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A population-based survey of beliefs about neck pain and its associated disorders: a cross-sectional study

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Abstract

Background Neck pain and whiplash are prevalent disorders with high socio-economic burden. Beliefs and expectations influence their prognosis, causing chronicisation. We aimed to investigate the perspective of the Italian population.

Methods We conducted an online survey among Italian adults recruited through social media. The main outcomes were the Whiplash Beliefs Questionnaire (WBQ) total score and its subscales, recovery expectations, and anxiety/stress items. Independent variables were history of neck pain, whiplash, and associated symptoms, with adjustment for age, gender, marital status, employment, and type of job. Associations were assessed using linear regression for WBQ outcomes and proportional odds logistic regression for recovery expectations and anxiety/stress.

Results One thousand thirty-four participants were included. Most responders were women (65%, $n=673$) between 35 and 50 years of age (37.6%, $n=389$) and reported working more than 6 h as a white-collar worker (39.7%, $n=411$). Most responders reported negative thoughts about the impact on quality of life (61.9%) and work (31.8%-30.2%). Many distrusted surgery (70.3%) medications (69.7%), and painkillers (51.2%). 23%-36% were not sure about the benefit of conservative strategies like exercise or rest (30.1%). The total score for the Whiplash Beliefs Questionnaire was significantly lower (mean difference = -1.82; $p=0.002$; 95% CI -2.98 to -0.66) among those with recent pain compared to laypersons (i.e., asymptomatic healthy individuals); additionally, significantly higher scores were found for recovery pessimism among those with associated symptoms compared to laypersons (mean difference = 0.45; $p=0.01$; 95% CI 0.09 to 0.79). Overall, laypersons exhibited different beliefs compared to those with recent or chronic neck pain. However, coping strategies, treatment pessimism, recovery expectations and anxiety/depression showed no significant differences ($p>0.05$).

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Conclusions This study highlights Italians' perspectives on neck pain and whiplash, showcasing a nuanced relationship between pain and beliefs. Italian responders reported negative beliefs regarding the impact of neck pain/whiplash and agreed that anxiety and stress influence the perception of pain. Recovery pessimism seems to be perceived more by individuals with symptoms. Future research should integrate individual's experience from qualitative research into quantitative research.

Keywords Chronic pain, Patient-centered care, Culture, Health belief model, Prognosis

Background

The healthcare costs and lost work time associated with neck pain and whiplash injuries are disproportionately high [1, 2]. Nontraumatic and traumatic neck pain are the fourth leading cause globally of years lived with disability [3]; notably, this rank has not changed since the 1990 s; furthermore, a significant rise in the incidence and prevalence is forecasted [2]. In Italy, the number of prevalent cases for neck pain has been estimated to be 2.730.000 (2.200.000–3.380.000) with a percentage change between 1990 and 2020 of 19.8% (13.2–26.0) [2]. It appears prevention and management research over the past 30 years has had minimal impact on the global burden of neck pain and associated disorders. It has been identified that many physiotherapists do not to follow the recommendations provided by evidence-based guidelines when managing musculoskeletal conditions [4]. In addition, while physiotherapists are generally confident in following the clinical practice guidelines for neck pain, adherence to recommendation in real world clinical setting appears suboptimal [5, 6]. Barriers to guideline adherence have been identified include the patient factors (e.g., health literacy, motivation, access), the physiotherapist factors (e.g., knowledge, skills, beliefs), and environmental factors (e.g., social determinants of health) [7–10].

Negative prognostic factors between neck pain and whiplash have shown considerable overlap [11–14]. High initial pain intensity and disability, longer duration of symptoms, reduced range of motion, and psychosocial factors may be predictors of poor outcomes [12, 13, 15, 16]. Psychological prognostic factors are broadly classified into three dimensions: cognitive (e.g., attitude, belief, perception), emotional (e.g., distress), and behavioral (e.g., coping) [17]. Social factors are particularly relevant for workers and their influence is divided under the perception of work and workplace factors [17] may manifest as altered behaviors [18–22]. Nevertheless, the mechanisms behind the persistence of symptoms are not yet fully understood; in addition, these findings have not yet translated into superior outcomes [23].

Understanding the recovery pathways in both conditions is challenging; however, insight about the transition to ongoing persistent symptoms may help identify appropriate interventions for those at greater risk of poor outcomes. A recent qualitative meta-synthesis suggested a call to action to investigate perspectives and experiences of individuals with pain at the neck to provide patient-centered care [24]. Patient-centered care is the practice of caring and respecting the individual patient's own terms to promote positive outcomes [25]. However, little attention has been spent around patient perspectives. The whiplash beliefs questionnaire (WBQ) is a questionnaire designed to evaluate subjects' expectations of recovery and beliefs about neck pain and whiplash injury. The WBQ has been found to possess adequate reliability [26] and was already used to survey healthy subjects (laypersons) in Canada, Australia, and Singapore [27, 28]. To date, there is no data on the validity of the WBQ in the Italian context, nor has the questionnaire been used and investigated.

