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Engendering pain management practices:

The role of physician sex on chronic low-back pain assessment and treatment prescriptions.

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Key-words: Gender biases; pain management practices; general practitioners; chronic low-back pain

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Abstract

The impact of physician sex on dimensions of medical care such as treatment prescriptions and referrals has been underexplored, especially in a pain context. Also, few studies have analyzed whether physicians sex moderates the influence of patients' or clinical situations' characteristics on pain management practices or its mediating processes. Therefore, our goal was to explore whether physician sex moderates the: a) effects of patient's (distressed) pain behaviors and diagnostic evidence of pathology (EP) on treatment prescriptions and referrals for chronic low-back pain (CLBP), and b) mediating role of pain credibility judgments and psychological attributions on these effects. 310 general practitioners (GPs; 72.6% women) participated in a between-subjects design, 2 (patient's pain behaviors) x 2 (EP) x 2 (GP sex) x 2 (patient sex). GPs were presented with vignettes depicting a fe(male) CLBP patient, with(out) distress and with(out) EP (*e.g.*, herniated disc). GPs judged the patient's pain and the probability of treatment prescriptions and referrals. Results showed that EP had a larger effect on male than on female physicians' referrals to psychology/psychiatry. Also, GP sex moderated the pain judgments that accounted for the effect of EP and pain behaviors on prescriptions. These findings suggest framing medical decision making as a process influenced by gender assumptions.

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Perspective

This paper shows that physician sex moderates the influence of clinical cues on pain management practices and the mediating role of pain judgments on these effects. It may potentially increase clinicians' awareness of the influence of gender assumptions on pain management practices and contribute to the development of more gender sensitive services.

Key-words: Gender biases; pain management practices; general practitioners; chronic low-back pain

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Introduction

There are sex-related differences in communication styles and primary-care preventive practices. As compared to males, female physicians provide more preventive services [5,20,21,33], and are more patient-centred, *i.e.*, more collaborative and emotionally responsive, gather more psychosocial information, engage in more psychosocial counseling and spend more time with patients.[10,33,45,46,47]. However, the effect of physician sex on dimensions of medical care such as treatment prescriptions and referrals has been less explored [7,11,12,49], especially in pain management contexts. This paper contributes to bridging this gap.

Studies looking for sex-related differences in pain management practices (PMP) are scarce. Although some authors have not found significant differences in analgesic administration practices [43], some have shown that female/male doctors prescribe more analgesics or opioids to female/male patients, respectively. This pattern emerges both in vignettes studies depicting chronic low-back pain patients (CLBP) [53,54] and in a prospective observational study of physicians' PMP in the ER. [48]. Therefore, like for primary-care preventive practices [10,12,21,49], patient sex seems to have a different impact on male and female physicians' PMP. However, because patient sex is not the only cue that may influence physicians' clinical judgments [52], it would be important to explore whether other relevant contextual cues (*i.e.*, variables pertaining to the patient or the clinical situation) could have different impacts on male and female physicians' PMP.

A recent literature review [52] shows that (chronic) pain is often under-estimated and treated in the absence of diagnostic evidence of pathology (EP) and also when patients show distressed pain behaviors. Several authors have hypothesized that the impact of such cues on pain assessment/treatment may be accounted for by pain being psychologized and/or judged as less credible/legitimate. [22,26,51]. However, whether such

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cues are equally weighed by male and female physicians in their PMP or whether such effects are accounted for by the same pain judgment processes (*i.e.*, how pain is perceived as credible or attributed to psychological causes), to the best of our knowledge, has never been explored. This study aimed to explore whether physician sex moderates: (1) the effects of patients' pain behaviors and EP on prescriptions and referrals for CLBP, and (2) the mediating role of pain credibility judgments and psychological attributions on these effects.

Because a more patient-centred physician would place less emphasis on the visibility and objectivity of patients' signs and symptoms and tend to perceive patients as more unique individuals [36], and also, because female physicians, probably as a consequence of gender socialization processes [37,39], are more often patient-centred [10,33,45,46,47], we hypothesised that: (H1) the absence of EP or presence of distressed pain behaviors would show effects consistent with results of former studies [52] on both male and female physicians' treatment and referral decisions, but these effects would be stronger among male physicians; (H2) the effects of EP and distressed pain behaviors on pain treatment and referral decisions would be mediated by pain credibility judgments and/or psychological attributions, but again these effects would be stronger among male physicians. Finally, because evidence shows that a CLBP scenario may suppress the impact of patient sex on pain judgments [8], we expected patient sex would not have a significant effect on PMP.

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Materials and Methods

Participants

Three hundred and fifty two Portuguese interns and specialists (59.8%) in General Practice, working in several health-care centres across the country, participated in this study (72.4% women). Age ranged from 23 to 62 years old (M = 35.93; SD=11.02) and participants had between one and 34 years of professional experience (M= 10.34; SD= 10.57). Ninety two percent reported having professional experience with chronic pain patients, most on a regular basis (M = 4.62 out of 7, SD = .95). Also, 24.1% of participants reported suffering (n = 45) or having suffered (n = 38) constant or intermittent pain for more than 3 months, most on a daily or weekly basis, located at their spine and with an average intensity of 5.21 out of 10 (SD = 2.15). Participants were recruited at several scientific meetings that took place in different regions of Portugal in 2009 and 2010. Participation in the study was voluntary and not financially or materially compensated.

