

Current use of PROMs and factors associated with their use in patients with nonspecific low back pain

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Abstract

Objective: Patient-related outcome measures (PROMs) can guide clinicians in providing evidence-based treatment and have the potential to empower patients, support clinical decision making, and improve quality of care. In order to make the information coming from PROMs useful, it is important to know to what extent the use of PROMs is biased in any way. Therefore, we assessed (a) the current level of use of PROMs among primary care physiotherapists and (b) which factors on the patient level, therapist level, and primary care practice level are associated with the use of PROMs in patients with nonspecific low back pain (LBP).

Design: An observational study based on electronic health record data recorded routinely in Nivel Primary Care Database.

Participants: A total of 2916 patients aged 18 years or older with nonspecific LBP consulting a primary care physiotherapist.

Methods: Multilevel logistic regression analyses were used to identify factors at the level of the patient, physiotherapist, and primary care practice, which may affect the use of PROMs.

Results: PROMs were used in 46% of the patients, by 72% of the physiotherapists, and in 71% of the physiotherapy practices. None of the included independent variables were associated with the use of PROMs. Only 1% of the variance was explained by the final model.

Conclusion: This study shows that the use of PROMs is mostly dependent on characteristics of patients. However, we did not succeed in identifying characteristics of patients that are responsible for that. This could mean that therapists randomly choose patients for PROMs or that there is some other unmeasured patient characteristic determining the use of PROMs. The former explanation implies no systematic bias in the information resulting from PROMs. More research is needed to examine possible related factors to improve implementation and a more frequent use of PROMs in the future.

KEYWORDS

patient-reported outcome measures, PROMs, physiotherapy, quality of care, low back pain, outcome measures

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1 | INTRODUCTION

Low back pain (LBP) is a leading cause of disability¹ and one of the most prevalent complaints treated by primary care physiotherapists.^{2,3}

Since LBP has a major impact on both the individual and the society, the need for high quality of care is urgent. "Quality of care" has been defined as "doing the right thing at the right time, in the right way, for the right person, and having the best possible results."⁴ To enhance the quality of care, the US "Institute of Medicine" (IOM) developed a model that distinguishes six areas of health care, namely, safety, timeliness, efficiency, effectiveness, equity, and patient-centeredness (Figure 1).⁵ These areas of health care fulfil the needs of different stakeholders.⁶ From the patient's perspective, effectiveness and patient-centeredness are regarded as the most important areas. From the health care professional's perspective, safety and effectiveness are the most important areas. From the health care organization's perspective, cost-effective—and timely—care are the most relevant aspects.⁷

Patient-reported outcome measures (PROMs) potentially represent an important method to assess the quality of care from those different perspectives. PROMs represent an important method to assess the quality of care from the patient perspective.^{8,9} The use of PROMs is highly recommended in clinical guidelines,¹⁰⁻¹² including the Dutch clinical practice guideline for LBP.¹³

The Dutch clinical practice guideline for physiotherapy in patients with nonspecific LBP¹³ recommends three PROMs specifically for diagnostic inquiry: (a) the Numeric Rating Scale (NRS) for evaluation of pain intensity,¹⁴ (b) the Patient-Specific Functional Scale (PSK)^{15,16} for evaluation of limitations in activities and participation problems, and (c) the Quebec Back Pain Disability Scale (QBPDS) for evaluation of limitations in activities.¹⁷

Despite the usefulness of PROMs to enhance quality of care,⁸ only 48% to 52%¹² of the physiotherapists appear to routinely use PROMs in their practice. Several studies focused on determining factors associated with the use of PROMs.¹⁸⁻²⁰ These studies mainly involved factors related to health care professionals.¹⁸⁻²² Main facilitating factors regarding the use of PROMs mentioned by physiotherapists were a positive attitude, familiarity, and being convinced of the advantages towards the use of PROMs.^{11,18} The most important barriers to use PROMs that have been reported are changing routines¹¹/changing behavior,¹⁸ time investment,^{11,12} level of knowledge,¹⁹ and practice organization^{12,18,23} (eg, no room or financial compensation).

