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Faculteit Revalidatiewetenschappen

master in de revalidatiewetenschappen en de kinesitherapie

Masterthesis

The influence of pain-related and psychological factors on treatment adherence and satisfaction with physiotherapy in persons with musculoskeletal shoulder pain

Isaura Clerix

Kenneth Lambeets

Scriptie ingediend tot het behalen van de graad van master in de revalidatiewetenschappen en de kinesitherapie, afstudeerrichting revalidatiewetenschappen en kinesitherapie bij musculoskeletale aandoeningen

PROMOTOR :

dr. Liesbet DE BAETS



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This master thesis is the final step to obtain our diploma in rehabilitation sciences and physiotherapy. After four years of studying, this is a unique opportunity to convert our theoretical knowledge into our “own research” under professional supervision. Of course, we needed the support and experience of others to realize this project, for which we are sincerely grateful.

First, we want to thank our promoter, Dr. Liesbet De Baets, for the excellent guidance and critical feedback. Thank you for your time and energy invested in our master thesis project during this academic year.

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Finally, we want to thank everyone who has shown an interest in what we did, and those who helped us in any way, but who we do not thank here by name. Thank you.

We wish you a lot of reading pleasure.

RESEARCH CONTEXT

Shoulder pain is the third most common musculoskeletal condition presented to physicians or physiotherapists in primary healthcare¹, and leads to functional disability in the working^{2,3} and general population³⁻⁵. Although a large group of persons with shoulder pain seeks primary-care services, persistent pain after 12 months is reported in about 50% of the patients⁶. Consequences of this persistent pain and pain-related disability are e.g. extensive use of health care services, sickness absence and disability pension, leading to an important socioeconomic burden⁷⁻¹⁰. Therefore, research in the field of shoulder pain needs to focus on the identification of factors predicting and mediating the evolution from acute to persistent shoulder pain and disability. Knowledge of these factors will provide opportunities for preventing persist shoulder pain and ameliorating treatment programs in case of shoulder pain.

At this moment however, the influence of pain self-efficacy and pain-related factors on the adherence to physiotherapy treatment is not studied yet. Also, their influence on the satisfaction of patients towards their received treatment is currently still unknown. This is a shortcoming, as adherence to treatment and being satisfied with the ongoing treatment are prerequisites to take advantage from physiotherapy for shoulder disorders. Knowledge of factors negatively affecting adherence or satisfaction is important to take into account when designing treatment plans.

This master thesis part two fits within the research domain of musculoskeletal rehabilitation. This research is part of a broader research project on the influence of psychological and pain-related factors on treatment adherence, motivation towards treatment and satisfaction with treatment in a physiotherapy setting treating persons with musculoskeletal shoulder pain. The aim of this master thesis is to assess the extent to which pain during movement, pain self-efficacy and motivation towards therapy correlate with adherence to therapy and satisfaction with therapy in a physiotherapy setting treating persons with musculoskeletal shoulder pain.

Based on the results of this pilot study, it will be clear on which psychological or pain-related factors the physiotherapist and future treatment protocols must respond to,

possibly by using technological applications, with the aim of improving therapy adherence and satisfaction with therapy.

This study is supervised by Prof. Dr. Annick Timmermans and Dr. Liesbet De Baets, members of the rehabilitation research center 'REVAL' at Hasselt University.

The research question for this master thesis was determined by the students, Isaura Clerix and Kenneth Lambeets, in consultation with the supervisor, Dr. Liesbet De Baets. There was no contribution from the students in the determination of the research design since this was elaborated within an ongoing research project. The recruitment of participants was done in collaboration between the students, their supervisor and the lead researcher, Prof. Dr. Annick Timmermans. Both students contributed to data processing and the academic writing process.

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ABSTRACT

Background: At this moment the influence of psychological and pain-related factors on adherence to and satisfaction with physiotherapy treatment is not studied yet. Since adherence to therapy and satisfaction with therapy are prerequisites for a successful shoulder rehabilitation this is a shortcoming in literature.

Objectives: This study investigates the correlation between baseline pain intensity, baseline intrinsic motivation for therapy or baseline pain self-efficacy on the one hand, and therapy adherence or satisfaction with therapy on the other hand at 3 months after the start of physiotherapy for musculoskeletal shoulder pain.

Participants: Patients suffering from a musculoskeletal shoulder complaint were recruited by physiotherapists in private physiotherapy practices in Flanders during the first appointment for their shoulder complaint. Patients needed to be older than 18 years and had to understand the Dutch language well.

Measurements: Pain self-efficacy was measured at baseline using the Pain Self-Efficacy Questionnaire. Pain during movement was measured at baseline using a numeric rating scale with 11 points. Patient motivation towards therapy was measured at baseline using the intrinsic motivation inventory sub scale 'interest/enjoyment'. Adherence to therapy and satisfaction with therapy was measured at 3-month follow-up using a 7-point Likert scale.