For many patients, nontraumatic and traumatic neck pain are complex biopsychosocial disorder with many contributors including biophysical, psychological, social and genetic factors, and comorbidities [29, 30]. The multifactorial and highly personal nature of these disorders contributes to the challenges of adequate management [31]. Notably, these factors do not have clear boundaries and instead overlap with one another [30]. Thus, it is relevant to investigate this complexity to understand how these factors interact with individuals with neck pain. At the heart of such an approach the biopsychosocial model has been proposed as a framework for personalized multidimensional assessment of the individual person [32]. Although findings from observational survey research can be difficult to interpret, they have the potential to provide relevant insight from the perspective of patients to guide clinicians implementing evidence-based recommendations in patient-centered care pathway [24].

Therefore, the objective of our study was to investigate the expectations of recovery and beliefs about neck pain and whiplash injury in the general Italian population. We hypothesized that expectations and beliefs about neck pain and whiplash injury may differ between layperson (i.e., asymptomatic healthy individuals) and person suffering for pain in the cervical spine.

Methods

An online survey was developed using the online platform Survey Monkey (SVMK Inc., San Mateo, USA) for use in the general Italian population. Our study is reported in line with the "Checklist for Reporting Results of Internet Surveys" (CHERRIES) [33] and the

"Strengthening the Reporting of Observational Studies in Epidemiology" (STROBE) guidelines [34]. This study was approved by the ethics committee of the Università degli studi del Molise on the 11/10/2023 (approval protocol number 23/2023). The authors followed the principles outlined in the Declaration of Helsinki for this study [35].

Questionnaire development

The WBQ was translated and adapted from the most recent version used in a cross-cultural comparison between Australian and Singaporean laypersons [28]. Two physiotherapists (specialized musculoskeletal physiotherapists with experience in cross-sectional studies and 15 year of clinical practice) and, subsequently, two layperson (asymptomatic healthy individuals) piloted the questionnaire for additional feedback on wording, response logic, conceptual ambiguity, and fulfillment duration to strengthen the transcultural adaptation and response rate [36–39]. The feedback received contributed to the final version of the questionnaire, particularly for the wording and linguistic adaptation. Using the original questionnaire and the feedback generated from the pilot stages, this strengthened the content and face validity of the questionnaire [37, 39].

The questionnaire was designed using the 14-item WBQ to investigate the beliefs on neck pain/whiplash [28]. In line with the study of Ng et al. [28], we also assessed expectation of recovery (with two additional questions) and anxiety and stress (with two other additional questions) adapted from the Survey of Pain Attitudes (SOPA-35) [40]. Participants were asked to state their agreement on each item using a 5-point Likert scale (1 = strongly disagree; 3 = not sure; 5 = completely agree). The questionnaire was introduced by close-ended questions which investigates sociodemographic information, education level, employment duties, and risk factors, such as having previously suffered from neck pain (i.e., never, in the last 3 months, or for more than 3 months), having a history of whiplash, and having related arm pain.

After receiving information about the survey, which included a short explanation of background and aim of the project, participants had the opportunity to ask any questions. Formal informed consent was required before starting the survey, with participants agreeing to include their answers in the final publication. All questions were presented in the same order and responses to all questions were mandatory for the survey to be considered completed. The questionnaire could be completed on any electronic device with Internet access.

Readers are invited to consult appendix 1a and 1b for the full version of the questionnaire respectively in Italian and English.

Setting and recruitment

A web-link to the survey was distributed via social media (Facebook and Instagram) from October 2, 2023, to February 5, 2024. Social media postings were distributed by the authors and their clinical practice profiles. To increase the response rate, several invitations were posted, and the survey was shared once a week. A priori sample size was calculated using Dillman's electronic survey formula. A priori, a sample size was calculated using the e-survey Dillman's formula with a 95% confidence level and a 5% of margin error [41]. At the time of the survey, the Italian population was 58.9 million [42]; therefore, the required sample size for this study was 385. As Survey Monkey was used without collecting respondents' IP addresses, recruitment was anonymous and voluntary; furthermore, the platform did not allow to access the same IP more than once. No compensation was offered for survey completion.

Data processing and analysis

Only completed surveys were included in the analysis. The final dataset was collected on an encrypted computer that researchers could access only for the purpose of statistical analyses. No sensitive information was collected. The dataset was exported to Microsoft Excel 2020 for the descriptive analysis (frequencies, mean, and standard deviation (SD)).