Since the use of PROMs has the potential to improve and measure quality of care,²⁴ research on associated factors, based on the different perspectives,²⁵ is urgent to enhance and improve quality of care. In order to be able to use PROMs in a useful way, it is important to know to what extent PROMs information is biased in any way. Previous studies have confirmed that the use of PROMs is associated with

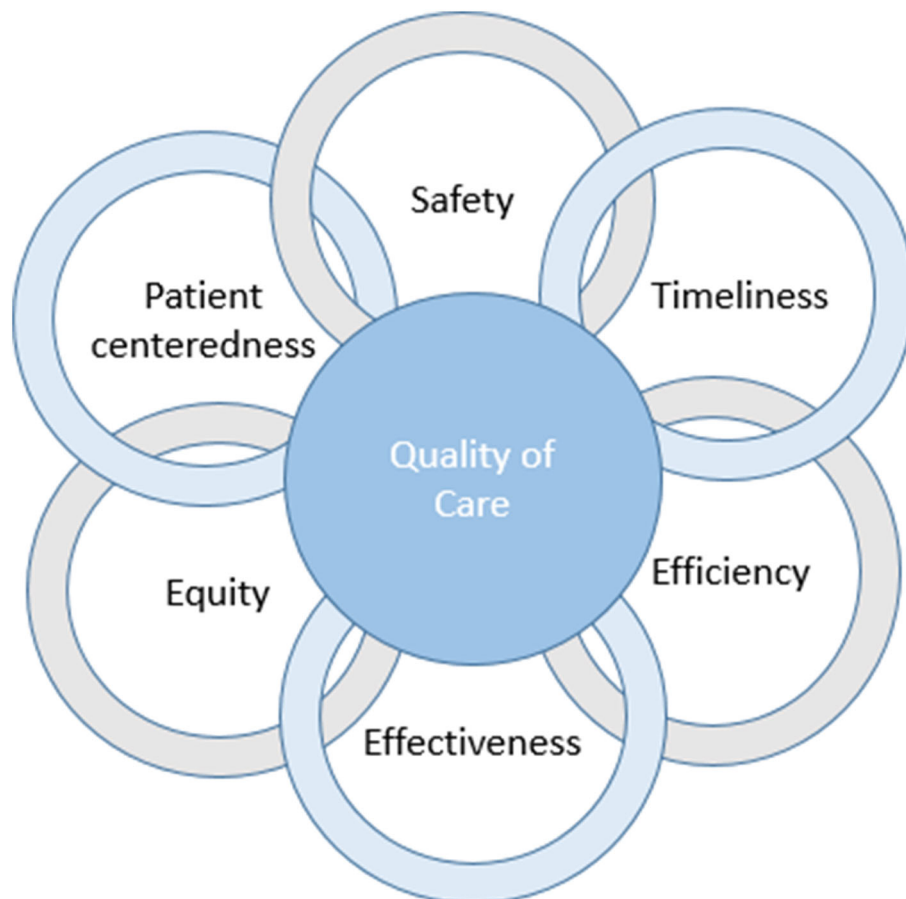


FIGURE 1 Model of the Institute of Medicine, explaining the different aspects of quality of care

factors at the level of professionals, patients, and primary care practices and their management,^{18,19,26} causing systematic bias in the information collected via PROMs. However, despite the large number of studies on the effects of physiotherapist characteristics on the use of PROMs, little is known about the effect of patient and primary care practice characteristics. The current study tries to fill this gap.

The aim of the current study is to assess the current level of use of PROMs and to assess which factors on patient level, therapist level, and primary care practice level are associated with the use of PROMs in patients with nonspecific LBP visiting a primary care physiotherapist.

