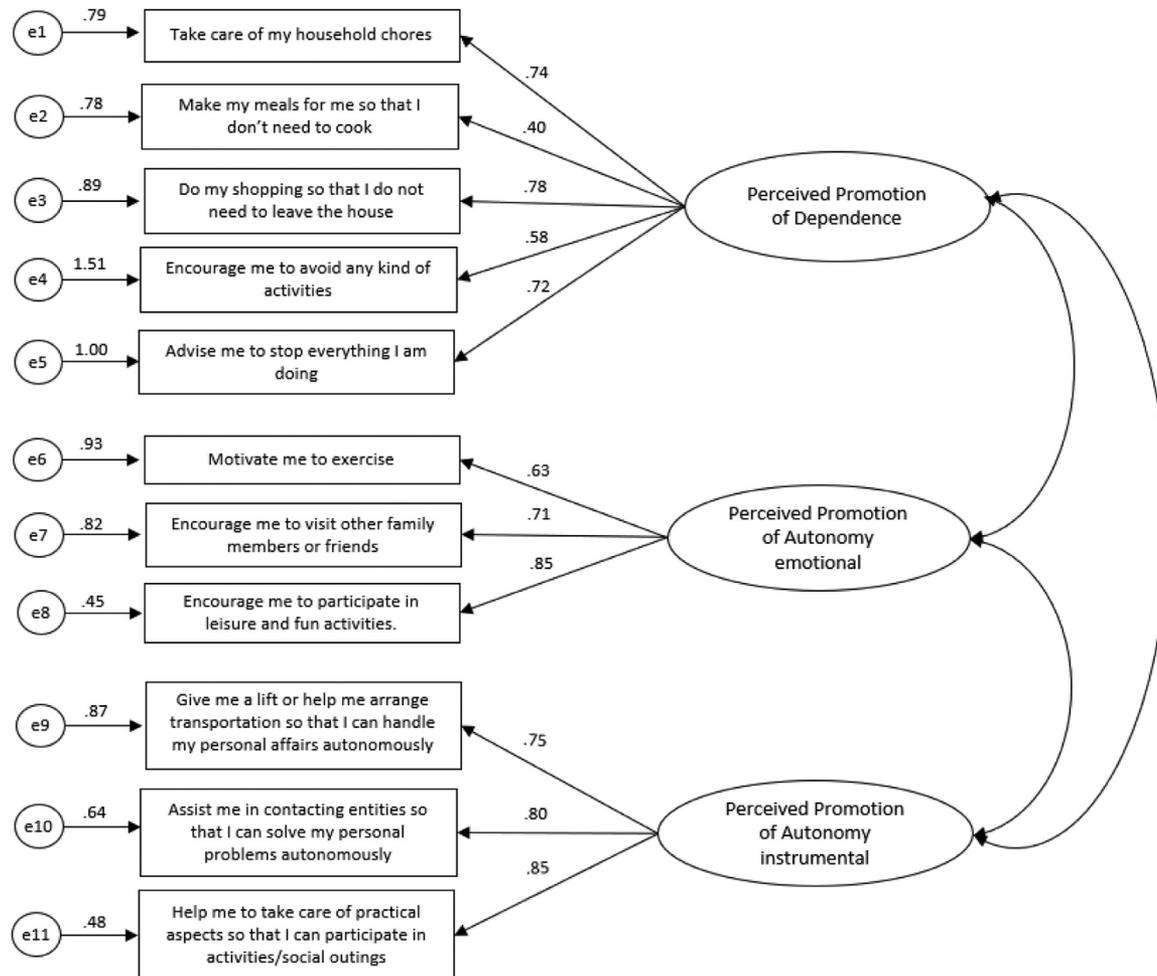


Figure 1. ISSADI_PAIN: 3-dimensional confirmatory factor model.

Inst ($r = .49, P < .001$); the difference between these correlation magnitudes was significant (Steiger's $Z = -5.80, P < .001$). There were no significant differences between the magnitude of the correlations between PPA-Inst and the other 2 factors (Steiger's $Z = .65, P = .25$).

Criterion-Related Validity

As can be seen in Table 3, all ISSADI-PAIN factors showed low to moderate positive associations with the coping strategy of asking for assistance among participants with acute and chronic pain. The associations of the ISSADI-PAIN factors with the remaining criteria showed a different pattern for the 2 sub-samples.

For participants with acute pain, PPD showed a low positive association with pain interference and a negative moderate association with exercising/stretching. Conversely, instrumental PPA showed a low positive association with physical functioning. Male participants also significantly ($P = .028$) reported more PPD ($M = 3.18, SD = .82$) than female participants ($M = 2.74; SD = .91$). No other correlations were significant ($P > .05$).

For participants with chronic pain, PPD showed a low negative association with task persistence. PPA-Emot showed low to moderate positive associations with

relaxation and exercising/stretching. PPA-Inst showed low positive associations with resting, relaxation, exercising/stretching, pain severity and a low negative association with physical functioning. No other correlations were significant ($P > .05$).

