MANUAL THERAPY AND NECK PAIN

‘neckspectations & pain platitudes’

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“We’ve all got our own little clovers

with worlds on them!”

(Dr. Suess, Horton hears a who)

Content

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In clinical practice and in clinical research there is a growing interest in the relationship between cognitive factors and outcome of treatment. Limited predictability of treatment outcome within the known strategies to classify patients according to these cognitive factors prompts us to seek further classification possibilities and reconsider underlying explanatory models. A specific scientific area of interest with regard to cognitive factors is that of attitudes, beliefs and expectation. In the field of psychology, it is long known and accepted that the way we think, influences the way we act and therefore might affect treatment outcomes. Several studies have shown that this may be applicable within the field of musculoskeletal medicine as well. Both health care professionals and patients have a unique set of cognitions and beliefs that predetermine their attitude towards pathologies and treatments. This attitude in itself influences the decision-making processes for both. A wonderful but complicating factor is the mutual influence these two parties have on each other when interacting within a treatment episode. Little is known about the precise underlying mechanisms and relationships between health models, beliefs, attitudes and behaviour. What are care providers’ beliefs and attitudes towards pain? How do these attitudes and beliefs translate to clinical practice? What are their patients’ beliefs and attitudes towards pain? How do these translate to expected and actual treatment outcome?

Chapter 1

General Introduction

General introduction

Introduction

Neck pain and practice variation

Neck pain is a common musculoskeletal condition with an estimated point prevalence in the general population of the Netherlands of 9-22% [1]. This statistic is in line with global prevalence of neck pain and has been fairly stable over the years [2]. Approximately one third of all adults is likely to experience neck pain during the course of one year. The course of neck pain is characterized by exacerbations and remissions, and 5-10% of patients will develop chronic pain (with a duration of 3 months or longer) [1,3]. Because generally no specific underlying pathology can be found, neck pain is usually labelled as 'non-specific' [4]. The literature on neck pain and manual therapy is substantial but results on effectiveness are conflicting, with the exception of thoracic manipulations that have been found to be effective [5]. For instance, a systematic review and meta-analysis in 2017 on adults with neck pain found that manual therapy was not more effective than exercise therapy [6]. Other studies seem to find better results for manual therapy when combined with exercise in patients with non-specific neck pain [7,8,9]. It is unclear if manual therapy outperforms physical therapy for neck pain patients [10,11]. In terms of cost-effectiveness, manual therapy may do better than other therapy modalities for patients with non-specific neck pain, but definite conclusions cannot yet be drawn [12,13].

Literature suggests that in clinical practice there is variation in the care provided for patients with neck pain. Practice variation may lead to an increase in health care

utilization and correlation with improved health outcomes is not evident [14]. Healthcare providers' attitudes and beliefs are possible factors contributing to practice variation. These attitudes and beliefs may influence the health care providers' perception of patient characteristics [15]. When left with multiple options, the treatment approach of choice may reflect the clinicians' attitudes and beliefs on pathology and health [16,17].

Modelling health

Throughout history 'health' has been modelled in several ways. For decades, the dominant health model in the Western world has been the biomedical model. The biomedical model is a linear model in which all signs and symptoms are attributed to physical pathology and health is defined as 'the absence of disease'. This model assumes causal relationship between the disease and its accompanying signs and symptoms, directs the diagnostic efforts at finding the damaged tissue and treatment is typically pain-contingent [18]. The real strength of the biomedical model was established with Louis Pasteur's germ theory of disease and held up throughout most of the twentieth century [19]. It was one of the major steps towards being able to prevent and cure many deadly infectious diseases. This model of disease has been the prevailing one for decades in our Western world. Because of its dominancy, it may appear that the biopsychosocial model of health is a new concept, at odds with the more widespread "magic bullet" approach to treatment. But medicine has been considering the interaction between disease processes and the patient's life circumstances for a long time, insights that date back as far as Hippocrates, who stated that "It is far more important to know what person the disease has, than what disease the person has" [20].

There were two important factors that helped the biopsychosocial model to emerge. First of all, the further development of the germ theory, that brought the

insight that not the germ is important, but the soil it needs to grow in [19]. Another important contribution to the development of a broader understanding of medicine took place in the early decades of the twentieth century, when the role of the unconscious and personality factors was demonstrated in the aetiology of many disorders. This was the birth of psychosomatic medicine [20]. Major contributions to this model were made by George Engel, firmly embedding the critical psychological and social factors to the traditional, linearly conceived biomedical model. Engel wrote that "the biopsychosocial model is a scientific model constructed to take into account the missing dimensions of the biomedical model. To the extent that it succeeds it also serves to define the educational tasks of medicine" [21]. The biopsychosocial model is engaged when the health care providers' belief is that psychological and social factors are of importance in the development and continuation of complaints. Since pain does not necessarily have a causal relationship with tissue damage, it can prevail long after the initial pathology (tissue damage) has healed. So, diagnosis is primarily aimed at identifying relevant psychological and social factors and treatment will be paced according to an aforethought schedule (time-contingent) [22]. Although the biomedical and biopsychosocial model are closely related, the exclusive use of either model can still be found in clinical practice and is receiving increasing scientific attention.

Historically, manual therapists were primarily biomedically educated, with focus on fundamental knowledge of anatomy and pathology and technical skills that were aimed to improve or restore joint function. Over time the curricula have been expanded with the insights from the biopsychosocial approach. It is unclear to what extent this 'added layer' has fundamentally shifted the therapeutic approach of manual therapists. Where and when is either one model used mostly? And how does that relate to the health models (biomedical or biopsychosocial) used by the neck pain patient group and the treatment outcome of manual therapy?

Complexity of human interaction

In an attempt to unravel the complexity of human interaction in a health care setting, there is a growing scientific interest in the relationship between cognitive factors and outcome of treatment. A specific area of interest with regard to cognitive factors is that of attitudes, beliefs and expectation.

Attitudes are conceptualized as the degree of feeling or affect held towards an object [23]. A belief is defined as a conceptualization of an object [24]. Beliefs can be distinguished from attitudes to the extent that a belief is the information known about the object and an attitude is synthesized from multiple beliefs [23]. By definition, attitudes are underlying variables of human behaviour. Evidence suggests that care providers' attitudes and beliefs influence their perception of patient characteristics and the way they manage their cases. The relation between knowledge and attitude towards pain has been established in earlier studies [25]. Since a professional's knowledge on pathology and classification is likely to be unevenly distributed across body parts, we postulate that the same may be the case for attitudes towards pain. It is hypothesized that there may be a correlation between the professionals' attitude towards pain and the targeted body part. Patients on the other hand may hold certain beliefs and attitudes towards their complaints and treatments that may influence their behaviour in terms of compliance. For both parties underlying beliefs and attitudes may morph expectations of treatment content and outcome. But how do we measure these expectations? And how do they relate to clinical behaviour and treatment outcome?

The concept of expectancy has been studied by a wide variety of authors and applied to many different subjects, ranging from work motivation to health expectation. Broadly speaking, expectancies are stored associations between

behaviours and resulting consequences, which then guide subsequent behaviours [26]. Because they are influential in guiding behaviour, aiding recognition and influencing understanding [27], expectancies are an important aspect of human experience. However, they are not easily recognized [28], being both conscious and unconscious [29], and may vary in scope from the highly circumscribed to the very broad. A simpler model of expectancy was proposed by Olsen et al. [30], which summarizes the major elements relating expectancies to subsequent behaviour. Their model identifies three antecedents to an expectancy: (1) direct experience, (2) the influence of other people and (3) beliefs. More specifically patient expectations are defined as patient's perceptions that a certain outcome of medical care is likely to occur [31,32]. Among other factors, for medical care, personal experiences and those of family members and acquaintances influence the development of these expectations. Expectations can also be influenced by the interactions that a patient has with the healthcare provider [32]. Patient expectations have the potential to influence treatment adherence and outcome, and some research supports this assumption [33,34,35]. Along with beliefs and attitudes, expectations have a complex relationship with actual behaviour. In order to optimize the outcome of health care, scientific effort is spent on trying to unravel and model the variables and their interactions that make up clinical behaviour of both care provider and patient.

Aim of the thesis

The overall objective of this thesis is to evaluate the realm of complexity of human interaction in health care and examine the body of knowledge and skills on pain attitudes of both manual therapist and neck pain patients, and the way they impact clinical behaviour and treatment outcome. By examining the relationships between

attitudes, expectancies and clinical behaviour we hope to assist in the recognition of this complexity of human interaction in health care, the deepening of our understanding of practice variation, and the optimisation of research models for manual therapeutic care for non-specific neck pain patients.

Outline of the thesis

Chapter two reviews the literature on the psychometric properties of the Pain Attitudes and Beliefs Scale for Physiotherapists (PABS-PT). A further validation of the PABS-PT for neck pain patients is described in chapter three. The possible relationships between the attitudes and beliefs of the manual therapist, as measured with the PABS-PT, their actual clinical behaviour and the perceived benefit of treatment in patients with neck pain, are explored in chapter four. Elaborating on the subjective world of the patient, the aim of chapter five is to evaluate the associations between patient expectancy on recovery and usual care as provided by manual therapists. The overall aim of chapter six is to explore the practice variation in manual therapy for non-specific neck pain patients and its association with treatment outcome. To explore for subgroups of neck pain patients, chapter seven focusses on possible differences between patients with non-specific neck pain that consult a manual therapist via self-referral or via referral by a physician and whether (self-)referral is associated with recovery. Finally, in Chapter eight the overall results and their applicability of this thesis are discussed, as well as the possible implications they have for future research.

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Chapter 2

Psychometric properties of the Pain Attitudes and Beliefs Scale for Physiotherapists: A systematic review

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ABSTRACT

Objective: Evidence suggests that care providers' attitudes influence their perception of patient characteristics and the way they manage their cases. Attitudes and beliefs of care providers can be measured with the Pain Attitude and Beliefs Scale for Physiotherapists (PABS-PT). This study evaluates the measurement properties of the PABS-PT.

Methods: Databases (PubMed-Medline, Embase, Cinahl and Pedro) were searched for studies on the development or evaluation of measurement properties of the PABS-PT. Methodological quality was assessed and rated using the COSMIN checklist and scoring system.

Results: Of the 139 identified publications, 10 met the selection criteria. Most of the included studies had fair to excellent methodological quality scores. Positive results were found for internal consistency, construct validity, reliability and responsiveness. No psychometric data were found for the content validity and interpretability of the PABS-PT.

Conclusion: The PABS-PT is still in a developmental stage. Results for the psychometric properties are promising, but content validity and interpretability need more study. The relationship between implicit and explicit attitudes, and their influence on test scores, remains unclear.

INTRODUCTION

Non-specific musculoskeletal disorders, including back and/or neck pain, are the most common causes for disability. Despite the absence of diagnostic tools that allow detection of pathology, several treatment strategies are known to be effective [4,5]. When left with multiple options, the choice of treatment often reflects the clinicians' attitudes and beliefs [8]. By definition, attitudes are underlying variables which influence behavior. Attitudes are conceptualized as the degree of feeling or affect held towards an object [7]. A belief is defined as a conceptualization of an object [27]. Beliefs can be distinguished from attitudes to the extent that a belief is the information known about the object and an attitude is synthesized from multiple beliefs [7]. Evidence suggests that care providers' attitudes and beliefs influence their perception of patient characteristics and the way they manage their cases [14,22].

Two different treatment approaches are reported: a biomedical approach and a biopsychosocial approach. The biomedical approach suggests that all signs and symptoms are caused by physical pathology. Diagnosing the pathology reveals key information for management of the disease. Because of the assumed causal relation between the disease and its accompanying signs and symptoms, diagnosis will primarily be directed at finding the damaged tissue and treatment will often be pain contingent [23]. The biopsychosocial approach suggests that psychological and social factors are important in the development and continuation of complaints [17]. According to the biopsychosocial approach, pain does not necessarily have a causal relationship with tissue damage and can prevail long after the initial pathology has healed. Diagnosis is primarily aimed at identifying relevant psychological and social factors, and treatment will often be time contingent [16]. Health care providers' attitudes and their case management may vary from neutral to the extremes of

these two approaches. Gaining insight into ways to measure and change the attitudes and beliefs of the health care provider may help to improve patient care. Several instruments are available that assess the attitudes and beliefs of the health care provider. A critical review of the quality of these instruments concluded that insight into their validity and reliability is still lacking [2]. Since numerous studies on the psychometric properties of these instruments have recently been completed, a re-evaluation of the literature is useful. The two most thoroughly tested instruments are the Health Care Providers' Pain and Relationship Scale (HC-PAIRS) and the Pain Attitudes and Beliefs Scale for Physiotherapists (PABS-PT). The HC-PAIRS was developed in the USA by adapting the PAIRS [22] and measures only the biomedical treatment orientation.

The PABS-PT was developed by expert validation and analysis of 36 items extracted from four different health-related questionnaires [20]. The original 20 item PABS-PT was further validated by Houben et al.[12], which resulted in a 19 item, highly-rated tool for the assessment of health care providers' attitudes and beliefs [2]. In contrast to the HC-PAIRS, the PABS-PT consists of two factors that distinguish between a biomedical (10 items) and a biopsychosocial treatment orientation (9 items). Therapists are asked to rate statements about treatment preferences on a 6-point Likert scale ranging from 'totally disagree' to 'totally agree'. Since its initial development, the PABS-PT has been used in different contexts and for different health care provider populations. This systematic review aims to provide an overview of the current psychometric properties of the PABS-PT.

METHODS

Criteria for studies for this review

All original studies that evaluated the psychometric properties of the PABS-PT, published in English, French, Dutch or German, were included for this review.

Specific psychometric properties of interest were internal consistency, construct validity, reliability and responsiveness. Internal consistency was defined as the interrelatedness between the items in a questionnaire, expressed by Cronbach's α or the Kuder-Richardson Formula 20 [18]. For this review we labelled alpha levels above 0.60 as 'acceptable' and above 0.70 as 'good' [19].

Construct validity is the degree to which the scores of an instrument are consistent with hypotheses based on the assumption that the instrument validly measures the construct to be measured [18]. It contains three aspects, i.e. structural validity (which concern the internal relationships between test items), hypotheses testing and cross-cultural validity. The latter two concern the relationships of test scores to scores of other instruments, or differences between relevant groups. Reliability was defined as the proportion of the total variance in the measurements which is due to 'true' differences. This aspect is reflected by the intraclass correlation coefficient (ICC) or Cohen's kappa. ICCs above 0.6 are generally accepted as 'moderate' and above 0.8 as 'high' [18]. Responsiveness is the ability of an instrument to detect change over time in the construct to be measured [18].

All studies that focused on physical and/or manual therapists and/or general practitioners (GPs), both certified or student, were included. No criteria, other than 'musculoskeletal pain', were formulated for the patient population. Excluded were abstracts and unpublished studies.

Strategy for identification of studies

Highly sensitive search strategies were used to retrieve studies on the PABS-PT in conjunction with a specific search for studies on the reliability or validity of the PABS-PT. The search filter for Medline is displayed in figure 1. For other databases this filter was adopted to fit the search engines characteristics. All relevant studies that met the inclusion criteria were identified by: 1) searches in the electronic databases PubMed-Medline (1966 to May 2010), Embase (1980 to May 2010),

Cinahl (1982 to May 2010), and Pedro (Physiotherapy Evidence Database to May 2010), 2) screening the references of all studies selected from the searches and relevant reviews, and 3) contacting the initial developers of the PABS-PT.

Query (Medline):

("pain"[MeSH Terms] OR "pain"[All Fields]) AND ("attitude"[MeSH Terms] OR "attitude"[All Fields] OR "attitudes"[All Fields]) AND ("culture"[MeSH Terms] OR "culture"[All Fields] OR "beliefs"[All Fields]) AND ("weights and measures"[MeSH Terms] OR ("weights"[All Fields] AND "measures"[All Fields]) OR "weights and measures"[All Fields] OR "scale"[All Fields])

Figure 1: Medline search strategy for psychometric properties of the PABS-PT

Study selection

One reviewer (BM) performed the search strategy. Two reviewers (BM and RP) independently selected the studies to be included in the review. First, titles and abstracts were screened for eligibility. Secondly, the full text of potentially relevant papers was read to ascertain whether the study met the selection criteria. Studies not fulfilling all of the criteria were excluded and their bibliographic details listed with the reason for exclusion. Any discrepancies regarding selection were resolved by consensus and, if necessary, by consulting a third reviewer (AV). A flow chart of the selection process can be viewed in figure 2.

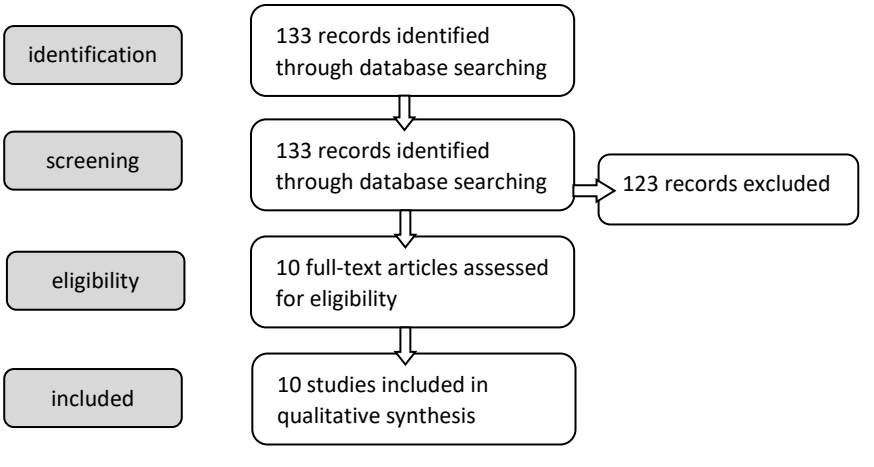

Fig. 2: flow diagram of study selection

Assessing risk of bias

Two reviewers (BM and RP) independently assessed the risk of bias, using the COSMIN checklist [18]. The COSMIN checklist comprises a four-step procedure to assess the methodological quality of studies evaluating the measurement properties of health status measurement instruments. In the first step the target measurement properties are marked in one or more out of 10 boxes. For each selected box, the relevant methodological standards are to be scored in step two. The third step focuses on general characteristics of the study. Each measurement property is subsequently rated on a 4-point scale ('poor', 'fair', 'good', or 'excellent') with a 'worst score counts' method. A study on a measurement property is rated as having 'excellent' quality if all relevant COSMIN items are scored adequate. A study is rated as having 'good' quality if some aspects are not reported, but one can assume that these issues are adequate. A study is rated as having 'fair' quality if the value of the measurement property might have been underestimated or estimated in a moderate sample size or when there were other minor flaws in the design or statistical analyses. A study is rated as 'poor' if the results are not to be trusted because of major flaws in the design or statistical analyses. The quality of the measurement properties was scored using the criteria proposed by Terwee et al., i.e. 'positive', 'indeterminate', or 'negative' [24].

Data extraction and analyses

One reviewer (BM) extracted the data of the included studies. Data were extracted on internal consistency (Cronbach's α, KR-20), construct validity (factor analysis, correlations), reliability (ICC, Cohen's kappa) and responsiveness (correlations). In case of uncertainty about the extracted data a second reviewer (RP) was consulted. The findings of the included studies were summarized, listing significant factors or themes.

RESULTS

Selection of studies and risk of bias

The Medline search identified 133 publications. The searches in Embase, Cinahl and Pedro yielded no additional results. Of the 133 identified studies that were potentially relevant, 10 met the selection criteria. Most of the studies focus on physical therapists working in primary care. Response rates of the included studies range from 38% to 100% and four different measurement properties were evaluated. Table 1 presents the general characteristics of the included studies and Table 2 presents the methodological quality of these studies.

Table 1 General characteristics of the included studies.

Study	Population (numbers)	Locus	Setting	Response rate	Measurement property
Bishop et al. 2008	physiotherapists (580), general practitioners (443)	LBP	PC, SC	38%	hypothesis testing
Bowey et al. 2010	general practitioners	LBP	PC	86%, 93%	reliability, responsiveness
Houben et al.2005a	physiotherapists (295)	LBP	PC, SC	99%, 91%	int. consistency, hypothesis testing
Houben et al. 2005b	physiotherapists (36)	LBP	ST	100%	hypothesis testing
Laekeman et al. 2008	physiotherapists (280)	CLBP	PC, SC, ST	79%, 63%	int. consistency, reliability
Ostelo et al. 2003	physiotherapists (373)	CLBP	PC, SC	62%	int. consistency
Vonk et al. 2009	physiotherapists (42)	NP	?	90%	responsiveness
Watson et al. 2008	general practitioners (83)	LBP	PC	97%	int. consistency, hypothesis testing
Overmeer et al. 2008	physiotherapists (42)	MS	PC	100%	hypothesis testing
Fullen et al. 2011	general practitioners	LBP	PC	57%	hypothesis testing

LBP = low back pain, CLBP = chronic low back pain, NP = neck pain, MS=musculoskeletal, PC = primary care, SC = secondary care, ST = students

Table 2 Methodological quality of the studies per measurement property.

Study	Content validity	Internal consistency	Construct validity	Reliability	Responsiveness	Interpretability
Bishop et al. 2008	*	*	F/+	*	*	*
Bowey et al. 2010	*	*	*	P/+	F/+	*
Houben et al.2005a	*	*	F/+	*	*	*
Houben et al. 2005b	*	G/+	F/+	*	*	*
Laekeman et al. 2008	*	E/+	*	F/+	*	*
Ostelo et al. 2003	*	E/+	*	*	*	*
Vonk et al. 2009	*	*	*	*	F/+	*
Watson et al. 2008	*	F/+	F/-	*	*	*
Overmeer et al. 2008	*	*	*	*	F/+	*
Fullen et al. 2011	*	*	F/+	*	*	*

Methodological quality: E=excellent, G=good, F=fair, P=poor, + positive result, - negative result, * not available

Internal consistency

The search yielded four studies that focused on the internal consistency of the PABS-PT [20,12,15,26]. The methodological quality ranged from 'fair' to 'excellent'. Overall the internal consistency showed positive results with Cronbach's α mostly >0.6 and consistently showing a 2-factor structure of the PABS-PT; the biomedical and behavioral orientation, albeit with differing items numbers per subscale (table 3).

The initial item pool (31 items) of the PABS-PT by Ostelo et al (2003) generated the interpretable 2-factor model. In order to improve the internal consistency of the behavioral factor, Houben et al. [12] added five items. Factor analysis confirmed the original biomedical/behavioral model and strengthened the behavioral factor.

By use of a forward-backward translation procedure, Laekeman et al.[15] developed a German version of the PABS-PT from the original 36-item questionnaire, confirming the two subscales of the original Dutch version. In accordance with Houben et al.[12], factor analyses suggested a 10-item biomedical scale (factor 1). In contrast to the Dutch version, analyses of the German version found only 4 items representative for the behavioral subscale and only 7 out of the 10 biomedical items were identical to the Houben version.

One study in the UK used an adapted (one item removed from the biomedical scale) version of Houben's 36-item PABS-PT version in a group of GPs [26]. The initial Cronbach's α for the behavioral subscale was low. After exclusion of eight items out of 13 it was acceptable.

	PABS-PT items (n)	**Factors (n)**	**Internal consistency (α)**	**% variance explained**
Ostelo et al. , 2003	20 (BM 14 / BPS 6)	2	BM 0.84 ; BPS 0.54	BM 25.2% / BPS 8.2%
Houben et al., 2005b	19 (BM 10 / BPS 9)	2	BM 0.80 ; BPS 0.68	BM 23.4% / BPS 10%
Laekeman et al., 2008	14 (BM 10 / BPS 4)	2	BM 0.77 ; BPS 0.58	/
Watson et al., 2008	18 (BM 13 / BPS 5)	2	BM 0.78 ; BPS 0.62	/

Table 3: internal consistency. BM = biomedical, BPS = biopsychosocial

Construct validity

Five of the included studies focused on the construct validity of the PABS-PT [12,13,2,26,10]. All five had a methodological quality score 'fair'. Overall we rated the construct validity as positive.

In a cross-sectional survey exploring the associations between attitudes/beliefs and reported clinical behavior of physiotherapists and GPs in the UK, Bishop et al. found

that work advice was significantly related to the PABS-PT scores. Higher biomedical ($F_{1,986} = 77.5$, $p < 0.0001$) scores went hand in hand with lower behavioral ($F_{1,981} = 31.9$, $p < 0.001$) scores and were associated with advice to remain off work. Only one third of the respondents could be categorized into the 'high biomedical/low behavioral' and 'low biomedical/high behavioral' subgroup.

In a similar study Fullen et al. [10] found that doctor-related factors (adherence to guidelines, number of years qualified) had a statistically significant effect ($p < 0.05$) on biomedical scores of the PABS-PT. Lower scores on the biomedical subscale had only a limited impact on consultation outcomes. Houben et al.[12] found that a physiotherapist's treatment orientation is predictive of harmfulness ratings of photographs depicting physical activity (PHODA) and work. Both PABS-PT factors proved to be consistent predictors of judgments of PHODA and of recommendations for physical activity and return to work ($p < 0.01$, $p < 0.001$, $p < 0.05$ resp.). Researching the relation between different types of attitudes, Houben et al. (2005a) found that implicit (automatically generated) and explicit (conscious, deliberate) measures appeared to be only weakly related to each other ($p > 0.26$). However, both were differentially related to treatment recommendations. From the HC-PAIRS and the Tampa Scale for Kinesiophobia for health care providers (TSK-HC) that were run alongside the PABS-PT, the former correlated weakly ($r=0.34$, $p < 0.05$) and the latter strongly ($r=0.79$, $p < 0.001$) with the biomedical subscale of the PABS-PT [13]. The HC-PAIRS and the TSK-HC are questionnaires that assess the health care providers' attitudes towards pain and impairment relations and movement and (re)injury, respectively.