Outcome

For the dependent variables we considered the total WBQ score and four factors that arise from the combinations of questions.

The total WBQ score was calculated from the sum of each question from 1 to 14. To maintain consistency, the scores of items 5 and 13 were reversed as they had been formulated. The maximum score that could be obtained was 70. Higher scores are interpreted as more negative/pessimistic beliefs about the condition.

A previous factorial analysis of the modified version of the WBQ identified 4 factors [27]. These factors exist within 10 common items in each questionnaire. The items considered for the creation of factors were questions 1 to 14. The four factors are labeled as "recovery pessimism" (questions 2, 6, 10), "beliefs about active coping" (questions 5, 12, 13), "beliefs about passive coping" (questions 11, 14), and "treatment pessimism" (questions 1, 4).

Questions that investigated the expectation of recovery were 15 and 16. Questions that investigated anxiety and stress were 17 and 18.

Independent variables

We identified some covariates of the outcome that, in relation to the WBQ score, may explain the results.

These predictors of outcome were: (1) a history of neck pain (2), a history of whiplash, and (3) symptoms associated with the conditions. Also, the stage of the condition was considered (i.e., acute or chronic). With associated symptoms we referred to symptoms in the shoulder, arm and/or hand including pain, tingling, numbness, loss of strength [43]. Gender, age, marital status, employment, and main type of job were considered covariates. Readers are invited to consult appendix 1a and 1b to find how these variables were measured.

Statistical methods

Descriptive statistics are presented as frequency and percentages for categorical variables and mean with the standard deviation for continuous variables. Data were presented clustered in tendencies -- agreement (agree and strongly agree), not sure, and disagreement (disagree and strongly disagree) -- and reported as the most frequent responses to each WBQ items [37, 39, 44–46].

We investigated the association of neck pain, whiplash, and associated symptoms, with the following dependent variables: total WBQ score; the factors "recovery pessimism", "beliefs about active coping", "beliefs about passive coping", "treatment pessimism"; expectation of recovery (questions 15 and 16); anxiety (question 17) and stress (question 18).

We investigated the multivariable association of the independent variables (neck pain, whiplash, and associated symptoms) with all the dependent variables reported above, adjusting for the covariates (i.e., gender, age, marital status, employment, and main type of job). We pre-specified these models a priori, based on clinical and methodological considerations. We used linear regression for the total score of the WBQ and its factors, whereas for questions 15 to 18, we used proportional odds logistic regression. Regression coefficients of the linear regression are reported as adjusted mean differences, representing the contrast between participants with vs. without the condition, conditional on covariates. For the proportional odds logistic models, the coefficients represent the adjusted odds ratios. All model assumptions (linearity, normality and homoscedasticity of residuals for linear regression; proportional odds assumption for logistic regression) were verified and found to be reasonably met. All the statistical analyses were performed using R [47].

Results

Descriptive analysis

Respondent characteristics

The completion of the questionnaire took approximately 5 min. A total of 1034 participants gave their consent and completed the survey. The majority of responders were women (65%, $n = 673$) between 35 and 50 years of age (37.6%, $n = 389$). Most respondents reported working more than 6 h as white-collar worker (39.7%, $n = 411$). The majority of responders reported a history of neck pain (60.2%, $n = 791$) and 34.9% ($n = 361$) reported a previous whiplash injury. Notably, only 9.4% ($n = 98$) of the responders did not report having suffered from any of the conditions; that is, they were considered asymptomatic healthy individuals (i.e., laypersons). Table 1 contains all sociodemographic baseline details.

Questionnaire responses

Most of the responders disagreed with item 1 "there is no real treatment for neck pain/whiplash injury" (neck pain, 68.2%, $n = 539$; whiplash, 67.5%, $n = 244$; laypersons, 64.2%, $n = 63$).

Of the survey responders, 42.8% ($n = 339$) of those with neck pain and 45.3% ($n = 163$) with a prior whiplash injury reported that they disagreed with item 2 "neck pain/whiplash injury will eventually stop you from working"; similarly, 44.9% ($n = 44$) of the laypersons reported they disagreed.

When asked if "Neck pain/whiplash injury means periods of pain for the rest of one's life" (item 3), responders reported disagreement (neck pain, 57.1%, $n = 452$; whiplash, 57.3%, $n = 207$; laypersons, 62.2%, $n = 61$).

63.7% ($n = 504$) of neck pain, 65.1% ($n = 235$) of whiplash responders, and 64.3%, ($n = 62$) of the laypersons reported to disagree with item 4 "doctors/physiotherapists cannot do anything for neck pain/whiplash injury".