Results: Reduced therapy adherence for advice during therapy at 3-month after starting physiotherapy was strongly related with decreased intrinsic motivation ($r=0.6348$; $p=0.0005$). No other significant relations between baseline variables and 3-month follow-up variables were detected in this study.

Conclusion: Higher levels of patient intrinsic motivation for therapy at baseline was related to higher levels of self-reported adherence to therapy at 3-month follow up and vice versa. This implicates that more motivated patients will be more adherent to therapy, than patients that are less motivated.

INTRODUCTION

Shoulder pain is the third most common musculoskeletal condition presented to physicians or physiotherapists in primary healthcare, and leads to functional disability in the working and general population¹⁻⁵. In the general adult population as many as 20% experience shoulder symptoms⁶. Twenty percent of these patients experience a disability associated with shoulder pain and half of this population is treated by a physiotherapist⁷.

Exercise therapy has been proven to be effective in the treatment for reducing pain in persons with shoulder complaints⁸. However, evidence shows that only half of all patients who received physiotherapy treatment have a full recovery after six months and only 60% after one year⁹.

This delay in recovery or incomplete recovery is associated with a combination of , occupational, psychological, social and biological factors^{10,11}. On biological level, obesity, co-morbidities, age and gender are factors that are associated with a delay in recovery from shoulder complaints^{10,12-15}. Chester et al. (2016) described furthermore that lower pain severity at baseline and higher pain self-efficacy at baseline were predictive for a better outcome of physiotherapy¹⁶. Also expectations of recovery regarding shoulder physiotherapy was a predictors for treatment outcome¹⁶. Depression and anxiety at baseline on the other hand were not predicting persistent shoulder pain or disability after physiotherapy¹⁷. In the occupational context, moving heavy objects, working above shoulder height and repetitive work affected healing negatively¹⁸⁻²⁴. Abovementioned factors can affect the recovery directly, or indirectly through their negative impact on adherence for physiotherapy.

The World Health Organization defines adherence as ‘the extent to which the behavior of a person corresponds to the recommendations of the therapist’²⁵. The effectiveness of the exercise programs used by the physiotherapist is strongly dependent on adherence in different parts of the physiotherapeutic treatment²². Firstly, attending the weekly therapy appointments is necessary. Secondary, adherence to the predefined exercise program, compliance to the physiotherapeutic advice in the all-day life context and the consistent implementation of home exercises is necessary to prevent recurrent and persistent

complaints²⁶. Patients with higher adherence experience more functional increase and are more satisfied with therapy. Despite this, adherence to therapy in musculoskeletal complaints remains low^{27,28}. Complementary with adherence, satisfaction with therapy may influence the effectiveness of therapy as well. Other disciplines reported lower engagement in treatment and lower success rates to be associated with lower satisfaction with therapy²⁹.

Other reasons for the small effects of therapy include too little targeted and individual rehabilitation, insufficient challenging of motor learning and no task specific rehabilitation^{30,31}. This list of factors may also negatively impact the patient's motivation.

Persistent pain and pain-related disabilities can often limit the possibility to perform all-day life tasks, but may also form an obstacle in the work area^{6,10}. This results in a considerable socioeconomic impact due to the extensive use of health care services and due to reduced work performance, sickness absence and early retirement or unemployment³²⁻³⁵.

Aforementioned socioeconomic burden combined with large numbers of incomplete recovery results in a consensus for the necessity of research to identify factors that can predict and mediate the recovery of musculoskeletal shoulder complaints. At this moment the influence of psychological and pain-related factors on the adherence to therapy and satisfaction with therapy is not studied yet. Knowing that adherence to therapy and satisfaction with therapy are prerequisites to a successful shoulder rehabilitation, this is a shortcoming in evidence. As a result, the research question is formulated as follows: 'Is there a correlation between baseline pain intensity, baseline motivation for therapy or baseline pain self-efficacy on the one hand, and therapy adherence or satisfaction with therapy on the other hand at three months follow-up after the start of physiotherapy sessions for musculoskeletal shoulder pain?' We hypothesize that low to moderate pain intensity during movement, high motivation for therapy and high pain self-efficacy (all at baseline) will correspond with high levels of therapy adherence and satisfaction with therapy at three-month follow-up. Vice versa, we hypothesize that high pain intensity during movement, low motivation for therapy and low pain self-efficacy will correspond with lower levels of therapy adherence and lower levels of satisfaction with therapy at three-month follow-up.

METHODS

STUDY DESIGN AND SETTING

This study is a 24-month multicenter, prospective, cohort study, that is carried out between January 2018 and March 2019.