Comparing scores on a GP customized version of PABS-PT with GP sickness absence certification for patients with non-specific low back pain, Watson et al. found no significant correlations [26].

Reliability

The search yielded two studies that tested the reliability of the PABS-PT [1,15]. Both had a 'fair' methodological quality score on the COSMIN list. Overall we rated the reliability as positive, but more high quality research is needed.

In a study that aimed to measure the test-retest reliability of the PABS-PT in a GP population (n=83), the ICC on the biomedical factor was 0.81 and on the behavioral factor 0.65. Overall, 94% of the biomedical and 93% of the behavioral scores fell between Bland and Altman 95% Limits of Agreement[1]. The test-retest reliability of the German version of the PABS-PT among 77 participants (70 GPs and 30 physiotherapy students) found a Pearson's correlation coefficient of 0.83 for the biomedical factor and 0.70 for the behavioral factor [15].

Responsiveness

Three of the included studies tested the responsiveness of the PABS-PT [25,1,21]. All three had a methodological quality score 'fair'. Overall we rated the responsiveness as positive.

To measure the sensitivity to change after a minimal intervention strategy (MIS), 73 GPs were recruited to take part in a longitudinal study [1]. The MIS comprised a 2-hour presentation on the management of non-specific low back pain that challenged the biomedical approach and advocated a time contingent one. The paired samples t-test (pre- and post MIS) showed significantly different mean PABS-PT scores. For the complete group the mean differences in scores were -8.88 (maximum score: 50) and 2.44 (max score: 45) for the biomedical and biopsychosocial factors, respectively. The change in the biomedical factor fell outside the 95% smallest real difference (SRD) lower bandwidth, suggesting a significant change in results. The change in the biopsychosocial factor fell short of the upper limit of the 95% SRD bandwidth, suggesting no significant change. A similar study evaluated the influence of a behavioral graded activity (BGA) program

on the treatment orientation [25]. The results indicate that BGA training might influence a therapist's treatment approach, since the scores on the biomedical subscale showed a 4.4 greater (95%CI -7.9; -0.8; maximum score 50) decrease for therapists who followed the training compared to therapists who did not. Evaluating the effects of an 8-day university-based training course on physiotherapists' treatment approach and patients' perception of the physical therapists' treatment behavior, Overmeer et al.[21] found changes in PABS-PT scores (decrease biomedical score Z= -5.09, $p < 0.001$; increase behavioral score Z= -2.06, $p < 0.001$) that are in line with other studies [25,1], but no differences in the way the patients perceived their physiotherapists. However, it is not clear whether these changes represent clinical important change [21].

DISCUSSION

This review provides an overview of the psychometric properties of the PABS-PT. Ten studies that focused on the psychometrics of the PABS-PT were found. Four of the included studies assessed the internal consistency of the PABS-PT. The methodological quality ranged from fair to excellent, and all reported positive results regarding the internal consistency of the PABS-PT. A closer look at the two factors revealed that the biomedical one (Cronbach's α 0.77-0.84) is more robust and stable than the behavioral factor (Cronbach's α 0.62-0.68). Nevertheless, items included in both factors vary considerably between studies; most often between 14 and 19 items were left in the analysis. The overall variability of factor items across studies indicate that the PABS-PT is still in a developmental stage. The relative instability of the behavioral factor can be explained by the fact that the biopsychosocial approach is more elaborate than the biomedical one. A second explanation might be the fact that the biomedical and biopsychosocial approach

are not the opposites of the same scale (Ostelo et al, 2003), but have a more hierarchical or supplementary relationship. Respondents may, dependent on the reference condition or body part, shift from one approach to the other, compromising the comparability between studies.

Of the five studies that focused on the construct validity by testing hypotheses (eg, comparing PABS-PT results to actual treatment administration), three found positive results. Comparability between studies is limited, due to adaptations in wording ('treatment' instead of 'therapy') or number of items (exclusion of one biomedical item) by Bishop et al. [2] and Watson et al. [26] respectively. A common drawback of hypothesis testing is that it is based on the assumption that the PABS-PT validly measures the treatment approach of the care provider. In the absence of a gold standard, it is not clear if this is true.

Of the two studies that measured the test-retest reliability of the PABS-PT, one had a 'poor' methodological score due to a long interval (3 months) between the test and the retest [1]. Correlation between tests ranged from 'moderate' (0.65) to 'high' (0.83) for both factors. Although these are acceptable figures by most standards, one may have expected higher correlation coefficients. By definition, an attitude (consisting of more beliefs) is stable [7]. It should therefore generate high scores on correlation in test-retest conditions. The correlations found in these studies do not unequivocally support that definition. It is unclear to what extent confounding variables (e.g. educational course) during the interval have biased the correlations scores. The three studies that measured the responsiveness of the PABS-PT had fair methodological scores and positive results. All studies suggest that scores on the PABS-PT are responsive to educational interventions. It is not clear if the effect sizes of the educational interventions are large enough to trigger a true shift from a biomedical to a biopsychosocial perspective or vice versa. Analogous to Overmeer et al.[21], responsiveness to educational interventions should be tested adding outcome measures on the level of practice behaviour and the patient.

There are a few considerations to the contents of this review. First, the definition of 'attitude' may be layered, which can lead to misconception. Several studies have shown that there may be a difference between implicit and explicit attitudes [6,11]. Quick responses are believed to reflect implicit attitudes. Slower responses tend to reflect explicit attitudes as they can be consciously 'moulded' to present the best fitting response for the situation. It is not clear to what extent the circumstances under which the questionnaire is presented, add to this effect. Although educational interventions seem to have an effect on test scores, their effect on underlying implicit attitudes is unknown. The possibility to manipulate responses is a potential validity pitfall for all paper questionnaires. Since the included studies on responsiveness focused on score changes on the level of the questionnaire only, they are blinded for the mechanisms that are described above. Data on responsiveness should therefore be interpreted with care. Secondly, it is unclear what constitutes a 'high' or a 'low' score on the biomedical-behavioral axis. The lack of a valid cut-off point makes it difficult to quantify a clinically relevant change in attitude. Although the possibility to dichotomize is desirable for psychometric research, it was not advocated in the original presentation of the PABS-PT.

A limitation of this review is the use of the 4-point COSMIN scoring system. As stated by the authors, the scoring system has not yet been validated and could have led to under- or overestimation of the methodological quality of the studies. A drawback of all methodological scoring systems is the inability to 'look through' the quality of writing. Although the COSMIN system seems sensitive to possible contrast between 'factual' methodological quality and 'documented' methodological quality by the scoring option "it can be assumed that…", there is a risk of faulty scoring. A second limitation of this review is the fact that data were extracted by only one reviewer. Although extraction criteria were clear and the second reviewer was approachable in case of uncertainty, this may have led to bias.

Although the results in this review are positive, more and high quality research is needed for more accurate knowledge on the psychometric properties of the PABS-PT. Future research should target the full range of psychometric properties of the PABS-PT, with special focus on interpretability, content validity and reliability. In the context of content validity it is relevant to explore the relationship between implicit and explicit attitudes in more detail. Analogous to the contrast between factual and documented methodological quality, the influence of context on the authenticity of the PABS-PT scores is still a blind spot; it may matter under which conditions the questionnaire is filled out.

CONCLUSION

The PABS-PT is still in a developmental stage. The available evidence on the measurement properties of the PABS-PT is positive but remains limited. Information on content validity and interpretability is lacking. The relationship between implicit and explicit attitudes and their influence on test scores remains unclear and requires further study. It is recommended to use the criteria as proposed by Terwee et al. [24] when designing these studies.

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Conflict of interest

All authors declare that there is no conflict of interest.

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Chapter 3

The psychometric properties of the PABS-PT in neck pain patients:

A validation study

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ABSTRACT

Objective: This study aims to assess the reliability and validity of the Pain Attitudes and Beliefs Scale for Physiotherapists (PABS-PT) in neck pain patients. Three research goals were formulated. (1): to reexamine the factor structure of the PABS-PT, (2) to assess the test-retest reliability of the PABS-PT and (3) to determine the construct validity of the biomedical factor of the PABS-PT.

Methods: Manual therapists (n=272) included in this study participated in an educational upgrade program for a professional masters' degree in the Netherlands and completed the Health Care Providers' Pain and Impairment Relationship Scale and the PABS-PT. Principal Axis Factor analysis was performed and correlation coefficients were calculated. In addition, Bland and Altman plots and the smallest real difference were determined.

Results: We performed factor analysis on 182 questionnaires and test-rest calculations on 73 questionnaires. The principal factor analysis confirmed the existing interpretable 2-factor model of a 'biomedical treatment orientation' and a 'behavioral treatment orientation'. Test-retest reliability was 'moderate' to 'good' and construct validity for the biomedical factor was 'moderate' to 'substantial'.

Conclusion: The PABS-PT shows a consistent factor structure and good test-retest reliability and construct validity. More research is needed to gain further insight in the interplay between implicit and explicit attitudes and the dynamics of the PABS-PT score across different body parts.

INTRODUCTION

Research on risk factors in back and neck pain indicates a link between attitudes and beliefs of the patient and the process of chronicity [1]. A less thoroughly explored territory is the potential influence of the attitudes and beliefs of the health care provider on the persistence of pain complaints of the patient. It is postulated that health care providers' attitudes and beliefs influence their treatment approach and activity recommendations and consequently mold the attitudes and beliefs of the patient [4,3,5,2].

Two different treatment approaches for musculoskeletal pain can be extracted from the literature. A biomedical (BM) approach and a biopsychosocial (BPS) approach. A BM approach is chosen when the health care providers' belief is that all signs and symptoms are caused by a physical pathology. This assumed causal relation between the disease and its accompanying signs and symptoms, directs the diagnostic efforts at finding the damaged tissue and treatment is pain-contingent [6]. A BPS approach is followed when the health care providers' belief is that psychological and social factors are of importance in the development and continuation of complaints. Since pain does not necessarily have a causal relationship with tissue damage it can prevail long after the initial pathology has healed. So, diagnosis is primarily aimed at identifying relevant psychological and social factors and treatment will be time-contingent [7]. The BM and BPS approach are not two opposites of the same scale: the BPS approach incorporates the BM view [8].

There are several instruments that assess the attitudes and beliefs of the health care provider. A critical review of the quality of these instruments found that evidence on their validity and reliability is still lacking [9,10]. The two most thoroughly tested instruments are the Health Care Providers' Pain and Impairment

Relationship Scale (HC-PAIRS) and the Pain Attitudes and Beliefs Scale for Physiotherapists (PABS-PT). Both questionnaires were developed and tested on health care providers' beliefs and attitude regarding treatment approach (BPS or BM) in low back pain patients [8,11,21].

Several studies have focused on the validity of the PABS-PT. Both the BM and the BPS factors of the revised PABS-PT were predictive of the results of judgments of the harmfulness of activities on the Photographic Series of Daily Activities (PHODA), an instrument that determines the perceived harmfulness of daily activities in patients with chronic low back pain [11]. Furthermore, the PABS-PT scores are found to be related to the advice to remain off work [12]. Further analyses of the PABS-PT on a small sample of physical therapy students (n=50) showed significant correlations between the BM subscale of the PABS-PT and the HC-PAIRS and the Tampa Scale of Kinesiophobia for health care providers [9]. Again all of these studies were done in a population of low back pain patients.

By definition, attitudes are underlying variables which influence behavior. Attitudes are conceptualized as the degree of feeling or affect held towards an object [16]. A belief is defined as a conceptualization of an object (Williams, 1989). Beliefs can be distinguished from attitudes to the extent that a belief is the knowledge of an object and an attitude is synthesized from multiple beliefs [16]. The relation between knowledge and attitude towards pain has been established in earlier studies [18]. Since a professional's knowledge on pathology and classification is likely to be unevenly distributed across body parts, we postulate that the same may be the case for attitudes towards pain. We hypothesize that there may be a correlation between the professionals' attitude towards pain and the targeted body part. Furthermore we are convinced that a more disabling pain complaint may lead to a

different treatment approach as well [19]. If this is the case the scores on both questionnaires would be influenced by the targeted patient population.

The aim of this study is to assess the reliability and validity of the PABS-PT in neck pain patients. To adapt the PABS-PT for this group, all mentions of “back pain” were changed into “neck pain”. This study has three goals; (1) to reexamine the factor structure of the PABS-PT in comparison to the factor structure in low back pain, (2) to assess the test-retest reliability of the PABS-PT and (3) to determine more extensively the construct validity of the PABS-PT in comparison with the HC-PAIRS. As the targeted population we have chosen neck pain patients since neck pain is in the top three of most frequently reported musculoskeletal disorders in the Netherlands [20]. A factor analysis will be carried out and compared to the factor structure of the questionnaire in low back pain patients. Furthermore the test-retest reliability of the modified PABS-PT will be tested. Lastly, the construct validity of the PABS-PT compared to the HC-PAIRS will be tested in neck pain patients. Our results might be of the upmost importance for and direct future studies on the influence of health care providers’ attitudes and beliefs on patient outcomes.

METHODS

Study design

This study was part of a prospective cohort study with 12 months follow up in Dutch manual therapy setting. The cohort study aimed to describe the usual care provided by Dutch manual therapists for patients with non-specific neck pain and to explore the clinical outcomes as well as the incidence and type of post manipulative complications. The PABS-PT, the HC-PAIRS and collection of socio-demographic data were an integral part of the baseline measurements for the cohort study.

Participants

The physical therapists (n=345) included in this study participated in a three year part-time educational upgrade program to obtain a professional masters' degree in manual therapy in the Netherlands. They were recruited in two consecutive years, the largest group (n=264) in 2007-2008 and a smaller group (n=81) in 2008-2009.

Questionnaires

Socio-demographic and professional data were collected and comprised gender, age, occupational setting, number of hours at work, number of years of experience with the management of non-specific neck pain patients.

The HC-PAIRS comprises 13 items and each item is scored on a seven-point Likert scale ('totally disagree' = 1 to 'totally agree = 7) and only measures the biomedical factor [21]. A high sum score on the HC-PAIRS reflects a belief in a strong relationship between pain and impairment. Assessment of the reliability and validity of the HC-PAIRS has shown consistent positive results [9].

The PABS-PT comprises 36 statements about treatment preferences which are scored on a six-point Likert scale ('totally disagree' = 1 to 'totally agree' = 6), generating sum score ranges from 6 to 60 for the biomedical factor and 6 to 54 for the behavioral factor. This is the version with the strengthened behavioral scale as developed by Houben et al. [11]. Examples of PABS-PT items are 'Increased pain indicates new tissue damage or the spread of existing damage' which indicates a biomedical orientation, and 'Mental stress can cause back pain even in the absence of tissue damage', which can be attributed to a biopsychosocial orientation. Although the PABS-PT is still in a developmental stage, reliability and validity are

found to be satisfactory [10]. For this study we adopted the PABS-PT by changing the words 'back pain' into 'neck pain'.

Procedure

Prior to the study, all therapists attended a 2-day course on the protocol for the Cohort study. The data for this embedded study have been collected in two different cohorts of physical therapists (2007-2008 and 2008-2009). The baseline PABS-PT and HC-PAIRS scores were performed on paper and the retest-score for the PABS-PT was performed online. For the retest the physical therapists had a time window of 48 hours to 2 weeks. There were no repeat assessments for the factor structure data collection. In total the two cohorts of therapists produced 182 PABS-PT and HC-PAIRS combinations and 73 retests for the PABS-PT (fig. 1).

Statistical analysis

All analyses were performed utilizing the Statistical Package for Social Sciences version 16 (SPSS 16).

Sociodemographics

For the presentation of the demographic variables of the participants, frequencies of age, gender, work setting, years of experience and weekly hours of work were calculated per cohort.

Factor structure

Factor structure of the PABS-PT was determined with a Principal Axis Factor Analysis (PAF) with an Oblimin rotation. Before factor analysis, all items were examined for heterogeneity, since this can bias the results of the analysis (Bernstein and Teng, 1989). In order to avoid skewed items, the following exclusion criteria were used: a Skewness and Kurtosis between 1.5 and +1.5, more than 70% of the scores located in extreme categories (either 1–2 or 5–6). For the factor analysis, the number of factors extracted was based on the content of the factors, the scree plot, and the item loading on the different factors. Factors were extracted until the 'eigenvalue' dropped below 1 or until the 'eigenvalue' hardly changed between two subsequent factors, visible as a leveling off of the scree plot. Items with a factor loading below 0.25 were removed. If an item loaded on more than one factor, the item was removed if the difference in loading was below 0.1. This procedure is similar to the one followed by Ostelo et al.[8] and was chosen to enable comparison.

Test-retest reliability

To assess the test-retest reliability of the PABS-PT as robustly as possible, the following statistical methods were used:

(1) The intraclass correlation coefficient (ICC), which is generally accepted in the medical literature as the preferred method of quantifying reproducibility [23,24]. The ICC (model 2 according to the guidelines specified by Fleiss) was interpreted as follows: an ICC of at least .70 is considered to be satisfactory for group comparisons [25].

(2) For the evaluation of systematic differences Bland and Altman plots of the 95% limits of agreement (LOA) were generated.

(3) To assess the actual size of the variability between the two sets of measurements, the standard error of the measurement (SEM) was calculated. The SEM is the square root of the within-subject variance [27,26], and is expressed in the same dimension as the measurement.

(4) The minimal detectable change (MDC) is defined as the smallest statistically significant change in measurement results. When the measured change is greater than the value of the MDC, the change is attributable to true change, rather than to measurement error [28]. The MDC is equal to ±1.96xSEMx√2.

Construct validity

The construct validity of the biomedical factor of the PABS-PT was determined by examining Pearson correlation coefficients of PABS-PT and HC-PAIRS scores. Values > 0.80 refer to excellent correlation, 0.61–0.80 indicate substantial correlation, 0.41–0.60 indicates moderate correlation, and any finding < 0.40 specifies a poor correlation [29].

RESULTS

Response rate

For factor analysis 53% of the questionnaires could be used for analysis. For the test-retest analysis 73 (21%) completed questionnaires were available. Since collection of retest data was performed online, empty fields were detected and refused immediately. Data were therefore complete. Tables 1 and 2 show the response rates.

Sociodemographics

Of the 2007-2008 cohort 136 manual therapists (78% males) with an average age of 42.2 years (SD 8.4) were included in the analysis. Of the 2008-2009 cohort 46 manual therapists (71% males) with an average age of 43.3 years (SD 7.8) were included in the analysis. Both cohorts were similar with regards to the variables 'work setting', 'weekly hours of work' and 'weekly number of neck pain patients'. Tables 1 and 2 show the details on the sociodemographics. Both cohorts are similar and will further be viewed as one.

Factor analysis

All items of the PABS-PT were tested for heterogeneity. Out of 36 items, 11 items (1, 15, 21, 32, 9, 13, 16, 18, 30, 34, 35) were excluded from the analyses because either Skewness or Kurtosis falling between ±1.5, or more than 70% of all scores being located in the extreme categories (either 1-2 or 5-6). Items that were finally included in one of the extracted factors are shown in table 3. Table 4 displays the descriptives for all items that were excluded in the factor analyses as well as reasons for exclusion.

Underlying dimensions were examined with a PAF with Oblimin rotation. Bartlett's Test of Sphericity ($\chi^2 = 389.5$; $p = 0.000$) and the Kaiser-Meyer-Olkin Measure (0.67) justified further analysis. The eigenvalue > 1 criterion initially suggested five factors, but the screeplot advised the extraction of only two factors. The factor analyses confirmed this. After examination of the factor loadings, 5 items were removed because of a loading smaller than 0.25 or a difference in loadings on both factors of less than 0.1 (2, 4, 14, 17, 28). The remaining factors consisted of 7 items for factor 1 and 8 items for factor 2.

Internal consistency was assessed with Cronbach's α. For factor 1 Cronbach's α was 0.75, and for factor 2 Cronbach's α was 0.73.

Two interpretable factors remained. Higher scores on the first factor refer to a strong belief in a relation between pain and tissue-damage, i.e. the biomedical treatment orientation. The item with the highest loading on this factor was 'increased pain indicates new tissue damage or the spread of existing damage'. A high score on the second factor refers to a belief that functional limitations and pain are not strongly related, i.e. the behavioral approach. The item with the highest loading on this factor was 'functional limitations associated with neck pain are the result of psychosocial factors'. The mean score for factor 1 (possible scoring range 0 to 30) was 17.6 (SD 4.9), and factor 2 (possible scoring range 0 to 48) scored a mean of 28.8 (SD 5.1).

Table 1: sociodemographics cohorts

	Cohort '07-'08 (n=264)			Cohort '08-'09 (n=81)			p- value	SD (95% CI)
	mean	(SD)	range	mean	(SD)	range		
Age (years)	42.2	(8.4)	23-61	43.3	(7.8)	27-65	0.008	13.8 (-9.74; -1.51)
Male (n)	207			44			0.622	0.59 (-0.22; 0.13)
Work experience	19.3	(7.1)		20.4	(7.9)		0.005	11.9 (-8.76; -1.67)
Weekly hours work	24.6	(10.2)		23.15	(9.5)		0.622	1.19 (-0.44; 0.27)
Weekly N of neck pain patients	12.2	(8.0)		10.5	(8.0)		0.518	14.7 (-2.96; 5.78)

(SD) = standard deviation, RQ = research question

Table 2: sociodemographics per research question

	Factor structure & Construct validity (n=182)			Test-retest reliability (n=73)		
	mean	(SD)	range	mean	(SD)	range
Age (y)	42.26	(8.5)	24-61	44.2	(7.5)	29-61
Male (n)	137			51		
Work experience	16.9	(8.1)		17.6	(7.6)	
Weekly hours work	24.0	(9.8)		24.4	(10.2)	
Weekly N of neck pain patients	11.2	(7.7)		10.4	(6.9)	

(SD) = standard deviation, RQ = research question

Table 3

No.	Item	Mean (SD)	IC	F1	F2
3	Knowledge of the tissue damage is not necessary for effective therapy	2.40(1.12)	0.181		0.418
6	Mental stress can cause neck pain even in the absence of tissue damage	4.41(0.96)	0.422		0.660
7	The cause of neck pain is unknown	3.60(1.14)	0.447		0.586
12	Functional limitations associated with neck pain are the result of psychosocial factors	3.05(1.2)	0.563		0.735
17	Therapy may have been successful even if pain remains	4.56(0.9)	0.434		0.672
27	There is no effective treatment to eliminate neck pain	2.60(0.9)	0.329		0.540
33	Learning to cope with stress promotes recovery from neck pain	4.79(0.9)	0.289		0.549
36	In neck pain, imaging tests are unnecessary	3.42(1.2)	0.451		0.683
10	Pain is a nociceptive stimulus, indicating tissue damage	2.86(1.3)	0.351	0.599	
20	Neck pain indicates the presence of organic injury	2.41(0.9)	0.412	0.579	
23	If therapy does not result in a reduction in neck pain, there is a high risk of severe restrictions in the long term	2.45(1.1)	0.481	0.709	
24	Pain reduction is a precondition for the restoration of normal functioning	2.92(1.2)	0.482	0.706	
25	Increased pain indicates new tissue damage or the spread of existing damage	2.33(0.9)	0.626	0.747	
29	Even if the pain has worsened, the intensity of the next treatment can be increased	4.56(0.8)	0.359	0.612	
31	The severity of tissue damage determines the level of pain	2.27(1.1)	0.369	0.611	

Descriptives (mean, standard deviation (SD), initial communalities (IC) and factor loadings on both factors for items selected for analyses (F1= biomedical; F2= behavioural)

Validity

Construct validity was tested by comparing the sumscores of the biomedical factor of the PABS-PT with the sumscores of the HC-PAIRS (n=73). The Pearson correlation coefficient between PABS-PT and HC-PAIRS was 0.55 for the test scores and 0.65 for the test-retest scores; being moderate and substantial correlations respectively.