Discussion

This study aimed to test the psychometric qualities of a novel measure to assess family pain-related social support for functional autonomy and dependence. Drawing upon a preliminary study of an initial pool of 20 items,¹⁵ we set forth to further investigate the construct and criteria-related validity of the revised ISSADI-PAIN.

A first analysis of the distributions of the 12 items led to the exclusion of one (item 12) due to its extreme asymmetry, as most participants reported that their family members almost never *advised them against physical exercise* when they were in pain. Given the high visibility of national public health campaigns promoting physical exercise,³⁹ this item might have been perceived as extreme and counter normative.

The exploratory and confirmatory factor analysis supported a 3-factor structure of the 11-item ISSADI-PAIN: 1) a 5-item factor including instrumental and emotional

Table 3. Correlations Between the ISSADI_PAIN Factors and Chronic Pain Coping Inventory (CPCI) Subscales, Physical Functioning, Pain Interference and Pain Severity and Participants' sex

	PAIN COPING							PAIN-RELATED OUTCOMES				PARTICIPANT SEX	
	GUARDING	RESTING	ASKING ASSISTANCE	RELAXATION	TASK PERSISTENCE	EXERCISING	PHYSICAL FUNCTIONING	PAIN SEVERITY	PAIN INTERFERENCE				
Acute pain (N = 61)													
PPD	.18	.11	.32 [‡]	-.01	-.11	-.29*	.07	.15	.20*			.29*	
PPA_Emot	.08	.05	.22*	.04	.10	.01	.13	.05	-.04			.01	
PPA_Inst	.19	.10	.32 [‡]	-.02	.02	-.11	.21*	.19	.13			-.00	
PPD	.11	.07	.26 [‡]	-.02	-.17*	-.07	.08	-.02	-.04			-.00	
PPA_Emot	.05	.10	.23 [‡]	.17*	-.16	.28 [‡]	.07	.09	.05			-.04	
PPA_Inst	.09	.14*	.27 [‡]	.17*	-.12	.13*	-.13*	.14*	.06			-.10	

Abbreviations: PPD = perceived promotion of dependence; PPA_Emot = perceived promotion of autonomy (Emotional/esteem support); PPA_Inst = perceived promotion of autonomy (Instrumental support). All values are Pearson correlation coefficients except those in the "Participant Sex" column, which are point biserial correlation coefficients. Participant Sex was dummy coded as 0 = Female and 1 = Male.

*P < .05.
[‡]P < .01.
^{‡‡}P < .001.

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support promoting functional dependence (PPD); 2) a 3-item factor including instrumental support for functional autonomy (PPA-Inst) and 3) a 3-item factor including emotional support for functional autonomy (PPA-Emot). These findings did not support our expectation that the measure's factor structure would fit either a 2-factor model (PPA vs PPD)³³ or a 4-factor model (PPA-Emot, PPA-Inst, PPD-Emot and PPD-Inst).¹⁵ This suggests, on 1 hand, that as compared to formal pain-related social support (eg, provided by staff in day-care centres), for which a 2-factor structure has been consistently found,^{29,33} in family contexts individuals differentiate the instrumental and emotional functions of pain-related social support for functional autonomy.¹⁵ This could be explained by the higher relevance of affects and emotional support in relationships with family members as compared to formal caregivers.⁴⁷ Contrasting preliminary findings,¹⁵ such differentiation was only found for PPA but not PPD. This may have been accounted for by the exclusion of item 12, which led the remaining 2 items on emotional support for functional dependence to load on the same factor as the items on instrumental support for functional dependence. Noteworthy, a very recent adaptation and validation of the Spanish version of this 11-item ISSADI-PAIN has confirmed the 4-factor model, hence, differentiating the instrumental and emotional functions of PPA and PPD.¹⁶ This difference could partly be accounted for by sampling issues, as Esteve et al's study¹⁶ only included people with long-lasting chronic pain. Nonetheless, findings suggest a higher stability across studies of the structure found for PPA than for PPD.

All 3 factors showed very good internal consistency, symmetrical distributions, wide score ranges and positive intercorrelations, which is consistent with other findings.^{15,16} The positive intercorrelation pattern is understandable as all factors assess family pain-related social support. As in the Spanish validation study,¹⁶ emotional and instrumental PPA were moderately associated, showing that although both assess PPA they also differentiate its emotional and instrumental dimensions. PPD showed a lower association with emotional than instrumental PPA, which may be accounted for by the tangible nature of the support actions assessed by PPD and PPA instrumental. Overall, our findings show that the revised ISSADI-PAIN has good construct validity and very good internal consistency.

The measure also shows good criteria validity. As hypothesised, higher family PPD was associated with poorer pain outcomes (pain disability only), but contrary to expectations, only for those with acute pain. Higher acute pain interference, by increasing pain cues, may elicit more family responses to promote functional dependence. The association between PPD and pain interference has been consistently found among individuals with CP, in formal^{29,30,31} and informal settings.¹⁶ The reasons as to why these associations were not found among individuals with CP in this study might be related to differences in settings, sample characteristics and measurement strategies. As expected, higher PPD was associated to less frequent wellness-focused coping, both for people with acute

pain (less exercising) and CP (less task persistence). As suggested in previous studies,^{15,29} PPD may be adaptive for acute pain but maladaptive for CP.

Emotional PPA was not associated with pain outcomes for any of the subsamples, which is in line with Esteve et al's findings.¹⁶ However, as hypothesised, more emotional PPA was associated with more wellness-focused coping (relaxation and exercising) among individuals with CP only, suggesting these responses may play an important role in CP adaptation processes.

Instrumental PPA showed more associations with pain outcomes. It was associated with better physical functioning among people with acute pain. Like PPD it was associated with increased acute pain cues (higher pain disability), it seems that family's tangible help to promote functional autonomy increases when individuals show less acute pain cues (higher physical functioning). Conversely, and in line with Esteve et al's,¹⁶ more instrumental PPA was associated with more CP severity and lower physical functioning. This suggests that this type of family support may play an important role during CP flares, by helping individuals maintain some level of activity engagement despite pain. Indeed, more family instrumental PPA was associated with an increased use of CP wellness-focused coping (relaxation and exercising) but also, to a lesser extent, illness-focused coping (resting), which may reflect efforts to achieve an optimal balance in activity levels.

Noteworthy, all ISSADI-PAIN dimensions showed a low to moderated positive association with the coping strategy "asking for assistance", for both sub-samples. This may be explained by the fact that, although this coping subscale mostly refers to requests for instrumental support, the form of requested assistance is not specified (eg, substitute the person vs help the person doing the task).

Finally, as expected, men with acute pain reported more PPD than women with acute pain. Given that women more often have domestic responsibilities,⁴⁶ families may be more reluctant to respond to their acute pain with PPD as to maintain family roles. As PPD may be adaptive in acute pain, by facilitating recovery, this suggests that families with traditional gender role distributions may put women at an increased risk of developing persistent pain. As in Esteve et al's,¹⁶ no sex-related differences were found among people with CP. On one hand, CP may dilute traditional gender role distributions in the family unit,²⁶ hence accounting for this result. On the other hand, if despite CP, families keep gender roles distributions, these findings suggest a higher discrepancy between received and needed support among women than men. Indeed, women with CP more often report increased domestic pressure to maintain their multiple roles, hindering CP adjustment.³⁵

Limitations, Future Directions, and Contributions

This study has some limitations. First, it only used self-report measures, which increases the likelihood of shared method variance biases. Like Matos et al's,³¹ future studies should include, eg, objective measures of

functional autonomy. Second, by asking participants to report the support received by their family members, we are more likely tapping their overall subjective feeling of being supported for functional autonomy/dependence rather than their perceptions of specific supportive transactions.¹ Future validation of an ISSADI-PAIN version asking participants to report the support received from a specific significant other (eg, spouse or life partner) could overcome this limitation. Third, participants with CP were community dwellers with very diverse pain experiences. As patterns of family PPA/PPD may change depending on the type of pain (eg, musculoskeletal vs migraines), studies with more homogeneous clinical samples may be useful. Fourth, sampling procedures resulted in a much higher number of participants with CP than acute pain, urging caution when comparing results between subsamples. Fifth, this study provides no information on the measures' temporal stability and predictive validity, which should be addressed in future prospective studies. For example, prospective studies analyzing the role of PPA/PPD in the transition from acute to CP would test the predictive validity of this instrument. These studies would also clarify the temporal relationships between family PPA/PPD and pain outcomes, which the present cross-sectional study is unable to do. Sixth, although we find no theoretical rationale to raise the hypothesis that people with different pain experiences (AP vs CP vs no current pain) would understand the meaning of the measured constructs differently, the factorial structure invariance across such groups could be a research question to be explored. Finally, some of the effect sizes of the associations between the ISSADI-PAIN and pain outcomes are modest, raising questions regarding their clinical significance or potential moderating variables, such as preferences for PPA/PPD.⁵

Despite its limitations, overall, this study has relevant theoretical and practical contributions. At a theoretical level, it extends to the family context a novel conceptualization of pain-specific social support that has proven useful in accounting for the impact of formal social support on CP adjustment.^{31,32} If most research on pain-specific received social support has been focusing on significant others' maladaptive responses,³ this conceptualization suggests a type of response to pain behaviors – support for functional autonomy – that may be particularly useful in CP. It also suggests that the usefulness of different types of pain-specific family responses may vary over the course of pain development. This is an important contribution given that, if the role of significant others' pain-related social support on chronic pain adjustment has been amply investigated,³ much less is known about the predictive role of such pain-specific supportive responses in the transition from acute to chronic pain.^{3,8,9} At a practical level, this measure may be useful in clinical contexts when working with couples or families of individuals with CP or in preventive settings, so as to identify maladaptive patterns of family support that may lead to pain persistence and poor adaptation. Overall, the revised ISSADI-PAIN is an innovative, valid, and reliable measure of 2 functions of

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family pain-related social support, which may influence pain persistence and adaptation.

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Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jpain.2022.10.016>.

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