PARTICIPANTS AND PROCEDURES

Recruitment of patients took place in physiotherapy practices by physiotherapists in Flanders. Participating physiotherapists were instructed to propose the patient to participate in this study at the start of their first treatment for a musculoskeletal shoulder complaint, if they met the eligibility requirements. All participating physiotherapists received a standardized explanation regarding the information they had to provide to possible participants, as well as the instructions they had to give to patients who decided to participate in this study.

Physiotherapist practices, located in Flanders, were found through personal contacts, relatives, 'clinical placements' list Rehabilitation sciences and Physiotherapy, Hasselt University, and members of 'Schoudernetwerk Vlaanderen'. Physiotherapy practices were contacted by email, by phone or through personal contact whether they are interested to be involved in this research. A clear description of the study, the eligibility criteria, and their involvement in the study was given. In this description they were told the length of the study (24 months), the kind of study (multicenter, prospective, cohort study), the measured variables (motivation for therapy at baseline, pain during movement at baseline, pain self-efficacy at baseline, therapy adherence for appointments at 3-month follow-up, therapy adherence to advice during therapy at 3-month follow-up, therapy adherence to advice after therapy at 3-month follow-up and satisfaction with therapy at 3-month follow-up), the follow-up moments (baseline and 3-month follow-up), how the patients received the first bundle of questionnaires (from their physiotherapist at the first treatment), how the patients had to send the first and second questionnaire bundle back to the researchers (by post or by email) and how the patients received the second bundle of questionnaires (by post three days prior to the 3-month follow-up period).

If the physiotherapist confirmed the eligibility of the patient according to the eligibility criteria, the patient was invited to participate in this study. Participants were eligible if they started

physiotherapy because of a shoulder complaint, unprecedented by any form of treatment for this same musculoskeletal shoulder complaint, if they were aged 18 years or older and understood the Dutch language well. Patients with the complex regional pain syndrome, shoulder pain after breast cancer (because of the treatment) or after a cardiac treatment, and patients with known neoplasm were excluded from the study. Patients suffering with shoulder pain of a cervical origin, persons with systemic conditions with a significant musculoskeletal component (i.e. inflammatory joint disorders, polymyalgia rheumatica, neoplastic disorders) or in case of neurological conditions (e.g. shoulder pain after a stroke or shoulder pain in multiple sclerosis) were excluded from the study as well, because shoulder pain in these cases was a comorbidity. Eligible participants who were interested in the study were asked to sign a consent form to participate, after being well-informed by their physiotherapist about the description of the study as aforementioned and the implications of participating. The signed consent form was handed to the researchers involved in this study, together with the patient's personal information, and a description of the physiotherapist's diagnosis of the shoulder disorder. Furthermore, date of therapy start was provided. Next, the physiotherapists gave a sealed envelope to the participant that contains information about the course of the study, contact details of the primary investigator, a bundle of questionnaires (including demographic information), for the baseline assessment, and one empty stamped envelope with the research address. The physiotherapist instructed the patient to open the envelope the same day, when they arrive at home. At that moment the task of the physiotherapist was done. The content and delivery of the physiotherapy treatment was unaffected by this study. On the information sheet, the participant was asked to fill in the questionnaires immediately the day of the first consultation to the physiotherapist, or as soon as possible, but no later than three days after the first consultation. When completed, the bundle was sent to the researchers, by posting it using the included empty envelope or sending it via email.

Three days before the three months follow-up date, the second bundle of questionnaires was sent to the participant, which assessed a self-reported adherence to therapy for appointments, adherence to advice during therapy, adherence to advice after therapy and satisfaction with therapy.

Finally, participants received a reminder to send the questionnaires six days after the follow-up data via e-mail or phone. When necessary, they received two reminders via SMS, e-mail or mail with the aim of increasing the response rate.

Ethical approval was obtained from the Ethics Committees of Hasselt University at 16/02/2018 (CME 2018/004).

VARIABLES

As mentioned before, this study investigated the influence of pain-related and psychological predictors/mediators, more specific the influence of baseline pain-intensity during exercise, motivation towards therapy and pain self-efficacy. These factors were identified and selected from literature in shoulder disorders, based on knowledge of predicting/mediating factors in other musculoskeletal pain problems.

Specifically, the Pain Self-Efficacy Questionnaire (PSEQ), which contains ten questions for the measurement of the patient's confidence in performing certain activities despite pain, has an excellent internal consistency and an adequate test-retest reliability^{36,37}. The participants answered by circling a number on a 7-point Likert scale under each item, where 0 = not at all confident and 6 = completely confident. The maximum score for this questionnaire is 60. The cut-off value for this questionnaire is 40, which means that a score of 40 or less corresponds with poor pain self-efficacy and a score higher than 40 corresponds with good pain self-efficacy. The pain self-efficacy was assessed at baseline.