At the level of the patient, we hypothesize age, recurring LBP, the duration of the complaint prior to treatment, and the number of treatment sessions to be positively related to the use of PROMs. Previous research reported a negative relationship between age of patients seen by therapists and the use of standardized outcome measures.¹² Several studies reported therapist's concerns about their patient's ability to complete outcome measures forms independently,^{11,12} filling in measurement outcomes could be confusing and difficult for patients,¹² which we hypothesize to be related to the patient's age. Recurring LBP may be an indication for physiotherapists to look more in-depth at the cause of the recurring complaint (for example, by using the QBPDS). Persistent LBP may possibly lead to chronic LBP and is, following the Dutch clinical guideline for LBP,¹³ a deviant course of the complaint. Therefore, we hypothesize therapists may be more inclined to use PROMs when the complaint is persistent or recurrent. We also hypothesize that the patients' type of health insurance and reimbursement plays a role as many health care insurance companies have set the use of PROMs as a condition for reimbursement. Physiotherapists may be more inclined to use PROMs in patients who are insured by health care insurances that have set the use of PROMs as a condition for reimbursement.

At the level of the professional, we hypothesize a physiotherapist's age and focus area (general physiotherapy or specialization) to be related to the use of PROMs. Younger physiotherapists may be more inclined to use PROMs because of the attention PROMs are given on the more recent curricula. Previous studies showed therapists who have a clinical specialty, as opposed to those who are not, are twice as likely to use outcome measures in practice.¹²

To our knowledge, the effect of organizational level characteristics on the use of PROMs has not been investigated before. We hypothesize that there is such an effect, because larger practices may have different policies regarding the use of PROMs in comparison with smaller practices.

2 | METHODS

2.1 | Study design

The current study is an observational cross-sectional study based on data in Nivel Primary Care Database (Nivel-PCD).²⁶ This database contains routinely recorded electronic health record data from general practitioners and allied health services primary care providers,

Box 1: Information about the Nivel Primary Care Database

Nivel Primary Care Database

NIVEL Primary Care Database (Nivel-PCD) uses routinely recorded data from health care providers, recorded in their electronic health record system, to monitor health and utilization of health services in a representative sample of the Dutch population. The aim of Nivel-PCD is to monitor developments in health and the use of primary care services in the Netherlands. Participants of Nivel-PCD are general practitioners (GP), physiotherapists, exercise therapists, dieticians, primary care psychologists, GP out-of-hours services, and primary health care centers. In 2016, 204 primary care physiotherapists and 50 physiotherapy primary care practices were registered in the Nivel-PCD; they registered data from 23.471 patients.

Privacy

NIVEL handles the data in accordance with the Dutch Data Protection Act. Researchers have no access to identifiable patient information, such as name, address, or citizen service number. Research results cannot be traced back to individual persons, health care providers, or health care organizations. Participating health care providers may withdraw from Nivel-PCD at any time and without stating reasons.

Representativeness

The representativeness of both participating physiotherapists and physiotherapy primary care practices in Nivel-PCD are determined by comparing their characteristics with data captured in the "Data Management Register for Healthcare" in 2016.

Governance

Steering committees with representatives from national associations of health care providers decide about the use of the data.

including physiotherapists. Box 1 provides background information regarding the Nivel-PCD. For this study, physiotherapy data were used, which were recorded between January 2014 and July 2016.

2.2 | Ethical considerations

The study has been conducted according to the principles of the Declaration of Helsinki (version 64, October 2013), in accordance with the Medical Research Involving Human Subjects Act (Wmo) and the Dutch Data Protection Act. Nivel-PCD data have been obtained with approval of the appropriate governance bodies under number NZR-00316.065.

2.3 | Study population

All patients of at least 18 years of age and diagnosed with nonspecific LBP, who consulted a primary care physiotherapist between January 2014 July 2016, were selected from the Nivel-PCD (n = 2916). In our study, nonspecific LBP included patients with degenerative diseases and muscle, tendon, or fascia diseases to the thoracic-lumbar vertebral column, lumbar vertebral column, or lumbar-sacral vertebral column.

The 2916 patients included in the study received care of 182 primary care physiotherapists, working in 42 primary care physiotherapy practices.

2.4 | Data collection

Data were derived from electronic health records of the primary care physiotherapy practices participating in Nivel-PCD. These data consist of patient demographics and treatment characteristics that are recorded routinely in their electronic medical record systems. In addition, we used data from Nivel-PCD's annual survey. Since a considerable part of physiotherapists' characteristics was missing in

Nivel-PCD survey data, the national "Data Management Register for the Healthcare Industry" (in Dutch: Algemeen GegevensBeheer register) was used to complete therapist characteristics. Table 1 summarizes the collected data in this study at the level of patient, physiotherapist, and primary care practice.

2.5 | Outcome variable

Primary outcome (dependent variable) in the current study was the use of PROMs (1 = yes, 0 = no) during a treatment episode of a patient suffering from LBP. The "use of PROMs" was operationalized by the use of one or more of the recommended PROMs in clinical guidelines in patients with LBP (NRS, PSK, and QBPDS).

2.6 | Independent variables

At the patient level, the independent variables were the patients' age and gender, whether the complaint was recurrent or not, duration of the complaint prior to treatment, number of treatment sessions in the episode, treatment result, and health insurance company. The independent variables at the therapist level are the therapists' age,

TABLE 1 Predictor variables per level, including their operationalization and measurement level

	Operationalization	Measurement Level
Patient level		
Age	A patient's age in years	Continuous
Gender	The patient's gender: male/female	Categorical
Recurrence	A complaint was considered recurrent when the patient was treated for the same complaint after a complaint-free episode of at least 4 wk and at most 2 y.	Categorical
Duration of the complaint	The duration of the complaint before treatment. Subdivided in four categories: <7 d, 1 wk-1 mo, 1-3 mo, and >3 mo	Categorical
Number of treatment sessions	The total number of physiotherapy sessions in one treatment episode	Continuous
Treatment result	The result of the treatment episode, which was filled in when closing a treatment episode. The result can be (a) goal achieved, (b) goal partially achieved, and (c) goal not achieved. This information is entered by the attending physiotherapist.	Categorical
Health insurance	Top 4 health insurance companies in the current sample of patient (top 1 company to top 4 company)	Categorical
Therapist level		
Age	A therapist's age in years	Continuous
Gender	The therapist's gender: male/female	Categorical
Focus area	The focus area of the therapist which can be general physiotherapy or one of the 10 recognized physiotherapy specialties, registered in the CKR. Recognized physiotherapy specialties are manual therapy, occupational health and ergonomics, geriatric physiotherapy, oncology, pediatrics, orofacial therapy, pelvic therapy, sport physiotherapy, psychosomatic therapy, and edema therapy.	Categorical
Primary care practice level		
Size of the primary care practice	The number of locations of one primary care practice	Continuous
Region	The region in which a practice is situated (north, east, south, west)	Categorical

Abbreviation: CKR, Dutch National Quality register for physiotherapists (Centraal Kwaliteits Register in Dutch)

gender, and specialization. At the primary care practice level, the independent variables are the size of the primary care practice and the region the primary care practice is located. The independent variables are listed in Table 1.

2.7 | Statistical analysis

2.7.1 | Descriptive statistics

All patient, therapist, and primary care practice characteristics were described for the total group of patients and separately for the patients who were evaluated with PROMs and the patients who were not evaluated with PROMs. Between-group differences were tested by unpaired Student *t* tests; in case of non-normally distributed data, the Wilcoxon rank sum test was used. Significance levels were set at $P < .05$. Nominal variables were tested for normality and equal variances by using QQ-plots, the Shapiro-Wilk test, and Levene tests. Categorical variables were tested for equal variances by using the Pearson chi-square test.

2.7.2 | Identifying factors associated with the use of PROMs

To determine factors that are associated with the use of PROMs in patients with LBP, data were analyzed by multilevel logistic regression analyses. Multilevel logistic regression analyses were applied due to the nested structure of the data: Patients (level 1) are nested in therapists (level 2), which are subsequently nested in physiotherapy practices (level 3).

Prior to the multilevel logistic regression analyses, a sample size calculation was conducted. To obtain a power of 0.80 in a multilevel analysis with 10 predictor variables, the necessary sample size is 1196.²⁷ The variance inflation factors (VIF) were calculated to check for multicollinearity between predictor variables. The VIF was set at a maximum of 10.²⁸

Missing data were assumed to be missing at random. Variables exceeding a missing amount of 50% were excluded from the analyses. Missing values per predictor variable are presented in Table 2.

Multilevel logistic regression analyses, using stepwise backward elimination, were used to identify the associated factors in a final model. Goodness of fit was tested by using a chi-square likelihood ratio test (LR χ^2 test), to test for maximum likelihood ($P < .05$). Cutoff value was a mean likelihood ratio (χ^2) of less than .05.

For the empty model and the final model, the proportion of explained variance in the outcome was assessed by calculating the variance partition coefficients (VPCs) per level. The level 1 variance error term is $\pi^2/3 = 3.29$.²⁹ The level 2 and level 3 variance error terms were calculated by using the formula: $p = \frac{\tau_{00}}{\tau_{00} + \pi^2/3}$.²⁹

Data analyses were performed using Stata, version 14.2 (StataCorp LP, College Station, Texas).

3 | RESULTS

3.1 | Study population

Table 2 shows the characteristics of the included patients ($n = 2916$), therapists ($n = 182$), and practices ($n = 42$). Almost half of the patients (46%; $n = 1328$) were evaluated by one of the recommended PROMs. The PSK and NRS were most frequently used (each 42%); the QBPDS was used in 15% of the patients. Gender and age were not significantly different in the PROMs-use group and nonuse group. The mean age was 51 years ($SD \pm 17$). The duration of the complaint prior to treatment was statistically significant longer in the PROMs-use group ($P < .05$). The duration of the treatment episode in days (mean, 52; $SD \pm 66$) and the mean number of treatment sessions per treatment episode (mean, 7; $SD \pm 6$) did not differ significantly.

A total number of 182 therapists (52% female; mean age, 41; $SD \pm 13$) were included in the sample. The majority of the primary care physiotherapists used PROMs (72%; $n = 131$). Most therapists registered a specialization (82%; $n = 149$). There were no significant differences in gender, age, or specialization between therapists who use PROMs and those who did not use PROMs.

Most of the practices were located in the western part of the Netherlands (45%; $n = 19$). The mean number of therapists is 4 ($SD \pm 3$), and the mean number of locations per practice is 2 ($SD \pm 0.9$). In the majority of the practices, PROMs were used (71%; $n = 30$). There were no significant differences on primary care practice size, region, and number of locations between practices that used PROMs and those that do not use PROMs.

No multicollinearity was detected, with mean VIF of 1.57 and all VIFs were under 10. All missing values were under 50%, except for treatment result (68%; $n = 1974$), which was excluded from analyses.

3.2 | Factors associated with use of PROMs

The backward regression resulted in a final model that included four variables: duration of the complaint prior to treatment, recurrence, region, and number of locations. As shown in Table 3, none of these variables was significantly associated with the use of PROMs in patients with LBP. Compared with the intercept-only model, the final model explained 1% of the variance with a total variance partition coefficients (VPC) of 4.07. Nineteen percent (19%) was explained at therapist level, where the least variance was located (VPC, 0.16). At practice level, 1.6% of the total variation was explained (VPC, 0.62). The variance at patient level did not change, because of the already fixed variance level 1 error term (VPC, 3.29).²⁹

4 | DISCUSSION

The objective of this study was to assess the current use of PROMs and to identify factors associated with the use of PROMs in patients with nonspecific LBP. The majority of therapists used PROMs (72%), and almost half of the patients (46%) were evaluated by one of the

TABLE 2 Descriptive statistics for patients with low back pain, their therapists, and the participating primary care practices

Patient characteristics	Total study population (N = 2916)	Use of PROMs		P value	Missing values
		Yes (n = 1328)	No (n = 1588)		
Age, mean (SD)	51 (17)	51 (17)	51 (18)	.57	-
Gender, n (%)					-
Female	1568 (54%)	716 (54%)	852 (54%)	.89	
Recurrence of complaint, n (%)					1337
Yes	756 (26%)	359 (46%)	397 (50%)	.06	
Duration of the complaint prior treatment, n (%)				.04*	1028
< 7 d	423 (22%)	217 (22%)	206 (23%)		
1 wk-1 mo	709 (38%)	348 (35%)	361 (40%)		
1-3 mo	326 (17%)	180 (18%)	146 (16%)		
> 3 mo	430 (23%)	246 (25%)	184 (21%)		
Duration treatment episode, mean (SD)	52 (66)	53 (67)	51 (66)	.06	11
Number of treatment sessions, mean (SD)	6.8 (6.4)	6.7 (5.5)	7 (6.4)	.9	11
Treatment result/goal achieved, n (%)				.008*	1974
Goal not achieved	30 (3%)	26 (5%)	4 (1%)		
Goal partially achieved	46 (5%)	32 (6%)	14 (4%)		
Goal totally achieved	866 (92%)	523 (90%)	343 (95%)		
Health insurance, n (%)				.06	28
Concern 1	745 (30%)	346 (31%)	399 (29%)		
Concern 2	670 (27%)	294 (26%)	376 (27%)		
Concern 3	602 (24%)	247 (22%)	355 (26%)		
Concern 4	489 (20%)	242 (21%)	246 (18%)		
Measurement instrument top 3 ^a					
NRS		871 (42%)			
PSK		879 (42%)			
QBPDS		323 (16%)			
Therapist characteristics	Number of therapists (n = 182)	Use of PROMs		P value	Missing values
		Yes (n = 131)	No (n = 51)		
Gender, n (%)				.20	11
Female	94 (52%)	65 (52%)	29 (63%)		
Focus area, n (%)				.97	18
General physiotherapy	15 (9%)	11 (9%)	4 (9%)		
Specialization	149 (91%)	110 (91%)	39 (91%)		
Primary care practice characteristics	Number of organizations (n = 42)	Use of PROMs		P value	Missing values
		Yes (n = 30)	No (n = 12)		
Primary care practice size, mean (SD)	4 (3)	4 (3)	4 (3)	.70	-
Region, n (%)				.65	-
North	6 (14%)	5 (17%)	1 (8%)		
South	8 (19%)	6 (20%)	2 (17%)		
West	19 (45%)	14 (47%)	5 (42%)		
East	9 (21%)	5 (17%)	4 (33%)		
Number of locations, mean (SD)	2 (0.9)	2 (0.86)	2 (1.2)	.66	-

Abbreviations: %, percentage; n, number of subjects; NRS = Numeric Rating Scale; PSK = Patient-Specific Complaints; QBPDS, Quebec Back Pain Disability Scale; SD, standard deviation.

^aThis is the frequency the measurement instrument is used in the clinimetrically evaluated group.

*P ≤ .05.

TABLE 3 The final model of the multilevel logistic regression analyses for factors associated with the use of PROMs in patients with low back pain

Final model					
Variables	OR	SE	z	P > z	(95% CI)
Duration of complaint prior to treatment	1.07	0.09	0.80	.42	(0.90-1.28)
Recurrence	0.80	0.16	-1.11	.27	(0.54-1.18)
Region	0.48	0.28	-1.28	.20	(0.15-1.48)
Number of locations	1.70	1.33	0.68	.50	(0.37-7.90)
Explained variance	Percentage, %				
Total explained variance	1				
Variance located					
Patient level	81				
Therapist level	15				
Practice level	4				

Note. Likelihood (LL) of the final model -515.26.

Abbreviations: CI, confidence interval; OR, odds ratio; P, P value; SE, standard error; z, z-score.

recommended PROMs. However, no associated factors with PROM use could be identified from the data that were routinely recorded in patient records.

Several studies previously investigated barriers and facilitators regarding the use of outcome measures on therapist level.^{11,12,20} One of the most obvious differences with previous studies concerns results with respect to specialization. Copeland et al²⁰ reported a strong association between the use of outcome measures and a master's degree qualification, and Jette et al¹² found that therapists with a specialty are twice as likely to use outcome measures in practice as opposed to those who have no specialty. Our results show no significant differences between specialized and nonspecialized therapists and the use of PROMs. This could be explained by the overrepresentation of specialized therapists in our study population.

In our study, the combination of four variables in the final model explains only 1% of the total variance in the use of PROMs. This suggests that there is no systematic bias in the selection of patients who (are asked to) engage in PROMs. The use of PROMs appears not to be associated with any of the factors investigated, at patient level, nor at therapist level, nor at practice level. This is a relevant finding, as it would be undesirable when the use of such important instruments like PROMs would be dependent on any characteristic at the level of the patient, therapist, or practice.

On the other hand, this also means that no factors could be identified that could help us to enhance the use of PROMs in patients with LBP.

4.1 | Strengths and limitations

Previous research on factors associated with the use of PROMs have been restricted to factors related to the physiotherapist. A strength of

the current study was the multilevel design, which enabled compatibility with all dimensions of the IOM model.⁶ Within this model, there appeared to be no factors associated with the use of PROMs. This does not mean that such factors are nonexistent. For future research, it would be interesting to include, for example, a therapist's attitude towards PROMs, a therapist's education level, patients' health literacy, and the content of contractual agreements between physiotherapy practices and health insurance companies.

In this study, we focused on the most frequently used PROMs in patients with LBP. In our study, patients were regarded as not engaged in PROMs that may have been engaged in other PROMs than the PSK, NRS, and QBPDS. This may have influenced the results of the study.

Another limitation may have been that information about the physiotherapists was outdated. This information was derived from the national registry of health care workers (AGB register). Specializations recorded in this registry are entered by physiotherapists themselves, but there is no obligation to update this information regularly, and there may be therefore be issues with the quality of the data.

4.2 | Implications for future research

As said, we did not find any factors to be associated with the use of PROMs. This, however, does not mean that such factors do not exist. Missing factors at the level of practices and therapists have already been mentioned. Some domains in the IOM model were underrepresented, especially "effectiveness." In future research, a patient's treatment result is recommended to be included. The successfulness of the treatment could not be included in our analyses because of the number of missing values. It might be that physiotherapists choose to use PROMs in those patients whose treatment had been more successful. Patients with lower levels of health literacy are probably not as likely to be invited to contribute to PROMs than patients

with higher levels of health literacy. These factors were not included in this study.

5 | CONCLUSION

This study shows that almost half of the patients with LBP (46%) are currently evaluated by one of the recommended PROMs in clinical guidelines in primary physiotherapy care. The use of PROMs appears not to be associated with the patient's or therapists' age or gender, whether the complaint is recurrent or not, the duration of the complaint prior to treatment, number of treatment sessions in the episode, treatment result, health insurance company, the therapists' specialization, or the region or size of the primary care practice. This suggests that information collected via PROMs is relatively unbiased. It also suggests that more sophisticated models are needed if our aim would be to incentivize and enhance the use of PROMs. Such models should include levels of health literacy, therapist's attitudes, and the content of the health insurers' contracts with therapists.

ACKNOWLEDGMENTS

The authors thank Tjard Schermer for his contribution to the final version of this article. Peter Spreeuwenberg for his statistical advice and guidance and acknowledge the support of JanJaap van der Net, lecturer at Utrecht University, Program Master Clinical Health Sciences.

CONFLICT OF INTEREST

The authors report no competing conflicts. Nivel-PCD is funded by the Dutch Ministry of Health, Welfare and Sport.

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How to cite this article: Brinkman M, Barten D-J, Pisters M, Verheij R. Current use of PROMs and factors associated with their use in patients with nonspecific low back pain. *Learn Health Sys*. 2019;3:e10194. <https://doi.org/10.1002/lrh2.10194>