BACHELORTHESIS

Living with chronic pain: Is multidisciplinary treatment in the Roessingh Rehabilitation Center equally effective for every patient?
An analysis of demographic, physical and psychological predictors of treatment outcome.

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Abstract

Background and objective: Chronic pain is a common condition with widespread consequences for the individual as well as society and health care systems. Because pain is long – lasting and it is often not possible to eliminate it, patients develop dysfunctional behavior patterns that can result in a vicious circle of impairment. Research suggests, that a multidisciplinary approach that concentrates on Cognitive Behavior Therapy (CBT) or Acceptance and Commitment Therapy (ACT) promises the best results for intervention. There is until now insufficient information about which therapy works for whom and what possible predictors of treatment outcome are. But this information appears to be necessary in order to optimize chronic pain treatment. Therefore, the research question was whether treatment in the Roessingh Rehabilitation Center in Enschede was effective in general, and whether there were predictors of treatment outcome.

Method: The Roessingh Rehabilitation Center uses a multidisciplinary approach, based on both, CBT and ACT. Four variables were selected for further investigation. Those were age, level of activity and the coping styles pain transformation and catastrophizing. For treatment outcome a paired sample T – test was done. For the analysis of the predictors linear regression models were used.

Results: The results show a positive treatment effect, which means that treatment in general was effective. Linear regression shows no statistically relevant result.

Discussion and conclusion: Analysis shows, that there is no statistical evidence that age, activity level, catastrophizing and pain transformation are predictors of treatment outcome. Those results are in accordance with existing literature, except from catastrophizing. Catastrophizing is in other research declared to be a predictor of treatment outcome. Given that much research about predictors of treatment outcome presents mixed results, further research appears essential. Also, future research should concentrate on the distinction between CBT and ACT with regard to treatment effect.

Samenvatting

Achtergrond en doelstelling: Chronische pijn is een vaak voorkomende aandoening die wijdverspreide gevolgen heeft zowel voor het individu, als ook voor de gemeenschap en de gezondheidszorg. Omdat pijn vaak langdurig is en het ook niet mogelijk is om het te elimineren, ontwikkelen chronische pijnpatienten dysfunctionele gedrags patronen die kunnen resulteren in een vicieuze cirkel van benadelingen. Onderzoek suggereert dat een multidisciplinaire aanpak die zich richt op Cognitieve Gedragstherapie (CGT) of Acceptance en Commitment Therapy (ACT) de beste resultaten van een interventie belooft. Tot nu toe is er ontoereikend informatie over de vraag welke therapie het beste werkt voor wie en wat mogelijke predictoren van behandelingsuitkomst zijn. Dit soort informatie lijkt echter noodzakelijk te zijn om behandelingsuitkomst te optimaliseren. Daarom was de onderzoeksvraag of behandeling in de Roessingh Revalidatiecentrum even effectief was voor elke patient en of er predictoren van behandelingsuitkomst zijn.

Methode: De Roessingh Revalidatiecentrum gebruikt een multidisciplinaire aanpak, gebaseerd op CGT en ACT. Vier variabelen werden gekozen voor verder onderzoek. Deze zijn leeftijd, niveau van activiteiten en de coping stijlen catastroferen en pijntransformatie. Voor het achterhalen van de behandelingsuitkomst werd een T – toets met gekoppelde paren gedaan. Voor de analyse van de predictoren werden lineaire regressiemodellen opgesteld.

Resultaten: De resultaten tonen een positieve behandelingsuitkomst, wat betekent dat behandeling in het Roessingh Rehabilitatie Center effectief is.

Discussie en conclusie: Uit de analyse blijkt, dat er geen statistische bewijs is dat leeftijd, niveau van activiteiten, catastroferen en pijn transformatie predictoren zijn van behandelingsuitkomst. Dit komt overeen met bestaande literatuur behalve catastroferen. In de literatuur wordt catastroferen namelijk wel gezien als predictor. Aangezien bestaande onderzoeken over predictoren van behandelingsuitkomst geen eenduidige resultaten tonen lijkt het noodzakelijk om verder onderzoek te doen. Bovendien zou verder onderzoek zich moeten concentreren op het onderscheid tussen CGT en ACT met betrekking tot behandelingsuitkomst.