For measuring the pain intensity during movement, the numeric rating scale (NRS) was used, where 0 = absolutely no pain and 10 = the worst possible imaginable pain. Mild pain intensity corresponds to a score of one to three, moderate pain to a score of four to six and severe pain to a score of seven to ten on the 11-point numerical rating scale. The NRS has a fair to moderate test-retest reliability and an adequate responsiveness³⁸. Thresholds for the minimum clinically important difference is 1.3³⁹. Pain intensity was assessed at baseline.

Patient motivation towards therapy was assessed at baseline by means of the intrinsic motivation inventory sub scale 'interest/enjoyment'. The intrinsic motivation inventory is a multidimensional measurement used for assessing the subjective experiences in motivation for therapy of participants on a scale from one to seven, where 1 = totally not true, 7 = very

true. For this study, especially the part 'interest, enjoyment' was important. To score this instrument, we first had to reverse score certain items (item three and four) by subtracting the item response from eight, the resulting number was the item score. Then, calculating the total sub scale score was done by averaging across all the items on that sub scale. The maximum score for this sub scale was seven. Higher scores on this questionnaire corresponds with higher levels of intrinsic motivation of the participant. Evidence shows a good internal consistency and an adequate validity and reliability for this measuring instrument³⁸.

Adherence to therapy, defined as the extent to which a person's behavior conformed to agreed recommendations from a healthcare provider, more specific the extent to which the patient complies with the agreements that are made and follows the therapist's advice during and after the rehabilitation period, was assessed by means of a 7-point Likert scale, where 0 = perfect adherence and 6 = not adherent at all. A lower score corresponds with higher levels of adherence for this item. This questionnaire consists of three items where two items relate to following advice during and after the rehabilitation period. One item was related to being present at the planned physiotherapy sessions. Adherence to therapy was assessed at three-month follow-up.

Patient's satisfaction with their received therapy was assessed by means of a 7-point Likert scale, where 0 = absolutely satisfied, 7 = absolutely dissatisfied. A higher score for this item corresponds with being more satisfied with received therapy. Satisfaction with therapy was assessed at three-month follow-up.

DATA COLLECTION

To ensure accurate, complete and reliable data, all study-related information was stored in a secure and accessible place and manner at the study site. All participant information was stored in locked cabinets in areas with limited access. A coded ID number identified the reports to maintain participant confidentiality. The online data collection in an excel file found place at the study site, so no confidential information must be taken home or to any other work place.

DATA-ANALYSIS

Firstly, missing data was imputed or the data set was removed from analysis. Imputation was used in case there were maximum three or less missing items for the intrinsic motivation inventory sub scale 'interest/ enjoyment' or for the pain self-efficacy questionnaire. Imputation was done via an analysis in SAS JMP 14 pro under screening, namely exploration of missing values⁴⁰. In this analysis all variables were added as Y-variables, next multivariate normal imputation with shrinkage estimate was used to impute the missing values. In case of missing values for pain during movement, satisfaction with therapy, adherence to appointments, adherence to advice during therapy and/or adherence to advice after therapy the entire data set was excluded from analysis.

The assessment of potential outliers was conducted via an analysis in SAS JMP 14 pro under screening, namely exploration of outliers⁴⁰. All variables were added into this analysis as Y-variables and the outliers in data sets were screened based on quantile range outliers. In case one or more outliers were identified, these outliers were removed from the correlation analysis.

The normal distribution of each variable was assessed in SAS JMP 14 pro⁴⁰. The assessment of each variable was conducted via the distribution analysis. Next a normal fit was applied to the distribution and a goodness-of-fit test was conducted. Classification in either normal or not normal distribution of a variable happened based on the Shapiro-Wilkinson W-test. The null hypothesis was that the variables were normally distributed. A probability value of 0.05 or lower than 0.05 for any given variable rejected the null hypothesis, meaning that this variable was not normally distributed.

To assess correlations between different variables a multivariate analysis was built via multivariate methods in JMP 14 Pro⁴⁰. All variables (satisfaction with therapy, therapy adherence for appointments, therapy adherence for advice during therapy and therapy adherence for advice after therapy, intrinsic motivation sub scale 'interest/enjoyment', pain during movement and pain self-efficacy) were entered as Y-variables and were plotted in pairs in a scatter plot square matrix. In case that all variables were normally distributed the parametric Pearson correlation would be used to assess correlations between variables. In

case of not normal distributed variables or when the sample size was less than 30, the non parametric Spearman correlation would be used to assess correlations between variables. The null hypothesis was that there was no correlation between any two given variables. The P value for significance was set at 0.05. A P value of 0.05 or less meant that the null hypothesis was rejected and that there was a correlation present between two variables.