Experimental design

This study used a quasi-experimental between-subjects design, 2 (EP: present vs. absent) x 2 (Patient's Pain Behaviors: with vs. without distress) x 2 (patient sex) x 2 (GP sex). Participants were randomly assigned to the experimental conditions. It should be stressed that the first three variables of the design were manipulated; however, while EP and patient's pain behaviors were considered independent variables, patient sex was included in the design merely as a control variable.

Manipulated variables

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Eight written vignettes were used in order to manipulate the first three variables of the experimental design. With the help of a GP, the vignettes were slightly modified from previously tested vignettes used in former studies we conducted with nurses. [7,8]. Below is a sample-vignette including the wording used to operationalize each one of the manipulated variables (identified in squared brackets) and also the information held constant across experimental conditions:

> A 37-year-old wo(man) **[patient sex]**, married and non-obese, goes to a health-care centre, complaining of low-back pain irradiating to her/his right lower limb, with which s(he) claims to have been living for 3 years. In the waiting room, this wo(man) is agitated and anxious (calm and quiet) **[patient's pain behaviors]**. Besides a painful facial expression, this wo(man) is complaining and verbalizing her/his pain frequently and spontaneously (does not complain or spontaneously verbalizes his/her pain) **[patient's pain behaviors]**. While in the waiting room, s(he) frequently tries to call for the attention of the health-care professionals who are passing by, in order to be seen more quickly (does not try to call for the attention of the heath-care professionals who are passing by, waiting for his/her turn to be seen) **[patient's pain behaviors]**. Finally, when called to the office of the GP who had just been assigned to her/him, s(he) described the pain in the following way: "I have been living with constant low-back pain for 3 years which has recently gotten worse. My back and right leg hurt a lot and sometimes it is difficult for me to walk. I have even been having trouble sleeping. It is a fearful and cruel (sharp and cutting) pain" **[patient's pain behaviors]**. This wo(man) has been taking paracetamol on her/his own initiative, despite

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not being able to get any relief. Recently, this wo(man) had an X-ray, CAT scan and MRI of the lumbar spine that showed significant evidences of a herniated disc (did not show any evidence of significant anomalies). **[evidence of pathology]**

It should be noted that the presence/absence of patient's signs of distress was operationalized by the simultaneous presence/absence of anxiety manifestations, verbal pain behaviors, requests for the attention of the health-care professionals and affective pain descriptors. As for verbal pain behaviors, different pain descriptors were chosen based on a Portuguese version of the McGill Pain Questionnaire. [41]. Two sensory (''sharp and cutting'') and two affective (''fearful and cruel'') descriptors were selected. The affective pain descriptors were aimed at conveying more emotional distress than the sensory pain descriptors.

As in our previous studies [8,9] several independent doctors and nurses checked for the credibility, realism and rigor of the scenarios. All the scenarios were perceived as simple and easy to read. It should also be noted that a CLBP scenario was chosen for two main reasons: (1) it is one of the most pervasive worldwide chronic pain conditions [16]; and (2) it is equally prevalent among males and females, allowing us to build a more gender-neutral scenario. [31,32].

Dependent variables

The dependent variables aimed to measure GPs' treatment and referral decisions. Based on previous studies on pain assessment and treatment decisions [15,24,35], and with the help of independent GPs, we adapted a set of items to operationalize the following dimensions:

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a) Non-pharmacological treatment prescriptions ("*How likely would you recommend non-pharmacological therapies to this patient, such as, walking, massage or hydrotherapy*?"). This item was rated on an evaluative scale from 1(not at all likely) to 7 (extremely likely);

b) Pharmacological treatment prescriptions ("*Which of the following options do you think would be the best treatment choice for this patient*? (1) *No pharmacological treatment*; (2) *non-opioid analgesic*; (3) *non-opioid analgesic + non-steroidal anti-inflammatory*; (4) *non-opioid analgesic + non-steroidal anti-inflammatory + weak opioid*; (5) *non-opioid analgesic + non-steroidal anti-inflammatory + strong opioid*. The development of this item was based on the World Health Organizations' Analgesic Ladder. [56].

c) Referrals (5 items; "*How likely would you refer this patient to*: (a) *Orthopedics*; (b) *Physiotherapy*; (c) *Neurosurgery*; (d) *Psychiatry/Psychology*; (e) a *Pain clinic*. All of the items were rated on an evaluative scale from 1(not at all likely) to 7 (extremely likely).

Several independent doctors and nurses confirmed the face validity of these items. Due to the low inter-correlation indices between the items measuring referral intentions (all $r < .30$, with the exception of a slightly higher correlation between referrals to orthopedics and neurosurgery; $r = .43$, $p < .001$), it was very difficult to identify any underlying and internally consistent factors. Therefore, these items were analyzed as separate dependent variables.