Table 4 Descriptives (mean, standard deviation (SD) and reason for exclusion) for excluded items

No.	Item	Mean (SD)	Reason for exclusion
1	Neck pain sufferers should refrain from all physical activity in order to avoid injury	1.51(0.75)	non-heterogeneity
2	Good posture prevents neck pain	4.25(0.98)	loading criterion
4	Reduction of daily physical exertion is a significant factor in treating neck pain	3.00(1.21)	loading criterion
5	Not enough effort is made to find the underlying organic causes of neck pain	3.27 (0.98)	loading on 2 factors
8	Unilateral physical stress is not a cause of neck pain	2.70 (1.04)	loading on 2 factors
9	Patients who have suffered back pain should avoid activities that stress the neck	2.11 (0.89)	non-heterogeneity
11	A patient suffering from severe neck pain will benefit from physical exercise	4.12 (0.99)	improvement of α
13	The best advice for neck pain is: 'Take care' and 'Make no unnecessary movements'	2.11 (0.89)	non-heterogeneity
14	Patients with neck pain should preferably practice only pain free movements	2.84 (1.18)	loading criterion
15	Neck pain indicates that there is something dangerously wrong with the neck	1.58 (0.89)	non-heterogeneity
16	The way patients view their pain influences the progress of the symptoms	5.19 (0.70)	non-heterogeneity
18	Therapy can completely alleviate the functional symptoms caused by neck pain	4.84 (1.0)	non-heterogeneity
19	If ADL activities cause more neck pain, this is not dangerous	4.07 (1.16)	improvement of α
21	Sport should not be recommended for patients with neck pain	2.08 (0.78)	non-heterogeneity

22	If neck pain increases in severity, I immediately adjust the intensity of my treatment accordingly	3.73 (1.12)	improvement of α
26	It is the task of the physiotherapist to remove the cause of neck pain	3.07 (1.32)	improvement of α
28	TENS and/or neck braces support functional recovery	2.67 (1.18)	loading criterion
30	If patients complain of pain during exercise, I worry that damage is being caused	2.19 (0.97)	non-heterogeneity
32	A rapid resumption of daily activities is an important goal of the treatment	5.12 (0.87)	non-heterogeneity
34	Exercises that may be neck straining should not be avoided during the treatment	4.86 (0.82)	non-heterogeneity
35	In the long run, patients with neck pain have a higher risk of developing spinal impairments	2.18(0.95)	non-heterogeneity

Test-retest reliability

The strength of the correlations between the scores on both test occasions and for both factors is quantified by the ICC (table 5). With ICC's of 0.73 for the biomedical factor and 0.82 for the behavioral factor, both factors qualify as "satisfactory". Mean differences between test and retest scores of the PABS-PT for the biomedical and the behavioral factor, the standard deviations of the mean differences (SD_{diff}) with 95% CI, and 95% LOA, together with the MDC are given in table 5. Scatterplots were produced for both the biomedical and behavioral factor (figs. 2 and 3). The zero is contained within the 95% CI for both factors, with 96% of the scores in the biomedical factor and 96% of the scores in the behavioral factor falling within the 95% LOA. The MDC for the biomedical factor was 8.34 and for the behavioral factor 4.37. Changes exceeding 8.34 for the biomedical and 4.37 for the behavioral factor fall outside the measurement error and represent change. The band width representing the uncertainty of the difference between both test occasions were for the biomedical factor 7.91 to -8.77 and for the behavioral factor 4.33 to -4.41.

Table 5 indices of test-retest reliability and measurement variability

factor (range)	mean test (SD)	mean retest (SD)	mean diff (95% CI)	ICC (95% CI)	95% LOA	SEM	SDC	95% SDC
Biomedical (0-30)	20.14 (6.13)	25.74 (6.19)	-0.43 (-1.78-0.92)	0.73 (0.56-0.83)	-11.91 to 11.05	3.01	8.34	7.91 to -8.77
Behavioural (0-48)	36.58 (4.91)	36.56 (4.49)	0.04 -0.83-0.91	0.82 (0.71-0.89)	-7.35 to 7.43	1.58	4.37	4.33 to -4.41

SD= standard deviation, mean diff=mean difference, CI=confidence interval, ICC=intraclass correlation coefficient, LOA=limits of agreement, SEM=standard error of the mean, SDC=smallest detectable change,

DISCUSSION

This study was the first to assess the reliability and validity of the amended PABS-PT in neck pain patients. Embedded in a large cohort study, a total of 182 physical therapists who attended an educational upgrade program completed the amended PABS-PT and the HC-PAIRS. Factor structure, validity and test-retest reliability were assessed. Principal factor analysis yielded an interpretable 2-factor model. Assessment of construct validity showed moderate to substantial correlations with HC-PAIRS scores, which supports the hypothesis that the PABS-PT measures the same construct. In this study a variety of statistical techniques has been used to gain insight into the test-retest reliability of the PABS-PT. Taking the 95% CI into account, the ICC values represent “moderate” to “good” reliability. Bland and Altman plots indicated “good” agreement.

The 2-factor model found in this study is in concordance with previous studies, but differed in the amount of items for both factors. For the biomedical factor and the behavioral factor, the results of this study share 6 items (item 10, 20, 23, 24, 25, 31) and 5 items (item 3, 6, 7, 12, 27) respectively with the original version by Ostelo et al [8]. Across the studies that assessed the internal consistency of the PABS-PT, there are four items that consistently contribute to the biomedical factor (item 10, 23,

25, 31) and none for the behavioral factor [8,21,13,14]. Similar to earlier studies [8,21] 11 items were excluded from the factor analysis because of skewness or kurtosis. Although the mean scores per factor were adequately balanced and comparable with other studies [18], the majority of participants totally agreed or disagreed on these items. A closer look shows that the skewed items tend to use an extreme wording for either the biomedical or the behavioral approach ("completely alleviate" and "dangerously wrong") or rephrase well known guideline recommendations. Since these items repeatedly fail to contribute to the factors it seems feasible to aim future research at testing a shortened version of the PABS-PT in an attempt to decrease assessment burden. Overall it can be concluded that for neck and lower back pain, health care providers' attitudes and beliefs are stable and that the PABS-PT can be used to measure them.

Although test-retest scores are satisfactory in this cohort of manual therapists, one would perhaps have expected an even more perfect agreement in scores. Attitudes and beliefs are usually held for a longer period of time. They are expected to react more as constants when measured in quick succession without interventions aimed at altering them [31,30]. A possible influential factor in this is the time allowed for or spent on filling out the questionnaire. Quick responses are believed to reflect implicit (automatically activated) attitudes. Slower responses tend to reflect explicit (consciously moulded) attitudes [32,33]. Discrepancies between implicit and explicit attitudes can explain imperfect agreement. Other, less conservative explanations would be that the notion of stability of attitudes is more complex than previously thought or the term 'attitude' is incorrectly chosen for the PABS-PT.

The PABS-PT shows good psychometric properties in various studies, but more research is needed to gain insight in its practical use. Although PABS-PT scores seem to respond to interventions aiming at changing attitudes towards pain, it is still unclear what constitutes a clinical relevant change [5,34]. Evidence on the association

between altered PABS-PT scores and clinical behavior is still lacking [10]. Bishop et al. [12] found associations between PABS-PT scores and self-reported clinical behavior in general practitioners and physiotherapists. Overmeer et al. [18] studied the impact of an educational program on PABS-PT scores and the way their patients perceived their therapists' behavior. Although scores on the PABS-PT changed significantly, the patients reported no change in perceived practice behavior of the therapists.

The limited stability of the behavioural factor, the possible impact of differing implicit and explicit attitudes and the unknown influence of the body part of interest on pain attitudes, leads to the notion that the PABS-PT is still in a developmental stage.

There are also some limitations to this study. First of all the percentage of questionnaires that could be analysed was low. The use of computerized data collection protected against missings in all returned questionnaires, but due to a software problem, a number of them could not be used for analysis. In a number of cases, the software was unable to connect ID's. Since this error occurred randomly across the sample, it is unlikely that it has biased results. Another limitation is that the PABS-PT wasn't presented to all the participants in the same manner. It is unclear if a paper version differs from an online version psychometrically. Lastly, variance in test-retest time may have influenced the reported reliability.

Future research is needed to elucidate the relationship between the biomedical and the behavioral approach. As mentioned above the biomedical and biopsychosocial approach are not two opposites of the same scale [8]. The relationship between both approaches could be more hierarchical or supplementary than oppositional, complicating statements about treatment orientation.

To gain a better insight in the practical use of the PABS-PT, it would be useful if future research concentrated on the relationship between PABS-PT scores and actual practice behavior and on the dynamics of the PABS-PT score across different body parts. Although this study underlines consistency of attitudes for spine related complaints, it is still unclear if that stability would be found, had we chosen a peripheral joint such as the knee. This knowledge would be useful for educational purposes and for the updates of clinical guidelines.

CONCLUSION

This study confirmed the 2 factor model for the amended PABS-PT in non-specific neck pain patients. The amended PABS-PT showed satisfactory test-retest reliability and a satisfactory construct validity for the biomedical factor in a different patient population. This indicates that indeed stable attitudes and beliefs are tested for spine related complaints. Further research is needed on the dynamics of the PABS-PT score across different body parts, different stages of complaints and the relationship between PABS-PT scores and actual practice behavior. The PABS-PT is still in a developmental stage.

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Chapter 4

Are attitudes and beliefs of manual therapists associated with their clinical behaviour and patient outcome?

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ABSTRACT

Objective: Health care providers' attitudes and beliefs influence the way they manage their patients. The aim of this study was 1) to measure the attitude and beliefs of manual physical therapists (MPTs) in the Netherlands and 2) to explore the associations between these attitudes and beliefs, the MPTs' clinical behaviour and 3) reported perceived recovery of neck pain patients.

Methods: In a prospective cohort study in a primary care setting 272 MPTs (predominantly middle aged men, with a mean work experience of 19 years) completed the Pain Attitudes and Beliefs Scale for Physical Therapists (PABS-PT) and treated a total of 1311 neck pain patients. Treatment modalities of MPTs' choice were logged and patient treatment outcome was assessed with de Global Perceived Effect questionnaire (GPE-DV) after the treatment episode. Treatment modalities were coded either biomedical or biopsychosocial and correlated with PABS-PT and treatment outcome.

Results: MPTs tended towards the biopsychosocial treatment orientation, whereas their actual clinical behaviour was primarily biomedical (68%). The majority of the patients (78.9%), predominantly female patients (mean age: 44.3) with recurrent neck pain, reported being 'recovered' after the treatment episode. Correlations between PABS-PT scores, actual clinical behaviour and recovery were all very low and varied between -.039 and 0.09.

Conclusion: We found very weak associations between attitudes and beliefs of health care providers, their actual clinical behaviour (ie treatment choice) and patient outcomes. Relying on indirect measurements for attitudes and beliefs and documentation of clinical behaviour may be insufficient for gaining insight in actual clinical decision-making.

INTRODUCTION

Literature suggests that in practice there is variation in the care provided for neck pain. Practice variation may lead to an increase in health care utilization and correlation with improved health outcomes is not evident[1]. Healthcare providers' attitudes and beliefs are possible factors contributing to practice variation. These attitudes and beliefs may influence the health care providers' perception of patient characteristics and the way they manage their patients[2,3]. When left with multiple options, the treatment approach of choice may reflect the clinicians' attitudes and beliefs[4,5].

Two different treatment approaches are reported in literature: a biomedical (BM) approach and a biopsychosocial (BPS) approach[6,7]. The biomedical approach suggests that all signs and symptoms are caused by physical pathology. Because of the assumed causal relation between the disease and its accompanying signs and symptoms, diagnosis will primarily be directed at finding the damaged tissue and treatment will often be pain contingent[7]. The biopsychosocial approach suggests that psychological and social factors are important in the development and continuation of complaints[8]. According to the biopsychosocial approach, pain does not necessarily have a causal relationship with tissue damage and can prevail long after the initial pathology has healed. Diagnosis is primarily aimed at identifying relevant psychological and social factors, and treatment will often be time contingent[9]. The BM and BPS approaches are not diametrically opposed to each other, but have been found to be independent enough to be separated[10,11].

Literature on the influence of care providers' pain attitudes and beliefs on treatment approach is limited and mainly focussed at general practitioners, a combination of healthcare professionals and patients with low back pain[12,13]. The existent evidence suggests that the attitudes and beliefs of a healthcare

professional may affect patients' attitudes and beliefs, and health outcomes[14]. Furthermore, healthcare professionals' attitudes and beliefs have been shown to influence their adherence to guidelines for low back pain. Healthcare professionals with a biomedical treatment orientation and high fear avoidance beliefs are more likely to show poor guideline adherence[5]. A study on the association between attitudes and beliefs and self-reported clinical behaviour also found that health care professionals with a stronger biomedical orientation were more likely to give work advice discordant with guideline recommendations[15].

Exploring the possibilities to change attitudes and beliefs, one study evaluated the impact of an educational program aimed at identifying and addressing psychosocial prognostic factors on pain attitudes and beliefs and the way patients perceived their therapists' behaviour[16]. Although scores on pain attitudes and beliefs changed significantly because of the educational program (decrease BM factor score, increase BPS factor score), the patients reported no change in perceived clinical behaviour of the therapists.

Knowledge on the relationship between attitudes and beliefs of manual therapists (MPTs), implications for their clinical behaviour and patient outcome, is still lacking. The attitudes and beliefs of MPTs has only been studied in a small study sample[17]. Although the results indicate that training may influence pain attitudes and beliefs, the effect on their actual treatment remains unclear. Generalisation of earlier findings in this field seems faulty, since professions have different training, practice and treatment goals. Insight into these associations may help customizing educational programs and clinical guidelines.

Therefore the aim of this study was 1) to measure the attitude and beliefs of MPTs and 2) to explore the associations between these attitudes and beliefs with the reported clinical behaviour (i.e. treatment choice) of the MPTs and 3) to explore

the associations between the healthcare providers attitudes and beliefs with the perceived benefit of treatment in patients with neck pain.

METHODS

Manual therapists

In total 272 MPTs participated in this study. All MPT's took part in a part-time three-year course, aimed to reregister certified Dutch manual therapists with an internationally recognized Master of Science degree. All MTP's consented to participate in this study as an integral part of their educational program.

Procedure

All participating MPTs were asked to include five consecutive patients (between 18-80 years of age) with neck pain, that consulted them for their neck pain between November 2007 and April 2008 in a cohort study[18]. Neck pain is defined as pain located in the area between occiput and the spine of scapulae[19]. Excluded were all patients with known specific causes of neck pain (e.g. known vascular or neurological disorders, neoplasm's, rheumatic conditions, referred pain from internal organs) and patients who were unable to read and/or write Dutch. The patients received information on the study and signed an informed consent to be included in the study. Demographic information (i.e., gender, age) was collected through the participating MPTs at baseline, including those individuals who were screened for eligibility, qualified for the study, but refused to participate. This information was only used to check representativeness of the study group. Ethical approval for this study was obtained from the Medical Ethical Committee (MEC-2007-359).

Data collection

Baseline. PABS-PT scores and baseline data (age, gender, years of experience, work setting and additional educational qualifications) for the MPTs were collected simultaneously at the start of the study. During each treatment session, the MPTs registered their process of clinical reasoning and the chosen treatments modalities in dedicated text boxes in their patient's journal. They were allowed to describe both reasoning process and treatment modalities in their own wording. Therapists were instructed to use the Dutch classification system for treatment modalities for the description of their treatment sessions (http://www.fysionet.nl/cvpb-fysio-januari2012-02.pdf).

Follow-up. At the end of the treatment episode the MPTs registered the reason to end therapy for each patient and the patients scored their perceived treatment effect using the GPE-DV on a form provided by the research group. The MPTs were blinded to the GPE-DV scores.

Questionnaires

One of the most thoroughly tested instruments for measuring attitudes and beliefs of health care providers is the Pain Attitudes and Beliefs Scale for Physiotherapists (PABS-PT). The PABS-PT measures both treatment approaches (BM and BPS), and was developed by expert validation and analysis of 36 items extracted from four different health-related questionnaires[11]. The resulting 20-item PABS-PT was further validated by Houben et al., who produced a 19-item (10 BM items and 9 BPS items) tool for the assessment of health care providers' attitudes and beliefs[20]. Therapists are asked to rate statements about treatment preferences on a 6-point Likert scale ranging from 'totally disagree' to 'totally agree'. Examples of questions

are: “pain is a nociceptive stimulus, indicating tissue damage” and “a patient suffering from severe back pain will benefit from physical exercises”.

A modified version of the PABS-PT (i.e. neck pain patients instead of back pain patients) showed psychometric properties consistent with the earlier studies[21]. The internal consistency of the biomedical factor (Cronbach’s α 0.77-0.84) is more robust and stable than of the behavioral factor (Cronbach’s α 0.62-0.68) [21]. Test-retest reliability ranges from ‘moderate’ (0.65) to ‘high’ (0.83) for both factors[2]. Construct validity of the PABS-PT was rated as positive in a critical review of its measurement properties[21]. Although the PABS-PT has been studied and translated into several languages, insight into its full psychometric properties is still limited[21,22,6,10]. For this study we chose the PABS-PT because it is able to measure both treatment approaches.

Patient recovery was measured with the Global Perceived Effect (GPE-DV) questionnaire[23,24]. The GPE-DV is a 7-point Likert scale ranging from ‘total recovery’ to ‘worse than ever’. As a single item scale it has a high face validity and excellent test-retest reliability (ICC 0.90 to 0.99) [24].

Analyses

We used descriptive statistics (SPSS version 20.0) to summarize the background data for the MPTs, patients and treatment. Data on the treatment modalities were labelled either “biomedical” or “biopsychosocial”. The treatment sessions were labelled using the international classification of functioning, disability and health (ICF). The label “biomedical” was given if there were no diagnostic considerations or treatment modalities other than ICF functions and/or activities or when a pain contingent approach was chosen. When personal and/or environmental factors were incorporated in the reasoning process or treatment modalities, or when the

total approach was time contingent, the label “biopsychosocial” was applied. Treatment descriptions limited to “information” and/or “advice” were labelled “unclear” if not further specified. Descriptions of the current patient status not containing information on the chosen treatment modality were also labelled “unclear”. One researcher (BM) labelled all data and a second researcher (RP) was consulted in case of uncertainty. A second researcher (RP) labelled a 10% sample of the total database to check robustness of the analyses. For each patient, the number of treatments that was labelled ‘biomedical’ was divided by the total number of treatment sessions for that patient. The same percentage was calculated per patient for the treatment sessions that were labelled ‘biopsychosocial’. All data were tested for normality (Kolmogorov-Smirnov and Shapiro-Wilkinson), Initial PABS-PT scores were generated and correlations were calculated (Spearman’s Rho, cases excluded listwise). Correlation coefficients ≤ 0.35 were considered to represent low association, 0.36 to 0.67 modest correlations, and 0.68 to 0.89 high and ≥ 0.90 very high correlations[25,26].

RESULTS

Manual therapists and patients

The demographic and professional characteristics of the MPTs are summarized in Table 1. Complete baseline data were available for 263 (96%) of the MPTs. The majority of the MPTs were male, with a mean age of 42 (SD 8.4) and a mean work experience of about 20 years, averaging almost 25 hours of work per week in a general practice. The demographic data of the patients are presented in Table 2. A total of 1311 patients (60% female) were included, with a mean age of 44.7 (SD 13.7) years. Most of them had recurrent neck pain and concomitant complaints, most frequently consisting of headache (31.1%) and irradiating arm pain (21%).

Within de study population, 456 (34,8%) patients had earlier treatment experience with musculoskeletal conditions. The study population was comparable with the group of non-enrolled patients concerning age and gender.

Table 2: Baseline characteristics of the patient population (N=1311)

Variable	***Participants (%)***
Gender female	660 (60%)
Mean age	44.3 (SD 13.7)
Duration of neck pain	
0-6 wks	240 (39,1%)
6-12 wks	138 (12,8%)
>12 wks	514 (47,9%)
Recurrent neck pain	755 (66,9%)
Work status; Employed	897 (77,1%)
Concomitant symptoms	2190 (199%)*
Headache	681 (62,1%)
Low back pain	448 (40,1%)
Irradiating arm pain	460 (41,9%)
Disturbed sleep	293 (26,7%)
Concentration problems	195 (17,8%)
Memory problems	113 (10,3%)
Earlier treatment experience	456 (34,8%)

*Note that the total of this item is more than 100% because patients could indicate more than one area of concomitant symptoms;

Table 1: Baseline characteristics of manual therapists (N=263)

Variable	*Mean (SD)*
Age (y)	42.2 (8.4)
Male, n (%)	207 (79%)
Work experience (y)	19.3 (7.1)
Weekly hours work	24.6 (10.2)
Weekly number of neck pain patients	12.2 (8.0)
PABS-PT Biomedical factor	24.5 (5.4)
PABS-PT Behavioural factor	36.5 (3.7)

PABS-PT = Patient Attitude and Beliefs scale Physiotherapists range BM 0-50 BPS 0-45

Attitudes and beliefs

The response rate for the PABS-PT scores was 59% (n=163). Mean (standard deviation, range) score for the biomedical subscale was 24.5 (5.4, 16–41), and for the biopsychosocial subscale 36.5 (3.7, 26–45) (see Table 1). Both factor scores showed a normal distribution. The mean observed scores were on the lower end of the possible ranges for the biomedical factor (6-60), and on the higher end for the biopsychosocial factor (6-54), meaning that the respondents tended towards the biopsychosocial side of the PABS-PT. The Pearson's correlation coefficient (r = -0.36) showed a modest negative association between the two subscales. The negative value suggests that respondents who score higher on one subscale tend to score lower on the other subscale.

Clinical behavior

Of the total number of treatment sessions (n=4974), 68% (n=3432) were labelled biomedical and 17% (n=845) biopsychosocial and 7% (n=348) as unclear. For a total of 495 treatments information on the treatment registration was missing (10%). The mean number of treatment sessions per patient was 4.9 (SD 2.7). The majority of treatment descriptions pertained to ICF functions and the corresponding techniques the manual therapist chose to influence those functions. Many of the treatments that were labelled biopsychosocial did not explain in any way how personal factors and/or activities were influenced. In 7% (n=348) of the treatments no codes were assigned because the textbox lacked information on the chosen treatment modality. Table 3 shows examples of common text box entries.

Table 3: Examples of textbox entries for treatment descriptions

Description	***Label***
Traction HVT (Nelson) C3-4 RE, massage multifidi cervical spine	Biomedical
Advice on prognostic factors and healthy behaviour, HVT C4-5-6	Biopsychosocial
Costal oscillation, mobilization cervical spine	Biomedical
Improving cognition on sickness, relaxation therapy	Biopsychosocial
Advice	Unknown

HVT= high velocity thrust; C=cervical

Global perceived effect

Recovery scores were available for 622 patients. The mean recovery score was 2.1 (SD 0.8). Dichotomization of the GPE-DV scores (scores 1-2: 'recovered'; scores 3-7 'not recovered') showed that 523 patients (78.9%) were considered to be 'recovered' and 141 'not recovered'. Data on recovery were skewed towards

'recovered' within the limits of normal distribution (Skewness 0.66 (SD 0.13); Kurtosis 0.57 (SD 0.26)).

Relationship between attitudes and beliefs, clinical behaviour and recovery

For calculation of the relationship between attitudes and beliefs data of 163 patients were available. Part of the MPT cohort was asked to complete the PABS-PT digitally for logistical reasons. These data couldn't be linked with the patient scores. For complete cases, baseline data for the MPT's and the patients did not differ from the total group. The correlations between the biomedical factor score and the clinical behaviour were r = 0.067 for the treatments labelled 'biomedical' and r = 0.05 for the treatments labelled as 'biopsychosocial'. Correlations between the biopsychosocial factor score and the clinical behaviour were r = 0.01 for the treatments labelled 'biomedical' and r = 0.09 for the treatments labelled as 'biopsychosocial'. Associations between PABS-scores and outcome were r = -0.039 and r = 0.019 (Spearmans Rho) for the BM and BPS factor respectively. All correlations are labelled as 'low' (Fig. 1 and Table 4).

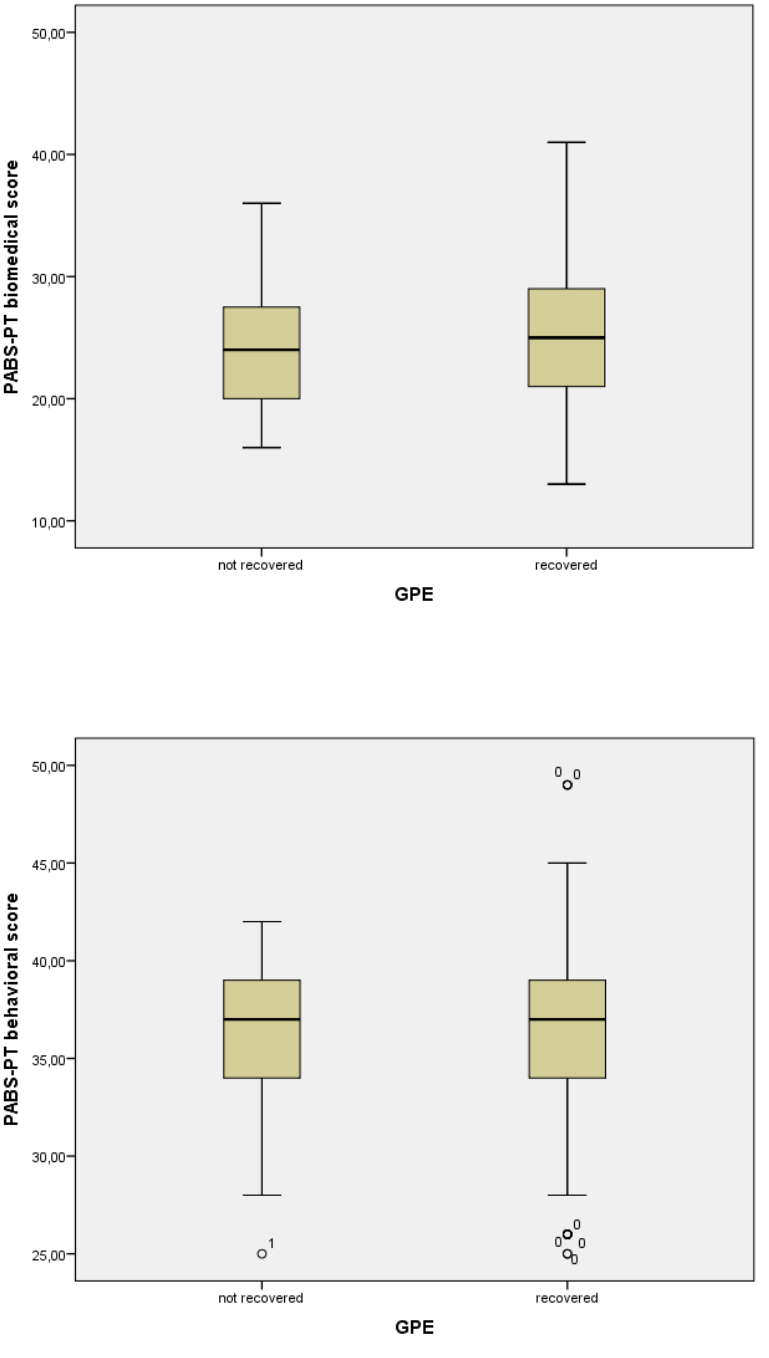

Fig 1: Boxplots of PABS-PT subscale (biomedical and biopychosocial) scores for categories of recovery

Table 4: Correlations (Spearman's rho)

	PABS-PT-BPS	Clinical behaviour BM (n=175)	Clinical behavior BPS (n=175)	Recovery (n=365)
PABS-PT-BM	-.36	.0069	.011	-.039
PABS-PT-BPS		.005	.090	.019

Post-hoc power analysis

A post-hoc power analysis was performed (G*power) and effect sizes were calculated (table 5). Across calculations power ranged from 6% to 32%, highlighting the risk for type two error. Multiple imputations was used after missing data were checked for patterns of missing not at random using Little's MCAR test. Rerunning the analysis in the pooled data (5 iterations) increased the power to a range of 7% to 52%. In order to reach statistical significance in this sample, the calculated effect size should be at least 0.21 ($1-\beta = 0.8$; $\alpha = 0.05$) (Table 5)

Table 5: post-hoc power analysis

R (n=175)	CI		R^2	$1- R^2$	power	R imput (n=356)	Power imput
0.067	-0.0822	0.2132	0.0045	0.99	0.22	0.067	0.35
0.05	-0.0991	0.1969	0.0025	0.99	0.16	0.05	0.24
0.01	-0.1385	0.1581	0.0001	0.99	0.06	0.01	0.07
0.09	-0.0591	0.2352	0.0899	0.91	0.32	0.09	0.52

DISCUSSION

Main findings

Our results show that the majority of the MPTs in this study tend towards a biopsychosocial perspective, whereas the majority of their actual applied treatments (68%) is qualified as 'biomedical'. Although the majority of the patients (78.9%) reported being recovered, no or only very weak associations were found between attitude/beliefs, clinical behaviour and recovery in this study.

MPTs in this study had similar attitudes and beliefs to therapists in other studies[16,20,15]. In a comparable study PABS-PT scores were linked to guideline adherence in a group of general practitioners and physical therapists and found a clear association between high biomedical scores and work advice for a vignette patient[1]. This could indicate that there is a real difference in practice behaviour between MPT's and non-specialized PT's. It is unclear whether the use of real patients instead of vignettes influences the actual and reported clinical behaviour. It should also be noted that during the course of this study there was no specific guideline for neck pain patients in the Netherlands, leaving little to adhere to.

Overall in our study, there was a strong tendency towards the biomedical treatment approach in reported clinical behaviour. Although the advocated treatment approach of the educational program from which the participating therapists were recruited is a biopsychosocial one, the biomedical tendency of the MPTs in this study may be explained by the character of their former education, clinical routine or the specific patient population (neck pain patients) [27]. The broader view on treatment approach as proposed by guidelines and educational institutions may be reflected in the higher scores on the behavioural factor of the PABS-PT. Although recovery was favourable in this study, this was not associated with the attitude of the MPT or with their reported clinical behaviour. There may

be several reasons for this lack of correlation. Firstly, since the BPS approach is more in line with guideline recommendations, it may be a more socially desirable projection than the biomedical one[28]. This can influence the way the PABS-PT is filled out, leading to an overestimation of BPS attitudes. It is also possible that BPS considerations and interventions have been poorly reported, leading to misclassifications (i.e. under documentation of BPS treatment) of clinical behaviour. In the limited number of studies on documentation, under-documentation is found frequently and is influenced by many variables[29]. It can be postulated that patient characteristics that cannot directly be influenced by specific MPTs' treatment modalities are at risk for under-documentation.

Strengths and limitations

This study is one of the few that evaluated the association between PABS-PT and actual practice behaviour. It is also the first study to assess attitudes and beliefs of manual therapists in a larger sample. It is unclear to what extent the indirect way to assess clinical behaviour through documentation, has led to bias. Acting on a tight schedule or not documenting reflections that are labelled 'of lesser importance', can lead to under-documentation. Another limitation of this study is the relatively low number of complete cases that could be analysed for the relationship between PABS-PT scores and clinical behaviour, increasing the risk of type two error. Since the demographic data of MPT's on both PABS measurement days was comparable, selection bias through the software problem is unlikely. Extra data would have strengthened the analyses, but post hoc analysis revealed that results would likely be the same in a larger sample. Lastly, the limited insight into the psychometric properties of the PABS-PT may influence the internal validity of this study.

Implications for clinical practice and future research

The PABS-PT is still in a developmental stage[21]. It is unclear to what extent the scores on both scales can predict clinical practice (ie treatment choice) or to what extent a respondent intuitively or deliberately produces socially desirable answers (i.e. behavioural orientation).

The findings of this study imply that the association between attitudes and beliefs of the health care provider and clinical behaviour (treatment choice) as well as patients' perceived effect might not be as strong as previously thought. The results of this study also show that manual therapy may facilitate good results for neck pain patients (78.9% of the patients recovered). Although no causal claim can be made, these results can be marked as noteworthy since almost 50% of the patients had their complaint for more than 12 weeks. The prognosis for neck pain in this phase is found to be poor[30] and guidelines typically advocate the BPS approach for prolonged spinal complaints[31]. Future research may address this.

The tendency towards a predominant biomedical treatment approach may be body part specific. For those body parts where there are specific techniques or tailored diagnostic concepts available (for instance ankle or knee joints), a primarily behaviourally oriented therapist may tend towards a more biomedical approach. Amongst MPTs the neck may be regarded as a body part that is easily accessible with specific techniques. If this theory holds truth, then educational programs can advocate a more biomechanical approach where it is possible and pursuing a biopsychosocial approach where it is needed. Future research in this field could concentrate on the possible variance of attitudes and beliefs across different body parts, and the influence of patients on the clinical behaviour of the care provider.

CONCLUSION

The MPTs in this study tended towards a reported biopsychosocial perspective, whereas the majority of their reported applied treatments were 'biomedical'. No or only very weak associations may exist between reported attitudes and beliefs of health care providers, their actual clinical behavior (ie treatment choice) and patient outcomes. Relying on indirect measurements for attitudes and beliefs and documentation of clinical behavior may be insufficient for gaining insight in actual clinical decision making.

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Chapter 5

Recovery expectations of neck pain patients do not predict treatments outcome in manual therapy.

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ABSTRACT

Purpose: Patient recovery expectations can predict treatment outcome. Little is known about the association of patient recovery expectations on treatment outcome in patients with neck pain consulting a manual therapist. This study evaluates the predictive value of recovery expectations in neck pain patients consulting manual therapists in the Netherlands. The primary outcome measure 'recovery' is defined as 'reduction in pain and perceived improvement'.

Methods: A prospective cohort study a total of 1195 neck pain patients. Patients completed the Patient Expectancies List (PEL) at baseline (3 item questionnaire, score range from 3-12), functional status (NDI), the Global Perceived Effect (GPE) for recovery (7-points Likert scale) post treatment and pain scores (NRS) at baseline and post treatment. The relationship between recovery expectancy and recovery (dichotomized GPE scores) was assessed by logistic regression analysis.

Results: Patients generally reported high recovery expectations on all three questions of the PEL (mean sumscores ranging from 11.3-11.6). When adjusted for covariates the PEL sum-score did not predict recovery (explained variance was 0.10 for the total PEL). Separately, the first question of the PEL showed predictive potential (OR = 3.7; 95%CI, 0.19-73.74) for recovery, but failed to reach statistical significance.

Conclusion: In this study patient recovery expectations did not predict treatment outcome. Variables predicting recovery were recurrence and duration of pain. The precise relationship between patient recovery expectations and outcome is complex and still inconclusive. Research on patient expectancy would benefit from more consistent use of theoretical expectancy and outcome models.

INTRODUCTION

Patient recovery expectations are defined as patient's perceptions that a certain outcome of medical care is likely to occur [1,2]. Among other factors, for medical care, personal experiences and those of family members and acquaintances develop these recovery expectations. Recovery expectations can also be influenced by the interactions that a patient has with the healthcare provider [3].

Recovery expectancies are believed to influence treatment outcome through mechanisms that are still largely unknown. One of the theoretical frameworks that can help unravel these mechanisms is the response expectancy theory [4]. This theory encompasses two relevant aspects of medical treatment: the patient as a passive recipient of treatment and the patient's volitional health-directed behavior. The first aspect refers to the expected occurrence of the individual's non-volitional, internal responses to a certain external stimulus (e.g., the expectation that an analgesic will lead to pain reduction). The second aspect refers to the outcome expectancies of one's own volitional health-directed behavior (e.g., the expectation that a relaxation exercise will reduce subjective stress). Patient recovery expectations have the potential to influence treatment adherence and outcome. So far expectancy research within the realm of physical and manual therapy is limited and mainly aimed at low back pain. The results vary, with some studies failing to find predictive value for patient expectancy [5,6], and others succeeding in doing so [7,8,9,10,11]

A recent study on neck pain patients pre-treatment expectations were found to be related to patients' ratings of recovery at one- and six-months post treatment (exercise and manipulation) [12]. At one month, patients with lower expectation on pain relief had a lower chance of recovery than those with high expectancies on pain relief (OR=0.33, 95% CI 0.11; 0.99). The expectation that spinal manipulation

would help while not receiving it also lowered the chance of treatment success (OR=0.16, 95% CI 0.04; 0.72) compared to expecting spinal manipulation and actually receiving it. Similar results were found for the influence of expectation on functional status in this study [12].

Neck pain is a common musculoskeletal disorder with an estimated point prevalence of 9-22% in the general population of the Netherlands [13]. Approximately one third of all adults is likely to experience neck pain during the course of one year [14]. Neck pain patients often seek help from manual therapists. Current guidelines incorporate known prognostic factors, but assessing expectancy prior to treatment is not a guideline recommendation. A deeper understanding of the influence of recovery expectancy on the treatment outcome in patients with neck pain consulting a manual therapist, could help improve guidelines, clinical decision making and patient outcome. This study aims to evaluate the predictive value of recovery expectancy of neck pain patients on outcome for manual therapy in the Netherlands.

METHODS

Study design

This study is part of a large prospective cohort study with 12 months follow up in a Dutch manual therapy setting studying the associations between pain attitudes, treatment choices and outcome expectations of manual therapists and non-specific neck pain patients. For this study only demographic data and data on expectancy, functional status and recovery post treatment were extracted from the database.

Participants

Manual therapists.

The manual therapists (n=272) included in this study took part in a part-time three-year course, aimed to reregister certified Dutch manual therapists with an internationally recognised Master of Science degree. All participating manual therapists were asked to include five consecutive patients of 18 years and over within a time frame of six months, that consulted them for their neck pain. Each new patient was immediately recorded in the database, providing insight in the inclusion flow.

Patients.

All adult patients consulting with non-specific neck pain were eligible. Neck pain is defined as pain located in the area between occiput and the spinae scapulae [15]. Excluded were all patients with known specific causes of neck pain (e.g. known vascular or neurological disorders, neoplasms, rheumatic conditions, referred pain from internal organs) and patients who were unable to read and/or write Dutch. The patients received information on the study and signed an informed consent to be included in the study. Demographic information (i.e., gender, age) was collected through the participating manual therapists at baseline, including those individuals who were screened for eligibility, qualified for the study, but refused to participate. This information was only used to check representativeness of the study group. Ethical approval for this study was obtained from the Medical Ethical Committee (MEC-2007-359) from Erasmus University Rotterdam, the Netherlands.

Baseline measurement

Manual therapists.

Socio-demographic and professional data were collected and comprised gender, age, occupational setting, number of hours at work, number of years of experience with the management of non-specific neck pain patients.

Patients.

Baseline data (age, gender, type of complaint, recurrence, duration of complaints) were recorded and all patients completed a baseline questionnaire including the Numeric Rating Scale (NRS) for pain intensity, functional status (Neck Disability Index (NDI), and the Patient Expectations List (PEL). The PEL is based on the two aspects of the response expectancy theory and was developed by expert consensus specifically for use in a Dutch manual therapy setting. It models 'expectancy' as a two-component variable consisting of 'treatment modality' and 'conviction'. It consists of 3 questions, each with a sub-question (see box 1). Each question generates a combined score with the sub-question, varying from '1' (low expectation and strongly convinced), '2' (low expectation and not strongly convinced), '3' (high expectation and not strongly convinced) to "4" (high expectation and strongly convinced). PEL sum scores for the three questions are generated and range from 3 to 12. We added an extra dichotomous question that checks earlier experiences with manual therapy (yes/no), which will be analyzed as a confounder.

Since the clinimetric properties of none of the separate PEL-questions (PEL-1, PEL-2 or PEL-3) have been evaluated so far, we will analyze the separate questions as well as the PEL sum scores.

Box 1: the patient expectancies list (PEL)

1	To what extent do you expect your neck pain to change as a result of the overall therapeutic approach?
1a	To what extent are you convinced that this will be the case?
2	To what extent do you expect your neck pain to change as a result of spinal manipulation?
2a	To what extent are you convinced that this will be the case?
3	To what extent do you expect your neck pain to change as a result of exercise?
3a	To what extent are you convinced that this will be the case?

Post treatment measurement

At the end of the individual treatment episodes, pain and the primary outcome 'recovery' were assessed with the Numeric pain rating scale (NRS) and Global Perceived Effect (GPE) respectively. On the GPE scale the patient scored on a 7-points Likert scale how much their condition improved or deteriorated since the start of the treatment, ranging from 'complete recovery' to 'worse than ever'. The GPE has several qualities that make it an appealing tool for use in clinical practice and research; being a single question, it is easy and quick to administer and the results are seemingly simple to interpret [16,17]. The GPE was reassessed at 12 months.

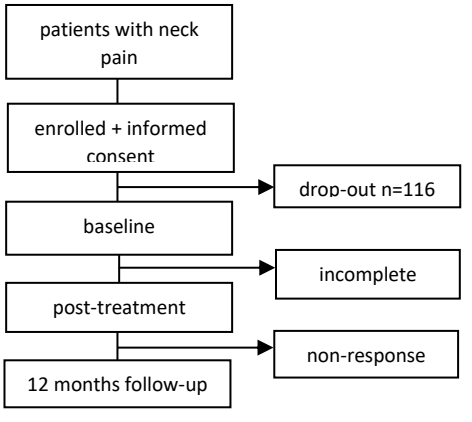

figure 1: flow chart of the study

Analyses

We used descriptive statistics (SPSS version 20.0) to summarize the baseline and post-treatment data. The independent variable was patient expectation. PEL scores were calculated for separate questions as well as for the total PEL and with the exception of the added dichotomous question, analysed as continuous variables. PEL scores for acute and non-acute neck pain patients were calculated separately. The outcome of interest was recovery (measured using the GPE) post treatment. The recovery data post treatment and at 12-months follow-up were dichotomized into "recovered" (scores 'completely recovered' and 'much improved') and "not recovered" ('slightly improved' to 'worse than ever'). Recovery data at 12 months follow-up were compared to the post treatment data for stability of recovery with McNemar's test.

As possible confounders patient age, gender, functional status, baseline pain scores, duration and recurrence of neck pain, smoking, and sports participation were entered in the analyses [18,19].

Concerning missing data, first we evaluated whether there are specific patterns of missing data using Little's MCAR test. We also compared baseline data between patients with and without missing data. In case this test was negative we performed multiple imputation to overcome a loss of power due to missing's. Both predictor and outcome variables were included in the multiple imputation [19,20]. A total of 10 datasets were created and analysis was performed on all datasets. Pooled estimates were calculated according to Ruben's rules [21]. All candidate predictors derived from the literature were checked for multicollinearity. Association between candidate variables and recovery was checked using Chi-square tests. Correlation coefficients ≤ 0.35 were considered to represent low association, 0.36 to 0.67 modest correlations, and 0.68 to 0.89 high and ≥ 0.90 very high correlations [22,23].

Univariate analyses were performed on single PEL questions and PEL sum scores separately. Next the univariate analysis were adjusted for previous experiences with manual therapy as a possible confounder to evaluate the association of expectancy and recovery.

Lastly, we performed a multivariate analysis (using Backward Wald) to build a prognostic model. To be able to adhere to the criterion of at least 10 events per variable we selected the variables with a $p < 0.10$ in the univariate analysis [24]. Overall performance of the model will be expressed by Nagelkerke's R^2 and the discriminant ability using the area under the curve (AUC). An AUC of 1.0 indicates perfect discrimination, between 0.8 and 1 indicates acceptable discrimination, between 0.7 and 0.8 fair discrimination, whereas an AUC of 0.5 to 0.7 indicates poor discrimination above chance [25]. The goodness-of-fit of the model was determined with the Hosmer-Lemeshow statistic [26].

RESULTS

Participants

Manual therapists.

The majority (79 %) of the manual therapists (MPTs) were male, with a mean age of 42.2 (SD8.4) years, a work experience of 19.3 (SD 7.1) years, averaging almost 24.6 (SD 10.2) hours of work per week in a general practice, with a mean weekly number of neck pain patients of 12.2 (SD 8).

Patients.

Post-treatment data were available for 663 (50.5%) patients, one year follow-up data for 385 (29.4%). The demographic data of the patients are presented in table 1. A total of 1311 patients (62.8% female) was enrolled, with a mean age of 44.7 years. Most of them reported recurrent (66.9%) and/or non-acute (>6 weeks duration) neck pain with concomitant symptoms, most frequently consisting of headache (31.1%) and irradiating arm pain (21%). Within the study population, 456 (34.8%) patients had earlier treatment experience with the manual therapist for their musculoskeletal conditions and 49.7% consulted the manual therapists through direct access. The participants are similar to the group of non-responders and non-participants concerning age and gender. From the eligible non-participants (n=2618), 63.2% was female, with a mean age of 44.9 (SD16.6).

Table 1: Patient characteristics at baseline

Variable	*All participants (n=1311)*		*Recovered* (n=523)*		*Not Recovered* (n=140)*	
Gender; female (%)	62.8%		79%		64.1%	
Age in years; mean (SD)	44.7 (13.7)		46.1 (13.7)		48.3 (13.8)	
Recurrent neck pain (%)	66.9%		68.7%		57.5%	
Referral Direct access General practitioner Other	 49.7% 44.7% 6.6%		 64% 58.3%		 36% 41.7%	
Marital status; married (%)	76.9%		74.4%		68.3%	
Work status; employed (%)	77.1%		72.9%		65.8%	
Smoking (%)	25.2%		27.3%		22.5%	
Practising sports (%)	65.9%		61.5%		60.8%	
Concomitant symptoms (%)	20.7%		19.3%		21.5%	
NRS pain (n=1183), mean (SD)	4.8 (2.1)		4.8 (2.0)		4.9 (2.1)	
NDI sumscore, mean (SD)	26.5 (6.5)		22.8 (6.4)		23.2 (5.8)	
Earlier treatment experience (%)	34.8%		36.2%		31.6%	
Duration of neck pain (n)	<6wks 512	>6wks 799	<6wks 234	>6wks 289	<6wks 34	>6wks 106
PEL-1: mean (SD); median	3.9 (0.2); 4.0	3.9 (0.4); 4.0	3.9 (0.1); 4.0	3.9 (0.3); 4.0	3.9 (0.2; 4.0)	3.8 (0.5); 4.0
PEL-2: mean (SD); median	3.9 (0.3); 4.0	3.8 (0.5); 4.0	3.9 (0.3); 4.0	3.8 (0.5); 4.0	3.9 (0.2); 4.0	3.8 (0.4); 4.0
PEL-3 : mean (SD); median	3.7 (0.7); 4.0	3.5 (1.0); 4.0	3.7 (0.8); 4.0	3.6 (0.8); 4.0	3.8 (0.3); 4.0	3.5 (0.9); 4.0
PEL-sumscore : mean (SD); median	11.6 (1.0); 12.0	11.3 (1.4); 12.0	11.7 (1.2); 12.0	11.4 (1.2); 12.0	11.8 (0.6); 12.0	11.3 (1.3); 12.0

* available post treatment GPE scores ; NRS, Numeric Rating Scale; NDI, Neck Disability Index; PEL, Patient Expectancies List;

Recovery expectation and treatment outcome

Patients reported high recovery expectations. Overall 31% of the respondents stated that their recovery expectations were partly based on earlier positive experiences with manual therapy. Due to non-response, complete data on recovery post-treatment were available for 663 patients, of which 523 patients (79%) were classified as 'recovered' (see figure 1) after receiving a mean number of treatments of 5.4 (SD 2.6). At 12 months follow-up, data were available for 385 patients, of which 303 reported to be 'recovered'.

Sum-scores were generally high (85.7% scored > 9, range 3-12). Scores for question 1 and 2 yielded slightly higher recovery expectations (means 3.9 (SD 0.4 and 0.5 resp.), range 1-4) than recovery expectations for question 3 (mean 3.6 (SD 0.9), range 1-4). All PEL scores showed negative Skewness and Kurtosis. No differences were found in the total PEL scores, or the individual PEL items, between acute and non-acute neck pain patients. Mc Nemar's test showed that there were no differences in recovery between the post-treatment measurement and the 12-month follow-up, suggesting that recovery was stable (Table 2).

Table 2: GPE post treatment and at 12 month follow-up (Mc Nemar's test)

n	Mean (SD)			
582	0.79 (0.40)	GPE post treatment	not recovered	recovered
385	0.79 (0.41)	GPE follow-up		
		not recovered	73	1
		recovered	1	286

GPE, Global Perceived Effect

Prediction and modelling

A multi collinearity check revealed that no variables had to be withheld from the analysis because of high correlation.

Univariate analysis. Unadjusted ORs for the separate questions of the were 4.04 (0.56-28.98), 0.44 (0.05-3.49) and 0.97 (0.94-1.32) for PEL-1, PEL-2 and PEL-3 respectively (table 3). When adjusted for earlier experience with manual therapy, the OR (95%CI) for PEL-1 increased slightly to 4.79 (0.51-45.20). When we adjust for all other possible confounders the analysis revealed similar results for the separate PEL questions, with OR's ranging from 3.73 (0.19-73.74) for PEL-1, to 0.19 (0.01-2.82) for PEL-2 (table 4). The OR's for the covariates all performed poorly, except for 'duration of pain', with OR's of 3.43 (1.955-6.00) and 3.17 (0.75-2.16) for acute (less than 6 weeks) and non-acute (more than 6 weeks) respectively. When considering a predictive model, the analyses yielded results in which only 'duration of pain', acute and non-acute were represented as positive predictors and in which 'patient recovery expectations' do not contribute.

Analyses for PEL sum scores yielded similar results (table 5), with slightly lower ORs for 'duration of pain' (acute, 3.28 (1.87-5.75); non-acute, 2.96 (1.28-6.85)) in the predictive model.

Model performance. The explained variance (R^2) of the final models was 0.9 (9%) and 0.10 for separate questions and total PEL respectively. This means that the models explain 9 to 10 percent of recovery. The ROC curve of the model for the total PEL showed a relatively poor discriminating ability for the model with a AUC of 0.675 (0.65-0.74). The models correctly predicted recovery for 80% of the patients.

Table 3: univariate regression

	Univariate, raw	Adjusted for earlier experience
	OR [95% CI]	OR [95% CI]
PEL1	4.0 [0.6-28.9]	4.8 [0.5-45.2]
PEL2	0.4 [0.1-3.5]	0.4 [0.1-3.6]
PEL3	0.9 [0.5-1.9]	0.9 [0.5-1.9]
PEL-total	1.1 [0.9-1.3]	

PEL, Patient Expectancies List

Table 4: multivariate regression for separate expectation scores predicting treatment outcome

	Range	Multivariate (enter)	Predictive model
		OR [95% CI]	OR [95% CI]
PEL1	1-4	3.7 [0.2-73.7]	
PEL2	1-4	0.2 [0.1-2.8]	
PEL3	1-4	0.7 [0.3-1.6]	
NDI	0-42	0.9 [0.9-1.0]	
NRS	1-10	0.9 [0.8-1.2]	
Gender		0.9 [0.5-1.8]	
Age	18-83	0.9 [0.9-1.0]	
Duration <6wks		3.4 [1.9-6.0]	3.3 [1.9-6.0]
Duration >6wks		3.1 [1.4-7.3]	2.6 [1.2-5.9]
Recurrent		1.3 [0.7-2.2]	
Medication		0.9 [0.5-1.7]	
Smoking		1.1 [0.6-1.8]	
Sports		0.7 [0.4-1.2]	
Performance measures of the model			
AUC (95%CI)		Correctly classified (%)	R^2
0.68 (0.65-0.74)		80.8	0.104

PEL, Patient Expectancies List; NDI, Neck Disability Index ; NRS, Numeric Rating Scale

Table 5: multivariate regression for summed expectation scores predicting treatment outcome

	Predictive model	
	OR [95% CI]	OR [95% CI]
PEL-total	1.0 [0.8-1.2]	
NDI	0.9 [0.9-1.0]	
NRS	0.9 [0.8-1.1]	
Gender	0.9 [0.5-1.6]	
Age	0.9 [0.9-1.0]	
Acute	3.3 [1.8-5.7]	3.4 [1.9-6.0]
Subacute	2.9 [1.2-6.8]	2.6 [1.2-5.9]
Recurrent	1.3 [0.7-2.2]	
Medication	0.9 [0.5-1.7]	
Smoking	1.1 [0.6-1.9]	
Sports	0.7 [0.4-1.2]	
Performance measures of the model		
AUC (95%CI)	Correctly classified (%)	R^2
0.68 (0.64-0.70)	80.5	0.094

PEL, Patient Expectancies List; NDI, Neck Disability Index ; NRS, Numeric Rating Scale

DISCUSSION

Main findings

In this study patients had a high and seemingly stable overall recovery rate and high overall recovery expectations of therapy. We found that patient recovery expectations of separate questions of the PEL, as well as the overall PEL score, did

not predict treatment outcome. In this study only 'shorter duration of pain' and 'first episode of neck pain' were positive predictors of recovery.

Comparison with literature

Although about half of the population reported not to have based their recovery expectations on earlier experiences with manual therapy, they still expected that spinal manipulation would bring them favourable results (PEL 2). Closely followed by the belief that exercise therapy would add to treatment effects (PEL 3). These high recovery expectations seem to be in line with research done on outcome expectancy in other fields of healthcare [27,28].

In this study we found that recovery expectations as measured by the PEL did not predict outcome in terms of recovery. These inconclusive results on the predictive value of expectancy are in line with earlier research. Studies that do find predictive value of patient expectancies on recovery [12,28], are countered by studies that fail to establish predictive value of patient expectancies on recovery [29,30].

One of the factors that may contribute to these inconsistent findings, is the heterogeneity of the conceptualization and assessment of patients' recovery expectations [31]. Some studies use different terminology for overlapping qualities of expectancy [32], others highlight only one or several aspects of expectancy [33]. Without a more uniform and detailed insight in the make-up of expectancy, comparison and integration of current findings is compromised. Based on perspectives from several human sciences, Thompson and Sunol proposed a helpful distinction between four types of expectation: ideal, predicted, normative and unformed. Their exact make-up and relation to terms such as 'hope' and 'satisfaction' are yet to be disentangled [34].

The effects of terminology may reach even further in expectancy research. Questions on spinal manipulation and exercise assume a uniform definition and meaning of what they consist of and what they can do. That assumption may very well be flawed. How reliably can one quantify expectancy if there is insufficient or at least varying insight in what 'spinal manipulation' and 'exercise' exactly are? It can be hypothesised that other studies in this field are influenced by the same mechanism, contributing to contrasting results. Lastly, the application of the GPE may add to inconsistent findings. The underlying assumptions of the GPE is that it measures a composite of multiple domains relative to 'improvement' or 'recovery' of one's condition, but knowledge on the factors patients take into account when determining their GPE, is still limited. A mixed-method study on de GPE revealed five main themes patients used to construct 'recovery', and that chronic neck pain patients have different expectations of recovery than non-chronic neck pain patients. Not expecting to fully recover, may lead to reponse-shift. Lastly the GPE seems to be strongly affected by 'current status' instead of 'stable change' especially as the transition time lengthens [35].

In this study the covariates 'initial pain intensity' and 'functional limitation' did not contribute to the predictive model. Results of earlier research suggest that high baseline neck pain intensity and high functional limitation have a strong association with outcome [34,35]. Although pain scores in this study seem typical for the population [35], the limited variance and low numbers of 'non-recovery' may have been the reason for lacking association. Although the majority of patients in this study reported longer existing neck pain, only 31% had earlier experience with manual therapy. The level of evidence for manual therapy is moderate for short-term effects of upper thoracic manipulation in acute neck pain, limited for long-term effects of neck manipulation, and limited for all techniques and follow-up durations in chronic neck pain [37,38,35]. Research on prognostic factors of neck pain

has shown that a vast number of predictors provide low predictive value or inconclusive results, suggesting there is still much work to be done in this field [35,39]. We non-directionally postulated that earlier experience may influence outcome expectation by providing either 'lived reference' to the patient that may be a dominant factor in the make-up of their expectancy.

Strength and Limitations

This study explored the predictive value of patient recovery expectations on outcome for manual therapy in a large group of patients. It contributes to the growing insight in the associations between patient expectancy and treatment outcome in general, and incorporates manual therapy and non-specific neck pain in the scope of research in this field.

A limitation of this study is number of missings in recovery scores, the high dropout rate and the limited variance (e.g. most patients reported relatively high PEL scores at baseline) in recovery expectancy, all negatively impacting the statistical possibilities to detect differences and associations. Some form of selection bias cannot be ruled out. Therapists were asked to include five consecutive patients and apart from inclusion flow and cross comparison with non-enrolled patients there was no process installed that guaranteed adherence to the inclusion process. Furthermore, measuring recovery expectancy as a nearly single factor variable seems to be an oversimplification of reality, blurring opportunities to find out more about its make-up and in- and external dynamics. For instance, it is unclear to what degree patients reported 'ideal' expectancy based on motivation instead of 'predicted' expectancy based on cognition and/or earlier experience. Since patient expectations on recovery were under-modelled and overall high in this study, and

the GPE was dichotomised, the capacity to find possible associations with recovery may have been limited.

Another limiting factor in this study is the developmental stage of the PEL. The PEL is a newly developed questionnaire and insight in its psychometric properties is lacking. There is limited insight into its psychometric properties.

Implications

For practice.

Understanding patient recovery expectations of treatment outcome is an important part of developing treatment plans and stimulating therapy adherence. Even though evidence is still sparse and inconclusive, there still may be practical reasons to measure recovery expectations . It may be a quick and reproducible route to an 'agreement on treatment' with your patients, since it provides possibilities to 'synchronise' preferences on treatment modalities and expectations of their outcome.

For research.

More collaboration is needed on adopting an integrative model of expectancy that incorporates aspects of the common sense model, process or structural recovery expectations and the valence of patients' recovery expectations [31]. Analogously, adopting a more frequent and nuanced GPE measurement that differentiates between acute and non-acute patients, would improve the capacity to detect possible associations between expectancy and outcome. It would also be relevant to focus on the dynamics and influenceability of recovery expectations during treatment, their physiological make-up and possible capability to influence favourable outcome [40].

CONCLUSIONS

Patient recovery expectations did not predict treatment outcome in this study. Variables predicting recovery were recurrence and duration of pain. Research on patient expectancy would benefit from more consistent use of theoretical expectancy models.

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Chapter 6

Practice variation in manual therapy for non-specific neck pain

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ABSTRACT

Purpose: The aim of this study was to explore practice variation in manual therapy for non-specific neck pain patients by: 1: exploring practice variation on the patient level, 2: exploring variation in practice and treatment approach on the level of the manual therapist, 3: exploring associations between practice variation and recovery.

Methods: A prospective Cohort study. 272 manual therapists (predominantly men, with a mean work experience of 20 years) completed the Pain Attitudes and Beliefs Scale for Physical Therapists (PABS-PT) and treated a total of 1311 neck pain patients. Treatment modalities of choice were logged and coded either biomedical or biopsychosocial and patient treatment outcome was assessed with de Global Perceived Effect questionnaire (GPE-DV) after the treatment episode.

Results: We found substantial practice variation in manual therapy for non-specific neck pain patients. Both acute and chronic neck pain patients received predominantly biomedical oriented treatment. No significant differences were found between the total number of and percentages biomedical (BM) or biopsychosocial (BPS) treatment sessions for acute and chronic neck pain patients. Manual therapists with an explicit BPS profile had a lower percentage of BPS treatment sessions for patients with chronic neck pain.

Conclusion: We found large practice variation for manual therapy in the treatment of patients with nonspecific neck pain, with no significant differences between acute and chronic patients for average number of treatments and percentages BM or BPS treatment sessions. Practice variation may be an indicator of a heterogeneous patient group.

INTRODUCTION

Neck pain is a common musculoskeletal disorder with an estimated point prevalence of 9-22% in the general population of the Netherlands [1]. Approximately one third of all adults is likely to experience neck pain during the course of one year. The course of neck pain is characterized by exacerbations and remissions, and 5-10% of patients will develop chronic pain [1,2]. Because current imaging practices cannot identify specific underlying pathology in most cases, neck pain is usually labelled as 'non-specific' [3,4].

Literature suggests that there is variation in the care provided for neck pain patients, but decreasing practice variation does not necessarily result in better patient outcomes [5]. Following guidelines aims to decrease practice variation, the utilization of ineffective treatment modalities and to improve patient outcomes [6,7]. Other strategies that have been tried to minimize unwanted practice variation include patient decision aids, provider performance feedback, provider financial incentives and regulatory changes. All strategies have shown limited success in decreasing unwanted practice variation [8-13]. Although guidelines offer a potential remedy to this unwanted practice variation, their implementation is troubled by both intentional and unintentional non-adherence [13-16]. Underlying motives for non-adherence to the guidelines are: the clinicians feeling of decreased autonomy, oversimplification of medicine, uncertainty regarding the evidence base, financial conflicts of interest, and potential litigation [17-19]. When asked to rate factors that influence practice variation, respondents perceived the lack of access to guidelines as slightly influential, patient differences and preferences moderately influential, and differences in clinician style and experience as most influential. [19].

In clinical practice the style of treatment often reflects the clinicians' attitudes and beliefs [20,21]. These attitudes and beliefs may influence the health care providers' perception of patient characteristics and the way they manage their patients [22,23]. Two different treatment approaches are reported in literature: a biomedical approach and a biopsychosocial approach [24,25]. The biomedical approach suggests that all signs and symptoms are caused by physical pathology. Because of the assumed causal relationship between the disease and its accompanying signs and symptoms, diagnosis will primarily be directed at finding the damaged tissue and treatment will often be pain contingent and may contain treatment modalities as 'mobilisation' and 'manipulation' [25]. The biomedical approach is found effective in the treatment of neck pain patients [26,27]. On the other hand, the biopsychosocial approach suggests that psychological and social factors are important in the development and continuation of complaints [28]. According to the biopsychosocial approach, pain does not necessarily have a causal relationship with tissue damage and can prevail long after the initial pathology has healed. Diagnosis is primarily aimed at identifying relevant psychological and social factors, and treatment will often be time contingent and may contain modalities as 'stress relief' and 'cognitive training' [29].

The biomedical and biopsychosocial approaches are not diametrically opposed to each other but have been found to be independent enough to be separated, and can both contain hands-on aspects as well as educational and instructional modalities [30,31]. A recent systematic review showed that psychological interventions have the potential to improve health outcomes, particularly psychological outcomes, in musculoskeletal pain conditions, but the evidence on the superiority of either a specific biomedical approach or a specific biopsychosocial approach in neck pain patients is unclear [32-38]. Guidelines generally advocate the biopsychosocial approach whenever psychological aspects seem to be at play [33,34].

Although the guidelines advocate both approaches depending on patient characteristics, it is unclear if and how these approaches are related to practice variation and patient outcome.

The overall aim of this study was therefore to explore the practice variation in a manual therapy setting for non-specific neck pain patients. Three aims were formulated: 1: explore practice variation on the patient level (e.g. acute versus chronic patients), 2: explore practice variation and treatment approach on the level of the manual therapist (e.g. predominantly a biomedical or a biopsychosocial attitude/approach), 3: explore the associations between manual therapist related practice variation in received treatment and recovery of the patients.

METHODS

Study design

This study is part of a large prospective cohort study (ANIMO) with 12 months follow up in a Dutch manual therapy setting aimed at describing usual manual therapy care in non-specific neck pain patients. Ethical approval for this study was obtained from the Medical Ethical Committee (MEC-2007-359) from Erasmus University Rotterdam, the Netherlands. For this study only data on treatment approach, treatment series, and patient outcome post treatment were extracted from the database of the ANIMO Cohort study.

Participants

Manual therapists.

For this study 279 manual therapists attending an educational program were asked to participate. All therapists were licensed manual therapists and registered by the Royal Dutch Society for Physical Therapy (KNGF). They were all working in primary or secondary health care settings. All participating manual therapists were asked to include five consecutive patients of 18 years and over that consulted them for their neck pain.

Patients.

All adult patients consulting with neck pain were eligible. Neck pain is defined as pain located in the area between occiput and the spinae scapulae [39]. Excluded were all patients with known self-reported specific causes of neck pain (e.g. known vascular or neurological disorders, neoplasms, rheumatic conditions, referred pain from internal organs) and patients who were unable to read and/or write Dutch. The patients received information on the study and signed an informed consent to be included in the study. Demographic information (i.e., gender, age) was collected through the participating manual therapists at baseline, including those individuals who were screened for eligibility, qualified for the study, but refused to participate. This information was only used to check the representativeness of the study population.

Baseline measurement

Manual therapists.

At baseline demographic data (age, gender, years of experience, work setting and additional educational qualifications) of the manual therapists were collected. Also, the Pain Attitudes and Beliefs Scale for Physiotherapists (PABS-PT) was assessed to evaluate treatment attitude. The PABS-PT measures both treatment approaches (biomedical and biopsychosocial). It was developed by expert validation and analysis of 36 items extracted from four different health-related questionnaires [40]. The resulting 20-item PABS-PT was further validated to a 19-item (10 biomedical items and 9 biopsychosocial items) tool for the assessment of health care providers' attitudes and beliefs [41]. The participating manual therapists were asked to rate statements about their treatment preferences on a 6-point Likert scale ranging from 'totally disagree' to 'totally agree'.

Patients.

As baseline data age, gender, recurrence and duration (acute < 6 weeks, chronic > 6 weeks) of complaints, work status, earlier experience with manual therapists, smoking, sports, pain (measured using a 11-point numerical rating scale (NRS)) and disability (measured using the neck pain index (NDI)) were recorded.

Post treatment session and post treatment series measurements

Manual therapists.

During each treatment session, the manual therapists registered their process of clinical reasoning and the chosen treatment modalities in dedicated text boxes in

their patient's journal. They were allowed to describe the reasoning process and treatment modalities in their own wording. Therapists were instructed to use the Dutch classification system for treatment modalities for the description of their treatment sessions.

Patients.

At the end of the treatment series, patients reported their recovery since the start of the treatment using the Global Perceived Effect (GPE) scale [42,43]. On the GPE the patient scored on a 7-point Likert scale how much their condition improved or deteriorated, ranging from 'complete recovery' to 'worse than ever'. The GPE has several qualities that make it an appealing tool for use in clinical practice and research; being a single question, it is easy and quick to administer and the results are seemingly simple to interpret [43].

Analyses

We used descriptive statistics (SPSS version 25.0) to summarize the baseline data for the manual therapists, patients and treatment. Data on the treatment modalities were labelled either "biomedical" or "biopsychosocial" (table 1).

For all patients, each individual treatment session was labelled using the international classification of functioning, disability and health (ICF). The label "biomedical" was given if there were no diagnostic considerations or treatment modalities other than ICF functions and/or activities, or when a pain contingent approach (ie clinical decisions primarily based on pain) was chosen. When personal and/or environmental factors were incorporated in the reasoning process or in the choice for treatment modalities, or when the total approach was time contingent (ie clinical decisions primarily based on progressive activity), the label

biopsychosocial was applied. Treatment descriptions limited to “information” and/or “advice” were labelled “unclear” if not further specified. Descriptions of the current patient status not containing information on the chosen treatment modality were also labelled “unclear”. One researcher (JHAM) labelled all data. A second researcher (RP) labelled a 10% sample of the total database to check robustness of the labelling. Discrepancies between labelling were solved by consensus or consultation of a third researcher (APG). If more than 10% of the double labelled sample showed discrepancies, then all data were to be labelled by the second researcher.

For practice variation on the patient level (acute, chronic) data was checked for normal distribution and we calculated the number of treatment sessions (mean, SD) and the percentages of treatment sessions labelled biomedical, biopsychosocial, or ‘unclear’. We also calculated, for acute and chronic patients separately, the dominant treatment orientation (defined as: >75% of sessions “biomedical”, intermediate, and >75% of sessions biopsychosocial).

The chance of recovery was calculated for all three treatment orientations. One-way ANOVA was used to compare the differences between acute and chronic patients, and the percentages of biomedical or PBS treatment sessions. The Kolmogorov-Smirnov test was used to demonstrate a normal distribution, and the Levene F-test was used to verify the homogeneity of the subjects.

For practice variation on the level of the manual therapists we compared their actual treatment approach (biomedical or biopsychosocial) with their score on the PABS-PT. For each manual therapist across all their included patients, the number of treatments that was labelled biomedical was divided by the total number of

treatment sessions given by that manual therapist, resulting in a percentage biomedical treatments. The same calculation was done for the treatment sessions that were labelled biopsychosocial. The independent samples t-test was used to compare the differences in dominant treatment approach of manual therapists and the percentages of biomedical or biopsychosocial treatment sessions that were given for the acute patients and the chronic patients separately. To determine the effect of dominant treatment approach on clinical decision making, two cut points were chosen: based on the ratio of biomedical and biopsychosocial subscale scores of the PABS-PT (PABS-PT- biomedical /PABS-PT- biopsychosocial ratio <0.5) and percentage score on the biomedical subscale alone (>50% factor score biomedical).

For the relationship between practice variation and patient outcome, the GPE scores were dichotomized into "recovered" (scores 'completely recovered' and 'much improved') and "not recovered" ('slightly improved' to 'worse than ever') and correlated with the total number of treatment sessions and percentages of biomedical and biopsychosocial oriented treatment sessions. Correlation coefficients ≤ 0.20 were considered no association; 0.21 to 0.35 low association, 0.36 to 0.67 modest associations, and 0.68 to 0.89 high and ≥ 0.90 very high associations [40,41].

Table 1: Baseline characteristics of manual therapists (N=263)

Variable	
Age (mean, SD)	42.2 (8.4)
Male, n (%)	207 (79%)
Years of work experience (mean, SD)	19.3 (7.1)
Weekly hours work (mean, SD)	24.6 (10.2)
Weekly number of neck pain patients (mean, SD)	12.2 (8.0)
PABS-PT Biomedical factor score (mean, SD)	24.5 (5.4)
PABS-PT Behavioural factor score (mean, SD)	36.5 (3.7)

PABS-PT = Patient Attitude and Beliefs scale Physiotherapists range BM 0-50 BPS 0-45, n number, SD standard deviation

RESULTS

Participants

Manual therapists.

In total 272 manual therapists participated; the majority (79%) were male, with a mean work experience of about 20 years, averaging almost 25 hours of work per week in a general practice (table 2). All manual therapists included between 1 and 5 patients.

Patients.

In total, the cohort consisted of 1311 patients. Due to non-response mainly post treatment, complete data were available for a total of 688 (343 acute, 282 chronic, 63 unlabelled) patients. The total group had a mean age of 44.6 years, reported recurrent neck pain (63%), and was employed (67%). A smaller percentage (34%) did not have earlier experience with manual therapists for their neck complaints (see table 3). The participants are similar to the group of non-responders and non-participants concerning age and gender.

Table 2: Baseline characteristics of the patient population (N=688)

Variable	***Acute (n=343)***	***Chronic (n=282)***	***Unlabelled (n=63)***
Gender female (%)	293 (85.4%)	251 (89%)	58 (92%)
Mean age (mean, SD)	43.7(13.5)	43.9	45.9
Recurrent neck pain, yes (%)	235 (68.7%)	162 (57.5%)	36.7 (58.3%)
Work status; Employed, yes (%)	226 (77,1%)	190 (67.3%)	43.1 (68.3%)
Earlier treatment exp., yes (%)	108 (31.6%)	102 (36.2%)	20.6 (32.8%)
Smoking, yes (%)	20.6	27.7	24.2
Sports, yes(%)	68.2	59.6	67.7
NRS (mean, SD)	4.9 (2.1)	4.7 (2.2)	4.8 (2.2)
NDI (mean, SD)	13.1 (6.5)	12.9 (6.4)	14.2 (7.4)

n number, NRS numeric rating scale, NDI neck disability index, SD standard deviation

Table 3: variation in biomedical and biopsychosocial approach on the level of the manual therapists

treatment approach per therapist (N=120)	**Mean (SD)**		**95% CI**		**CoV (%)**	
	Acute	**Chronic**	**Acute**	**Chronic**	**Acute**	**Chronic**
% biomedical	63.7 (29.2)	65.3 (26.8)	55.4-72.0	57.4-74.2	29 (29)	17 (24)
% biopsychosocial	17.9 (22.4)	16.7 (21.7)	11.6-24.3	10.4-23.1	114 (55)	92 (55)

SD Standard Deviation, CI Confidence Interval, CoV Coefficient of Variation

Practice variation

Patient level:

The 688 patients in total received 3353 treatment sessions, with a mean number of treatments of 4,9 (SD 2.8; range 1-32). When subgrouping into 'acute' and 'chronic', patients received a mean number of treatments of 4.5 (SD 2.6; range 1-13) and 5.1 (SD 2.8; range 1-32) respectively. For patients with acute neck pain 68% (SD 28.6) of the treatment sessions were labelled biomedical and 16% (SD 23.5) biopsychosocial. The remaining 16% fell into the category 'unclear'. Patients with chronic neck pain received 64% (SD 27.9) biomedical treatments, and 19% (SD 24.5) biopsychosocial. The remaining 17% fell into the category 'unclear'. Patients with acute neck pain had a 20% chance, and patients with chronic neck pain had a 33% chance of receiving a predominantly (>75% of the treatments labelled 'biomedical') biomedical treatment. A predominantly biomedical treatment yielded a 91% probability on recovery for patients with acute neck pain, and a 79% probability on recovery for patients with chronic neck pain. A predominantly biopsychosocial (>75% of the treatments labelled 'biopsychosocial') treatment yielded a 100%

probability on recovery for patients with acute neck pain, and a 93% probability on recovery for patients with chronic neck pain (see table 4). We found no statistically significant differences between patients with 'acute, 'chronic' and 'unclear' duration of complaint, concerning the number of treatments sessions and percentage of biomedical or biopsychosocial treatment approach (see table 4).

Manual therapist level:

Treatment approach based on the PABS-PT: due to software problems only 55 complete PABS-PT scores could be generated, so treatment orientation data for 217 manual therapists were lacking. On the PABS-PT, the mean percentage loading on the biomedical subscale was 41.8 (SD 8.9), and for the biopsychosocial subscale 31.7 (SD 6.3), which means that the manual therapists were slightly more oriented towards a biomedical treatment approach.

Actual treatment approach: the mean percentages of treatments that were labelled biomedical or biopsychosocial across the group of manual therapists were 64% (SD 29.2) and 18% (SD 22.4) respectively for patients with acute neck pain, and 65% (SD 26.8) and 17% (SD 21.7) for patients with chronic neck pain (see table 5). Explicitly biopsychosocial oriented manual therapists (PABS-PT- biomedical /PABS-PT-biopsychosocial ratio <0.5) used statistically significantly less treatment sessions with the biopsychosocial label compared to the rest of the group (9.4 (SD 12.5) and 20.9 (SD 24.7)) for patients with chronic neck pain (see table 7). No significant differences were found for the second cut point (>50% loading on the biomedical factor).

Association between practice variance and recovery:

Recovery rate was generally high (79%) across the total group of patients. No associations were found between either total number of treatment sessions and recovery (r=-0.14), or percentages biomedical and biopsychosocial oriented treatment sessions and recovery (r=-0.1 and -.12 respectively). In addition, we found low to no associations between the percentage of biopsychosocial treatments and recovery for both acute and chronic neck pain patients separately (r=0.26 and r=-0.09 resp).