RESULTS

PARTICIPANTS

Twenty-eight participants have been included in the analysis. Roughly half of the participants are female and a little under half are male, with a mean age of 56 years. The biggest group of participants is retired, the second biggest group is on sick leave and the third biggest group is engaging in normal workflow. Roughly half of the participants practice weekly sport whereas the other half does not. The majority of treatments included: some kind of mobilization (79%), education about the patient's injury (71%), supervised exercise therapy (71%) and home exercises (79%). Eight participants were excluded from analysis due to too much missing items or values. Three had no value for satisfaction with therapy, two had no value for pain during movement, one had no values for therapy adherence, one had four missing items for the pain self-efficacy questionnaire and one had no data for the intrinsic motivation inventory sub scale 'interest/enjoyment'. One item from the intrinsic motivation inventory sub scale 'interest/enjoyment' was imputed for one participant. The full demographics' overview can be seen in table 1.

OUTLIERS

No outliers were detected.

DISTRIBUTION

The data for the intrinsic motivation inventory sub scale 'interest/enjoyment' and pain during movement were normally distributed based on the p-value of the W-test, respectively 0.4001 and 0.1303. However, the data for pain self-efficacy, satisfaction with treatment, therapy adherence for appointments, adherence to advice during therapy and adherence to advice after therapy were not normally distributed. Respectively with a p-value of the W-test of 0.0036, <0.0001, <0.0001, <0.0001 and <0.0001. The full distribution information can be seen in table 2.

CORRELATION ANALYSIS

Multivariate analysis showed one statistically significant correlation based on the p-value of the spearman correlation. Therapy adherence for advice during therapy at 3-month follow-up shared a strong negative correlation with intrinsic motivation inventory sub scale 'interest/enjoyment' at baseline with a spearman's Rho correlation of -0.6348 on a

significance probability value of 0.0005. This means that when intrinsic motivation increases on the intrinsic motivation inventory sub scale 'interest/enjoyment', that the score for adherence for advice during therapy decreases, which corresponds with higher adherence and vice versa. Higher motivation at baseline appears to be correlated with higher levels of self-reported adherence to advice during therapy at 3-month follow-up based on the current sample. A full list of all analytic data can be seen in table 3.

DISCUSSION

We hypothesized that low to moderate pain intensity during movement at baseline, high motivation for therapy at baseline and high pain self-efficacy at baseline would correspond with high levels of therapy adherence at 3-month follow-up and high levels of satisfaction with therapy at 3-month follow-up. Vice versa, we hypothesized that high pain intensity during movement, low motivation for therapy and low pain self-efficacy at baseline would correspond with lower levels of therapy adherence and lower levels of satisfaction with therapy. However, in this study only one significant correlation, in line with our hypothesis, has been found. Therapy adherence for advice during therapy at 3-month follow-up shared a strong negative correlation with intrinsic motivation inventory sub scale 'interest/enjoyment' at baseline. Based on this study higher levels of patient motivation for therapy at baseline was correlated with higher levels of self-reported adherence to advice at 3-month follow up. This finding is in line with similar findings in R. Essery et al. (2016)⁴¹. This study also describes self-motivation for therapy as a strong predictor for adherence to therapy. However, this current study found no significant relationship between pain self-efficacy at baseline and adherence to therapy at 3-month follow-up. This in contrast with R. Essery et al. (2016), who found that self-efficacy is a strong predictor for therapy adherence⁴¹.

Complementary to aforementioned findings, Bergmann et al. showed that virtual reality augmented robot-assisted gait training for stroke patients increased motivation, acceptability and adherence of therapy⁴². These findings implicate a correlation between motivation towards therapy and therapy adherence. The findings of Bergmann et al. allow us a glimpse of the possibilities using technology to improve rehabilitation for all kinds of patients. In the near future technology could provide personalized adaptations to improve rehabilitation outcome based on motivation for therapy, therapy adherence and pain self-efficacy.

Previous studies support the necessity of carrying out the present pilot study. The study of McLean et al. showed that there are still unknown barriers to increase therapy adherence. Numerous strategies for increasing exercise adherence have been identified but their effectiveness is uncertain and guidance for best practice does not exist^{27,43,44}. Presumably unknown interactions with other factors hinder strategies for increasing adherence to therapy. This study aims to clarify some interactions between adherence at a 3-month follow-

up and other variables at baseline such as pain self-efficacy, motivation for therapy and pain during movement. Increasing evidence surrounding factors that influence adherence can help to find strategies to increase therapy adherence.

It is important to consider that there may not be an ideal way to assess adherence to therapy. According to McLean et al., there are many ways to assess adherence to therapy, but there is limited evidence to suggest the most appropriate measurement tool to assess adherence. Due to significant methodological and quality issues it is unclear which measurement tool is recommended to assess therapy adherence⁴³. Consequently, development and evaluation of therapy adherence assessment is essential. The assessment tool used in our study was purely patient-reported, there were no additional clinical-reported measures. This lack of good quality measures must be addressed.