Most of the responders reported to agree when asked "a bad neck/whiplash injury should be exercised" (item 5) (neck pain, 64.9%, $n = 513$; whiplash, 63%, $n = 227$; laypersons, 65.3%, $n = 64$). Similarly, responders reported to agree with item 6 "neck pain/whiplash injury makes everything in life worse" (neck pain, 65.1%, $n = 515$; whiplash, 64.7%, $n = 233$; laypersons, 53.1%, $n = 52$).

Most of the responders reported to disagree to item 7 "surgery is the most effective way to treat neck pain/whiplash injury" (neck pain, 72.3%, $n = 572$; whiplash, 72.6%, $n = 262$; laypersons, 59.1%, $n = 58$) and to item 8 "Neck pain/whiplash injury may mean you end up in a wheelchair" (neck pain, 70.7%, $n = 559$; whiplash, 73.1%, $n = 264$; laypersons, 63.3%, $n = 62$). When asked if "alternative treatments are the answer to neck pain/whiplash injury" (item 9), most of the responders reported not to be sure (neck pain, 35.7%, $n = 129$; whiplash, 32.6%, $n = 118$; laypersons, 37.8%, $n = 37$). Notably, many whiplash responders reported also to agree (35.7%, $n = 129$).

When asked if "neck pain/whiplash injury means long periods of time off work" (item 10), 38.9% ($n = 308$) of neck pain sufferers and 35.2% ($n = 127$) of whiplash responders reported they disagreed. Notably, most whiplash responders reported also to agree (38.2%, $n = 138$). Similarly, more than one third of laypersons (36.7%,

Table 1 Demographic characteristics of the respondents

	Neck pain		Whiplash		Layperson		Total of responders	
	%	*n.*	%	*n.*	%	*n.*	%	*n.*
Gender								
Male	28.5	225	34.3	124	47.9	47	34.9	361
Female	71.4	565	65.6	237	52	51	65	673
Age								
18–25	7	55	8.5	31	13.2	13	9.2	96
26–34	14.9	118	15.5	56	30	30	19.3	200
35–50	40.1	317	42.1	152	28.5	28	37.6	389
51–65	30.9	244	28.5	103	22.4	22	27.7	287
> 65	6.9	55	5.2	19	5.1	5	5.9	62
Marital status								
Married	59.2	468	54.8	198	43.8	43	55.1	570
Widower/separated	9.6	76	9.4	34	5.1	5	8.3	86
Single	31.1	246	35.7	129	51.2	50	36.7	378
Work status								
Employed	57.9	458	59.2	214	53	52	56	580
Self-employed	17.9	142	17.4	63	21.4	21	20.1	208
Housewife	13.6	108	11	40	5.1	5	10.5	109
Unemployed	4.8	38	4.9	18	7.1	7	4.6	48
Student	5.6	44	7.2	26	13.2	13	8.6	89
Type of prevalent work								
Sitting position with computer use for over 6 h a day	41	324	32.9	119	44.8	44	39.7	411
Lifting and/or carrying weights	8.6	68	10.5	38	5.1	5	7.1	74
Awkward position	5.7	45	6	22	3	3	5.3	55
Repetitive movements	21	166	21	76	18.3	18	20	207
Frequently changing position	23.4	185	29.3	106	28.5	28	27.7	287
Previous Neck Pain								
During past 3 months	25	198	21.8	79	0	0	21.4	222
For > 3 months	74.9	592	58.1	210	0	0	55	569
Never	0	0	19.9	72	100	98	23.5	243
Symptoms in the upper limb (pain, tingling, numbness, loss of strength)								
Yes	100	791	73.1	264	0	0	70.4	728
No	0	0	26.8	97	100	98	29.5	306
TOT.	100	791	100	361	100	98	100	1034

$n = 36$) reported they were not sure (36.6%, $n = 36$) and to agree (36.6%, $n = 36$).

Most of the responders reported disagreement to item 11 "medication is the only way of relieving neck pain/whiplash injury" (neck pain, 71.3%, $n = 564$; whiplash, 69%, $n = 249$; laypersons, 61.2%, $n = 60$). In addition, most neck pain (44.2%, $n = 350$) and whiplash (41.8%, $n = 151$) responders disagreed to item 12 "if you have neck pain/whiplash injury, you should rest until it gets better", while most laypersons reported not to be sure (38.8%, $n = 38$). When asked "if you have neck pain/whiplash injury you should try to stay active" (item 13), most neck pain responders reported to agree (39.1%, $n = 309$); however, a high number also reported not to be sure (34.9%, $n = 276$). Most whiplash responders reported to agree (40.4%, $n = 146$), but a high number also reported not to be sure (30,7%, $n = 111$). Most laypersons (40.8%, $n = 40$) reported not to be sure. In addition, most and responders disagreed (neck pain, 52.6%, $n = 416$, whiplash $n = 191$; 52.9%, $n = 190$; laypersons, 45.9%, $n = 45$) with item 14 "simple painkillers are usually enough to control most neck pain/whiplash injury".

All results are reported in appendices 2–5.

Recovery expectation, anxiety and stress

Almost half of neck pain (44.9%, $n = 355$) and whiplash (44.9%, $n = 161$) responders reported to disagree to the item 15 "most neck pain/whiplash injury settles quickly (a few days to a few weeks)". Most laypersons (48.0%, $n = 47$) reported not to be sure. Most neck pain (44.8%, $n = 354$) and whiplash (46.3%, $n = 167$) responders agreed to item 16 "you get on with normal activities such as going to work soon after neck pain/whiplash injury". Laypersons mainly reported to not be sure (35.7%, $n = 35$) and to agree (37.8%, $n = 37$).

Most of the responders agreed with item 17 "anxiety increases the pain you feel" (neck pain, 74.7%, $n = 591$; whiplash, 72.1%, $n = 260$; laypersons, 70.4%, $n = 69$) and to item 18 "stress in your life increases the pain you feel" (neck pain, 83.2%, $n = 658$; whiplash, 81.2%, $n = 293$; laypersons, 73.5%, $n = 72$).

All results are reported in appendices 6–9.

Inferential statistical analysis

Inferential statistical analysis is summarized in Tables 2 and 3.

Total WBQ score

A statistically significant difference was found between laypersons and those with recent neck pain with a mean difference of −1.82 points on the WBQ total score ($p < 0.01$; 95%CI −2.99 to −0.66) (Table 2). No statistically significant difference was found for persistent neck pain and recent and persistent whiplash patients (Table 2).

Recovery pessimism (items 2, 6, and 10)

A statistically significant difference was found for participants reporting associated symptoms compared to participants who did not report associated symptoms (mean difference = 0.44; $p = 0.01$; 95%CI 0.09 to 0.79) (Table 2). Also, we found a statistically significant difference between laypersons and those with recent neck pain (mean difference=−0.51; $p < 0.01$; 95%CI −0.96 to −0.06), and between laypersons and those with neck pain for more than 3 months (mean difference=−0.48; $p < 0.01$; 95%CI −0.87 to −0.09) (Table 2).

Table 2 Association of history of neck pain, whiplash, and associated symptoms with the whiplash beliefs questionnaire (WBQ) total score and subscales, adjusted for age, gender, marital status, employment, and type of job. Values represent regression coefficients (95% CI) from linear regression models. Negative coefficients indicate lower mean WBQ scores in the group with the condition compared to the reference group (layperson)

	Layperson	History of neck pain		History of whiplash	Presence of associated symptoms
		Yes, for more than 3 months	Yes, in the last 3 months	Yes	Yes
Total WBQ score	36.05 (34.73 to 37.36)	−0.95 (−1.96 to 0.06)	**−1.82 (−2.99 to −0.66)***	0.07 (−0.74 to 0.87)	0.78 (−0.12 to 1.69)
Recovery pessimism	9.81 (9.31 to 10.32)	**−0.48 (−0.87 to −0.09)***	**−0.51 (−0.96 to −0.06)***	−0.05 (−0.36 to 0.26)	**0.44 (0.09 to 0.79)***
Active coping	8.18 (7.76 to 8.60)	−0.01 (−0.33 to 0.32)	−0.32 (−0.70 to 0.05)	0.12 (−0.14 to 0.38)	0.06 (−0.22 to 0.35)
Passive coping	4.95 (4.63 to 5.27)	−0.06 (−0.31 to 0.19)	- 0.05 (−0.33 to 0.24)	0.02 (−0.18 to 0.22)	−0.09 (−0.31 to 0.13)
Treatment pessimism	4.75 (4.36 to 5.14)	−0.01 (−0.31 to 0.29)	−0.31 (−0.65 to 0.04)	0.02 (−0.22 to 0.26)	0.26 (−0.01 to 0.53)

*: p – value < 0.05

Active coping, passive coping, and treatment pessimism

No statistically significant differences were found between participants with neck pain, whiplash, or associated symptoms, compared to laypersons (Table 2).

Recovery expectation (items 15 and 16)

A statistically significant difference was found for subjects reporting associated symptoms for the question "most neck pain/whiplash injury settles quickly (a few days to a few weeks)" (odds ratio (OR) 1.38; 95%CI 1.09 to 1.76; $p < 0.05$); however, no difference was found after adjusting for possible covariates (OR 1.22; 95%CI 0.94 to 1.59; $p > 0.05$). Furthermore, a statistically significant difference at the unadjusted analysis was also found for participants reporting a history of neck pain for more than 3 months (OR 1.37; 95%CI 1.05 to 1.79; $p < 0.05$). However, even in this case, the association was no longer statistically significant in the adjusted analysis (Table 3).

Anxiety and stress (items 17 and 18)

At the univariate analysis, a statistically significant difference was found for participants reporting recent (OR 1.45; 95%CI 1.01 to 2.09; $p < 0.05$) and neck pain for more than 3 months (OR 1.62; 95%CI 1.20 to 2.19; $p < 0.05$) for the question "stress in your life increases the pain you feel". After adjusting for possible covariates, only participants reporting neck pain for more than 3 months showed a statistical difference in this item (OR 1.49; 95%CI 1.08 to 2.06; $p < 0.05$) (Table 3).

Discussion

To the best of our knowledge, this is the first study assessing the beliefs and perceptions about neck pain and whiplash between patients and healthy asymptomatic individuals (i.e., laypersons). Similar to Singaporeans, the participants in our study were more pessimistic about the impact of pain on work [28]. Notably, a lower proportion of the Italian responders agreed that surgery and medication are effective in relieving neck pain and whiplash injury compared to Australians and Singaporeans; however, a higher proportion agreed that alternative treatment is effective compared to the Australian sample. Like the Australians and Singaporeans, most Italian responders were distributed between being positive and not sure about exercise and staying active. Similar to the Canadian

Table 3 Association of history of neck pain, whiplash, and associated symptoms with recovery expectations (Questions 15–16), anxiety (Question 17), and stress (Question 18), adjusted for age, gender, marital status, employment, and type of job

	QUESTION 15 - Recovery Expectations			
	UNIVARIABLE ASSOCIATION		***MULTIVARIABLE ASSOCIATION****	
	OR (95% CI)	***P* - value**	**OR (95% CI)**	***P* – value**
Cervical pain				
Reference: No	1.00	-	1.00	-
Yes, for more than 3 months	**1.37 (1.05–1.79)**	**< 0.05**	*1.16 (0.87–1.55)*	*> 0.05*
Yes, in the last 3 months	0.96 (0.70–1.33)	*> 0.05*	*0.86 (0.62–1.20)*	*> 0.05*
History of Whiplash				
Reference: No	1.00	-	1.00	-
Yes	*1.05 (0.83–1.32)*	*> 0.05*	*0.98 (0.78–1.25)*	*> 0.05*
Associated symptoms				
Reference: No	1.00	-	1.00	-
Yes	*1.38 (1.09–1.76)*	*< 0.05*	*1.22 (0.94–1.59)*	*> 0.05*
	QUESTION 16 - Anxiety			
	UNIVARIABLE ASSOCIATION		**MULTIVARIABLE ASSOCIATION***	
	OR (95% CI)	***P* - value**	**OR (95% CI)**	***P* – value**
Cervical pain				
Reference: No	1.00	-	1.00	-
Yes, for more than 3 months	0.98 (0.74–1.28)	> 0.05	0.90 (0.67 to 1.20)	> 0.05
Yes, in the last 3 months	0.80 (0.57–1.10)	> 0.05	0.74 (0.53 to 1.03)	> 0.05
History of Whiplash				
Reference: No	1.00	-	1.00	-
Yes	1.04 (0.82–1.32)	> 0.05	1.02 (0.80 to 1.29)	> 0.05
Associated symptoms				
Reference: No	1.00	-	1.00	-
Yes	1.14 (0.90–1.46)	> 0.05	1.14 (0.87 to 1.49)	> 0.05
	QUESTION 17 – Anxiety			
	UNIVARIABLE ASSOCIATION		**MULTIVARIABLE ASSOCIATION***	
	OR (95% CI)	***P* - value**	**OR (95% CI)**	***P* – value**
Cervical pain				
Reference: No	1.00	-	1.00	-
Yes, for more than 3 months	1.28 (0.96–1.71)	> 0.05	1.19 (0.87 to 1.62)	> 0.05
Yes, in the last 3 months	1.30 (0.92–1.84)	> 0.05	1.19 (0.83 to 1.71)	> 0.05
History of Whiplash				
Reference: No	1.00	-	1.00	-
Yes	0.90 (0.71–1.15)	> 0.05	0.89 (0.69 to 1.14)	> 0.05
Associated symptoms				
Reference: No	1.00	-	1.00	-
Yes	1.13 (0.88–1.46)	> 0.05	1.10 (0.83 to 1.45)	> 0.05
	QUESTION 18 - Stress			
	UNIVARIABLE ASSOCIATION		**MULTIVARIABLE ASSOCIATION***	
	OR (95% CI)	***P* - value**	**OR (95% CI)**	***P* – value**
Cervical pain				
Reference: No	1.00	-	1.00	-
Yes, for more than 3 months	**1.62 (1.20–2.19)**	**< 0.05**	**1.49 (1.08–2.06)**	**< 0.05**
Yes, in the last 3 months	**1.45 (1.01–2.09)**	**< 0.05**	1.30 (0.89–1.88)	> 0.05
History of Whiplash				
Reference: No	1.00	-	1.00	-
Yes	0.98 (0.76–1.27)	> 0.05	1.00 (0.78–1.30)	> 0.05
Associated symptoms				
Reference: No	1.00	-	1.00	-
Yes	1.28 (0.98–1.67)	> 0.05	1.20 (0.90–1.60)	> 0.05

sample, more than 60% of the Italian responders agreed with the statement 'neck pain/whiplash injury makes everything in life worse' [27]. Like Australians and Singaporeans, less than 25% of the Italian responders disagree that they will return to normal activities soon; while only 23% of Italians agreed to recover quickly like Canadians [27]. Beliefs about anxiety and stress were similar, with more than 70% of participants agreeing that anxiety and stress increased the experience of pain [28].

Although these variability does not reflect the differences in the prevalence of neck pain and whiplash injury, they could be a reflection of cultural nuances between countries [28]. Differences between healthcare and compensation systems may also have had an influence. Of note, Italy provides universal public health care and some form of social security benefits to people with injuries [48, 49] and this may have impacted the beliefs and expectations of responders compared to other counties [12, 17]. Many factors were found contributing to an individual's experience of pain, including physical (e.g., pain intensity and stage), psychological (e.g., recovery expectation, distress, coping, and self-efficacy), and social (e.g., impact on daily life and work) factors with no firm boundaries among them [24]. Although these factors are commonly investigated separately, all seem to interact and influence with each other [30]. Notably, self-efficacy, psychological distress, and fear were identified as intermediate factors related to the experience of neck pain and developing disability [50]. Of interest, low self-efficacy was observed to be consistently associated with disability, affective distress and pain severity [51]. However, in our study, we did not find any differences among conditions nor stage from responders' perspectives. Instead, negative recovery expectations, depression or anxiety, passive coping, and multiple sites of pain were found to be associated with pain intensity/persistence and to predict poor general outcome [52]. Accordingly, we found that recovery pessimism was higher for responders with associated symptoms, and in responders with neck pain compared to laypersons. Although cause-effect inferences can't be made from the findings of cross-sectional studies [53, 54], this may be due to how items 2, 6 and 10, and the presence of symptoms reflect a more pessimistic view and a poor recovery [12].

Our findings on recovery pessimism and the influence of stress and anxiety align with qualitative evidence showing that people with neck pain and whiplash describe an inseparable interplay between physical, psychological, and social dimensions of their condition, with expectations, coping, and perceived control strongly shaping the lived experience and function [24, 55]. Particularly, greater recovery pessimism among symptomatic respondents in our sample echoes patient narratives, where uncertainty about prognosis and altered self-identity are common [24, 55]. These results reinforce the importance of targeted assessment of beliefs, self-efficacy, and distress rather than assuming their uniform relevance across patients. It also supports the integration of patient-reported experiences into outcome measures development and the delivery of individualized, patient-centered care.

Overall, few significant findings with large confidence intervals were found. There was a statistically significant lower total score of the WBQ for respondents with recent neck pain compared to laypersons. Although the minimal detectable change for WBQ score has not been established, the Back Belief Questionnaire (BBQ), from which the WBQ was developed, has a minimal detectable change that ranges from 5.9 to 10.5 points [56]. The − 1.82 point mean difference that we found after adjustment does not seem to be a meaningful clinical difference. We found stress significantly higher ($p < 0.05$) for responders experiencing neck pain for more than 3 months with an OR after adjustment of 1.48 points (95% CI 1.07 to 2.05). Although not statistically significant, most of the responders of our study also agreed that anxiety influences the perception of pain. Stress and anxiety were found to both be positively associated with neck pain and poorer outcomes [57]. However, there is little knowledge and inconsistent findings on how stress and anxiety might impact neck pain [58–61] as their interaction is unique to each individual and is not yet fully understood [57, 62, 63].

Implications

Psychological/social factors were commonly observed in people suffering from pain on the neck [64–68]. The biopsychosocial model contributed to raising awareness of the complexity of the concept of health, highlighting the central role of the patient [69]. More specifically, providing emphasis to the person means also considering the subjective perspective [70]. However, clinicians reported a lack in training in managing psychosocial impairments [71, 72] leading to a non-standardized and inadequate management of these factors [73]. Thus, there is the need to move toward a patient-centered approach [74] to consider the individual experience as a pivotal element during the process of care [75–77]. The individual's experience is essential to improve clinical outcomes and should be further integrated into education and practice [76, 77]. Future research on neck pain and whiplash injury should integrate individual's experience to inform quantitative research [78] investigating relevant patient reported outcomes [79] to improve the poor content validity of commonly used outcome measures [80]. Therefore, the validation and transcultural adaptation of reliable tools to capture patient-reported experience such as the WBQ is suggested. Nevertheless, it is important

to acknowledge that our findings do not indicate a universal or uniform influence of psychosocial factors in all patients with neck pain, but rather highlight their potential relevance in specific individuals and context, underscoring the need for targeted assessment within a patient-centered framework.

Strength and limitations

The high response which exceeds the required sample size is a strength of our study and confirms the willingness of the population to participate in this study. Unlike previous studies that mainly reported unadjusted comparisons, we conducted multivariable analyses to adjust for relevant sociodemographic and occupational covariates, thereby providing estimates of the independent association between neck pain/whiplash and beliefs. Although the survey was opened to the general Italian population with no restriction, one limitation was that the older population could not be easily reached as they use social networks to a lesser extent. Thus, our method of recruitment could have led to selection bias. In addition, as the proportion of people in Italy using social media and the diffusion by re-posting is unknown, understanding the coverage of the survey was not possible. Another limitation may be the absence of a transcultural validation of the WBQ. A further limitation of the study is the cross-sectional nature of the design that does not allow cause-effect relationships to be established between observed beliefs and outcomes. To not reduce the social desirability, the collection of patients' information was limited; thus, relevant information may have been omitted (e.g., duration and etiology of pain, medical history, current pain management, geographical distribution of the sample). Lastly, in our survey what constitutes a clinically meaningful difference remains unknown.

Conclusion

Our study is the first to investigate the beliefs in both neck pain/whiplash responders and laypersons, highlighting a heterogeneous and non-linear interaction between pain and responders' perspectives. Italian responders reported negative beliefs regarding the impact of neck pain/whiplash and agreed that anxiety and stress influence the perception of pain. Recovery pessimism seems to be perceived more by individuals with symptoms. Further studies are needed to integrate individual's experience into quantitative research.

Abbreviations

WBQ	Whiplash beliefs questionnaire
SOPA-35	Survey of pain attitudes
CHERRIES	Checklist for reporting results of internet surveys
STROBE	Strengthening the Reporting of Observational Studies in Epidemiology
95%CI	95% Confidence interval
OR	Odds ratio
BBQ	Back belief questionnaire

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12891-025-09328-x.

Supplementary Material 1: Checklist for Reporting Results of Internet E-Surveys (CHERRIES).

Supplementary Material 2: STROBE Statement—checklist of items that should be included in reports of observational studies.

Supplementary Material 3: Appendix 1a. Survey Monkey Questionnaire in Italian. Appendix 1b. Survey Monkey Questionnaire in english. Appendix 2. Comparison of individual items of WBQ for neck pain sample. Appendix 3. Comparison of individual items of WBQ for whiplash sample. Appendix 4. Comparison of individual items for who reported associated symptoms. Appendix 5. Comparison of individual items for laypersons. Appendix 6. Comparison of expectation of recovery, anxiety, and stress for neck pain sample. Appendix 7. Comparison of expectation of recovery, anxiety, and stress for whiplash sample. Appendix 8. Comparison of expectation of recovery, anxiety, and stress for who reported associated symptoms. Appendix 9. Comparison of expectation of recovery, anxiety, and stress for laypersons.

Authors' contributions

Concept/idea/research design/guarantor: F.Mo. Acquisition of data: M.F., F.N., S.S., F.C., and G.L. Analysis and interpretation of data: F.Mo., D.F., M.C., I.Y., J.D., G.G., F.Ma. Writing/review/editing of manuscript: F.Mo., M.F., F.N., S.S., F.C., G.L., D.F., M.C., J.D., G.G., F.Ma. Final approval of the manuscript: All authors.

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Data availability

All data relevant to the study are included in the article or are available as supplementary files.

Declarations

Ethics approval and consent to participate

Technical-Scientific Committee of the Università degli studi del Molise of the 11/10/2023, with approval protocol n. 23/2023. All participants provided written informed consent electronically before proceeding with the questionnaire.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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