Table 4: comparison between PABS-PT scores and clinical behaviour of the manual therapists

	Variables		Mean (SD)		95% CI		t-value	
	Explicit BPS profile		**Acute**	**Chronic**	**Acute**	**Chronic**	**Acute**	**Chronic**
PABS-PT Ratio < 0.5	**Treatment sessions (n)**	BPS	8.3 (7.0)	7.5 (4.6)	-4.9 – 2.4	-3.3 – 4.3	-2.03	-0.62
		non-BPS	9.6 (5.1)	8.0 (6.9)				
	% biomedical sessions	BPS	66.2 (23.8)	69.5 (25.1)	-21.2 – 12.9	-22.9 – 9.9	0.25	-0.99
		non-BPS	62.0 (32.5)	62.9 (27.8)				
	% biopsychosocial sessions	BPS	22.4 (19.7)	9.4 (12.5)	-20.3 – 5.5	0.55 – 22.4	-0.03	0.86
		non-BPS	15.0 (23.8)	20.9 (24.7)				
	Explicit BM profile							
PABS-PT: >50% BM factor	**Treatment sessions (n)**	BM	7.3 (6.5)	6.3 (2.9)	-6.2 – 2.4	-6.2 – 2.2	-0.19	0.19
		non-BM	9.3 (6.3)	8.3 (6.9)				
	% biomedical sessions	BM	58.5 (33.4)	66.8 (26.7)	-26.8 – 13.4	-16.2 – 20.2	0.96	2.40
		non-BM	65.2 (28.2)	64.8 (27.2)				
	% biopsychosocial sessions	BM	17.1 (20.0)	16.7 (22.1)	-16.7 – 14.3	-14.8 – 14.7	0.14	-0.43
		non-BM	18.2 (23.2)	16.7 (21.8)				

BPS biopsychosocial, BM Biomedical, SD Standard Deviation, CI Confidence Interval

Table 5: variation in number and type of treatments on the level of the patients

Variable	*treatment sessions per patient*		*% biomedical*		*% biopsychosocial*		*percentage 'unclear'*	
	Acute	*Chronic*	*Acute*	*Chronic*	*Acute*	*Chronic*	*Acute*	*Chronic*
Mean (SD)	4.5 (2.6)	5.1 (2.8)	68.1 (28.6)	64.3 (27.9)	16.2 (23.5)	18.7 (24.5)	15.7	17
95% CI	4.2-4.8	4.8-5.4	64.6-71.5	61.4-67.2	13.3-18.9	16.2-21.3		
Mean diff. (95% CI)	-0.39 (-0.91 – 0.15)		3.85 (-1.47 – 9.17)		-1.23 (-5.82 – 3.36)			

SD standard deviation, CI confidence interval

DISCUSSION

Main findings

Neck pain patients received predominantly biomedical oriented treatment from manual therapists, regardless of their complaints being acute or chronic. We found no significant differences between acute and chronic patients for the total number of and percentages biomedical or biopsychosocial treatment sessions patients received. For both acute and chronic neck pain patients, probability for recovery was generally high. Overall both groups of patients had a higher chance of recovery if they received predominantly biopsychosocial treatment, but this finding may be biased by low numbers. Manual therapists with an explicit biopsychosocial profile according to the PABS-PT, had a lower percentage of biopsychosocial treatment sessions for patients with chronic neck pain compared to the other manual therapists.

Comparison to the literature.

This study was the first we are aware of to explore practice variation in manual therapy for neck pain patients. The variance in clinical behaviour in this study seems consistent with findings in other fields [46,47]. Studies have found that differences in patient beliefs are associated with poorer health outcomes in musculoskeletal complaints [48]. One could hypothesize that diversity in patient beliefs may drive manual therapists to customize patient care, increasing practice variation. This seems in accordance with new insights into the relevance of psychological factors [48]. Some negative beliefs may resolve on their own as pain subsides. Others may hinder treatment adherence and need to be addressed. A balance between the two phenomena is needed, since incorporating psychological awareness into treatment does not mean that cognitive or psychological factors should become the primary focus of the intervention [48]. From this perspective, practice variation may be large, but the underlying approach may be consistent: starting treatment with primarily biomedical intervention strategies, incorporating biopsychosocial modalities as the treatment series progresses and more diagnostic insight into a patient is gained. The fact that chronic patients had better chance of recovery if treated predominantly with a biopsychosocial approach, is in concordance with research on the relevance of psychosocial prognostic factors within this group [49].

The broader therapeutic scope of the biopsychosocial therapist also may explain the fact that (s)he has a lower average of treatment sessions for chronic neck pain patients. Taking psychosocial factors into account from the start, as opposed to incorporating them if results are lacking, may save time in the end. The difference between treatment approach as measured by the PABS-PT (i.e comparable biomedical and biopsychosocial attitudes) and actual clinical practice, ie overall high percentages of biomedical treatment, may be explained by two factors: a) the motivation to become a manual therapist and b) the content of the educational

programmes. As a discipline, manual therapy (even more so than physical therapy) has historically established itself in the biomedical domain, focussing on correcting joint function from a mechanical theoretical framework [50,51]. This 'set' image may draw professionals with affinity to this perspective. On the other hand, the educational programming has shifted to a broader, biopsychosocial perspective and a more holistic theoretical framework. These two factors may cause dissonance between what manual therapists produce on the PABS-PT and how they act in clinical practice. Qualitative video-based research in 2010 found similar results [52]. It is not clear if these treatment approaches (biomedical or biopsychosocial) are generated consciously (knowingly producing desirable outcome), or subconsciously. In the latter case, it could be part of a professional dualism; a conflict between the 'thought' or ideal self and the actual self [53].

The large practice variation found in this study may be partly explained by the fact that at the time this study was conducted the current Dutch guideline had not been published yet. In general, the existence of guidelines has a down regulating effect on practice variation [54]. Nevertheless, good guideline adherence does not always translate into better clinical outcomes [14,47].

Inversely it could be hypothesized that in the presence of good clinical outcomes, a higher practice variation is a pointer for heterogeneity within the patient population. Although this study has limitations to consider, the data seem to be in concordance with that hypothesis.

Limitations

Firstly, it is unclear to what extent the indirect way to assess clinical behaviour through documentation in a study environment has led to bias. Acting on a tight schedule or not documenting reflections that are labelled 'of lesser importance',

can lead to under-documentation and misclassification of treatment approach. Secondly, the absence of a known cut-off point for the PABS-PT scores makes contrasting biomedical and biopsychosocial manual therapists arbitrary. Although the chosen cut-points in this study provide an insight into the differences between manual therapists with either explicit biomedical or biopsychosocial approaches, different cut-points could have generated different results. Lastly, the high percentage of recovery, the small number of manual therapists data on the PABS-PT that was available and low percentage of patients that received a predominantly biopsychosocial treatment, may have increased the risk of type two error. Since the demographic data of MPT's on both PABS measurement days was comparable, selection bias is unlikely. Although manual therapists were asked to include five consecutive patients, selection bias cannot be ruled out and other factors influencing recovery are not accounted for.

Implications

For practice

In the presence of good outcomes, practice variation may be a professional response to a heterogeneous patient group. The incomplete knowledge that currently exists on the interrelationship between beliefs of both patient and care provider, and their impact on practice variation, can partly explain the implementation challenges of guidelines. Chances of adaptation are slim when recommendations are generalized and explicit, and the knowledge base is lacking. Observed practice variation should therefore be the start of further research into subgroups instead of restrictive policy, and guideline recommendations should be less explicit and more open-ended in situations of limited knowledge.

For research

It would be useful to gain further insight into the dynamics of measuring attitudes and beliefs. Questionnaires may have a high risk of societal desirable answers, with subjects knowing the intent of the test and consciously, or subconsciously, altering their responses. Research on beliefs of therapists as well as patients would benefit from contextualization. Incorporating models that are constructed around practice variation may help to gain deeper insight into the clinical decision-making process [51]. Combining quantitative techniques with more qualitative research strategies may help gaining insight into the possible fluidity of beliefs.

CONCLUSIONS

We found practice variation for manual therapists in the treatment of patients with nonspecific neck pain. There was no statistically-significant association between acute and chronic patients concerning the average number of treatments and percentages biomedical or biopsychosocial treatment sessions. Furthermore, there was no association between practice variation and patient outcomes.

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Chapter 7

Differences in Patient Characteristics, Number of Treatments, and Recovery Rates Between Referred and Self-referred Patients With Nonspecific Neck Pain in Manual Therapy: A Secondary Analysis

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Abstract

Objective: In various countries, patients can visit a physiotherapist via self-referral. The aims of this study were to evaluate whether there are differences between individuals with nonspecific neck pain who consult a manual therapist via self-referral and those who do so via referral by a physician concerning patient characteristics, number of treatments, and recovery; and whether (self-)referral is associated with recovery.

Methods: This study is part of a prospective cohort study with posttreatment and 12-month follow-up in a Dutch manual-therapy setting. Adult patients with nonspecific neck pain were eligible for participation. Baseline measurements included demographic data and data concerning neck pain. At follow-up, number of treatments, recovery, and satisfaction were assessed. To evaluate differences between the groups, we used the x2 test and the independent t test. A logistic regression analysis was used to evaluate the association between referral status and recovery.

Results: In total, 272 manual therapists participated and 1311 patients were included. Of 831 patients whose referral data are available, about half patients consulted a manual therapist by self-referral. The mean number of treatments was 5.4, which did not differ between the 2 groups. We found no differences between the groups concerning age, sex, pain intensity at baseline, or recovery rate. Patients in the self-referral group experienced acute neck pain more frequently, had recurrent complaints more often, and reported less disability compared to the referred group. Referral status was not associated with recovery.

Conclusion: We found several small differences between self-referred and referred patients.

INTRODUCTION

Neck pain is defined as pain in the neck that lasts at least 1 day.[1] It is the sixth leading global cause of disability, ranking among the top 10 causes of disability worldwide.[2] The mean point prevalence of nonspecific neck pain is 14%, the mean 1-year prevalence is 26%, and the 1-year incidence ranges from 10% to 21%.[3] In the Netherlands, costs associated with neck pain represent 1% of health care expenditures and the number of people experiencing neck pain are predicted to increase to 50% by 2040.[4] The prognosis of patients presenting with an acute episode of neck pain in primary care is poor, as 47% still experience symptoms after 1 year.[5] Patient self-referral, or direct access, means that patients can be examined, evaluated, and treated by physiotherapists without the requirement of a physician's referral. Since January 2006, patients in the Netherlands can consult a physiotherapist or manual therapist without referral. This decision was evaluated 5 years later using data from a longitudinal database registry in Dutch primary care.[6] It was found that the number of individuals with musculoskeletal disorders who consulted a physiotherapist using self-referral increased from 27.8% in 2006 to 44.2% in 2010 and 56% in 2017.[7] Furthermore, a slight difference was found between referred and self-referred patients in the number of treatments. Self-referred patients needed on average 3 treatment sessions fewer than referred patients, about 10 versus 13.[6] A recent systematic review found that self-referred patients needed fewer physiotherapy treatments and visits to physicians, less imaging performed, and fewer nonsteroidal anti-inflammatory drugs and secondary care referrals.[8] The self-referred patients were quite often younger, with a higher level of education, and mostly they presented a less severe clinical condition and a more acute complaint. The systematic review suggests that self-referral to physiotherapy is feasible, safe, and cost-efficient.[8] Manual therapy (or musculoskeletal physiotherapy) is considered a specialized physiotherapy

treatment in the Netherlands. Manual therapists focus predominantly on spinal complaints and frequently perform spinal manipulations and mobilizations aimed at reducing the time to recovery.[9] It remains unclear whether the differences found between referred and self-referred patients in physiotherapy also hold in manual-therapy practice. Therefore, this study aims to evaluate whether there are differences (2-tailed) between individuals with nonspecific neck pain who consult a manual therapist via self-referral and those who do so via referral by a physician concerning patient characteristics, number of treatments, and recovery; and whether (self-)referral is associated with recovery after treatment.

METHODS

Design

This study is part of a prospective cohort study (the Amersfoorts Nekonderzoek of the Master Manuele therapie Opleiding [ANiMO]) of individuals with neck pain consulting a manual therapist, with posttreatment and 12- month follow-up. Ethical approval was obtained from the Medical Ethical Committee (MEC-2007-359) of the Erasmus University Medical Center, Rotterdam, the Netherlands.

Participants

Manual Therapists. In total, 279 manual therapists (MTs) attending an educational program were asked to participate in this study; all of them participated as part of the course. All therapists were licensed MTs registered by the Royal Dutch Society for Physical Therapy. They were all working in primary or secondary health care settings. We consider this a random sample of Dutch MTs, as all MTs have to follow this educational program to keep their license. Patients. All participating MTs were

asked to include at least 5 patients aged 18 years and over who consulted them for neck pain between November 2008 and April 2009. Excluded were all patients with known self-reported specific causes of neck pain (eg, known vascular or neurological disorders, neoplasms, rheumatic conditions, referred pain from internal organs). Baseline Measurement Manual Therapists. Sociodemographic and professional data were collected at baseline and comprised sex, age, occupational setting, number of hours at work, and number of years of experience with the management of patients with nonspecific neck pain. Furthermore, during each treatment session the MTs registered in the patient's treatment diary the number of treatments, their process of clinical reasoning, and the chosen treatment modalities. MTs gathered this data independently from the patient.

Patients

All patients filled in a baseline questionnaire independently including age, sex, pain intensity (using the Numeric Rating Scale [NRS]), duration of complaint (acute, subacute, or chronic), recurrent complaints (yes/no), medication use (yes/no), work status (yes/no), disability (using the Neck Disability Index [NDI] and Neck Bournemouth Questionnaire [NBQ]), fear avoidance (using the Fear-Avoidance Beliefs Questionnaire [FABQ]), and whether they had previous experience consulting a MT (yes/no).[10-14] The NRS measures momentary pain intensity; it is an 11-point scale ranging from 0 (no pain) to 10 (unbearable pain). The NDI is a questionnaire consisting of 10 items that deal with the limitation caused by the complaint, both in work-related and non−work-related activities. For each item, the degree of limitation is determined from 0 (no limit) to 5 (huge constraint). All scores are added up and converted to percentages reflecting the degree of disability. The NBQ highlights the biopsychosocial dimensions of pain; behavior and environment

affect the development, progress, and perception of pain. The NBQ is a questionnaire consisting of 7 items in which each item can be displayed on an 11-point scale ranging from 0 to 10, with higher scores indicating more pain or limitation for the given activity. Ultimately, the total score is calculated by taking the sum of the 7 items in a range of 0 to 70. The FABQ measures the extent to which physical activities (FABQ-PA) and work-related activities (FABQ-W) affect the pain. The questionnaire consists of 16 items, each measured on a 7-point scale (ranging from 0-6) indicating the extent to which it affects the pain. The first 5 questions relate to the extent the physical activity affects the pain, with a total FABQ-PA score ranging from 0 to 30. The remaining 11 questions are related to the degree to which work influences the pain, with a total FABQ-W score ranging from 0 to 66. The higher the score, the more the activities influence the pain.

Posttreatment Measurement

Manual Therapists

At the end of the treatment episode, the MT assessed the number of treatment sessions and reported in the treatment diary the reason for stopping the treatment episode.

Patients

At the end of the treatment episode, patients completed a posttreatment questionnaire including the NRS, NDI, NBQ, and FABQ. Recovery of the complaint and treatment satisfaction were both measured using the Global Perceived Effect (GPE) scale.[15- 17] The GPE-recovery scale asks the patient to rate, on a 7-point numerical scale, how much their condition has improved or deteriorated since baseline; it ranges from totally recovered to worse than ever. The GPE-satisfaction scale indicates, on a 7-point numerical scale, how satisfied the patient is with the

received treatment. For this question the scale ranges from absolutely satisfied to absolutely not satisfied.

All patient data were gathered using paper-based questionnaires. A research assistant entered the data in SPSS statistical software and we performed a random 10% check for mistakes. To collect the data from the MTs, a custommade digital survey was carried out. Personal log-in codes were provided per MT during the educational program. MTs had access only to their own data. Only the principal investigator had access to all personalized data, and MTs' data were recoded as numbers. All analyses were performed on coded data.

Analysis

To summarize the baseline data, we used descriptive statistics. We present data on the total group and the self-referral and referral groups. The duration of the complaint was divided into acute (0-6 weeks), subacute (6 weeks to 3 months), and chronic (longer than 3 months). The recovery data were dichotomized into "recovered" (scores: "completely recovered" and "much improved") and "not recovered"; and for satisfaction, into "satisfied" (scores: "absolutely satisfied" and "very satisfied") and "not satisfied." Next, the difference between the self-referral and referral groups at baseline was tested. For the dichotomous variables, we used the x2 test, and for the continuous variables, we used the independent t test. We checked whether the continuous data were normally distributed using the Shapiro-Wilk test. In case of data that were not normally distributed, we used a nonparametric test (Mann-Whitney U test) for assessing (median) differences. Lastly, we evaluated whether referral is 1 of the predictors of recovery in a logistic regression model, using backward Wald regression. Predictors were selected based on the literature (age, gender, duration of complaint, recurrent complaints, pain [NRS], and function [NDI]).[3,5] Some extra predictors were added to explore their

association with recovery (referral, number of treatments, and previous experience [expectancy of the patient]). In the selection we aimed to comply with at least 10 predictors per case in the smallest group, meaning a maximum of 9 predictors. We checked a priori multicollinearity between the predictors using the correlation matrix. All analyses were done in SPSS 24.

RESULTS

Participants

Manual Therapists. In total, 272 MTs participated, including 1 to 5 patients each. The MTs provided data on the number of treatments for 1090 patients, and data on referral for 831 (76.2%) of them; for 259 patients, data on referral were missing.

Patients. In total, 1311 patients are included in the cohort, of which 1190 provided data at baseline. The mean age of the patients was 44.7 years, and 69.4% were female (Table 1). Almost half of the patients had chronic complaints (47.9%), and more than half mentioned that their complaints were recurrent (66.9%). The average pain intensity was moderate (4.8 on the 11-point NRS), as was the average disability measured with the NDI and NBQ (Table 1). Not all continuous data were normally distributed.

Follow-up

After treatment, 747 patients (62.8%) provided data, with the majority stating themselves to be recovered (61.6%) and satisfied with the treatment (71.2%; Table 1). The mean (SD) number of treatments was 5.4 (2.6). The range of number of treatments was 1 to 32, with a median of 5 (Fig 1).

Referral

Of all 831 patients with information on referral, 413 (49.7%) consulted the MT via self-referral, 372 (44.8%) were referred to the MT by their general practitioner, 45 by a medical specialist, and 2 by their company doctor. Table 1 presents the differences at baseline and follow-up between the self-referral and referral groups. Overall, most baseline variables are comparable. About one-third of the people had previously been to a MT, but the number was slightly lower in the self-referral group compared with the referred patients (mean difference = 5.7%). In the self-referral group, patients on average had acute complaints more often (mean difference = 8.9%), experienced less disability (mean difference = 2.9 on a 0-100 scale), and experienced recurrent complaints more often (mean difference = 9.6%). These differences are small but reached statistical significance. At follow-up, the number of treatments was comparable between the groups. Most patients were satisfied with their treatment, and there was a slight difference in recovery in favor of the self-referral group (mean difference = 5.7%). For the regression analysis all correlations were below 0.46, so no multicollinearity was present. Furthermore, referral was not a predictor for recovery when evaluated in a prognostic model (Table 2). The explained variance of the model was low at 7.2%. This model showed that male patients with an acute complaint and low disability at baseline have the best chance to recover.

Table 1: Patient characteristics.

	Direct Access (n=413)	***Referral (n=418)***	***Total (n=1311)***
Baseline			
Age (n=1170): mean (SD)	44.5 (13.6)	46.2 (14.5)	44.7 (13,7)
Gender (n=1186): male (%)	116 (30.5)	123 (31.5)	363 (30.6)
Pain intensity (NRS: 0-10) (n=1183): mean (SD)	4.7 (2.1)	4.9 (2.1)	4.8 (2.1)
Duration of the complaint (n=1071): yes (%):			
- Acute (<6 weeks)	149 (42.8)	126 (35.5)*	420 (39.2)
- Sub-acute	45 (12.9)	40 (11.3)	138 (12.9)
- Chronic (> 3 months)	154 (44.3)	189 (53.2)*	513 (47.9)
Recurrent complaint (n=1129): yes (%)	256 (70.3)	227 (60.9)*	755 (66.9)
Use of medication (n=1190): yes (%)	173 (45.4)	202 (51.5)	560 (51.6)
Work status (n=1163): yes (%)	291 (77.8)	278 (72.4)	896 (77)
Smoking (n=1190): yes (%)	92 (24.1)	97 (24.7)	300 (25.2)
NDI (0-100) (n=1096): mean (SD)	10.7 (8.8)	13.6 (10.6)*	12.3 (9.7)
Previous experience with MT (n=1169); yes (%)	126 (33.3)	150 (39)	407 (34.8)
NBQ (0-70) (n=1171): mean (SD)	26.7 (12.2)	28.8 (13.4)	28.3 (12.9)
FABQ-PA score (0-30) (n=1103): mean (SD)	12.3 (7.4)	13.9 (7.5)	13.2 (7.3)
FABQ-W score (0-66) (n=1129): mean (SD)	11.9 (11.3)	15.3 (13.6)	13.4 (12.2)
Post treatment			
Treatment number (n=1092); mean (SD)	5.3 (2.5)	5.6 (2.5)	5.4 (2.6)
Recovery (n=730): yes (%)	158 (64)	141 (58.3)	450 (61.6)
Satisfied (n=747): yes (%)	179 (71)	176 1.5)	532 (71.2)

Owing to missing data, percentages may not total 100%. FABQ-PA, Fear-Avoidance Beliefs Questionnaire, Physical Activities; FABQ-W, Fear-Avoidance Beliefs Questionnaire, Work-Related Activities; NBQ, Neck Bournemouth Questionnaire; NDI, Neck Disability Index; NRS, Numeric Rating Scale; SD, standard deviation. a x2 test used; * P < .05.

Table 2: Prediction of recovery

Variable	***Beta***	***OR (95% CI) Complete model***	***OR (95% CI) Model based on Backward wald selection***
Number of treatments (continuous)	-0.03	0.97 (0.88-1.06)	
Referral (yes)	-0.15	0.86 (0.56-1.34)	
Age (continuous)	0.005	1.0 (0.99-1.02)	
Gender (male)	0.44	1.62 (1.0-2.62)	1.54 (0.97-2.46)
Recurrent complaint (yes)	-0.20	0.82 (0.51-1.34)	
Expectancy (yes)	-0.02	0.98 (0.61-1.58)	
Pain intensity (continuous)	-0.08	0.92 (0.81-1.04)	
Sum score NDI (continuous)	-0.07	0.95 (0.90-1.0)	0.93 (0.89-0.97)
Duration of complaint (acute)	0.60	1.88 (1.16-3.05)	1.83 (1.15-2.91)
Performance measures			
Constant		0.740	0.367
Explained variance		8.6%	7.2%
Hosmer & Lemeshow test		P = 0.99	P = 0.764

NDI, Neck Disability Index; OR, odds ratio.

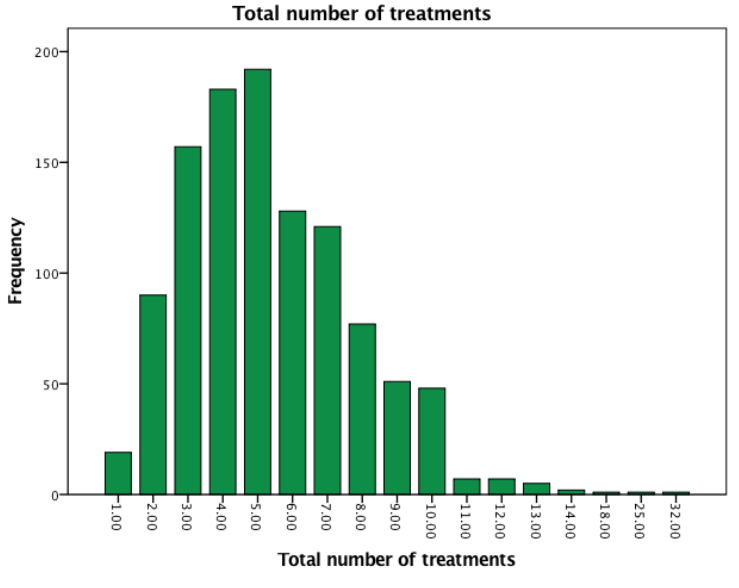

Fig 1. Treatment frequency in number of times treated

DISCUSSION

Main Findings

In Dutch manual-therapy practice, about half of patients consult the MT via self-referral. This group of patients more often has acute and recurrent complaints and less disability compared with referred patients. These differences are small, all below 10%.

Comparison With the Literature

Our finding on the percentage of self-referrals is consistent with findings from a longitudinal database registry in Dutch primary care (NPCD).[6] In contrast with other studies, we found no difference in number of treatment sessions, age, or sex between self-referred and referred patients.[8] We found, for example, no differences in treatment numbers compared with direct access in physiotherapy, which might lead to the assumption that direct access might not impact health care costs as much as in physiotherapy. Like the findings in the systematic review, we also found that self-referred patients more often presented to the MT with acute complaints. In comparison to referred patients, self-referred patients reported slightly less often that they had previous experience with an MT. This has not been evaluated before, but our assumption was that if patients had a good experience with treatment by an MT, they would probably more frequently self-refer to the MT for new or recurrent complaints. This assumption does not hold in our data. When compared with the NPCD, the average number of treatments in our study was much lower.[6] We found an average of 5.4 treatment sessions, compared with 10-13 in the NPCD. Our finding is comparable with the findings in a recent randomized clinical trial,[9] where the average number of manual-therapy treatments was 6.1 and the average number of physiotherapy treatments was 10.

It might be that because of the low number of treatments, we were unable to find a difference between referred and self-referred patients.

Strengths and Limitations

This is 1 of the largest prospective cohort studies in individuals with nonspecific neck pain. A limitation of this study is the amount of missing data. Data come from 2 different sources: the MTs' treatment diaries and the patients themselves at baseline and follow-up. For several patients we had only treatment data from the MT; these patients, although they filled out an informed consent, did not complete any questionnaire. At baseline some patients did not fill in all questions, for instance on age and gender; others did not fill in the questionnaires on disability or fear avoidance. In addition, we suffered a loss to follow-up of 37.2%. This nonresponse leads to incomplete data, and estimates are less precise and statistical analysis has less power. If the dropout is selective, the nonresponse can lead to a systematic distortion of the results, but we have no indication of selective dropout in this cohort.

CONCLUSION

This study showed that there were several statistically significant but small differences between the self-referral and referral groups. In general, self-referred patients reported less disability and more often recurrent and acute complaints when consulting an MT. Self-referred patients had similar average numbers of treatment sessions and recovery rates to referred patients. ACKNOWLEDGMENTS This study was supported by the Departments of General Practice and Neuroscience, Erasmus Medical Center, University Medical Center Rotterdam; Avans Hogeschool, University of Applied Sciences; and the Institute for Master Education in Manual Therapy, SOMT, Amersfoort, the Netherlands.

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Chapter 8

General discussion

General discussion

Main findings of the thesis

The Pain Attitudes and Beliefs Scale for Physiotherapists PABS-PT is still in a developmental stage. Although the available evidence on the measurement properties of the PABS-PT is positive, it is also still limited since insight in content validity and interpretability is lacking. This thesis confirmed the two-factor model of the PABS-PT in non-specific neck pain patients. As for the relationship between healthcare providers' attitudes and beliefs, their actual clinical behaviour (ie treatment choice) and patients outcomes for non-specific neck pain, no or very weak associations may exist. In further exploring the subjective world of the patients, this thesis assessed patient a priori expectations on treatment outcome and reported post treatment outcome. Patient expectations did not predict treatment outcome. Variables that did predict outcome were recurrence of the complaint and duration of pain. We found large practice variation for manual therapy in the treatment of non-specific neck pain, with no significant differences between acute and chronic patients for the average number of treatments and percentages biomedical (BM) or biopsychosocial (BPS) oriented treatment sessions. In researching possible differences between self-referred neck pain patients and referred neck pain patients, we found that self-referred non-specific neck pain patients reported less disability and more often recurrent and acute complaints when consulting a manual therapist as compared to referred patients. Self-referred

patients had similar average numbers of treatment sessions and recovery rates to referred patients.

Evaluating the results

Measuring attitudes

In this thesis the conventional way of measuring attitudes (ie measurement using a self-report questionnaire) was adopted. If we compare our work to earlier research, our results are in line with previous findings. We also found adequate contrast between the two factors of the PABS-PT [1,2,3]. Another similarity is the relative instability of the behavioural factor. The number of questionnaire items that add to this factor seems to vary across studies [1,2,3]. This instability may be explained by the fact that the biopsychosocial approach is more elaborate than the biomedical one. Its multi-layered construct (biomedical, psychological and social) complicates the assessment of how many items are needed to validly and reliably detect and objectify its existence. A second explanation might be the fact that the biomedical and biopsychosocial approach are not the opposites of the same scale [1] but have a more hierarchical or supplementary relationship. Chronologically the two extra layers of the biopsychosocial model are built on the basis of the biomedical model, factually incorporating it. Apart from the advantage of being able to compare the results to earlier research, the chosen approach also has drawbacks.

In treating attitude as a stable variable, we may have ignored its dynamics. By definition, attitudes are underlying variables that influence behaviour. Literature recognises two types of attitude: implicit attitudes and explicit attitudes [4]. Implicit attitudes are unconscious beliefs that can still influence decisions and behaviour, and explicit attitudes are conscious beliefs that guide decisions and behaviour. Attitudes are comprised of three components: emotions, behaviours and thoughts.

These three components can also be described as the 'ABC' model: affective, behavioural and cognitive. The 'affective' response is one's emotional response to a task or an entity. The 'behavioural' response is the displayed verbal or behavioural tendency to a task or entity, whereas the 'cognitive' response is the cognitive evaluation of the entity based on an internal belief system. In this definition an attitude can instantly change whenever one of its components changes. For example, someone who regularly arrives late may be considered not very punctual or organised. However, this same person may spend time caring for somebody who is very ill, and their personal time delivering this care may interfere with their prompt arrival to work or lessons. With this new information, this person's actions may be viewed from a different perspective and attitudes towards this person may change instantly. It is therefore defendable to state that an attitude is instable by nature, and depends on multiple contextual aspects. Moving forward, it is then illogical to measure it at just one point in time and with little or no context. By doing so we put ourselves at risk of not measuring attitude, but at best one of its components. Apart from intraconceptual changeability of attitude, a case can also be made for interconceptual changeability. Although manual therapists in this thesis reported a primarily biopsychosocial approach to non-specific neck pain patients, it is unclear that these results can be translated to other body parts. As fundamental knowledge (ie anatomical, pathophysiological) differs across body parts, so may the accompanying attitudes towards the manual therapist's ability to treat them shift towards a more biomedical approach. Due to its simpler anatomical make-up, a knee joint may be approached more mechanically (and thus more biomedically) than the more complex cervical spine. It is unclear how approaches (and underlying attitudes) are spread across body parts.

The second consideration has to do with the fact that attitude measurement is typically done by indirect measurement and is therefore subject to bias. In this study our measurement of attitudes towards pain was part of an educational

program. It is likely that respondents may have grasped the underlying construct (ie the preferable attitude towards pain measurement) and consciously or subconsciously moulded their answers to fit the professional norm that they believe is proposed by the program. It is unsure how responses would have changed if measurements were not a part of the program or if the construct was blurred by other aspects of the questionnaire. Measuring complex variables such as attitudes is complicated by the fact that we can only work with what a respondent decides to project. To optimize the quality of data, it would therefore be useful to pay attention to influencing factors such as framing, priming, the formative nature of interaction and physical context.

Relationship between attitudes, clinical behaviour and outcome

In this thesis we found no correlations between PABS-PT scores, reported clinical behaviour of the manual therapists and treatment outcome for patients with neck pain. Since the scientific knowledge on these possible relations is scarce, it is hard to tell if these results contrast or complement the body of knowledge. Theoretically an association between attitude and clinical behaviour is plausible. In that case, the marked difference we found between the PABS-PT scores and the logged clinical behaviour, must be due to bias. In many cases a therapist that scored explicitly 'biopsychosocial' on the PABS-PT, registered no biopsychosocial considerations and had a typically 'biomedical' treatment approach. We can only postulate on the underlying mechanisms. One explanation could be that the manual therapists reported their clinical behaviour poorly and/or faulty. Being pressed for time or not being able to recognise and verbalise automated reasoning and the application of tacit knowledge, may have resulted in poor reports. In addition, manual therapists may have a preferred order in their approaches, initiating with more mechanical and biomedical reasoning, and progressing to biopsychosocial reasoning strategies as complaints deviate from the initial prognosis. Or even using biomedical

reasoning strategies in a time contingent protocol, creating blended treatment approaches.

When looking at the absence of a correlation between attitudes, clinical behaviour on one hand and treatment outcome on the other, the high percentage of recovered patients must also be considered. When comparing our percentage of recovered patients to other studies, this percentage is higher than normal and might limit the capability of finding a correlation [5,6]. It is unclear why recovery in this cohort is so high. Manual therapists were explicitly asked to recruit consecutively. It is not likely that selection bias has skewed the recovery percentage, since the ability to predict treatment success is known to be limited in neck pain patients [7]. A more plausible line of thinking is that patients may have overstated their recovery, knowing that they participated in a research project in which their care provider had a role. It is unclear to what extent this response bias has influenced the results. Exploring further possibilities to clarify the absence of a correlation between PABS-PT scores, clinical behaviour and treatment outcome, selection bias should be considered. In addition, we might have oversimplified a complex human encounter that has many effect modifying variables. As stated earlier, attitudes may change during a treatment episode. The same can be postulated for patient expectancy. It is plausible that this 'human interaction' moulded and changed attitudes, expectancies and treatment strategies along the way, converging them into an efficient treatment with a favourable outcome.

Lastly, we should not rule out the possibility that the lacking correlation represent reality. Under the assumption that our explanatory models are adequate, that would mean that we should be careful in investing in educational programs that are aimed to change attitudes of manual therapists for the sole purpose of changing the outcome of treatment.

Relationship between expectancy and outcome

In this thesis patients' expectations did not predict treatment outcome. Although patient recovery expectations have the potential to influence treatment adherence and outcome, research showed varying results so far [8,9,10]. Given the methodological choices we made, these results may represent reality. Entering a treatment episode, it is likely that patients have varying cognitions about what may be wrong or what needs to be done. Since the vast majority of patients in this cohort showed good recovery, the absence of any correlation is then eminent. However, translating this finding to the conclusion that 'there is no correlation between patient expectations and treatment outcome', would be oversimplifying matters. Analogous to the attitude measurements, we may have missed the dynamic characteristics of expectancy. Evidence suggests that expectancies can change over time and are related to treatment length, therapist and clarity of the initial information provided to the patient yet they are usually assessed at baseline only [11,12]. By measuring at one point in time, we ignored possible changes during the treatment episode. Like attitude, expectancy is a changeable compound variable, consisting of several building blocks. In reviewing the existing literature in relation to health (and healthcare) expectations, the most frequently cited conceptual framework we identified was that by Thomson and Sunol [13]. They identified four 'types' of expectation: ideal (desired or preferred outcomes); predicted (actually expected outcomes), normative (what should happen), and 'unformed'. This classification has one major drawback; it does not adequately address actuality. A simpler model of expectancy, which summarizes the major elements relating expectancies to subsequent behaviour, is proposed by Olson et al. [14]. Their model identifies three antecedents to an expectancy: (1) direct experience, (2) other people and (3) beliefs. Our work would have benefited from more focus on the dynamics and influenceability of recovery expectations during

treatment, their physiological make-up and possible capability to influence favourable outcome.

As for outcome we suggest to follow the same line of reasoning as stated in the previous section. The only variables that did predict outcome in this thesis were recurrence of complaint and duration of pain. These predictors are in line with earlier research on prognostic factors in neck pain patients [15].

Practice variation and self-referral

In this thesis we observed large practice variation for manual therapy in the treatment of neck pain, with no significant differences between acute and chronic patients for the average number of treatments and percentages BM- or BPS oriented treatment sessions. The found practice variation is in line with other studies on this topic [16,17]. Practice variation is commonly viewed as cost increasing and inefficient and health care policy is commonly aimed at reducing it [18,19]. The large practice variation found in this thesis may be partly explained by the fact that at the time this study was conducted the current Dutch guideline on neck pain had not been published yet. The existence of well implemented guidelines has a down regulating effect on practice variation [20,21]. Nevertheless, good guideline adherence (ie lower practice variation) does not always translate into better clinical outcomes [22,23]. Inversely it could be hypothesized that in the presence of good clinical outcomes (ie better than the natural course), a higher practice variation can be an indication for heterogeneity within the patient population. In this thesis, the data on practice variation and recovery rates seem to be in concordance with that hypothesis. Although guidelines offer a potential remedy to unwanted practice variation, their implementation is troubled by both intentional and unintentional non-adherence [24-26]. Underlying motives for non-adherence to the guidelines are: the clinicians feeling of decreased autonomy, oversimplification of medicine,

uncertainty regarding the evidence base, financial conflicts of interest, and potential litigation [27-29]. It is in this non-adherence that the impact of personal attitudes and subjective norms becomes evident. According to Sackett's model of evidence-based practice [30], clinical decisions are ideally made in the overlap of research evidence, clinical expertise and patient values. In situation where research evidence is scarce or conflicting, the main contributors to clinical reasoning and decision making are clinical expertise and patient values. If both clinicians and patients have their unique sets of attitudes and values, that maybe shaped and transformed during the course of their interaction, then a large variety of decision outcomes is possible, resulting in higher practice variation. From a research perspective, this is neither good or bad, but primarily logical and in concordance with the current state of knowledge and insight. As insight progresses, practice variation within subgroups should diminish. Another factor adding to practice variation is the classification of neck pain. Non-specific neck pain outnumbers specific neck pain with a ratio of 9:1. If we choose one way of objectifying pathology (ie visualisation of mechanical disruption), and the resulting distribution is skewed, then it would be logical to conclude that the non-specific group is heterogeneous and our classification still needs further development. For instance, what would the distribution (between specific and non-specific groups) look like if we qualified other mechanical variables such as mobility and motor control, or how will the distribution shift with technological advances? After all, what is considered high-end technology now, may be low-resolution imagery of the near future, being able to visualise tissue damage we cannot see with contemporary technology. Finally, what would happen if we classified neck pain patients by their cognitions? Or by their first choice of care provider (ie self referral)? Chances are that the distribution would look vastly different. When divided by (self-)referral the distribution in this study was about 50-50, a more even distribution. Our data showed that practice variation on the level of 'average number of treatments' and 'recovery', was small.

So, in conclusion we can hypothesize that according to the current classification patients with non-specific neck pain represent a heterogeneous group and that practice variation is, at least partly, a logical and consequence of that. Only through variation science can progress in further classification and finding nuanced treatment strategies for subgroups of neck pain patients.

Moving forward

Measuring attitudes and expectancy

This thesis adds valuable insight to an emerging field of interest within healthcare. It provides new knowledge on the influence of attitudes and expectancies on treatment behaviour and outcome. By adopting and applying existing instruments and measurement protocols to assess attitudes and expectancy, comparison with existing literature is possible. It also provides us with opportunities to further improve the way we study this topic. In the definition of Olson et al, the changeability of expectancy is clearly present. Direct experience can shape and alter expectation. It is unclear how fast and how frequently expectancy can change during the course of treatment, as it may be a very reactive variable. People may, consciously or subconsciously, understate their expectancy because they do not want to put pressure on their care provider, or overstate expectancy to set a high delivery bar. The communicational skills of the care provider may instantly impact expectancy (“these complaints often disappear” vs “these complaints don’t always disappear”). If attitudes and expectancies truly are compound variables (and not constants), we can further improve the value of their measurement by elaborating on their components, contracting the context of the measurement and measure more frequently. It would make sense to couple that with more frequent measurements of outcome. In conclusion I would propose to incorporate more frequent measurements in expectancy studies, as well as more frequent measurements of its components and contraction of context. This may further

unravel confounding variables in the search for associations between expectancy and treatment outcome. Variables of interest would be communicational skills, trust, social status, personality traits, comprehensibility and richness of information, health literacy.

Analogous to attitude measurement, the measurement of expectancy and behaviour using self-report questionnaires and patient logs is indirect and subject to bias. There may even be an influence of the physical appearance of a questionnaire itself. It is not unlikely that the sequence of questions serves as a basis for attitude or expectancy formation, changing the outcome variable while we are trying to objectify it [31]. The context in which questions are asked, may have the same effect. On top of this complexity, we have to accept the fact that thinking is largely a subconscious process and not all that passes in our brain can be caught in words. In this view a questionnaire is not an 'objective' probe, but a formative instrument as well, with a user that may be aware of that effect, but unable to prevent it from occurring.

Although this thesis may have missed subtle interplay between care provider and patient by adopting a 'low resolution' route to collecting data, it adds information to the emerging insight in the complexity of human interaction. Complexity is described as "a dynamic and constantly emerging set of processes and objects that not only interact with each other but come to be defined by those interactions" [32]. In revealing a complex system, this thesis could be a ripple in the transition to more open and qualitative research strategies in complex concepts such as attitude and expectation. An interesting line of thinking is that we 'accept' the interplay between these variables to be complex and treat them as a black box. Health care professionals could then be trained and skilled in competencies that are relevant to professionally managing attitudes, expectancy and behaviour.

Communication, reflection and professional relationship

Further exploring the hypothesis that these variables are highly changeable, other fields of interest open up, such as the influence of wording, communication style and reflection. It is only through language that we can consciously access the world. Our interpretation of that world is personal and depends on vocabulary. Careful and mutual exchange of ideas and concepts between care provider and patient, is of vital importance if we want to consciously learn about and manage attitudes and beliefs. If a care providers' wording influences expectancy, then it is of importance to be able to formulate any message in a suiting fashion for the patient at hand. That requires high communicational competencies. Inversely, the wording of patients may also influence beliefs, attitudes and expectancies of the care provider.

If shared decision making (a process in which both the patient and care provider contribute to the decision-making process and agree on treatment decisions) is the approach of choice, then a stable quality of this exchange is even more important. Aside from the competency of being able to put beliefs and expectancies into words and reflecting upon that wording, which can be viewed as the 'reliability of text', there is also the aspect of 'validity of text'. In order to harvest valid answers that represent true beliefs and expectancies, the treatment relationship has to meet an array of criteria linked to safety, trust and linguistic alignment. Therapeutic relationship has been consistently associated with treatment outcomes in health research. A systematic review and meta-analysis examining the effect of manipulating patient-clinician relationships on medical outcomes found a significant effect (overall effect size $d = .11$; $p = .02$) in favour of the enhanced patient-provider relationships group [33]. This brings us back to Hippocrates' view that it is far more important to know what person the disease has, than what

disease the person has, and the germ theory, that brought the insight that not the germ is important, but the soil it needs to grow in. Although communication and professional relationship are factors that are recognised by biomedical research, they are for obvious reasons not always incorporated in pragmatic quantitative designs, and sometimes labelled 'placebo'. Incorporating these variables as possible serious contenders in recovery may greatly improve our insight in how health is constructed, maintained and regained.

In order to recognize faulty assumptions, reflective competencies should be on par with the communicational skills. This may be as 'simple' as routinely asking yourself questions as "why do I think that 'x' is caused by 'y'?", "Where or how can I check if this assumption is true?" and "Could this case be an exception to the rule?". Better insight into these mechanisms may be valuable to optimize the absolute effect of the technical treatment itself and should have an impact on training programs for professionals.

Implications for practice

The PABS-PT should be further validated before it is implemented in clinical practice. Although our study confirmed the two-factor model, insight in contextual factors on its reliability is still lacking. Depending on the context, socially desirable answers may be generated, blinding the researcher to underlying 'true' beliefs and attitudes.

In the absence of strong clinical evidence, practice variation should be viewed from a Darwinian perspective. It is a form of richness from which the optimal 'way of doing' will emerge. Practice variation should therefore be the start of research to evaluate its value or threats rather than the start of a policy to reduce it. Until

deeper insight in the variables of practice variation and their interrelationships is at hand, treatment recommendations by guidelines should not be overly restricting.

The impact of patient expectations on treatment outcome is still inconclusive. For clinical practice it is still advisable to take patient expectations into account when composing a treatment plan. Not only is the evidence supportive of its positive contribution, it is also highly unlikely to negatively impact treatment outcome. Sackett's model for evidence-based practice can still serve clinicians well in this respect.

Manual therapy is a viable treatment/management option for neck pain patients. These patients can consult a manual therapist, taking into consideration that they represent a heterogeneous group of health care providers and practice variation can therefore be large.

Implications for research

Research on the interaction of beliefs, expectancy and behaviour could benefit from the use of more elaborate research models as proposed by the literature on complexity theory [34]. Complexity theory focuses on understanding the patterns of interaction at different levels and times between elements of a system. Rather than analysing individual elements in isolation [35], it recognizes elements within the system (such as non-linearity, feedback loops and coevolution) that enable researchers to gain a deeper understanding in possible elaborate interaction. This facilitates a transdisciplinary approach to research, allowing different bodies of knowledge to be blended to provide a wider understanding of complex problems [36, 37]. Applying the principles of complexity theory to research on the relationship between beliefs, expectancy, clinical behaviour, adherence and outcome, would mean that we:

- View it as an open system
- Apply diverse models as used in social sciences and have psychology and biomedical science collaborating more extensively in this field.
- View beliefs, expectancy, clinical behaviour and adherence as true variables and measure them more frequently and in context for both patient and health care provider.
- Enrich responses by the use of more qualitative techniques, since not just 'wording', but 'meaning', 'intention', 'retrieved or computed' and their interaction and dynamics are underlying variables of interest.

Furthermore, future research may focus on possible differences of pain attitudes and beliefs, dependant on body part or stage of complaint. Aside from a distribution of knowledge between care providers, there may be different levels of knowledge within care providers, depending on the body part of interest. A deeper perceived understanding of a given body part, may influence the care providers pain attitudes towards complaints pertaining to that body part. A similar hypothesis can be articulated for the different stages of a complaint; pain attitudes may be different for acute complaints than for chronic complaints.

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Chapter 9

Summary

Samenvatting

Dankwoord

List of publications

Summary

Neck pain is a common musculoskeletal disorder that approximately one third of all adults is likely to experience during the course of one year. The course of neck pain is characterized by exacerbations and remissions, and 5-10% of patients will develop chronic pain. Because current diagnostic investigations cannot identify specific underlying pathology in most cases, neck pain is usually labelled as 'non-specific'.

Literature suggests that there is variation in the care provided for neck pain patients. Guidelines aim to decrease this practice variation, as well as the utilization of ineffective treatment modalities to improve patient outcomes. Other strategies that have been tried to minimize unwanted practice variation include patient decision aids, provider performance feedback, provider financial incentives and regulatory changes. It is believed that practice variation may lead to an increase in health care utilization, but research suggests that decreasing practice variation does not necessarily result in better patient outcomes.

Healthcare providers' attitudes and beliefs are possible factors contributing to practice variation. By definition, attitudes are underlying variables which influence behavior. These attitudes and beliefs may influence the health care providers' perception of patient characteristics and the way they manage their patients. When left with multiple options, the treatment approach of choice may reflect the clinicians' attitudes and beliefs. Attitudes are conceptualized as the degree of feeling or affect held towards an object. A belief is defined as a conceptualization of an object. Beliefs can be distinguished from attitudes to the extent that a belief is the information known about the object and an attitude is synthesized from

multiple beliefs. Driven by health care providers' attitudes and beliefs, two different treatment approaches can be discerned: a biomedical approach and a biopsychosocial approach. The biomedical approach suggests that all signs and symptoms are caused by physical pathology, and diagnosis will primarily be directed at finding the damaged tissue and treatment will often be pain contingent. The biopsychosocial approach suggests that psychological and social factors are important in the development and continuation of complaints and that pain does not necessarily have a causal relationship with tissue damage. Diagnosis is then primarily aimed at identifying relevant psychological and social factors, and treatment will often be time contingent. The biomedical and biopsychosocial approaches are not diametrically opposed to each other but have been found to be independent enough to be separated.

Patient recovery expectations are defined as patient's perceptions that a certain outcome of medical care is likely to occur. Among other factors, for medical care, personal experiences and those of family members and acquaintances develop these recovery expectations. Recovery expectations can also be influenced by the interactions that a patient has with the healthcare provider. Patient recovery expectations have been shown to influence treatment adherence and outcome, but overall, the research in this field shows varying results so far.

In order to add to the body of knowledge on practice variation, healthcare providers' attitudes and beliefs, and patients' expectations, we conducted a prospective cohort study with 12-months follow-up in the manual therapy setting in the Netherlands. Prior to the study, all participants followed a 2-day course on the protocol of the study and were responsible for selecting patients. At baseline, the characteristics of the manual therapist (age, gender, years of experience, work setting and additional educational qualifications) were assessed using a web-based questionnaire. In addition, attitudes and beliefs are assessed using the Pain Attitude and Beliefs Scale for Physiotherapists (PABS-PT) and the Health Care

Providers' Pain and Impairment Relationship Scale (HC-PAIRS). Each manual therapist was asked to include 5 consecutive patients with neck pain presenting in their clinical practice. Every patient with nonspecific neck pain, aged between 18-80 years, and able to read and write Dutch is eligible for participation.

In **Chapter one** we present an overview of the available evidence on the measurement properties of the Pain Attitude and Beliefs Scale for Physiotherapists (PABS-PT). The PABS-PT is a questionnaire that consists of two factors that distinguish between a biomedical and a biopsychosocial treatment orientation. Databases PubMed-Medline, Embase, Cinahl and Pedro were searched for eligible studies. All studies that focused on physical and/or manual therapists and/or general practitioners (GPs), both certified and student, were included. No criteria, other than 'musculoskeletal pain', were formulated for the patient population. Methodological quality was assessed and rated using the consensus-based standards for the selection of health measurement instruments (COSMIN) checklist and scoring system. Of the 139 identified publications, 10 met the selection criteria. Most of the included studies had fair to excellent methodological quality scores. Positive results were found for internal consistency, construct validity, reliability and responsiveness. No psychometric data were found for the content validity and interpretability of the PABS-PT. Factor items varied across studies, but the biomedical factor seems to be more robust and stable (Cronbach's α 0.77 - 0.84) than the behavioral factor (Cronbach's α 0.62 - 0.68). This overview of evidence showed that the PABS-PT is still in a developmental stage. Results for the psychometric properties are promising, but content validity and interpretability need more study.

Chapter two focusses on the reliability and validity of the Pain Attitudes and Beliefs Scale for Physiotherapists (PABS-PT) in neck pain patients. Three research aims were formulated; 1) to reexamine the factor structure of the PABS-PT, 2) to assess the test-retest reliability of the PABS-PT and 3) to determine the construct validity of the biomedical factor of the PABS-PT. We included 272 manual therapists that participated in an educational upgrade program for a professional masters' degree in the Netherlands and they completed the Health Care Providers' Pain and Impairment Relationship Scale and the PABS-PT. We then performed a Principal Axis Factor analysis and calculated correlation coefficients and the smallest real difference. In total 182 questionnaires were available for factor analysis and 73 for test-retest calculations. The principal factor analysis confirmed the existing interpretable 2-factor model of a 'biomedical treatment orientation' and a 'behavioral treatment orientation'. For the biomedical factor and the behavioral factor, the results of this study share 6 items and 5 items respectively with the original version of the PABS-PT. Test-retest reliability was 'moderate' to 'good' and construct validity for the biomedical factor was 'moderate' to 'substantial'. In conclusion the amended PABS-PT shows a consistent factor structure, good test-retest reliability and construct validity. The limited stability of the behavioral factor, the possible impact of differing implicit and explicit attitudes and the unknown influence of the body part of interest on pain attitudes, leads to the notion that the PABS-PT is still in a developmental stage.

Health care providers' attitudes and beliefs influence the way they manage their patients. In **Chapter three** we focus on the possible associations between health care providers' attitudes and beliefs and treatment outcome. The aims of this study were 1) to measure the attitude and beliefs of manual physical therapists in the Netherlands and 2) to explore the associations between these attitudes and beliefs,

the manual physical therapists' clinical behavior and perceived recovery of neck pain patients. Treatment modalities of manual physical therapists' choice were logged, and patient treatment outcome was assessed with de Global Perceived Effect questionnaire after the treatment episode. Treatment modalities were coded either biomedical or biopsychosocial and correlated with PABS-PT and treatment outcome. The label "biomedical" was given if there were no diagnostic considerations or treatment modalities other than ICF functions and/or activities or when a pain contingent approach was chosen. When personal and/or environmental factors were incorporated in the reasoning process or treatment modalities, or when the total approach was time contingent, the label "biopsychosocial" was applied. Treatment descriptions limited to "information" and/or "advice" were labelled "unclear" if not further specified. Manual physical therapists tended towards the biopsychosocial treatment orientation, whereas their actual clinical behavior was primarily biomedical (68%). The majority of the, predominantly female, patients with recurrent neck pain, reported being 'recovered' after the treatment episode. Correlations between PABS-PT scores, actual clinical behavior and recovery were all very low and varied between -.039 and 0.09. In conclusion, we found very weak associations between attitudes and beliefs of health care providers, their actual clinical behaviour (ie treatment choice) and patient outcomes. Relying on indirect measurements for attitudes and beliefs and documentation of clinical behaviour may be insufficient for gaining insight in actual clinical decision-making. Future research in this field could concentrate on the possible variance of attitudes and beliefs across different body parts, and the influence of patients on the clinical behavior of the care provider.

Little is known about the association of patient recovery expectations and treatment outcome in patients with neck pain consulting a manual therapist.

Several studies suggest that patient recovery expectations can predict treatment outcome. **Chapter four** evaluates the predictive value of recovery expectations in neck pain patients consulting manual therapists in the Netherlands. The primary outcome measure 'recovery' is defined as 'reduction in pain and perceived improvement'. The relationship between recovery expectancy and recovery was assessed by logistic regression analysis. We found that patients generally reported high recovery expectations on all three questions of the PEL. When adjusted for covariates the PEL sum-score did not predict recovery. When analyzed separately, the first question of the PEL showed predictive potential for recovery but failed to reach statistical significance. In conclusion, patient recovery expectations did not predict treatment outcome in this study. Variables that did predict recovery were recurrence and duration of pain. The precise relationship between patient recovery expectations and outcome is complex and still inconclusive. Research on patient expectancy could benefit from more focus on the dynamics and influenceability of recovery expectations during treatment, their physiological make-up and possible capability to influence favorable outcome.

Chapter five concerns the first study, we are aware of, to explore practice variation in manual therapy for neck pain patients. It focusses on three aims: 1) exploring practice variation on the patient level, 2) exploring variation in practice and treatment approach on the level of the manual therapist, 3) exploring associations between practice variation and recovery. In our Cohort study treatment modalities of choice were logged and coded either biomedical (BM) or biopsychosocial (BPS). The label "biomedical" was given if there were no reported diagnostic considerations or treatment modalities other than mechanical or physiological dysfunctions of joints (e.g. "extension C2,3 right side is impaired") and muscles (e.g. "shortened trapezius muscle"), or when a pain contingent approach was chosen. When personal and/or environmental factors were incorporated in the diagnostic

reasoning process or in the choice for treatment modalities (e.g. “experienced anxiety levels influence movement behaviour”), or when the total approach was time contingent, the label biopsychosocial was applied. Patient treatment outcome was assessed with de Dutch Version of the Global Perceived Effect scale (GPE-DV) after the treatment episode. We found substantial practice variation in manual therapy for non-specific neck pain patients. Both acute and chronic neck pain patients received a predominantly biomedical oriented treatment. No significant differences were found between the total number of and percentages BM or BPS treatment sessions for acute and chronic neck pain patients. Manual therapists with an explicit BPS profile had a lower percentage of BPS treatment sessions for patients with chronic neck pain. In conclusion we found practice variation for manual therapists in the treatment of patients with nonspecific neck pain. There was no association between acute and chronic patients concerning the average number of treatments and percentages biomedical or biopsychosocial treatment sessions. Furthermore, there was no association between practice variation and patient outcomes.

Finally, the objective of **Chapter six** was to evaluate whether there are differences between individuals with nonspecific neck pain who consult a manual therapist via self-referral and those who do so via referral by a physician concerning patient characteristics, number of treatments, and recovery; and whether (self-)referral is associated with recovery. Baseline measurements drawn from our Cohort study included demographic data and data concerning neck pain. At follow-up, number of treatments, recovery, and satisfaction were assessed. To evaluate differences between the groups, we used the chi-squared test and the independent t-test. A logistic regression analysis was used to evaluate the association between referral status and recovery. Of the 831 patients whose referral data are available, about

half consulted a manual therapist by self-referral. The mean number of treatments was 5.4, which did not differ between the 2 groups. This study showed that there were several statistically significant but small differences between the self-referral and referral groups. In general, self-referred patients reported less disability and more often recurrent and acute complaints when consulting a manual therapist. Self-referred patients had similar average numbers of treatment sessions and recovery rates to referred patients.

Chapter seven reflects on the findings of separate chapters of this thesis and compares the accumulated outcome of this work with the literature on this subject. It also elaborates on the strengths and weaknesses of this work and provides recommendations for future research and clinical practice.

Samenvatting

Nekpijn is een veel voorkomende musculoskeletale aandoening die ongeveer een derde van alle volwassenen in de loop van een jaar waarschijnlijk zal treffen. Het verloop van nekpijn wordt gekenmerkt door exacerbaties en remissies, en 5-10% van de patiënten zal chronische pijn ontwikkelen. Omdat de huidige beeldvormingstechnieken in de meeste gevallen geen specifieke onderliggende pathologie kunnen identificeren, wordt nekpijn meestal bestempeld als 'aspecifiek'.

Uit de literatuur blijkt dat er praktijkvariatie is in de zorg voor nekpijnpatiënten. Richtlijnen zijn bedoeld om deze praktijkvariatie te verminderen, evenals het gebruik van ineffectieve behandelingsmodaliteiten, met als doel zo de behandeluitkomsten van patiënten te verbeteren. Andere strategieën die zijn ingezet om ongewenste praktijkvariatie te minimaliseren, zijn onder meer beslissingshulpmiddelen voor patiënten, feedback over prestaties van hulpverleners, financiële prikkels voor hulpverleners en wijzigingen in de regelgeving. Er wordt aangenomen dat praktijkvariatie leidt tot een toename van het gebruik van zorg, maar onderzoek suggereert dat het verminderen van praktijkvariatie niet noodzakelijkerwijs leidt tot betere patiëntresultaten.

De ‘attitudes’ en ‘beliefs’ van zorgverleners zijn mogelijke factoren die bijdragen aan praktijkvariatie. Attitudes zijn per definitie onderliggende variabelen die gedrag beïnvloeden. Deze ‘attitudes’ en ‘beliefs’ kunnen van invloed zijn op de manier waarop zorgverleners patiënt kenmerken waarnemen en op de wijze waarop zij hun patiënten helpen. Wanneer er meerdere opties zijn, bestaat de kans dat de gekozen behandelstrategie de ‘attitudes’ en ‘beliefs’ van de clinicus weerspiegelen. Een ‘attitude’ wordt geconceptualiseerd als de mate van gevoel of affiniteit die men ten opzichte van een object heeft. Een ‘belief’ wordt gedefinieerd als een

conceptualisatie van een object. Beliefs kunnen worden onderscheiden van attitudes in die mate dat een belief de informatie betreft die bekend is over het object en een houding wordt gesynthetiseerd uit meerdere beliefs. Voortvloeiend uit de 'attitudes' en 'beliefs' van zorgverleners zijn twee verschillende behandelbenaderingen te onderscheiden: een biomedische benadering en een biopsychosociale benadering. De biomedische benadering veronderstelt dat alle tekenen en symptomen worden veroorzaakt door fysieke pathologie. Diagnostiek zal dan ook voornamelijk gericht zijn op het vinden van het beschadigde weefsel en de behandeling zal vaak pijncontingent zijn. De biopsychosociale benadering veronderstelt dat psychologische en sociale factoren belangrijk zijn bij de ontwikkeling en voortzetting van klachten en dat pijn niet noodzakelijkerwijs een causaal verband heeft met weefselschade. De diagnose is hierdoor in de eerste plaats gericht op het identificeren van relevante psychologische en sociale factoren, en de behandeling zal vaak tijdcontingent zijn. De biomedische en biopsychosociale benaderingen staan niet diametraal tegenover elkaar, maar blijken verschillend genoeg om als aparte benaderingen gezien te kunnen worden.

De herstelverwachtingen van de patiënt worden gedefinieerd als de perceptie van de patiënt dat een bepaalde uitkomst van medische zorg waarschijnlijk zal zijn. Deze verwachtingen voor herstel worden, onder andere, gevormd door persoonlijke ervaringen in de zorg en die van familieleden en kennissen. Herstelverwachtingen kunnen ook worden beïnvloed door de interacties die een patiënt heeft met de zorgverlener. Het is aangetoond dat de herstelverwachtingen van patiënten de therapietrouw en het behandelresultaat beïnvloeden, hoewel onderzoek op dit gebied over het algemeen wisselende resultaten laat zien.

Om de kennisbasis over praktijkvariatie, de 'attitudes' en 'beliefs' van zorgverleners en de herstelverwachtingen van patiënten te vergroten, hebben we een prospectief cohortonderzoek uitgevoerd met 12 maanden follow-up binnen de

manuele therapie in Nederland. Voorafgaand aan het onderzoek volgden alle manueel therapeuten een 2-daagse cursus over het protocol van de studie en waren ze verantwoordelijk voor de selectie van patiënten. Bij aanvang werden de kenmerken van de manueel therapeut (leeftijd, geslacht, jarenlange ervaring, werksetting en aanvullende opleidingskwalificaties) vastgelegd aan de hand van een web-based vragenlijst. Daarnaast worden attitudes en overtuigingen beoordeeld met behulp van de Pain Attitude and Beliefs Scale voor fysiotherapeuten en de Health Care Providers' Pain and Impairment Relationship Scale. Elke manueel therapeut werd gevraagd om 5 opeenvolgende patiënten met nekpijn in hun praktijk deel te laten deelnemen. Elke patiënt met aspecifieke nekpijn, tussen de 18 en 80 jaar oud, die Nederlands kan lezen en schrijven, kwam in aanmerking voor deelname.

In **hoofdstuk één** presenteren we een overzicht van het beschikbare bewijs over de meeteigenschappen van de Pain Attitudes and Beliefs Scale (PABS-PT). De PABS-PT is een vragenlijst die bestaat uit twee factoren die onderscheid maken tussen een biomedische en een biopsychosociale behandelingsoriëntatie. Databases PubMed-Medline, Embase, Cinahl en Pedro werden doorzocht op geschikte studies. Alle onderzoeken gericht op fysiotherapeuten en/of manueel therapeuten en/of huisartsen (huisartsen), zowel gecertificeerd als student, werden meegenomen. Voor de patiëntenpopulatie werden geen andere criteria geformuleerd dan 'musculoskeletale pijn'. Methodologische kwaliteit werd beoordeeld met behulp van de COnsensus-gebaseerde normen voor de selectie van gezondheidsmeetinstrumenten (COSMIN) checklist en scoresysteem. Van de 139 geïdentificeerde publicaties voldeden er 10 aan de selectiecriteria. De meeste van de opgenomen studies hadden voldoende tot uitstekende methodologische kwaliteitsscores. Er werden positieve resultaten gevonden voor interne

consistentie, constructvaliditeit, betrouwbaarheid en responsiviteit. Er zijn geen psychometrische gegevens gevonden over de inhoudsvaliditeit en interpreteerbaarheid van de PABS-PT. Factoritems varieerden tussen studies, maar de biomedische factor lijkt robuuster en stabieler (Cronbach's α 0,77 - 0,84) dan de biopsychosociale factor (Cronbach's α 0,62 - 0,68). Uit dit overzicht van de gegevens bleek dat de PABS-PT zich nog in een ontwikkelingsfase bevindt. Resultaten voor de psychometrische eigenschappen zijn veelbelovend, maar inhoudsvaliditeit en interpreteerbaarheid hebben meer onderzoek nodig.

Hoofdstuk twee richt zich op de betrouwbaarheid en validiteit van de PABS-PT bij nekpijnpatiënten. Er zijn drie onderzoeksdoelstellingen geformuleerd; 1) het opnieuw onderzoeken van de factorstructuur van de PABS-PT, 2) het opnieuw onderzoeken van de test-hertest betrouwbaarheid van de PABS-PT en 3) het bepalen van de constructvaliditeit van de biomedische factor van de PABS-PT. We hebben 272 manueel therapeuten geïncludeerd die hebben deelgenomen aan een educatief upgradeprogramma voor een professionele master in Nederland en zij hebben de Health Care Providers' Pain and Impairment Relationship Scale en de PABS-PT afgerond. Vervolgens hebben we een Principal Axis Factor analyse uitgevoerd en correlatiecoëfficiënten en het 'smallest real difference' berekend. In totaal waren er 182 vragenlijsten beschikbaar voor factoranalyse en 73 voor test-hertest berekeningen. De belangrijkste factoranalyse bevestigde het bestaande 2-factor model van een 'biomedische behandelingsoriëntatie' en een 'biopsychosociale behandelingsoriëntatie'. Voor de biomedische factor en de gedragsfactor hebben de resultaten van deze studie respectievelijk 6 items en 5 items met de originele versie van de PABS-PT gemeen. De betrouwbaarheid van de test-hertests was 'matig' tot 'goed' en de constructvaliditeit voor de biomedische factor was 'matig' tot 'substantieel'. Concluderend toont de gewijzigde PABS-PT een

consistente factorstructuur en een goede test-hertest betrouwbaarheid en constructvaliditeit. De beperkte stabiliteit van de gedragsfactor, de mogelijke impact van verschillende impliciete en expliciete attitudes en de onbekende invloed van het betreffende lichaamsdeel op pijn ‘attitudes’, leiden tot het idee dat de PABS-PT zich nog in een ontwikkelingsfase bevindt.

De houding en overtuigingen van zorgverleners hebben invloed op de manier waarop zij met hun patiënten omgaan. In **hoofdstuk drie** richten we ons op de mogelijke associaties tussen de ‘attitudes’ en ‘beliefs’ en het behandelresultaat van zorgverleners. Het doel van dit onderzoek was 1) het meten van de ‘attitudes’ en ‘beliefs’ van manueel therapeuten in Nederland en 2) het onderzoeken van de associaties tussen deze ‘attitudes’ en ‘beliefs’, het klinisch gedrag van de manueel therapeuten en het waargenomen herstel van nekpijnpatiënten. Behandelingsmodaliteiten van de keuze van manueel fysiotherapeuten werden geregistreerd en het behandelresultaat van de patiënt werd beoordeeld met de Global Perceived Effect-vragenlijst na de behandelreeks. De behandelingsmodaliteiten werden gecodeerd als biomedisch of biopsychosociaal en gecorreleerd aan PABS-PT en de behandeluitkomst. Het label "biomedisch" werd gegeven als er geen andere diagnostische overwegingen of behandelingsmodaliteiten waren dan ICF-functies en/of -activiteiten of wanneer een pijncontingente aanpak werd gekozen. Wanneer persoonlijke en/of omgevingsfactoren werden opgenomen in het redeneringsproces of de behandelingsmodaliteiten, of wanneer de totale aanpak tijdsafhankelijk was, werd het label "biopsychosociaal" toegekend. Behandelingsbeschrijvingen die beperkt waren tot "informatie" en/of "advies" werden als "onduidelijk" bestempeld, zo niet nader gespecificeerd. Manueel fysiotherapeuten neigden naar de biopsychosociale behandelingsoriëntatie, terwijl hun gerapporteerde klinische gedrag voornamelijk

biomedisch was (68%). De meerderheid van de, overwegend vrouwelijke, patiënten met terugkerende nekpijn meldde dat ze na de behandelserie 'hersteld' waren. Correlaties tussen PABS-PT scores, daadwerkelijk klinisch gedrag en herstel waren allen zeer laag en varieerden tussen -.039 en 0.09. Concluderend vonden we zeer zwakke associaties tussen ‘attitudes’ en ‘beliefs’ van zorgverleners, hun werkelijke klinische gedrag (d.w.z. behandelingskeuze) en patiëntresultaten. Afgaan op indirecte metingen voor ‘attitudes’ en ‘beliefs’ en documentatie van klinisch gedrag is onvoldoende om genuanceerd inzicht te krijgen in de daadwerkelijke klinische besluitvorming. Toekomstig onderzoek op dit gebied zou zich kunnen concentreren op de mogelijke spreiding van ‘attitudes’ en ‘beliefs’ over verschillende lichaamsdelen, en de invloed van patiënten op het klinische gedrag van de zorgverlener.

Er is weinig bekend over de associatie tussen herstelverwachtingen van nekpijn patiënten en de behandeluitkomst van manuele therapie. Verschillende studies suggereren dat de herstelverwachtingen van patiënten de uitkomst van de behandeling kunnen voorspellen. **Hoofdstuk vier** onderzoekt de voorspellende waarde van herstelverwachtingen bij nekpijnpatiënten die manueel therapeuten in Nederland consulteren. De primaire uitkomstmaat 'herstel' wordt gedefinieerd als 'vermindering van pijn en waargenomen verbetering'. De relatie tussen herstelverwachting en herstel werd beoordeeld aan de hand van logistische regressieanalyse. We ontdekten dat patiënten over het algemeen hoge herstelverwachtingen rapporteerden op alle drie de vragen van de Patient Expectancies List (PEL). Wanneer gecorrigeerd voor covariaten voorspelde de PEL-somscore geen herstel. Bij afzonderlijke analyse, vertoonde de eerste vraag van de PEL voorspellende capaciteit, maar behaalde daarin geen statistische significant niveau. Concluderend voorspelden de herstelverwachtingen van patiënten de

uitkomst van de behandeling in deze studie niet. Variabelen die herstel voorspelden, waren recidief en duur van de pijn. De precieze relatie tussen de herstelverwachtingen van de patiënt en de uitkomst is complex en nog steeds niet overtuigend. Onderzoek naar de patiëntverwachting zou baat kunnen hebben bij meer focus op de dynamiek en beïnvloedbaarheid van herstelverwachtingen tijdens de behandeling, hun fysiologische samenstelling en mogelijke vermogen om behandelresultaten te beïnvloeden.

Hoofdstuk vijf betreft de eerste studie, voor zover wij weten, waarin praktijkvariatie binnen de manuele therapie voor nekpijnpatiënten wordt onderzocht. Het richt zich op drie doelen: 1) het verkennen van praktijkvariatie op patiëntniveau, 2) het verkennen van variatie in de praktijk en behandelaanpak op het niveau van de manueel therapeut, 3) het verkennen van associaties tussen praktijkvariatie en herstel. In onze cohortstudie werden behandelingsmodaliteiten naar keuze geregistreerd en gecodeerd, hetzij biomedisch (BM) of biopsychosociaal (BPS). Het label "biomedisch" werd gegeven als er geen gemelde diagnostische overwegingen of behandelingsmodaliteiten waren anders dan mechanische of fysiologische disfuncties van gewrichten (bijv. "extensie C2,3 rechterkant is aangetast") en spieren (bijv. "verkorte trapeziusspier"), of wanneer een pijncontingente benadering werd verkozen. Wanneer persoonlijke en/of omgevingsfactoren werden opgenomen in het diagnostische redeneringsproces of in de keuze voor behandelingsmodaliteiten (bijv. "ervaren angstniveaus beïnvloeden bewegingsgedrag"), of wanneer de totale aanpak tijdcontingent was, werd het label biopsychosociaal toegekend. De uitkomst van de behandeling van patiënten werd na de behandeling beoordeeld met de Nederlandse versie van de Global Perceived Effect scale (GPE-DV). We vonden aanzienlijke praktijkvariatie in manuele therapie voor aspecifieke nekpijnpatiënten. Zowel acute als chronische

nekpijnpatiënten kregen een overwegend biomedisch georiënteerde behandeling. Er werden geen significante verschillen gevonden tussen het totale aantal en percentages BM- of BPS-behandelingssessies voor acute en chronische nekpijnpatiënten. Manueel therapeuten met een expliciet BPS-profiel hadden een lager percentage BPS-behandelsessies voor patiënten met chronische nekpijn. Concluderend vonden we praktijkvariatie onder manueel therapeuten bij de behandeling van patiënten met aspecifieke nekpijn. Er was geen verband tussen acute en chronische patiënten voor wat betreft het gemiddelde aantal behandelingen en de percentages biomedische of biopsychosociale behandelingssessies. Bovendien was er geen verband tussen praktijkvariatie en patiëntresultaten.

Ten slotte was het doel van **hoofdstuk zes** om te evalueren of er verschillen zijn tussen personen met aspecifieke nekpijn die een manueel therapeut raadplegen via directe toegang (zelfverwijzing) en degenen die dit doen via een verwijzing door een arts, voor wat betreft patiëntkenmerken, aantal behandelingen en herstel; en of (zelf)verwijzing samenhangt met herstel. Baseline metingen uit onze Cohort studie omvatten demografische gegevens en gegevens over nekpijn. Bij de follow-up werd het aantal behandelingen, herstel en tevredenheid beoordeeld. Om verschillen tussen de groepen te evalueren, gebruikten we de x2-test en de onafhankelijke t-test. Een logistische regressieanalyse werd gebruikt om de koppeling tussen verwijswijze en herstel te evalueren. Van de 831 patiënten van wie de verwijzingsgegevens beschikbaar zijn, raadpleegde ongeveer de helft een manueel therapeut door zelfverwijzing. Het gemiddelde aantal behandelingen was 5,4, wat niet verschilde tussen de 2 groepen. Deze studie toonde aan dat er verschillende statistisch significante, maar kleine verschillen waren tussen de zelfverwezen en doorverwezen groepen. Over het algemeen meldden zelfverwezen

patiënten minder invaliditeit en vaker terugkerende en acute klachten bij de manueel therapeut. Zelfverwezen patiënten hadden een vergelijkbaar gemiddeld aantal behandelingssessies en herstelpercentages als doorverwezen patiënten.

Hoofstuk zeven reflecteert op de bevindingen van de afzonderlijke hoofdstukken en vergelijkt het geaggregeerde resultaat met de literatuur. Ook wordt in deze sectie ingegaan op de sterktes en zwakten van dit werk en worden aanbevelingen gedaan voor toekomstig onderzoek en de klinische praktijk.

Dankwoord

Ik moet me inhouden niet te starten met de reclametekst van een bekende telecom provider “wie had dat gedacht?”. Het is immers nooit mijn ambitie geweest om een project te starten waarbinnen ik tien maal mijn verjaardag kon vieren. Toch is dat zo gelopen. Was het dan de veel beschreven lijdensweg? Hoewel de looptijd doet vermoeden van wel, zou dat toch niet mijn conclusie zijn. Bovendien zou je je terecht kunnen afvragen of iemand een dergelijk lang lijden überhaupt wel zou kunnen overleven. Waarom dan toch al die tijd? Laat ik de verklaring daarvoor ten eerste in mijn persoonlijkheidsstructuur zoeken. Naast een concentratieboog van homeopatische omvang, ben ik ook ‘gezegend’ met een brede interesse. Het heeft tot gevolg dat ik me soms letterlijk het betere deel van een jaar heb laten afleiden door andere projecten die met fysiotherapie, onderwijs, cartoons of verbouwingen hebben te maken.

Een andere factor is duidelijk de shift in motivatie die ik heb doorgemaakt. Mijn ware drijfveer is het bijdragen aan een solide maatschappelijke basis voor fysiotherapie. De realisatie dat mijn bijdrage aan de wetenschap niet de wereld gaat veranderen en er voor een stevige maatschappelijke positionering van fysiotherapie op dit moment in de tijd wellicht andere zaken van groter belang zijn, hebben mijn schrijfdrift meer ontspannen dan verwacht. Maar het is goed zo. Ik heb thuis niets gemist en meen in diezelfde tijd bij de academie en voor de beroepsgroep prima bijdragen te hebben geleverd.

Laat ik starten met het danken van de projectgroep. Arianne, bedankt voor het tonen van het geduld dat je eigenlijk niet eens hebt. Je enorme aanhoudendheid heeft zeker geholpen om dit tot een goed eind te brengen. Annelies, dank voor je goed getimede suggesties en fijne gesprekken. Bart, dank voor het tonen van het

geduld dat jij wel hebt. Renske, dank voor het in alle openheid kunnen uitwisselen van ‘wat we ervan vinden’.

Zonder dat ik meen dat ze er veel hinder van hebben ondervonden, wil ik uiteraard ook Imre, mijn gezin en mijn familie danken. Gewoon zomaar, omdat we onderling een dynamiek hebben waarin erg veel kan en maar weinig echt moet. Niet dat deze houding het tempo van het werk in positieve zin heeft beïnvloed, maar wel omdat ze onze echte gedeelde waarden vertegenwoordigt.

Ook dank aan de academie en de vrienden en collega’s die dit traject met gepaste interesse en verbazing hebben gevolgd. Het heeft allemaal bijgedragen aan het feit dat dit werk toch nog binnen één generatie is afgerond.

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