Kelsey J. Picha et al. concluded that all scales to assess self-efficacy were specific to condition or task, and not applicable for all musculoskeletal patient populations. Because of this task specificity there are too few assessment tools and this is a problem. The measure used to assess this construct should differ based on the clinical question of the clinical researcher⁴⁵.

To interpret the current findings with caution, some limitations of this study should be mentioned. The first and most significant limitation is the relatively small sample size included for analysis. Due to the size of this sample (n=28), this study might not have had sufficient power to detect all correlations between variables. Larger studies like R. Essery et al. reported correlations which this study has not been able to detect. A way to compensate for this limitation was by assessing the non-parametric Spearman correlation values rather than using parametric values for assessing correlations between variables. Especially in the therapy adherence for advice after therapy the sample size was very low (n=10) due to a lot of participants still being in therapy at the point of analysis.

Second, a selection bias might likely be present due to the fact that physiotherapists executed the recruitment in the practice and not the researchers. It cannot be excluded that physiotherapists for whatever reason selectively picked participants. Also, physiotherapists who engage in scientific research might represent practices with more quality of treatment than others, this might over represent participants with specific traits.

A possible reason for a clear majority of very satisfied and high adherence outcomes with little dissatisfied outcomes is a reporting bias. Even though participants have been informed that the results are completely anonymous, participants might feel like they discredit their physiotherapist or themselves in the eyes of their physiotherapist by giving a lesser satisfaction score or a lesser adherence score. To diminish the effects of this bias the participants were given an envelope which could be closed to shield their answers from their physiotherapist.

Aside from a possible reporting bias it is important to note that a floor effect in the assessment of adherence to therapy exists. This explains the high amount of very low scores on all scales involving some therapy adherence. In the adherence scale used in this study, low scores meant high adherence. Based on the observed floor effect in the results across all different kinds of therapy adherence observed in this study, there is reason to assume that the scale used in this study for measuring adherence cannot discriminate low scores on the scales accurately enough with lower validity of the adherence assessments as a result. This is complementary with reports in other studies involving therapy adherence as mentioned above.

Due to the fact that this study is a pilot study, it was not possible to assess the statistical power of the findings. When designing this study, the minimal clinical important difference for the variable's adherence to appointments, adherence to advice during therapy, adherence to advice after therapy and satisfaction with therapy was not known. The results obtained in this study should be used in future studies to calculate statistical power and the minimal clinical important difference for therapy adherence and satisfaction with therapy.

Finally, another limitation of this study is the short follow-up period. Longer follow-up could uncover the potential difference of correlations between variables in different follow-up periods.

CONCLUSION

Therapy adherence for advice during therapy at 3-month follow-up shared a strong negative correlation with intrinsic motivation inventory sub scale 'interest/enjoyment' at baseline. Based on this study higher levels of patient intrinsic motivation for therapy at baseline was correlated with higher levels of self-reported adherence to therapy at 3-month follow up. This also means that lower levels of patient motivation for therapy at baseline was correlated with lower levels of self-reported adherence to therapy at 3-month follow-up. Further research is necessary to determine the exact relations between all variables included in this study. These further studies should be conducted with a bigger sample size to assess whether a clinically significant relation between pain during movement, intrinsic motivation for therapy, pain self-efficacy and therapy satisfaction or adherence to therapy is present in people with musculoskeletal shoulder disorders. These studies should aim to eliminate the limitations described in this study.

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ATTACHMENTS

Table 1: selected summary baseline characteristics of participants (n=28)

Factor	Category	Mean (SD)	Number (%)
Demographics			
Age (years)		56 (11)	
Sex	Male		12 (43)
	Female		15 (54)
	Unknown		1 (3)
Work situation	Normal		6 (21)
	Sick leave		8 (28)
	Retirement		11 (32)
	Unemployed		1 (3)
	Invalidity		1 (3)
	Housewife		1 (3)
Unemployed (days)		88 (112)	
Sport	Yes		12 (43)
	No		15 (54)
	Unknown		1 (3)
Sport (hours/week)		4 (4.5)	
Other conditions	Yes		18 (64)
	Diabetes mellitus		2 (7)
	Mental health problems		2 (7)

	High blood pressure	1 (3)
	Rheumatoid arthritis	3 (11)
	Major operation in the past	2 (7)
	Joint prosthesis	2 (7)
	Heart disease	2 (7)
	Others	5 (18)
	No	10 (36)
Diagnosis	No clear diagnosis	1 (3)
	Impingement/ subacromial bursitis	5 (18)
	Conservative (with corticosteroid)	2 (7)
	Conservative (without corticosteroid)	3 (11)
	Arthroscopic subacromial decompression	5 (18)
	Glenohumeral instability	0 (0)
	Conservative	0 (0)
	Rotator cuff tendinopathie	4 (14)
	Rotator cuff tear	7 (25)
	Conservative	2 (7)
	Arthroscopic reduction	5 (18)
	Adhesive capsulitis	2 (7)
Treatment modality	Education (disorder)	20 (71)
	Advice	18 (64)

Pain education	12 (43)
Manual therapy	14 (50)
Soft tissue techniques	14 (50)
Joint mobilizations	22 (79)
Mechanical effect	19 (68)
Analgesic effect	15 (54)
Other manual techniques	3 (11)
Supervised exercise therapy	20 (71)
Non-supervised exercise therapy	7 (25)
Home exercises	22 (79)
Other modalities	0 (0)
Unknown	5 (18)

Table 2: Distribution of variables

Variable	Mean (SD)	P-value W-test
Intrinsic motivation inventory subscale interest/enjoyment – assessed at baseline	4.75 (1.08)	0.4001
Pain during movement – assessed at baseline	6.06 (2.36)	0.1303
Pain self-efficacy – assessed at baseline	42.89 (12.15)	0.0036*
Satisfaction with therapy – assessed at 3-month follow-up	4.82 (1.22)	<0.0001*

Adherence to appointments – assessed at 3-month follow-up	0.21 (0.79)	<0.0001*
Adherence to advice during therapy – assessed at 3-month follow-up	0.54 (0.86)	<0.0001*
Adherence to advice after therapy – assessed at 3-month follow-up	0.55 (0.93)	<0.0001*

*Not normally distributed at 0.05 level

Table 3: Overview of correlation analytics

Variable at baseline	Variable at 3-month after start of therapy	Spearman Rho correlation coefficient	Probability value
Satisfaction with therapy	Intrinsic motivation inventory, subscale usefulness/enjoyment	0.3379	0.0786
Satisfaction with therapy	Pain during movement	-0.2452	0.2086
Pain self-efficacy questionnaire	Satisfaction with therapy	-0.1867	0.3414
Therapy adherence for appointments	Intrinsic motivation inventory, subscale usefulness/enjoyment	0.0475	0.8102
Therapy adherence for appointments	Pain during movement	0.2770	0.1535
Therapy adherence for appointments	Pain self-efficacy questionnaire	-0.0130	0.9476

Therapy adherence for advice	Intrinsic motivation inventory, subscale usefulness/enjoyment	-0.6348	0.0005*
Therapy adherence for advice	Pain during movement	0.0422	0.8378
Therapy adherence for advice	Pain self-efficacy	0.1902	0.3520
Therapy adherence for advice after therapy	Intrinsic motivation inventory, subscale usefulness/enjoyment	-0.2945	0.3794
Therapy adherence for advice after therapy	Pain during movement	-0.3692	0.2638
Therapy adherence for advice after therapy	Pain self-efficacy	0.3198	0.3377
Therapy adherence for advice after therapy	Therapy adherence for appointments	-0.2345	0.4876

*significant correlation at 0.05 level

In te vullen door de promotor(en) en eventuele copromotor aan het einde van MP2:

Naam Student(e): Clerix Isaura..... **Datum:** 27/05/2019.....

Titel Masterproef: The influence fo pain-related and psychological factors on treatment adherence and satisfaction with psysiotherapy in persons with musculoskeletal shoulder pain.

- 1) Geef aan in hoeverre de student(e) onderstaande competenties zelfstandig uitvoerde:
- NVT: De student(e) leverde hierin geen bijdrage, aangezien hij/zij in een reeds lopende studie meewerkte.
 - 1: De student(e) was niet zelfstandig en sterk afhankelijk van medestudent(e) of promotor en teamleden bij de uitwerking en uitvoering.
 - 2: De student(e) had veel hulp en ondersteuning nodig bij de uitwerking en uitvoering.
 - 3: De student(e) was redelijk zelfstandig bij de uitwerking en uitvoering
 - 4: De student(e) had weinig tot geringe hulp nodig bij de uitwerking en uitvoering.
 - 5: De student(e) werkte zeer zelfstandig en had slechts zeer sporadisch hulp en bijsturing nodig van de promotor of zijn team bij de uitwerking en uitvoering.

Competenties	NVT	1	2	3	4	5
Opstelling onderzoeksvraag	0	0	0	0	X	0
Methodologische uitwerking	X	0	0	0	0	0
Data acquisitie	0	0	0	0	X	0
Data management	0	0	0	0	X	0
Dataverwerking/Statistiek	0	0	0	0	X	0
Rapportage	0	0	0	0	X	0

- 2) Niet-bindend advies: Student(e) krijgt toelating/~~geen toelating~~ (schrappen wat niet past) om bovenvermelde Wetenschappelijke stage/masterproef deel 2 te verdedigen in bovenvermelde periode. Deze eventuele toelating houdt geen garantie in dat de student geslaagd is voor dit opleidingsonderdeel.
- 3) Deze wetenschappelijke stage/masterproef deel 2 mag wel/~~niet~~ (schrappen wat niet past) openbaar verdedigd worden.
- 4) Deze wetenschappelijke stage/masterproef deel 2 mag wel/~~niet~~ (schrappen wat niet past) opgenomen worden in de bibliotheek en docserver van de UHasselt.

Datum en handtekening
Student(e)

26/05/2019

Datum en handtekening
promotor(en)

Liesbet De Baets

27/05/2019

Datum en handtekening
Co-promotor(en)

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INVENTARISATIEFORMULIER WETENSCHAPPELIJKE STAGE DEEL 2

DATUM	INHOUD OVERLEG	HANDTEKENINGEN
07/08/2018	Overleg inhoud MP2 en uitleg over rekrutering van praktijken en hoe datacollectie moet gebeuren	Promotor: Copromotor/Begeleider: Student(e): <i>Isaura Clerix</i> Student(e): <i>Lambeets Kenneth</i>
09/09/2018	opstellen online data sheet	Promotor: Copromotor/Begeleider: Student(e): <i>Isaura Clerix</i> Student(e): <i>Lambeets Kenneth</i>
02/10/2018	gegevens online zetten	Promotor: Copromotor/Begeleider: Student(e): <i>Isaura Clerix</i> Student(e): <i>Lambeets Kenneth</i>
06/11/2018	gegevens online zetten	Promotor: Copromotor/Begeleider: Student(e): <i>Isaura Clerix</i> Student(e): <i>Lambeets Kenneth</i>
19/03/2019	uitleg statistische verwerking gegevens	Promotor: Copromotor/Begeleider: Student(e): <i>Isaura Clerix</i> Student(e): <i>Lambeets Kenneth</i>
13/05/2019	uitleg statistische verwerking gegevens (aanpassing statistisch model)	Promotor: Copromotor/Begeleider: Student(e): <i>Isaura Clerix</i> Student(e): <i>Lambeets Kenneth</i>
		Promotor: Copromotor/Begeleider: Student(e): Student(e):
		Promotor: Copromotor/Begeleider: Student(e): Student(e):
		Promotor: Copromotor/Begeleider: Student(e): Student(e):
		Promotor: Copromotor/Begeleider: Student(e): Student(e):

In te vullen door de promotor(en) en eventuele copromotor aan het einde van MP2:

Naam Student(e): Lambeets Kenneth **Datum:** 27/05/2019

Titel Masterproef: The influence fo pain-related and psychological factors on treatment adherence and satisfaction with psysiotherapy in persons with musculoskeletal shoulder pain.

- 1) Geef aan in hoeverre de student(e) onderstaande competenties zelfstandig uitvoerde:
- NVT: De student(e) leverde hierin geen bijdrage, aangezien hij/zij in een reeds lopende studie meewerkte.
 - 1: De student(e) was niet zelfstandig en sterk afhankelijk van medestudent(e) of promotor en teamleden bij de uitwerking en uitvoering.
 - 2: De student(e) had veel hulp en ondersteuning nodig bij de uitwerking en uitvoering.
 - 3: De student(e) was redelijk zelfstandig bij de uitwerking en uitvoering
 - 4: De student(e) had weinig tot geringe hulp nodig bij de uitwerking en uitvoering.
 - 5: De student(e) werkte zeer zelfstandig en had slechts zeer sporadisch hulp en bijsturing nodig van de promotor of zijn team bij de uitwerking en uitvoering.

Competenties	NVT	1	2	3	4	5
Opstelling onderzoeksvraag	0	0	0	0	X	0
Methodologische uitwerking	X	0	0	0	0	0
Data acquisitie	0	0	0	0	X	0
Data management	0	0	0	0	X	0
Dataverwerking/Statistiek	0	0	0	0	X	0
Rapportage	0	0	0	0	X	0

- 2) Niet-bindend advies: Student(e) krijgt toelating/~~geen toelating~~ (schrappen wat niet past) om bovenvermelde Wetenschappelijke stage/masterproef deel 2 te verdedigen in bovenvermelde periode. Deze eventuele toelating houdt geen garantie in dat de student geslaagd is voor dit opleidingsonderdeel.
- 3) Deze wetenschappelijke stage/masterproef deel 2 mag wel/~~niet~~ (schrappen wat niet past) openbaar verdedigd worden.
- 4) Deze wetenschappelijke stage/masterproef deel 2 mag wel/~~niet~~ (schrappen wat niet past) opgenomen worden in de bibliotheek en docserver van de UHasselt.

Datum en handtekening
Student(e)

26/05/2019



Datum en handtekening
promotor(en)

Liesbet De Baets



27/05/2019

Datum en handtekening
Co-promotor(en)