Mediator Variables

Based on our previously validated measures of pain judgments [8,9], we choose 4 items that showed the highest loadings and item-test correlations for the following

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dimensions of pain judgments: (a) Pain credibility (2 items; *To what extent do you believe this patient's pain is genuine?/To what extent do you feel this patient's pain reports are truthful?)*; (b) Psychological attributions (2 items; *To what extent do you believe this patient's pain is determined by psychological/emotional factors?*). All items were rated on an evaluative scale from 1 (not at all) to 7 (extremely), where the anchors were adapted to the item's content (*e.g.*, extremely genuine).

In order to check the factor structure of the measure in our sample, a principal axis factor analysis (oblique rotation) was undertaken (Table 1). Two factors were extracted with *Eigenvalues* above 1: 1) *Psychological attributions to pain* and 2) *Pain credibility*. Both factors showed good internal reliability (Table 1) and a low negative correlation (r = -.33, p <.001).

Table 1
Principal factor analysis of pain judgment items (oblique rotation): factor loadings and consistency indices.

Items	Factor 1	Factor2
Pain determined by emotional factors	.934	-.324
Pain determined by psychological factors	.928	-.318
Pain genuineness	-.376	.913
Truthfulness of pain reports		.894
Chronbach Alpha	.79	.93

Note: factor loadings below .30 were not included

Procedure

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This study was approved by the Institutional Review Board. The procedure was the same as the one we have used in our previous studies. [8,9]. Participants' were invited to collaborate on a study on memory and decision making processes in clinical contexts. They were told that, firstly, the study aimed at understanding to what extent the ability to recall clinical information was influenced by its presentation format, *i.e.*, on a videotaped, audio taped or written format. Despite being told that they had been randomly assigned to the latter condition, all clinical scenarios were presented in a written format. All participants were told that, on a second part, the study aim was to analyze the influence of the recalled information on health-care professionals' attitudes towards a patient/clinical situation. After participants verbally consented to collaborate, they were randomly presented one of the eight written scenarios. They were given a maximum of two minutes to carefully read the information and form an impression of the pain patient, and told they could not refer back to the scenario after the two minutes were over. Afterwards, they were asked to recall several details of the clinical scenario (*e.g.*, patient's symptoms, sex, age, pain duration, patient's emotional state, presence of evidence of pathology), most items were included to check the manipulations of the independent variables. Then, they were asked to judge the patient's pain, and to rate the likelihood of prescribing non-pharmacological treatment, to choose the most suitable pharmacological treatment and, finally, to rate the likelihood of referrals. Finally, socio-demographic information was collected, along with participants' personal and vicarious experience with chronic pain. Questionnaires were individually administered and took an average of 10 minutes to complete. Finally, all participants were debriefed.

Data analyses

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We started by conducting several analyses (Pearson correlations and t-tests) in order to check whether there were any significant effects of the socio-demographic and pain-related variables on GPs' pain judgments and treatment prescriptions and referrals. No significant effects were found. Therefore, these variables were not included in further analyses.

Next, in order to check whether, controlling for patient sex, GP sex moderated the effects of EP and patient's pain behaviors on treatment prescriptions and referrals, univariate analyses of variance were conducted, over each one of the seven dependent variables, with the following between-subjects factors: 2 (GP sex) x 2 (EP) x 2 (Patient's pain behaviors) x 2 (Patient sex). Because patient sex did not show any significant interactions with any of the independent variables, and only showed a very small main effect on referrals to psychology/psychiatry (see Table 2), patient sex was excluded from the following analyses.

Finally, to explore the mediating role of pain judgments on the abovementioned effects, moderated mediation models were tested following the procedures proposed by Muller, Judd & Yzerbyt [38], along with a Product-of-Coefficients Approach [42] to test the indirect effects. Because our previous analyses (Table 2) showed no significant effects of any of the independent variables on referrals to physiotherapy and a pain clinic, these were not considered for the moderated mediation models. Hence, four moderated mediation models [1 IV (EP or Patient's Pain Behaviors) x 1 Mediator (Pain credibility or Psychological attributions)] were conducted for each of the five remaining DVs, but significant moderated mediations were only identified for two DVs: pharmacological and non-pharmacological treatment prescriptions (PTP and NPTP, respectively; see Tables 3, 4 and 5). Contrast coding was attributed to the IVs - EP (absent = -0.5; present = +0.5) and pain behaviors (without distress = -0.5; with distress = +0.5) – and the

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moderator (female GP = -0.5; male GP = +0.5). The mediators (pain credibility and psychological attributions) were mean centered. Interaction terms were created between the GP sex and the IVs (EP and pain behaviors) and the mediators (pain credibility and psychological attributions), respectively. Afterwards, all the analyses were carried out in three steps (see Tables 3, 4 and 5): (1) Equation 1: Treatment prescriptions (PTP or NPTP) were regressed on the IV (EP or pain behaviors), GP sex, and the respective interaction term (EP x GP sex or pain behaviors x GP sex); (2) Equation 2: Mediators (Pain credibility or Psychological attributions) were regressed the IV (EP or pain behaviors), GP sex and the respective interaction term (EP x GP sex or pain behaviors x GP sex); (3) Equation 3: Treatment prescriptions (PTP or NPTP) were regressed on the IV (EP or pain behaviors), GP sex and the respective interaction term (EP x GP sex or pain behaviors x GP sex), the mediators (Pain credibility or Psychological attributions) and the respective interaction term (pain credibility x GP sex or psychological attributions x GP sex). Finally, we proceeded to the decomposition of the estimated parameters for male and female GPs separately (see Figures 1, 2 and 3). This was done by replicating the relevant regression models with GP sex as a dummy variable: (1) to estimate male GPs parameters (males = 0 and females = 1), and reverse scoring (2) to estimate female GPs parameters (females = 0 and males = 1).

It should be noted that due to the considerable amount of analyses, in order to prevent an inflated type I error, we started by considering a Bonferroni correction that would reduce our critical value to $p \leq .001$. However, the Bonferroni correction is often criticized by being overly conservative [40], controlling for type I error often at the expense of increasing type II error. Therefore, in order to find a balance between both types of error, we decided to reduce our critical value to $p \leq .01$.

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Results

Manipulation checks

About 86% of the participants correctly recalled all the information presented in the scenarios. However, 12 men and 30 women, equally distributed across experimental conditions, failed to recall at least one piece of information (*e.g.*, EP, patient's pain behaviors or age). These participants were not significantly different from the rest of the sample in terms of their socio-demographic characteristics and professional or vicarious experience with chronic pain. Therefore, they were excluded from the following analyses.

Mean differences in treatment prescriptions and referrals

Firstly, we aimed to explore whether physician sex moderates the effects of the patient's pain behaviors and EP on prescriptions and referrals for CLBP. In order to do this, a set of univariate analyses of variance were conducted (see Data Analyses section).

As can it be seen in Table 2, there were several significant main effects of the IVs, especially of EP. But, in order to test our first hypothesis, we were particularly interested in the interaction effects of GP sex with patient's pain behaviors and EP, respectively. However, and in spite of the high observed power of the tested models, only one of these interaction effects was significant. More specifically, regarding the referrals to psychology/psychiatry, the EP main effect was qualified by GP sex, F (1, 268) = 8.49, p = .004, η^2 = .03. The analyses of simple effects showed that the EP effect was stronger among male GPs ($M_{EPabsent}$ = 4.37; $SD_{EPabsent}$= 1.83, $M_{EPpresent}$ = 2.11; $SD_{EPpresent}$= 1.35), F (1, 268) = 42.67, p <.001, η^2 = .14, than among female GPs

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($M_{EPabsent}$ = 3.82; $SD_{EPabsent}$= 1.71, $M_{EPpresent}$ = 2.80; $SD_{EPpresent}$= 1.48), F (1, 268) = 24.24, p <.001, η^2 = .08.

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Table 2 - Main effects of EP and patient's pain behaviors and sex on treatment prescriptions and referrals.

	Evidence of Pathology				Patient's pain behaviors				Patient sex			
Dependent variables	*M* (*SD*)		*F*	η^2	*M* (*SD*)		*F*	η^2	*M* (*SD*)		*F*	η^2
	Present	Absent			With distress	Without distress			Male	Female		
TREATMENT PRESCRIPTIONS												
Pharmacological	3.41 (.69)	2.73 (.92)	40.86**	.13	3.03 (.89)	3.12 (.88)	ns	__	3.13 (.87)	3.01 (.90)	ns	__
Non-pharmacological	4.72 (1.43)	5.38 (1.17)	9.18*	.03	4.99 (1.37)	5.14 (1.31)	ns	__	5.03 (1.35)	5.09 (1.34)	ns	__
REFERRALS												
Neurosurgery	5.64 (1.56)	2.06 (1.44)	307.7**	.53	3.67 (2.27)	3.80 (2.24)	ns	__	3.78 (2.28)	3.68 (2.32)	ns	__
Orthopedics	4.13 (1.81)	2.21 (1.34)	90.29**	.25	2.95 (1.80)	3.10 (1.84)	ns	__	3.15 (1.80)	2.90 (1.83)	ns	__
Physiotherapy	4.62 (1.51)	4.28 (1.39)	ns	__	4.56 (1.48)	4.50 (1.49)	ns	__	4.39 (1.40)	4.48 (1.51)	ns	__
Pain clinic	3.51 (1.60)	3.16 (1.68)	ns	__	3.36 (1.59)	3.27 (1.71)	ns	__	3.33 (1.63)	3.32 (1.67)	ns	__
Psychology/Psychiatry	2.59 (1.47)	3.96 (1.75)	66.42**	.20	3.91 (1.79)	2.71 (1.51)	30.16**	.10	3.13 (1.80)	3.56 (1.72)	6.85*	.03

Note: **$p \leq .001$, *$p \leq .01$, ns = non-significant

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Predictors of treatment prescriptions: Moderated mediation analyses.

Our second aim was to explore whether physician sex moderates the mediating role of pain judgments on the effects of the independent variables on prescriptions and referrals for CLBP. In order to do that, we conducted a set of moderated mediation analyses (see Data Analyses section).

Predictors of pharmacological treatment prescriptions (PTP)

Linear regression results for moderated mediation effects on PTP are shown in Table 3. As expected following the previously reported analyses of variance (Table 2), in equation 1, EP had a significant total effect on PTP (b = .70, SE = .11) but there was no significant effect of GP sex (b = .06, SE = .11) nor of the interaction term (b = .09, SE = .22). The second equation model showed that EP had a significant effect on pain credibility (b = .40, SE = .12) but again there was no significant effect of GP sex (b = -.09, SE = .12) nor of the interaction term (b = .36, SE = .23). The analysis of the estimated parameters of the third equation model showed a slightly lower direct effect of EP (b = .53, SE = .11), as compared to the same effect in equation 1, and an effect of pain credibility judgments (b = .33, SE = .06), suggesting that pain credibility judgments partially mediated the effect of EP on PTP. However, the significant interaction of pain credibility by GP sex (b = .32, SE = .12) showed that this mediation was moderated by the GP sex. In order to better interpret these results, the decomposition of the estimated parameters was undertaken for male and female GPs (Figure 1). For male GPs, the effect of EP on PTP was partially mediated by pain credibility judgments (Sobel Z = 1.98, $p < .05$), *i.e.*, a CLBP without EP was perceived as less credible and, hence, a weaker pharmacological treatment was perceived as more adequate. However, for female GPs, the EP had no significant effect on pain credibility

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judgments and these showed a significantly lower effect on PTP than the effect found among male GPs. Consequently, pain credibility judgments did not account for the effect of EP on female GPs' PTP.

Table 3

Regression analyses for moderated mediation effects on pharmacological treatment prescriptions (PTP): EP as predictor

	Equation 1 (criterion PTP)		Equation 2 (criterion CREDIB)		Equation 3 (criterion PTP)	
Predictors	β	*t*	β	*t*	β	*t*
EP	.39	6.39**	.22	3.43**	.30	4.89**
GPsex	.03	.59	-.04	-.75	.06	1.22
EP*GPsex	.02	.39	.10	1.57	-.05	-.84
CREDIB					.34	5.53**
CREDIB*GPsex					.17	2.69**
R^2adj	.14**		.03**		.22**	

CREDIB = Pain credibility; * $p<.05$ ** $p<.01$

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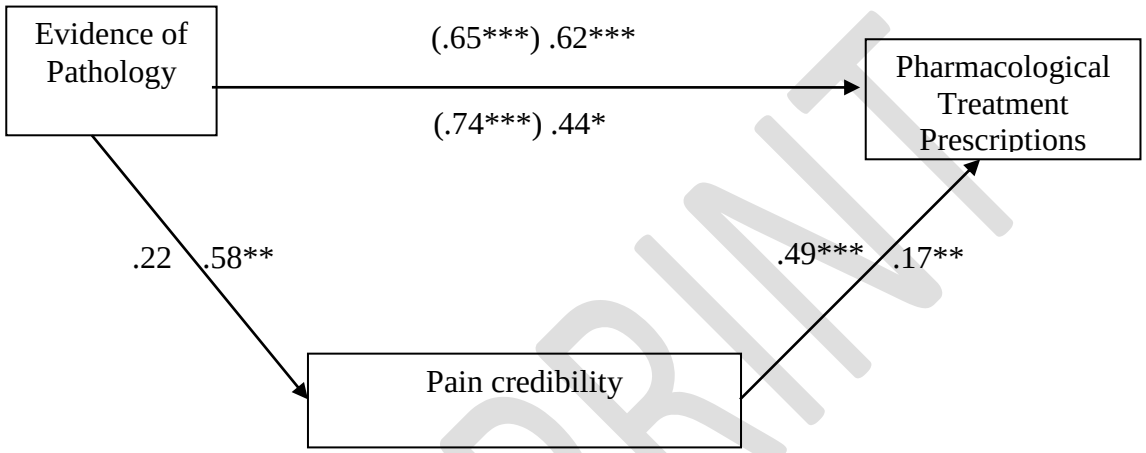
Figure 1

Effects of evidence of pathology on pharmacological treatment prescriptions mediated by pain credibility judgments and moderated by the GP sex.



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Note: Female GP = exterior b values; b values in parentheses correspond to the overall effect of EP on PTP and the b values that immediately follow correspond to the direct effect, controlling for pain credibility; * p <.05; ** p < .01; *** p<.001;

Predictors of non-pharmacological treatment prescriptions (NPTP)

As for NPTP, Table 4 shows the total effect of EP on NPTP (*b* = -.54, SE = .17, equation 1) and on psychological attributions to pain (*b* = -.78, SE = .15, equation 2). In equation 3, there is a slightly smaller direct effect of EP on NPTP (*b* =-46, SE =.17) and a significant interaction effect of the GP sex by psychological attributions (*b* = -.50, SE = .14), suggesting that the effect of EP on NPTP was partially mediated by

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psychological attributions and this effect was moderated by the GP sex. Figure 2 shows the decomposition of the estimated parameters for male and female GPs separately. For female GPs, the effect of EP on NPTP was partially mediated by psychological attributions (Sobel Z = 2.91, p <.01) to pain, *i.e.*, without EP, pain was more attributed to psychological causes and, hence, NPTPs were more common. However, for male GPs, both EP and psychological attributions had no significant effects on NPTP.

Table 4

Regression analyses for moderated mediation effects on non-pharmacological treatment prescriptions (NPTP): EP as a predictor.

	Equation 1 (criterion NPTP)		Equation 2 (criterion PSYATT)		Equation 3 (criterion NPTP)	
Predictors	β	*t*	β	*t*	β	*t*
EP	-.20	-3.25**	-.32	-5.31**	-.17	-2.74**
GPsex	-.02	-.32	.05	.88	-.02	-.36
EP*GPsex	.11	1.81	-.02	-.27	.04	.65
PSYATT					.10	1.63
PSYATT*GPsex					-.23	-3.65**
R^2adj	.07**		.09**		.13**	

PSYATT = Psychological attributions;* p<.05 ** p<.01

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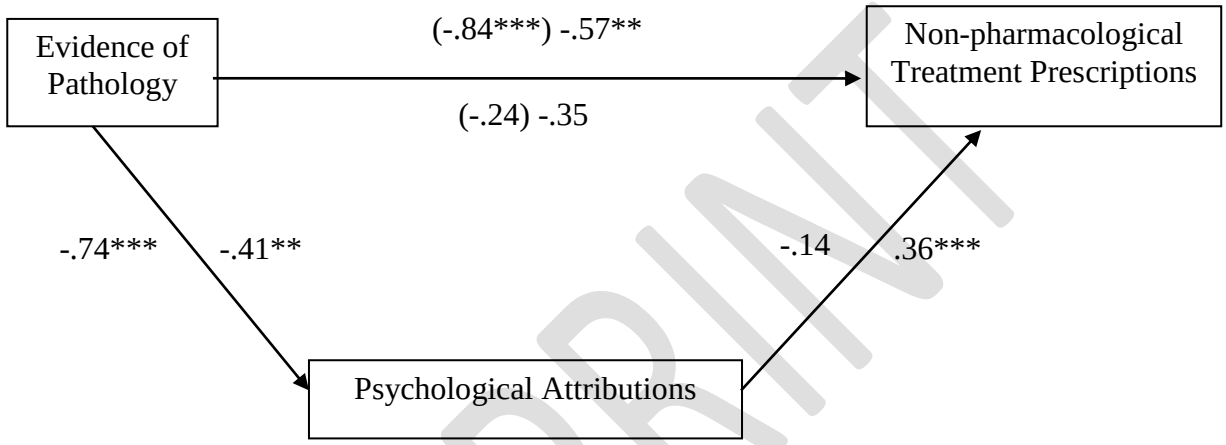
Figure 2

Effects of evidence of pathology on non-pharmacological treatment prescriptions mediated by psychological attributions to pain and moderated by the GP sex.



Note: Female GP = exterior b values; b values in parentheses correspond to the overall effect of EP on NPTP and the b values that immediately follow correspond to the direct effect, controlling for psychological attributions; * p <.05; ** p < .01; *** p<.001

Finally, Table 5 shows an effect of pain behaviors on psychological attributions (*b* = 1.26, SE = .13, equation 2) but no significant effect of pain behaviors on NPTP (*b* = -.24, SE = .17; equation 1). However, in equation 3, the effect of pain behaviors (*b* = -.65, SE =.18) and psychological attributions (*b* = .31, SE = .07) on NPTP are significant, which suggests that the total effect of pain behaviors on NPTP in equation 1 is being suppressed by its indirect effect on NPTP through psychological

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attributions.[35,51]. That the effect of psychological attributions was qualified by the GP sex (*b* = -.65, SE = .15), suggested that the suppression effect was being moderated by this latter variable. Figure 3 shows the decomposition of the estimated parameters for male and female GPs separately. For male GPs, when the patient showed signs of distress, his/her pain was clearly more attributed to psychological causes but, as opposed to female GPs' reports, such attributions had no significant effects on NPTP. Like male GPs, female GPs made more attributions to psychological causes when the patient showed signs of distress. However, equation 3 (Table 5) shows that pain behaviors had a positive indirect effect (1.3 x .64 = .83), through psychological attributions, but a negative direct effect on NPTP (-.88). Because the direct and indirect effects have a similar size but opposite signs, the total effect of pain behaviors on females' NPTP was suppressed. This means that the more a female GP interpreted the patients' distressed pain behaviors as signs of pain determined by psychological factors the more she was likely to prescribe NPT, but the less she shared such interpretation the less likely she was to prescribe NPT. In other words, the negative impact of distressed pain behaviors on NPTP only happened when such behaviors were not followed by psychological attributions to pain.

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Table 5

Regression analyses for moderated mediation effects on non-pharmacological treatment prescriptions (NPTP): Pain behaviors as predictor.

	Equation 1 (criterion NPTP)		Equation 2 (criterion PSYATT)		Equation 3 (criterion NPTP)	
Predictors	*β*	*t*	*β*	*t*	*β*	*t*
PB	-.09	1.41	.52	9.52**	-.24	3.57**
GPsex	-.03	-.30	.06	1.14	-.04	-.80
PB*GPsex	-.07	1.09	-.02	-.32	.09	1.29
PSYATT					.28	4.24**
PSYATT*GPsex					.29	4.39**
R^2adj	ns		.27**		.16**	

PSYATT = Psychological attributions; PB= Pain Behaviors ;* $p<.05$ ** $p<.01$

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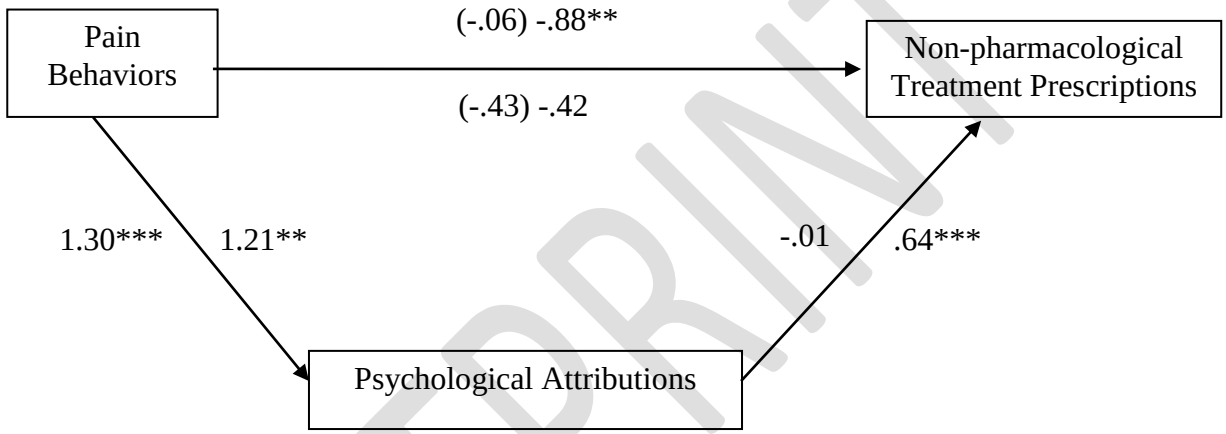
Figure 3

Effects of patients' pain behaviors on non-pharmacological treatment prescriptions mediated by psychological attributions to pain and moderated by the GP sex.



Note: Female GP = exterior b values; b values in parentheses correspond to the overall effect of pain behaviors on NPTP and the b values that immediately follow correspond to the direct effect, controlling for psychological attributions * p <.05; ** p < .01; *** p<.001

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Discussion

This study explored whether GP sex moderates: (1) the effects of patients' pain behaviors and EP on treatment prescriptions and referrals for CLBP, and (2) the mediating role of pain credibility judgements and psychological attributions on these effects. Consistent with other studies [48,53,54], our findings showed that GP sex influences

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PMP. However, to the best of our knowledge, this is the first study directly supporting the moderator role of GP sex on the effects of EP and patient's pain behaviors on PMP and their respective mediating paths.

GP sex as a moderator of the effects of contextual cues on PMP.

Our findings have only very partially supported our first hypothesis, given that GP sex only moderated the effect of EP on referrals to psychology/psychiatry; as hypothesized, EP had a larger effect on male than female GPs' referrals. As expected, male GPs seemed to place a higher emphasis on the visibility/objectivity of patients' symptoms [36] making such referrals, *i.e*., they were more likely to refer the patient to a psychologist/psychiatrist in the absence of objective, visible EP than in its presence. This may reflect a more pronounced Cartesian thinking, where the presence/absence of EP was interpreted as meaning pain of organic/psychological causes, respectively. Such reasoning is often inadequate, considering that EP is far from being a good criterion to infer a person's low-back pain severity, credibility or cause.[27,30.]

The fact that this effect was only found for referrals to psychology/psychiatry might be partially accounted for by the stronger gender connotations of the latter (as compared to other referrals and treatment decisions), *i.e*., stronger association with the female stereotype.[23,28]. In fact, other authors have suggested that the effects of GP sex on medical practices might be greater in clinical situations that are more strongly associated with gender stereotypes.[25]. This may eventually be explained by the fact that, by activating GPs' gender schemas (*i.e*., cognitive structures that encompass learned knowledge about the meanings of being a man or a woman)[7], such gendered clinical situations may increase the likelihood of GPs' decisions being influenced by their

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gender identities/stereotypes [17], accounting for sex-related differences in GPs' medical decisions.

Still, this argument does not explain why GP sex moderated the effect of EP but not of pain behaviors on psychology/psychiatry referrals. This may possibly be accounted for by the fact that, as compared to EP, distressed pain behaviors are a less ambiguous and more consensual cue when it comes to referrals to psychology/psychiatry, which would suppress the likelihood of a gender schematic processing.[13]

GP sex as a moderator of the mediating role of pain judgments on the effects of contextual cues on PMP.

Our findings also partially supported our second hypothesis. It was predicted that the effects of EP and distressed pain behaviors on pain treatment and referral decisions would be mediated by pain credibility judgments and/or psychological attributions, but these effects would be stronger among male physicians. Such results were found for the effects of EP on PTP. While EP generally showed a large effect on PTP, it was mainly among male GPs that part of this effect was accounted for by pain credibility judgments. In fact, it was mostly among male GPs that EP showed a significant effect on pain credibility judgements: in the absence of EP pain was perceived as less credible. Also, male GPs' pain credibility judgments had a larger impact on their PTP. Such results may suggest that male GPs are more likely to adopt the role of gate-keepers of PT, characterized by a more suspicious, less empathic and, as predicted and supported by former evidence, less patient-centred style of interaction.[10,33,45,46,47]. Another possible interpretation is that this result may also reflect the adoption of a more stringent biomedical approach to pain.

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On the other hand, psychological attributions to pain were only significantly related to female GPs' NPTPs. Although both male and female GPs attributed pain to psychological causes more in the absence of EP or in the presence of distress cues, such attributions only showed a significant effect on female GPs' NPTPs: the more pain was attributed to psychological causes the more likely they were to prescribe NPT. Also, it was mainly among female GPs that psychological attributions to pain accounted for the effects of EP and pain behaviors on NPTP. First, psychological attributions partially mediated the effect of EP on NPTP: the absence of EP lead to more psychological attributions to pain, which in turn lead to a higher likelihood of NPTP. Second, psychological attributions entirely suppressed the effect of distressed pain behaviors on NPTP; in the presence of distressed pain behaviors, the more pain that was attributed to psychological causes the more likely was the prescription of NPT. However, if patients' distress was not attributed to psychological causes, female GPs were less likely to prescribe NPT. Such results corroborate former evidence suggesting that female doctors are more likely to take into account psychosocial factors when diagnosing or prescribing treatment. [10,33,45,46,47]. In this particular case, it was mainly among female doctors that psychological attributions played a significant role in predicting NPTP, which may be logical considering that walking, massage or hydrotherapy may be effective in diffusing distress, which often heightens pain experiences. [2,3]. It should be noted, however, that this effect was only found for NPTP, not for PTP. In fact, again similar to former studies [52], our data showed that both male and female GPs are less willing to prescribe pain medications when pain is attributed to psychological causes. Taken together, these results suggest that female doctors' NPTP may be compensating for their unwillingness to prescribe stronger PT when pain is psychologized. Notwithstanding, it should be stressed that it was mainly among female GPs that such

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psychological factors showed a significant predictive role of NPTPs. This could mean that female GPs may be more willing to refer patients to multidisciplinary treatment programs, where biological and psychosocial dimensions of pain experiences are taken into account.

Limitations, future directions for research and implications

Some methodological limitations may be pointed out to this study, primarily regarding its ecological validity. First, because written vignettes are limited representations of real clinical scenarios, the generalization of our findings should be tentative. This is particularly true for results pertaining to the effects of pain behaviors. In fact, EP and patient sex are easy to accurately operationalize to represent their theoretical constructs, but this is not so for pain behaviors, given their richness and complexity. Moreover, because the operationalization of distressed pain behaviors represented extreme situations (total absence of distress cues vs. presence of several distress cues), the generalization of our results to less extreme (and more common) scenarios should be made with reservations.

Second, because the NPTP variable did not specify the many and distinct treatments that it could encompass (*e.g.*, walking, massage, acupuncture), it is difficult to say if the same pattern of results would be found for the separate prescription of these different NPT. The same could be said regarding the PTP variable, namely, the prescription of the distinct drugs (e.g., non-opioid analgesics, non-steroidal anti-inflammatory, weak and strong opioids).

Third, our results have partially supported our hypotheses in a CLBP scenario but it is not possible to predict whether similar results would be found in other pain-

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related clinical scenarios (*e.g.*, in a more gendered pain situation like migraines or fibromyalgia).

Fourth, it is difficult to understand if our small effect sizes reflect the real effect sizes in clinical situations or are a consequence of the use of vignettes. The fact that we requested that participants systematically process the vignettes' information may have reduced the activation of participants' gender schemas [13], accounting for the small effect sizes.

Fifth, although several cross-cultural studies suggest the contents of gender representations are shared by many western societies [55], it would be interesting to check whether our results would be replicated in other cultures.

Finally, because our participants were recruited in scientific meetings, a selection bias should be considered given that they could be more motivated and involved in professional self-actualization than other GPs who did not have the opportunity to participate in our study. We suspect that a stronger pattern of biases would be found among the latter.

In sum, due to ecological and construct validity constraints some of our findings should be interpreted with parsimony. Future studies using more ecologically valid methodologies (*e.g.*, video clips) and more representative samples and pain-related clinical scenarios could be useful to overcome these shortcomings.

Despite the shortcomings, this study has both theoretical and practical implications. Theoretically, our results suggest that GP's PMP may in certain situations be influenced by their gender assumptions and representations, although this contention should be directly tested. If this is true, it contradicts the ideology of the socially, culturally and, hence, gender neutral physician, which still prevails within the medical establishment.[4,29,44]. In fact, despite all the efforts of medical institutions to produce

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"neutral" doctors, such socialization processes may seem unable to entirely overcome earlier gender socialization processes, in general, and in pain, in particular [37,39]; where, as compared to men, women seem to be taught to be more accepting of their own and other's pain and its associated distress. In practical terms, this suggests that instead of ignoring such influences, they should be addressed, *e.g*., by the integration of gender awareness training programs in medical curricula. [18,44]. Helping doctors to become aware of how gender influences their own PMP may well be an important step toward ensuring gender equity in pain management services.

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