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Introduction

Chronic Pain

One of the most common and most important reasons for people to visit a doctor is pain. According to the International Association for the Study of Pain (IASP) is pain "an unpleasant sensory and emotional experience with actual or potential tissue damage, or described in terms of such damage" (Merskey & Bogduk, 1994). Generally there are three categories of pain: acute pain, chronic pain and cancer – related pain (Ashburn & Staats, 1999). The current thesis concentrates especially on chronic pain. As opposed to acute pain, chronic pain is unpredictable in duration, more pervasive, and mostly not connected to pathology at all. This becomes apparent in the fact that it is often not possible for patients to localize the pain to a special part of the body (Ashburn & Staats, 1999; Kröner – Herwig, Frettlöh, Klinger & Nilges, 2011). Furthermore, while acute pain has mainly a warning and protection function, this is not the case with chronic pain. As a result, chronic pain is not a symptom, but rather a disease itself which is often associated with much suffering (Kröner – Herwig et al., 2011). In general, chronic pain is described as pain that lasts over a long period of at least three or more months (Andersen, Kohberg, Juul – Kristensen, Herborg, Sogaard & Roessler, 2014; Kröner – Herwig, et al., 2011; Morrison & Bennett, 2012). In the literature about chronic pain, there is agreement that chronic pain occurs often (Morrison & Bennett, 2012). Prevalence studies about chronic pain in the Europe population show that the percentages of people that suffer from chronic pain range from 11.2 % to 24.4% (Breivik, Collett, Ventafridda, Cohen & Gallacher, 2006; Croft, Rigby, Boswell, Schollum & Silman, 1993; Rustøen, Klopstad Wahl, Rokne Hanestad, Lerdal, Paul, & Miaskowski, 2012). Those numbers indicate that chronic pain is a major health problem in Europe. Suffering from chronic pain tends to result in costs for both the individual and society. For the individual those costs are related to physical and psychological factors (Morrison & Bennett, 2012) and include depression, fear and negative thoughts (Andersen et al., 2014; Heiskanen et al., 2012; Morrison & Bennett, 2012), sleep disturbance, fatigue, and reduced physical and mental functioning (Ashburn & Staats, 1999). But also interpersonal conflicts arise, and social roles and social relations, as intimate relationships, are influenced negatively (Andersen et al., 2014). Costs for society are economy – related. Chronic pain is often associated with non – attendance from work and reduced productivity as well as enormous costs for the health care systems that result from chronic pain treatment (Heiskanen et al., 2012; McCracken & Turk, 2002; Morrison & Bennett, 2012; Vowles, Witkiewitz, Sowden & Ashworth, 2014).

Therapy

The problem with chronic pain is that treatment is difficult. Research indicates namely, that current treatments, as pharmacological approaches, surgery, exercise or physical rehabilitation, are not able to fully eliminate pain (Turk, Wilson & Cahana, 2011). This leads to a need for a new approach. Current research provides evidence that the most effective way to treat chronic pain is a multimodal or multidisciplinary approach which includes and combines different treatment directions (Ashburn & Staats, 1999; Heiskanen et al., 2012; Kröner – Herwig et al., 2011; Scascighini et al., 2008; Turk et al., 2011). The main goal of such a multidisciplinary pain treatment is to reduce, but not eliminate, the pain and, furthermore, to improve acceptance, control and self - management of pain. Another goal is to improve physical and mental functioning in order to rehabilitate the patients so that they can function as well as is possible (Ashburn & Staats, 1999; McCracken & Turk, 2002). During multidisciplinary treatment several disciplines work together, including physicians, psychologists, nurses, physiotherapists, counselors or pharmacists (Ashburn & Staats, 1999). Generally, a multidisciplinary approach has proven to be successful (Flor, Fydrich & Turk, 1991; Heiskanen et al., 2012; Scascighini et al., 2008; Stein & Miclescu, 2013). Improvements include for example an increase in health related quality of life (HRQoL) (Heiskanen et al., 2012) or social activity, but also light decreases in the mean levels of pain intensity, pain severity and opioid consumption (Stein & Miclescu, 2013).

A multidisciplinary approach is often based on *Cognitive Behavioral Therapy (CBT)*. CBT acts on the assumption that the cognitive evaluation of pain is essential for pain experience and pain behavior, including pain intensity, attempts to cope, mood and pain – related disability (Morrison& Bennett, 2012; Sharp, 2001). The concrete goal of CBT is to change negative thoughts and dysfunctional attitudes towards pain into more healthy and adaptive thoughts, emotions and actions. The result is behavior change (Ashburn & Staats, 1999; McCracken & Turk, 2002; Morrison & Bennett, 2012; Sharp, 2001). Morrison and Bennett (2012) make this concrete, by introducing three sub goals patients have to achieve, in order to change pain behavior: First of all, patients have to learn to believe that problems are treatable. Second, patients should learn about the relationship between thoughts, emotions and behavior. Finally, patients should be provided with a strategy to manage the pain, psychological suffering and psychosocial problems; furthermore, they should be helped with developing an adaptive way of thinking, feeling and behaving. Common interventions within CBT are relaxation skills training, problem solving skills training, interventions to change perception, communication skills training or family interventions (McCracken & Turk, 2002).

CBT has proven to be an effective treatment modality for chronic pain treatment (Jensen, Romano, Turner, Good & Wald, 1999; Sharp, 2001; McCracken & Turk, 2002; Veehof, Oskam, Schreurs & Bohlmeijer, 2011; Williams, Eccleston & Morley, 2012).

A specific form of CBT which is commonly used in today's multidimensional treatment programs for chronic pain is *Acceptance and Commitment Therapy (ACT)*. ACT is a form of psychotherapy that combines acceptance and mindfulness strategies with commitment and behavior change strategies; the goal is to accept pain and the obstacles that evolve from pain experience, and to concentrate on meaningful actions by increasing psychological flexibility (Dahl, