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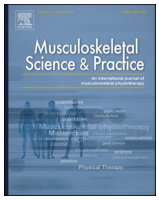

Physiotherapist factors associated with the intention to deliver psychologically informed physiotherapy in persistent low back pain: An online cross-sectional vignette study

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ABSTRACT

Background: Prior qualitative research has revealed several barriers to physiotherapists delivering psychologically informed physiotherapy (PIP). It is not known which factors are most relevant to PIP delivery.
Objectives: To determine the proportion of physiotherapists in Aotearoa/New Zealand who intend to deliver PIP to persons with non-specific low back pain (LBP), and to determine factors associated with the intention to deliver PIP.
Design: This study used a cross-sectional online vignette case survey design.
Setting: Aotearoa/New Zealand registered physiotherapists who regularly treat LBP were invited to participate.
Methods: Participants (n = 224) outlined their intended assessment and treatment plan for two vignettes with persistent LBP. They then completed the Knowledge and Attitudes of Pain Questionnaire (KNAP), components of the Determinants of Implementation Behaviour Questionnaire (DIBQ) and demographic questions.
The proportion of physiotherapists intending to deliver PIP was determined by scoring participants' vignette plans as psychologically informed or non-psychologically informed. Binary regression was used to determine which questionnaire and demographic variables were associated with the intention to deliver PIP.
Results: One third of participants intended to deliver PIP in the management of LBP. Binary regression analysis showed that pain knowledge and attitudes were consistently associated with the intention to deliver PIP across vignettes (OR = 1.05, 95 % CI = 1.01–1.08; p = .015) (OR = 1.05, 95 % CI = 1.02–1.09, p = .005). Beliefs about the consequences of PIP was associated with the intention to deliver PIP in one vignette (OR = 2.15, 95 % CI = 1.12–4.11, p = .021).
Conclusion: Findings suggest that physiotherapists' knowledge and attitudes towards pain and their belief that PIP is effective are associated with PIP delivery. Improving pain knowledge and beliefs around PIP may improve the quality of LBP management.

1. Introduction

Psychologically informed physiotherapy (PIP) integrates psychological techniques alongside traditional physiotherapy practice (Main and George, 2011; Denneny et al., 2020). Most of the evidence on PIP is in the context of persistent musculoskeletal pain. PIP aims to address the psychological processes that can lead to secondary disability in persistent pain and, subsequently, poorer outcomes (Main and George, 2011). These psychological factors include pain catastrophising, low recovery expectations, low self-efficacy and fear avoidance (Otero-et al., 2022). In low back pain (LBP) psychological factors are associated with the development and perpetuation of persistent symptoms (Wiles et al., 2022). Provision of PIP is in line with guidelines which recommend psychological therapies for persistent LBP (Foster et al., 2018; Qaseem et al., 2017; Malfliet et al., 2019).

Physiotherapists have been successfully trained to screen for psychological risk factors and provide psychologically informed interventions such as cognitive behavioural therapy (CBT), acceptance and commitment therapy (ACT), mindfulness and pain neuroscience education (Ballengee et al., 2021). These interventions aim to improve

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pain outcomes in a variety of ways, such as reducing the sense of threat, changing thoughts and behaviours about pain and soothing the physiological response to pain (Keefe et al., 2018). In persistent LBP, recipients of PIP tend to have improved outcomes compared to those receiving traditional physiotherapy (Archer et al., 2018). Systematic reviews show that cognitive behavioural based physiotherapy improves pain, disability or function compared to traditional physiotherapy (Coronado et al., 2020; Hall et al., 2018; Devonshire et al., 2023). One review found high quality evidence that physiotherapist-delivered CBT was more effective than exercise or education alone on reducing disability and pain (Hall et al., 2018).

Despite this, there are several challenges to the uptake of PIP. In qualitative research physiotherapists cite many barriers to the delivery of PIP. This includes beliefs of PIP being unacceptable to patients, low confidence, lack of skills and knowledge, perception that it is outside their scope of practice, discomfort with dealing with psychosocial aspects of pain, and being sceptical about omitting biomedical assessment (Ballengee et al., 2021; Driver et al., 2017; Gardner et al., 2017; Holopainen et al., 2020). Even when trained in PIP, physiotherapists may still spend more time and place on biomedical treatments (Stevenson et al., 2006). This suggests that training alone is not sufficient to facilitate the uptake of PIP.

To facilitate physiotherapists' implementation of PIP, it would be helpful to understand what factors are most associated with PIP delivery. Quantitative research suggests that pain neuroscience knowledge, specific chronic pain training, higher education and physiotherapists working in interdisciplinary settings influences biopsychosocial orientation (Díaz-Fernández et al., 2024; Mikamo and Takasaki, 2021); while confidence and biopsychosocial orientation are significantly associated with the use of selected biopsychosocial approaches (Takasaki and Ueno, 2024; Alshehri et al., 2020). These studies did not assess a wide range of independent variables, meaning that other influential factors may have been missed. It is also not known how many physiotherapists are practicing PIP. In international studies, 25–80 % of physiotherapists report they use biopsychosocial methods for non-specific LBP (Díaz-Fernández et al., 2024; Alshehri et al., 2020; Akindele et al., 2020; Bahns et al., 2021; do et al., 2022; Hallegraeff et al., 2021). Yet these studies assessed for specific psychological therapies using closed ended questions which may have introduced social desirability bias and limited the physiotherapists' ability to spontaneously describe their management plans. Evidence of this bias was identified in one study which found that the use of psychological assessments was lower when clinical records were examined (Hallegraeff et al., 2021). No quantitative study has examined physiotherapists' PIP delivery using open-ended questions.

In Aotearoa/New Zealand (NZ), physiotherapists are primary healthcare providers and the most frequently visited health professional by persons with musculoskeletal conditions (Reid and Larmer, 2007). Therefore, it is essential that NZ physiotherapists are equipped to provide best evidence-based care to those with low back pain. Understanding how many NZ physiotherapists practice PIP and what factors most influence this would help direct initiatives aimed at improving LBP management in NZ.

1.1. Objectives

1. To determine the proportion of physiotherapists who intend to deliver PIP to individuals with persistent LBP.
2. To identify factors that are associated with the intention to deliver PIP to individuals with persistent LBP.

The authors hypothesised that there would be a significant positive relationship between the intention to deliver PIP and pain knowledge and attitude, and there would be a significant relationship between the intention to deliver PIP and the measures of behaviour change.

2. Methods

2.1. Study design

The study was a cross-sectional survey using online vignette case studies. Ethical approval was obtained from the institutional ethics committee. The study report conforms to the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) guidelines (Von Elm et al., 2007) and the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) (Eysenbach, 2004). This study gained ethical approval from the Auckland University of Technology Ethics Committee, approval reference number (23/137).

2.2. Study sample

The target population were physiotherapists registered with the Physiotherapy Board of NZ who managed patients with LBP. There was no limit on the number of patients with LBP they managed, and it was assumed that all practising NZ physiotherapists have a good understanding of English. Therefore, there were no exclusion criteria set.

The survey was open to all eligible physiotherapists, and we used a sample of convenience. Recruitment and data collection in the form of an 'open survey' occurred throughout NZ between July 2023 and October 2024. Advertisements about the study were circulated to physiotherapists using email, social media, clinic visits, and at conferences. Invitations provided a link that directed potential participants to an online information sheet on the Qualtrics XM Platform website. No other website was used to provide information about the study. The information sheet advised the purpose of the study was "to understand physiotherapists' clinical reasoning in treating low back pain". This concealed the focus of the study was PIP, reducing social desirability bias. Participants were advised of the researchers' details, the approximate length of the time of the survey, and brief information about the questionnaire items. They were advised that the survey was voluntary, and they were incentivised by an offer to enter two draws to win a $300 voucher. Interested participants selected an arrow button to commence the survey. In keeping with ethical guidelines for anonymous studies, consent was implied by submission of the survey. No personal information was collected.

An a-priori sample size calculation was undertaken using G*Power based on the results of a prior study (Gibbs et al., 2021). For a regression model with 11 predictors, an effect size of .7, 80 % power and 2-tailed probability of 5 %, 251 participants would be needed. Approximately 6350 physiotherapists held an annual practising certificate in 2023 (Physiotherapy Board of New Zealand), therefore this sample size would target 4 % of the NZ physiotherapy population. There is no data on the number of physiotherapists that treat persistent LBP, therefore the target population size is not known.

2.3. Survey development

The online survey was developed by the researchers and informed by current literature in PIP. The initial survey was tested using a convenience sample of 8 physiotherapists who provided feedback on whether the vignettes and open-ended answers reflected their usual practice, the comprehensiveness and readability of the survey, completeness of information given, and length of time taken to complete the questionnaire. The final questionnaire was only available in English and contained 104 items over 11 pages. There were two parts to the survey, outlined below. All items required a response for the participant to proceed to each new page and to complete the survey. Once questions were completed, participants were unable to alter their answers to previous questions. Timestamps were not used because it was determined that the length of time taken to complete a survey would not necessarily reflect the quality of the response. The Qualtrics XM Platform did not provide a method of determining unique visitors and cookies were not used to identify

unique responses. Instead, the IP addresses were manually checked by the researchers. Where an IP address was used more than once, the demographic data were checked to determine if a respondent had submitted multiple entries. If this was suspected, the second entry was deleted.

2.4. Section 1: vignette case studies

Two vignette case studies were selected from prior research that investigated clinical decision making for LBP (Gibbs et al., 2021; Rainville et al., 2000). One vignette describes an administrator with mild LBP with recurrent exacerbations; the other describes a foreman worker with 9 months of moderate-to-severe low back and lower limb pain (see supplementary materials). The vignettes represent typical patients in musculoskeletal practices, have persistent LBP, and could be managed by a physiotherapist without referral to a specialist. Vignettes have been shown to have a moderate positive correlation with real life clinical behaviour (Evans et al., 2015; Van et al., 2020).

Each vignette was presented individually followed by open-ended questions asking participants to list both the assessments and treatments they would provide to the case. The order of the vignettes was switched once there were 120 completed surveys (anticipated halfway point) to control for possible order effects. For each vignette, once the two open-ended questions were answered, participants asked to select the likelihood they would provide six psychological and six biomedically based therapies (detailed in supplementary data) on a 10-point Likert scale, where 1 = not at all likely and 10 = highly likely. These Likert scale items could not be viewed by the participants when answering the open-ended questions. The Likert scale was presented on a separate page.

2.5. Section 2: questionnaires

The second section assessed factors that may influence the delivery of PIP, determined from prior literature that has cited barriers to PIP including lack of skills, training, knowledge, support, confidence, and time, as well as beliefs it is not aligned with scope of practice and is unacceptable to patients (Ballengee et al., 2021; Driver et al., 2017; Gardner et al., 2017; Holopainen et al., 2020). These barriers were assessed quantitatively using the Knowledge and Attitudes of Pain (KNAP) questionnaire, 7 selected domains (36 items) of the Determinants of Implementation Behaviour Questionnaire (DIBQ), and demographic/work related questions (see Table 1). Country of training, ethnicity and gender were also asked but were not included in the analyses (based on previous research). The KNAP questionnaire was presented as 15 items per page; the DIBQ and demographic questions had 10 items presented per page. The order of the items in section 2 was not randomised or altered during the data collection. No adaptive questioning was used.

The KNAP has a high test-retest reliability, good internal consistency and strong correlation with other questionnaires that assess pain knowledge and attitudes (Beetsma et al., 2020). The DIBQ was developed from the Theoretical Domains Framework (TDF) Questionnaire, used in implementation research for health professional behavioural change (Atkins et al., 2017). Internal consistency of the DIBQ is acceptable to good and the domains have good discriminant validity (Huijg et al., 2014). The domains of the DIBQ used in the survey were determined following pilot testing of the correlations between subscales. A five-point Likert scale from "Strongly Disagree" to "Strongly Agree" was used for each item.

2.6. Data analysis

The data were captured automatically by the Qualtrics XM Platform and transferred to the Statistical Package for Social Sciences (SPSS) Version 29.0.2.0 (IBM Corp, Armonk, NY, USA). Responses were included in analyses if they answered at least one vignette open-ended question. Where possible, multiple imputations were performed if there were missing data to reduce the impact of nonresponse bias. Any cases with no completed questions were excluded. To determine whether a participant intended to deliver PIP, two researchers independently scored each participant's assessment and treatment plans as psychologically informed ($Intention_{PIP}$) or non-psychologically informed ($Intention_{NONPIP}$) based on set criteria (see supplementary data) for each vignette. This was the dependent variable for the first objective. Participant answers were analysed only in regard to their inclusion of any psychological assessment or treatment, despite what other physiotherapy methods were described. Once a score was determined, the remainder of the qualitative data supplied by the participants was not utilised in the analysis. Any differences in scoring were discussed and where agreement could not be reached, a third researcher determined the classification. Descriptive analyses determined the percentage of physiotherapists intending to deliver PIP. To validate this classification process, participants were given a "psychological score" and a "biomedical score" for each vignette based on the Likert scale responses relating to treatment options (calculated by totalling Likert scale responses of the six psychological-based treatments and six biomedical-based treatments separately to give a maximum score of 60 in each category). One-way ANOVAs were performed to compare the psychological and biomedical scores between the $Intention_{PIP}$ and $Intention_{NONPIP}$ groups for each vignette.

To determine the factors associated with intention to deliver PIP, a binary regression model was used for each vignette. The dependent variable was the classification as $Intention_{PIP}$ or $Intention_{NonPIP}$. The potential independent variables were those listed in Table 1. To decide which variables were entered into the binary regression, Mann Whitney U and Chi-square tests compared each independent variable between the $Intention_{PIP}$ and $Intention_{NonPIP}$ groups. Any variable with a p value $< .2$

Table 1
Independent variables and how they were assessed.

Independent variable	Independent measurement tool
Pain attitude and knowledge	KNAP Pain Questionnaire
Knowledge of PIP	DIBQ subscale 1: **Knowledge** items e.g. *I know how to deliver PIP*
PIP Skills	DIBQ subscale 2: **Skills** items e.g. *I have the skills to deliver PIP*
Perceived scope of practice	DIBQ subscale 3: Social/professional **role** e.g. *Delivering PIP is part of my work as a physiotherapist.*
Confidence to deliver PIP	DIBQ subscale 4: Beliefs about capabilities items (**Confidence**) e.g. *I am confident that I can provide PIP*
Perceived outcomes from PIP	DIBQ subscale 6: Beliefs about **consequences** e.g. *For me, delivering PIP is very useful*
Biomedical orientation	DIBQ subscale 8: **Goals** e.g. *Working on biomedical issues is a higher priority than delivering PIP*
Perceived level of support	DIBQ subscale 11: **Organisation** items e.g. *The management of the organisation I work in is helpful with delivering PIP*
Age	Demographic question: Please state your age in exact years.
PIP formal training hours	Demographic question: How many hours of formal training in psychosocial interventions have you had?
Years of experience	Demographic question: How many years have you been practising as a physiotherapist?
PIP Supervision	Demographic question: How frequently do you have supervision with a therapist experienced in PIP?
Qualification	Demographic question: What is your highest level of qualification?
Time per appointment	Demographic question: How much time do you spend with each patient?
Funding model	Demographic question: How is the majority of your work funded?

KNAP = Knowledge and Attitudes of Pain questionnaire; PIP = psychologically informed physiotherapy; DIBQ = Determinants of Implementation Behaviour Questionnaire; e.g = example.

was considered for the regression analysis. Multiple imputation datasets for Mann-Whitney U and Chi-square tests were used for determining which variables would be entered into the binary regression.

Variables with a Spearman correlation coefficient greater than .7 were considered to be highly correlated and a pragmatic decision was made about excluding one of them from the binary regression. The excluded independent variable was used in a sensitivity analysis. Collinearity statistics were also checked and checks for outliers undertaken.

Independent variables were entered into regression models using the enter method. Multiple imputation was performed using the automatic imputation method and linear regression model. Variables with a p value $< .05$ were considered significant. The odds ratio and 95 % confidence intervals were also reported. The same method was used in the sensitivity analysis.

Chi-square tests were performed to determine whether the order of vignette presentation influenced participant responses. A chi-square test was also undertaken to ascertain differences between survey completers and non-completers.

3. Results

3.1. Participants

The vignette section of the survey was commenced by 224 participants and the full survey by 176 participants, resulting in a completion rate of 78.6 % (see Fig. 1). There were 470 views of the information sheet of the survey. Due to the study being an anonymous open online survey and the inability to monitor unique visitors to the site, it is not possible to know how many potential participants closed the webpage and completed the survey later. Therefore, participation rate cannot be accurately determined. Participant demographic details, KNAP and DIBQ scores are presented in Tables 2 and 3.

Table 2
Demographic data of study participants (N = 176).

Variable		Frequency	%
Gender	Male	58	33
	Female	117	67
	Not stated	1	<1
Age	Range	22–77	
	Mean (SD)	40 (12)	
Ethnicity	European	155	88
	Māori	4	2
	Pacific Island	0	0
	Asian	15	8
	Other	2	1
Years of experience	Range	1–53	
	Mean (SD)	17 (12)	
Qualification	Bachelor's degree	56	32
	Post-graduate cert/diploma	78	44
	Master's degree	39	22
	PhD	3	2
Country of training	NZ	138	78
	Australia	2	1
	UK	18	10
	South Africa	8	5
	Other	10	6
PIP supervision	No	130	74.3
	Yes	45	25.7
PIP formal training hours	None	41	23.4
	<50	89	50.9
	≥50	45	25.7
Time per appointment (mins)	20–25	25	14.2
	30–35	79	44.9
	40–45	42	23.9
	50–60	30	17.0
Funding	Insurance	68	38.6
	Patient/private funded	77	43.7
	Public	31	17.6

% = percentage; SD = standard deviation; cert = certificate; PhD = Doctor of Philosophy; NZ = New Zealand; UK = United Kingdom; PIP = psychologically informed physiotherapy; ≤ less than; ≥ = greater than; mins = minutes.

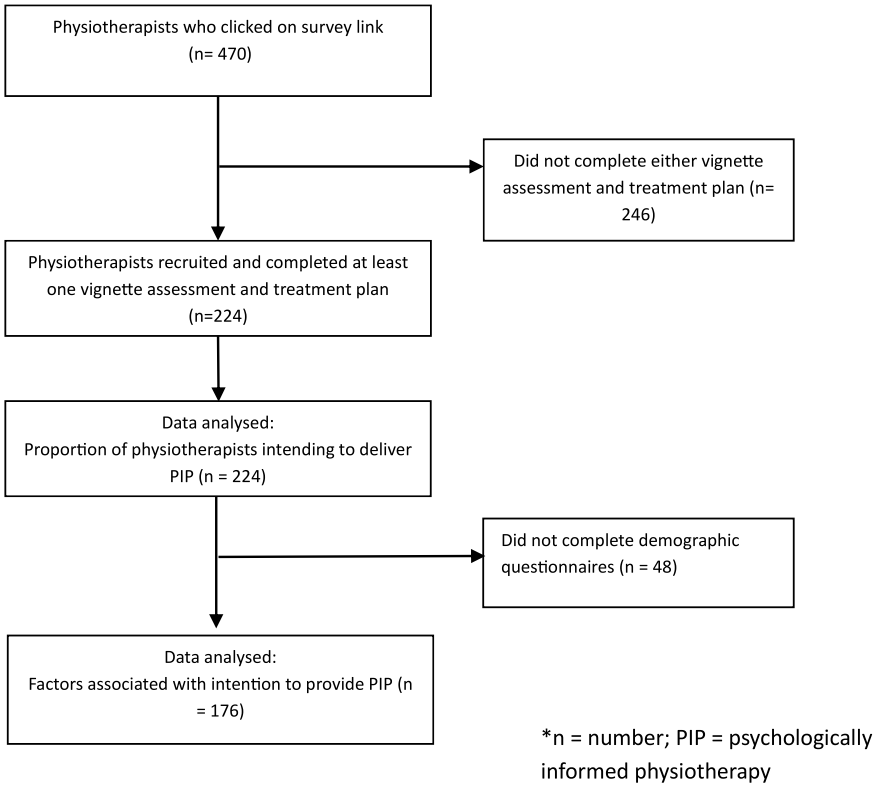

Fig. 1. STROBE diagram showing participant flow through the study.

Table 3
Median and interquartile range of the KNAP and DIBQ scores.

Scale		N	Md	IQR
KNAP (0–150)		184	119.5	11–127
DIBQ (1–5)	Knowledge	183	3.00	2.25–3.75
	Skills	183	3.00	2.00–4.00
	Role	183	4.00	3.00–5.00
	Confidence	183	2.75	2.13–3.50
	Consequences	179	3.33	2.75–3.83
	Goals	176	2.50	1.50–3.00
	Organisation	176	3.00	2.06–4.00

N = number; Md = median; IQR = interquartile range; KNAP = Knowledge and Attitudes of Pain questionnaire; DIBQ = Determinants of Implementation Behaviour Questionnaire.

3.2. Intention to provide PIP

One third (33 %) of physiotherapists intended to provide PIP, regardless of the vignette (Table 4). For both vignettes, the psychological score was significantly higher in the $Intention_{PIP}$ group compared to $Intention_{NonPIP}$, and the biomedical score was significantly higher in the $Intention_{NonPIP}$ group, validating the dichotomisation into intention groups. There were no changes in statistical significance when the imputed data were included in this analysis. Chi-square tests demonstrated that order of vignette was significant for the administrator vignette only (see supplementary data).

3.3. Factors associated with intention to deliver PIP

The results of the univariate analyses (Mann-Whitney U tests and Chi-square tests) for both vignettes are displayed in Table 5. Spearman's correlations showed that DIBQ subscales Knowledge, Skills, Confidence and Role were correlated so Skills, Confidence and Role subscales were excluded in the primary analysis. DIBQ Role was entered in the sensitivity analysis (see supplementary data).

3.3.1. Binary regression

The results of the logistic regression models are shown in Tables 6 and 7. For the administrator vignette the model was statistically significant, $\chi^2(14, N=174)=51.86, p<.001$, correctly classifying 76.4 % of cases. KNAP and vignette order were significantly associated with intention to deliver PIP. The odds ratio for KNAP indicates that each point scored in the 150-point KNAP scale increased the odds of intending to deliver PIP by 5 %.

For the foreman vignette, the model was statistically significant, $\chi^2(11, N=174)=43.89, p<.001$, correctly classifying 75.9 % of cases. KNAP and DIBQ Consequences were significantly associated with the intention to deliver PIP. Each point scored on the KNAP scale increased the odds of intending to deliver PIP by 5 %. Each point scored on the 5-point DIBQ Consequences domain increased the odds of intending to deliver PIP by 215 %.

In the sensitivity analyses, KNAP remained significant in both vignettes (see supplementary data). DIBQ Role was not significant in either vignette.

Table 4
Proportion of physiotherapists' intention to deliver PIP for each vignette.

		N	%	Mean Psych score (SE)[a]	Mean Biomed score (SE)[a]
Admin (n = 210)[b]	$Intention_{NonPIP}$	141	67.5	28.94 (.90)	34.77 (.67)
	$Intention_{PIP}$	68	32.5	38.60 (1.03)	30.41 (.85)
	P			<.001	<.001
Foreman (n = 204)	$Intention_{NonPIP}$	135	66.5	29.68 (.83)	35.41 (.66)
	$Intention_{PIP}$	68	33.5	39.01 (1.04)	31.5 (.89)
	P			<.001	1 < .001

n = number; % = percentage; psych = psychological; SE = standard error; biomed = biomedical; admin = administrator; NonPIP = non psychologically informed physiotherapy; PIP = psychologically informed physiotherapy; P = probability; ≤ less than.

[a] Mean psychological and biomedical scores are pooled imputed data.

[b] One case in administrator vignette did not adequately complete the open-ended answer.

3.4. Survey completers versus non-completers

In the administrator vignette, there was a significant difference in intention to deliver PIP between non-completers and completers (p = .034; see supplementary data). In the foreman vignette, there was no significant difference in intention to deliver PIP between completers and non-completers (p = .121).

4. Discussion

This study found that one third of NZ physiotherapists intend to deliver PIP, despite most participants having post-graduate qualifications or at least some training in PIP. This supports qualitative research findings that physiotherapists do not necessarily provide PIP even though they have received training (Holopainen et al., 2020). This finding is low compared to international studies, where 25–80 % of physiotherapists report they use biopsychosocial methods for non-specific LBP (Díaz-Fernández et al., 2024; Alshehri et al., 2020; Akindele et al., 2020; Bahns et al., 2021; do Prado et al., 2022; Hallegraeff et al., 2021). As mentioned above, these studies were at risk of social desirability bias, making direct comparisons to our findings challenging. Our study used open-ended questions and concealed the focus of the study to reduce this bias.

The multivariate analyses revealed that higher knowledge of pain neuroscience was most consistently associated with the intention to deliver PIP, and positive beliefs about the consequences of providing PIP was associated in one vignette. These findings indicate that even small increments of knowledge about pain are associated with an increased likelihood of delivering PIP. The robustness of this finding was evident in that it remained significant in the sensitivity analyses. While our univariate analyses were in line with previous qualitative research findings (Ballengee et al., 2021; Driver et al., 2017; Gardner et al., 2017; Holopainen et al., 2020), to our knowledge, this is the first study to use multivariate analyses to highlight the unique importance of pain knowledge and beliefs to PIP delivery.

Prior research has shown that pain neuroscience knowledge has a moderate positive correlation with biopsychosocial orientation (Beetsma et al., 2020). It has been also determined that treatment orientation directs treatment selection (Alshehri et al., 2020; do Prado et al., 2022; Gibbs et al., 2021; Simmonds et al., 2012), therefore it is unsurprising that higher pain neuroscience knowledge was associated with PIP in this study. This finding supports a prior study where pain neuroscience scores predicted the frequency of physiotherapists providing biopsychosocial therapy in persistent pain (Díaz-Fernández et al., 2024), although a relationship was not found in another study (Takasaki and Ueno, 2024). Neither of these studies examined physiotherapists providing specific psychological interventions therefore are not directly comparable to our study.

Interestingly, our sample had a median KNAP score of 119.5 out of a possible 150, which is higher than other reports in international research (Díaz-Fernández et al., 2024; Takasaki and Ueno, 2024; Beetsma et al., 2021), meaning that this sample had high pain neuroscience knowledge despite low intention to deliver PIP. Potentially, a very high level of pain neuroscience knowledge is needed for PIP delivery to occur, or more than just knowledge is required to implement PIP in practice. Prior research suggests that a process of learning and reflection is required for new knowledge to translate into practice (Holopainen et al., 2020). This may be particularly necessary for physiotherapists who have experienced strong biomedical influences in their

Table 5
Median values of the independent variables for the $Intention_{non\text{-}PIP}$ and $Intention_{PIP}$ groups for each vignette. Data were compared between groups using Mann Whitney U and Chi-Square tests, as appropriate. Variables with P < .2 were considered for inclusion in the regression analysis.

	Administrator vignette				Foreman vignette			
	Non-PIP (N = 119)	PIP (N = 64)	Z/χ^2	P	Non-PIP (N = 120)	PIP (N = 64)	Z/χ^2	P
KNAP	115	126	4.85	<.001	117	124.5	4.36	<.001
DIBQ								
Knowledge	3.00	3.50	4.05	<.001	3.00	3.50	3.42	<.001
Skills	2.67	4.00	4.13	<.001	3.00	4.00	4.28	<.001
Role	4.00	4.33	3.70	<.001	4.00	4.17	3.48	<.001
Confidence	2.50	3.00	3.87	<.001	2.5	3.06	3.85	<.001
Consequences	3.22	3.67	4.35	<.001	3.25	3.67	4.36	<.001
Goals	.50	2.00	−2.85	.004	2.50	2.00	−1.99	.047
Org	3.00	3.50	2.65	.008	3.00	3.25	1.81	.071
Age	39	38	−.27	.786	37	39	1.37	.170
Years of Practice	14	15	.03	.980	13	18	1.33	.185
Qualification								
Bachelor's	36.3	23.8	2.91	.233	39.8	17.5	10.57	.005[a]
PG cert/dip	41.6	49.2			41.6	49.2		
Masters/PhD	22.1	27.0			18.6	33.3		
PIP Supervision								
No	81.3	61.9	6.92	.009	78.6	66.7	2.40	.121
Yes	18.8	38.1			21.4	33.3		
PIP Training								
0	27.4	16.1	11.16	.004[a]	23.9	22.6	3.52	.172
<50	54.9	43.5			54.9	43.5		
≥50	17.7	40.3			21.2	33.9		
Funding								
Insurance	34.5	46.0	7.36	.061	37.2	41.3	3.38	.337
Patient/private	48.7	34.9			45.2	41.2		
Public	16.8	19.0			17.7	17.5		
Appt Time								
20 - 25	15.9	11.1			14.2	14.3	5.13	.162[b]
30–35	47.8	39.7	7.05	.070	48.7	38.1		
40 - 45	24.8	22.2			24.8	22.2		
50–60	11.5	27.0			12.4	25.4		

Non-PIP = non psychologically informed physiotherapy; PIP = psychologically informed physiotherapy; Md = median; N = number; Z = z-score; X^2 = chi square; P = probability; KNAP = knowledge and attitudes of pain; DIBQ = determinants of implementation behaviour questionnaire; Know = knowledge; Org = organisation; ≤ less than; PG = post-graduate; cert = certificate; PhD = doctor of philosophy; ≥ = greater than; Appt = appointment.
[a] no longer significant in multiple imputation data set but <.2.
[b] no longer >.2 in multiple imputation dataset.

Table 6
Results of the logistic regression of factors associated with the delivery of PIP in the administrator vignette.

	Odds Ratio [95 % CI]	p
KNAP	1.05 [1.01–1.08]	.015[a]
DIBQ		
Knowledge	1.63 [.99–2.69]	.053
Consequences	1.57 [.82–2.97]	.171
Goals	.80 [.48–1.21]	.286
Organisation	.74 [.27–1.14]	.167
PIP training hours		
<50	.76 [.27–2.16]	.611
≥50	1.18 (.33–4.28)	.802
Appointment time		
30–35 min	1.07 [.33–3.46)	.914
40–45 min	.82 [.23–2.90]	.754
50–60 min	1.82 [.39–8.50]	.446
Supervision	2.36 [.97–5.76]	.058
Funding		
Patient/private	.63 [.28–1.42]	.264
Public	.80 [.25–2.52]	.701
Vignette order	.35 [.14 - .89]	.027[a]

CI = Confidence Interval; p = probability; KNAP = Knowledge and Attitudes of Pain questionnaire; DIBQ = Determinants of Implementation Behaviour Questionnaire; PIP = psychologically informed physiotherapy; ≤ less than; ≥ = greater than; mins = minutes.
[a] p < .05.

Table 7
Results of the logistic regression of factors associated with the delivery of PIP in the foreman vignette.

	Odds Ratio [95 % CI]	P
KNAP	1.05 [1.02–1.09]	.005[a]
DIBQ		
Knowledge	1.27 [.80–2.02]	.311
Consequences	2.15 [1.12–4.11]	.021[a]
Goals	.93 [.63–1.36]	.698
Organisation	.70 [.46–1.06]	.095
Hours		
<50	.52 [.21–1.42]	.177
≥50	.55 [.17–1.80]	.321
Supervision	1.70 [.69–4.02]	.252
Qual		.083
PGCert/dip	2.36 [.96–5.82]	.063
Masters/PhD	2.57 [.91–7.26]	.075
Age	1.01 [.97–1.04]	.693

CI = Confidence Interval; p = probability; KNAP = Knowledge and Attitudes of Pain questionnaire; DIBQ = Determinants of Implementation Behaviour Questionnaire; ≤ less than; ≥ = greater than; Qual = qualification; PG = post graduate; cert = certificate; dip = diploma; PhD = doctor of philosophy.
[a] p < .05.

education and work environment (Mescouto et al., 2022).

Belief about the consequences of PIP was also relevant to the delivery of PIP. The consequences involved the perceived outcomes of PIP for the physiotherapist (positive emotions, financial reimbursement, recognition), patient outcomes, and improved collaboration with other health

professionals. Beliefs about consequences has been found to be important in some studies testing physiotherapists' implementation of biopsychosocial interventions for LBP (Ris et al., 2021; Schröder et al., 2020; Richmond et al., 2018) but not others (Matthews et al., 2015; Moniz et al., 2024). All of these studies examined different target interventions rather than general PIP, which may account for variation in findings. Alternatively, the inconsistency across studies and the fact that it was only significant in one vignette in the current study suggests it is not a robust finding across management of LBP.

Our findings that contextual factors, such as appointment time and funding, were not significantly associated with treatment intention is consistent with previous work (Alshehri et al., 2020; Bahns et al., 2021). Although prior research suggested that age or experience might influence PIP delivery (Díaz-Fernández et al., 2024; Hallegraeff et al., 2021), the nature of the relationship was reported as either linear (Hallegraeff et al., 2021) or non-linear (Díaz-Fernández et al., 2024). In contrast, we found no association of age or experience with PIP, suggesting this may not be a key predictor.

In terms of physiotherapists' training, PIP supervision, higher qualifications and more hours of formal training in PIP were greater in the $\text{Intention}_{\text{PIP}}$ group in the univariate analyses in one vignette only, and none were significant in the multivariate analyses. Prior research has had mixed results in relation to training and adherence to evidence-based LBP management, with several studies showing significant associations (Díaz-Fernández et al., 2024; do Prado et al., 2022; Bahns et al., 2021; Alshehri et al., 2020; Akindele et al., 2020) and others not (Mikamo and Takasaki, 2021; Takasaki and Ueno, 2024; Gibbs et al., 2021). The variation may relate to the type of post-graduate education received (Mescouto et al., 2022). Specific training in pain improves pain neuroscience knowledge (Beetsma et al., 2021) and predicts frequency of delivering biopsychosocial methods, whereas higher education does not (Díaz-Fernández et al., 2024). In addition, specific PIP training does not always mean it is used in practice (Stevenson et al., 2006), potentially because biomedical orientation and intolerance of uncertainty drive treatment selection (Gibbs et al., 2021; Simmonds et al., 2012) more than biopsychosocial orientation (Gibbs et al., 2021).

4.1. Clinical implications

The results of this study may inform organisations, employers, trainers, educational institutions and stakeholders, whose aim is to encourage physiotherapists to deliver high quality care in the management of LBP. The results of this study suggest that attention could be paid to optimising physiotherapists' knowledge of pain neuroscience and the positive consequences of delivering PIP. Focusing on other factors such as appointment time, funding model, or organisational support may not improve delivery of PIP.

How to target pain neuroscience knowledge and improve physiotherapists' beliefs of the consequences of PIP so that change occurs is not clear from our study. Implementation researchers advise that behaviour change is complex. A variety of training interventions (Gervais-et al., 2023), repeated action, and ongoing monitoring (Johnson and May 2015) may be required to facilitate long term change in health professionals. Future research using implementation strategies that align with behavioural change models may be required.

4.2. Future research

Future research could investigate the proportion of physiotherapists delivering PIP in actual clinical practice through direct clinical observation and retrospective examination of physiotherapy records for evidence of PIP. To understand how education and training impact knowledge and practice, pain knowledge and intention to deliver PIP could be examined before and after pain science education programmes/workshops. Qualitative research could be undertaken with physiotherapists who have a high pain neuroscience knowledge score but do not intend to deliver PIP to determine other potential factors associated with implementation. Finally, to evaluate potential behaviour change strategies, a randomised controlled trial could be undertaken to compare actual PIP delivery between an intervention group that receive PIP training with specific implementation strategies, feedback and regular supervision, and a control group who receive PIP training only.

4.3. Strengths and limitations

This study used rigorous research methods to understand the various factors that may influence PIP, including selecting independent variables from qualitative research, using validated questionnaires, and the use of uni- and multi-variate analyses. The purpose of the research was concealed, and the dependent variable was validated, reducing the risk of social desirability bias. Participant characteristics, except ethnicity, were also similar to available statistics on the NZ physiotherapy population (Physiotherapy Board of New Zealand; Physiotherapy New Zealand Remuneration Survey) meaning that the findings are likely representative of all NZ physiotherapists.

There are also some limitations. The study was set in NZ where physiotherapists are primary healthcare providers and work in a unique cultural and sociopolitical context, which may limit the generalisability of the findings internationally. Survey non-completers showed a tendency to be less psychologically informed in one vignette. Therefore, it is likely some bias occurred in the results; however, multiple imputation was applied where possible to reduce this effect. It is also acknowledged that there may be a risk of self-report bias. While vignettes have been shown to have a moderate positive correlation with real life clinical behaviour (Evans et al., 2015; Van et al., 2020), another study showed that physiotherapists over-reported their use of psychological assessment (Hallegraeff et al., 2021). It is not possible to know for certain whether the participants answers in this study reflected their usual clinical methods. It is also difficult for an online survey to fully capture the nature of a real-life clinical interaction. Key aspects of PIP include developing rapport, establishing trust and setting patient-centred goals, which would also have psychological benefit to the recipient (Ballengee et al., 2021), but may not have been described by participants. These strategies help to build a therapeutic relationship which is important in managing persistent pain (Kinney et al., 2020). Implementation of the traditional biopsychosocial model in persistent LBP, where biological, social and psychological factors are segregated, has been criticised as reductionistic (Bianchi et al., 2025). Instead, the use of the biopsychosocial-enactive model, that emphasises patient centred care, and establishing therapeutic alliance has been suggested to be a preferential focus (Bianchi et al., 2025; Arrigoni et al., 2024). Future studies examining real-life clinical practice would help confirm the prevalence of PIP provision. In addition, the use of KNAP to measure pain neuroscience, a recently validated questionnaire designed in collaboration with persistent pain clinicians, researchers, and educators (Beetsma et al., 2020), may also have its' limitations. Along with KNAP developers we acknowledge that pain neuroscience knowledge is constantly developing and the questionnaire items require regular review (Beetsma et al., 2020). It is possible that recent or sophisticated pain neuroscience findings may not be reflected in some KNAP questionnaire items, which could have influenced responding for physiotherapists who are most up-to-date with pain neuroscience. Finally, the sample size did not reach the target of 251 participants, indicating that it may have been underpowered. However, fewer than 11 predictors were entered in the regression models as originally expected. Given that KNAP and beliefs about consequences continued to be statistically significant within sensitivity analyses, it remains likely that these factors are most important to delivery of PIP.

5. Conclusion

Only one third of NZ physiotherapists intend to deliver PIP, and the factors most strongly associated with this are knowledge of pain neuroscience and beliefs about the consequences of delivering PIP. These findings suggest further educating physiotherapists about pain and methods to translate this knowledge into practice may be beneficial to enhance best practice management of chronic LBP.

CRediT authorship contribution statement

Claire Earl: Writing – review & editing, Writing – original draft, Visualization, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Debbie J. Bean:** Writing – review & editing, Visualization, Validation, Supervision, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Gwyn N. Lewis:** Writing – review & editing, Visualization, Validation, Supervision, Project administration, Methodology, Investigation, Formal analysis.

Ethical approval

This study was approved by the Auckland University of Technology Ethics Committee on June 01, 2023, AUTEC Reference number (23/137).

Data statement

Data will be shared upon reasonable request.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Dr Natalie Tuck contributed to the conception and design of the study; and analysis of pilot study data.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.msksp.2025.103462.

References

Akindele, M., Rabiu, M., Useh, E., 2020. Assessment of the awareness, adherence, and barriers to low back pain clinical practice guidelines by practicing physiotherapists in a low-resourced country. Physiother. Res. Int. 25, e1811. https://doi.org/10.1002/pri.1811.

Alshehri, M.A., Alzahrani, H., Alotaibi, M., Alhowimel, A., Khoja, O., 2020. Physiotherapists' pain attitudes and beliefs towards chronic low back pain and their association with treatment selection: a cross-sectional study. BMJ Open 10, e037159. https://doi.org/10.1136/bmjopen-2020-037159.

Archer, K.R., Coronado, R.A., Wegener, S.T., 2018. The role of psychologically informed physical therapy for musculoskeletal pain. Current Physical Medicine and Rehabilitation Reports 6, 15–25. https://doi.org/10.1007/s40141-018-0169-x.

Arrigoni, A., Rossettini, G., Palese, A., Thacker, M., Esteves, J.E., 2024. Exploring the role of therapeutic alliance and biobehavioural synchrony in musculoskeletal care: insights from a qualitative study. Musculoskeletal Science and Practice 73, 103164. https://doi.org/10.1016/j.msksp.2024.103164.

Atkins, L., Francis, J., Islam, R., O'Connor, D., Patey, A., Ivers, N., et al., 2017. A guide to using the Theoretical Domains Framework of behaviour change to investigate implementation problems. Implement. Sci. 12, 1–18. https://doi.org/10.1186/s13012-017-0605-9.

Bahns, C., Happe, L., Thiel, C., Kopkow, C., 2021. Physical therapy for patients with low back pain in Germany: a survey of current practice. BMC Muscoskelet. Disord. 22, 563. https://doi.org/10.1186/s12891-021-04422-2.

Ballengee, L.A., Zullig, L.L., George, S.Z., 2021. Implementation of psychologically informed physical therapy for low back pain: where do we stand, where do we go? J. Pain Res. 14, 3747. https://doi.org/10.2147/JPR.S311973.

Beetsma, A.J., Reezigt, R.R., Paap, D., Reneman, M.F., 2020. Assessing future health care practitioners' knowledge and attitudes of musculoskeletal pain; development and measurement properties of a new questionnaire. Musculoskeletal Science and Practice 50, 102236. https://doi.org/10.1016/j.msksp.2020.102236.

Beetsma, A.J., Reezigt, R.R., Reneman, M.F., 2021. Knowledge and attitudes toward musculoskeletal pain neuroscience of manual therapy postgraduate students in the Netherlands. Musculoskeletal Science and Practice 52, 102350. https://doi.org/10.1016/j.msksp.2021.102350.

Bianchi, M., Rossettini, G., Cerritelli, F., Esteves, J.E., 2025. Insights into how manual therapists incorporate the biopsychosocial-enactive model in the care of individuals with CLBP: a qualitative study. Chiropr. Man. Ther. 33, 7. https://doi.org/10.1186/s12998-025-00574-3.

Coronado, R.A., Brintz, C.E., McKernan, L.C., Master, H., Motzny, N., Silva, F.M., et al., 2020. Psychologically informed physical therapy for musculoskeletal pain: current approaches, implications, and future directions from recent randomized trials. Pain reports 5, e847. https://doi.org/10.1097/PR9.0000000000000847.

Denneny, D., Frijdal, A., Bianchi-Berthouze, N., Greenwood, J., McLoughlin, R., Petersen, K., et al., 2020. The application of psychologically informed practice: observations of experienced physiotherapists working with people with chronic pain. Physiotherapy 106, 163–173. https://doi.org/10.1016/j.physio.2019.01.014.

Devonshire, J.J., Wewege, M.A., Hansford, H.J., Odemis, H.A., Wand, B.M., Jones, M.D., et al., 2023. Effectiveness of cognitive functional therapy for reducing pain and disability in chronic low back pain: a systematic review and meta-analysis. J. Orthop. Sports Phys. Ther. 53, 244–285. https://doi.org/10.2519/jospt.2023.11447. https://ezproxy.aut.ac.nz/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=163734310&site=eds-live.

Díaz-Fernández, Á., Cortés-Pérez, I., Obrero-Gaitán, E., Ortega-Martínez, A.R., Osuna-Pérez, M.C., Zagalaz-Anula, N., et al., 2024. Chronic pain management approaches among Spanish physiotherapists: influences, practices, barriers, and challenges. J. Personalized Med. 14, 903. https://doi.org/10.3390/jpm14090903.

do Prado, T., Parsons, J., Ripat, J., 2022. Evidence-based practice for non-specific low back pain: canadian physiotherapists' adherence, beliefs, and perspectives. Physiotherapy Canada 74, 44–53. https://doi.org/10.3138/ptc-2020-0038.

Driver, C., Kean, B., Oprescu, F., Lovell, G.P., 2017. Knowledge, behaviors, attitudes and beliefs of physiotherapists towards the use of psychological interventions in physiotherapy practice. A systematic review. Disabil. Rehabil. 39, 2237–2249. https://doi.org/10.1080/09638288.2016.1223176.

Evans, S.C., Roberts, M.C., Keelay, J.W., Blossom, J.B., Amaro, C.M., Garcia, A.M., et al., 2015. Vignette methodologies for studying clinicians' decision-making: validity, utility, and application in ICD-11 field studies. Int. J. Clin. Health Psychol. 15, 160–170. https://doi.org/10.1016/j.ijchp.2014.12.001.

Eysenbach, G., 2004. Improving the quality of web surveys: the Checklist for reporting results of internet E-Surveys (CHERRIES). J. Med. Internet Res. 6, e34. https://doi.org/10.2196/jmir.6.3.e34.

Foster, N.E., Anema, J.R., Cherkin, D., Chou, R., Cohen, S.P., Gross, D.P., et al., 2018. Prevention and treatment of low back pain: evidence, challenges, and promising directions. Lancet 391, 2368–2383. https://doi.org/10.1016/S0140-6736(18)30489-6.

Gardner, T., Refshauge, K., Smith, L., McAuley, J., Hubshcer, M., Goodall, S., 2017. Physiotherapists' beliefs and attitudes influence clinical practice in chronic low back pain: a systematic review of quantitative and qualitative studies. J. Physiother. 63, 132–143. https://doi.org/10.1016/j.jphys.2017.05.017_1836-9553.

Gervais-Hupé, J., Filleul, A., Perreault, K., Hudon, A., 2023. Implementation of a biopsychosocial approach into physiotherapists' practice: a review of systematic reviews to map barriers and facilitators and identify specific behavior change techniques. Disabil. Rehabil. 45, 2263–2272. https://doi.org/10.1080/09638288.2022.2094479.

Gibbs, M.T., Morrison, N.M., Marshall, P.W., 2021. Biomedical beliefs explain the clinical decision made by exercise-based practitioners for people with chronic low back pain. Spine 46, 114–121. https://doi.org/10.1097/BRS.0000000000003698.

Hall, A., Richmond, H., Copsey, B., Hansen, Z., Williamson, E., Jones, G., et al., 2018. Physiotherapist-delivered cognitive-behavioural interventions are effective for low back pain, but can they be replicated in clinical practice? A systematic review. Disabil. Rehabil. 40, 1–9. https://doi.org/10.1080/09638288.2016.1236155.

Hallegraeff, J.M., Van Zweden, L., Oostendorp, R.A., Van Trijffel, E., 2021. Psychological assessments by manual physiotherapists in the Netherlands in patients with nonspecific low back pain. J. Man. Manip. Ther. 29, 310–317. https://doi.org/10.1080/10669817.2021.1919283.

Holopainen, R., Simpson, P., Piirainen, A., Karppinen, J., Schutze, R., Smith, A., et al., 2020. Physiotherapists' perceptions of learning and implementing a biopsychosocial intervention to treat musculoskeletal pain conditions: a systematic review and metasynthesis of qualitative studies. Pain 161, 1150–1168. https://doi.org/10.1097/j.pain.0000000000001809.

Huijg, J.M., Gebhardt, W.A., Dusseldorp, E., Verheijden, M.W., Van Der Zouwe, N., Middelkoop, B.J., et al., 2014. Measuring determinants of implementation behavior: psychometric properties of a questionnaire based on the theoretical domains framework. Implement. Sci. 9, 33. https://doi.org/10.1186/1748-5908-9-33.

Johnson, M.J., May, C.R., 2015. Promoting professional behaviour change in healthcare: what interventions work, and why? A theory-led overview of systematic reviews. BMJ Open 5, e008592. https://doi.org/10.1136/bmjopen-2015-008592.

Keefe, FJ, Main, CJ, George, SZ, 2018. Advancing psychologically informed practice for patients with persistent musculoskeletal pain: Promise, pitfalls, and solutions. Physical Therapy 98, 398–407. https://doi.org/10.1093/ptj/pzy024.

Kinney, M., Seider, J., Beaty, A.F., Coughlin, K., Dyal, M., Clewley, D., 2020. The impact of therapeutic alliance in physical therapy for chronic musculoskeletal pain: a systematic review of the literature. Physiother. Theory Pract. 36, 886–898. https://doi.org/10.1080/09593985.2018.1516015.

Main, C.J., George, S.Z., 2011. Psychologically informed practice for management of low back pain: future directions in practice and research. Phys. Ther. 91, 820–824. https://doi.org/10.2522/ptj.20110060.

Malfliet, A., Ickmans, K., Huysmans, E., Coppieters, I., Willaert, W., Van Bogaert, W., et al., 2019. Best evidence rehabilitation for chronic pain part 3: low back pain. J. Clin. Med. 8, 1063. https://doi.org/10.3390/jcm8071063.

Matthews, J., Hall, A.M., Hernon, M., Murray, A., Jackson, B., Taylor, I., et al., 2015. A brief report on the development of a theoretically-grounded intervention to promote patient autonomy and self-management of physiotherapy patients: face validity and feasibility of implementation. BMC Health Serv. Res. 15, 1–9. https://doi.org/10.1186/s12913-015-0921-1.

Mescouto, K., Olson, R.E., Hodges, P.W., Costa, N., Patton, M.A., Evans, K., et al., 2022. Physiotherapists both reproduce and resist biomedical dominance when working with people with low back pain: a qualitative study towards new praxis. Qual. Health Res. 32, 902–915. https://doi.org/10.1177/10497323221084358.

Mikamo, Y., Takasaki, H., 2021. Pain neurophysiology knowledge enhances attitudes toward biopsychosocial management of low back pain among Japanese physical therapists. Progress in Rehabilitation Medicine 6, 20210039. https://doi.org/10.2490/prm.20210039.

Moniz, A., Duarte, S.T., Aguiar, P., Caeiro, C., Pires, D., Fernandes, R., et al., 2024. Physiotherapists' barriers and facilitators to the implementation of a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice in patients at risk of recurrence of low back pain: a qualitative study. BMC Primary Care 25, 39. https://doi.org/10.1186/s12875-024-02274-y.

Otero-Ketterer, E., Peñacoba-Puente, C., Ferreira Pinheiro-Araujo, C., Valera-Calero, J.A., Ortega-Santiago, R., 2022. Biopsychosocial factors for chronicity in individuals with non-specific low back pain: an umbrella review. Int. J. Environ. Res. Publ. Health 19, 10145.

Physiotherapy Board of New Zealand Annual Report 2023/24 2024. https://www.physioboard.org.nz/wp-content/uploads/2024/07/Physiotherapy-Board-Annual-Report-2024_web.pdf.

Physiotherapy New Zealand Remuneration Survey 2023 Zealand RN 2023 https://pnz.org.nz/about-pnz.

Qaseem, A., Wilt, T.J., McLean, R.M., Forciea, M.A., Physicians* CGCotACo, 2017. Noninvasive treatments for acute, subacute, and chronic low back pain: a clinical practice guideline from the American College of Physicians. Ann. Intern. Med. 166, 514–530. https://doi.org/10.7326/M16-2367.

Rainville, J., Carlson, N., Polatin, P., Gatchel, R.J., Indahl, A., 2000. Exploration of physicians' recommendations for activities in chronic low back pain. Spine 25, 2210–2220. https://www.thespinejournalonline.com/.

Reid, D., Larmer, P., 2007. The New Zealand health priorities: where do New Zealand private practice physiotherapists fit? NZ Journal of Physiotherapy 35, 42. https://nzjp.org.nz/nzjp.

Richmond, H., Hall, A.M., Hansen, Z., Williamson, E., Davies, D., Lamb, S.E., 2018. Exploring physiotherapists' experiences of implementing a cognitive behavioural approach for managing low back pain and identifying barriers to long-term implementation. Physiotherapy 104, 107–115. https://doi.org/10.1016/j.physio.2017.03.007.

Ris, I., Boyle, E., Myburgh, C., Hartvigsen, J., Thomassen, L., Kongsted, A., 2021. Factors influencing implementation of the GLA:D Back, an educational/exercise intervention for low back pain: a mixed-methods study. JBI Evidence Implementation 19, 394–408. https://doi.org/10.1097/XEB.0000000000000284.

Schröder, K., Öberg, B., Enthoven, P., Kongsted, A., Abbott, A., 2020. Confidence, attitudes, beliefs and determinants of implementation behaviours among physiotherapists towards clinical management of low back pain before and after implementation of the BetterBack model of care. BMC Health Serv. Res. 20, 1–14. https://doi.org/10.1186/s12913-020-05197-3.

Simmonds, M.J., Derghazarian, T., Vlaeyen, J.W., 2012. Physiotherapists' knowledge, attitudes, and intolerance of uncertainty influence decision making in low back pain. Clin. J. Pain 28, 467–474. https://doi.org/10.1097/AJP.0b013e31825bfe65.

Stevenson, K., Lewis, M., Hay, E., 2006. Does physiotherapy management of low back pain change as a result of an evidence-based educational programme? J. Eval. Clin. Pract. 12, 365–375. https://doi.org/10.1111/j.1365-2753.2006.00565.x.

Takasaki, H., Ueno, T., 2024. Japanese clinical physical therapists with the mechanical diagnosis and therapy license are more competent and confident in pain management than those without it: a cross-sectional study. Cureus 16, e70652. https://doi.org/10.7759/cureus.70652.

Van Liew, C., Leon, G.A., Grimm, K.J., Cronan, T.A., 2020. Vignette responses and future intentions in a health decision-making context: how well do they correlate? Families. Systems, & Health 38, 26. https://doi.org/10.1037/fsh0000464.

Von Elm, E., Altman, D.G., Egger, M., Pocock, S.J., Gøtzsche, P.C., Vandenbroucke, J.P., 2007. The strengthening the reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. Lancet 370, 1453–1457. https://doi.org/10.1016/S0140-6736(07)61602-X.

Wiles, L.K., Hibbert, P.D., Stephens, J.H., Molloy, C., Maher, C.G., Buchbinder, R., et al., 2022. What constitutes "appropriate care" for low back pain: Point-of-care clinical indicators from guideline evidence and experts (the STANDING Collaboration Project). Spine 47, 879–891. https://doi.org/10.1097/BRS.0000000000004274.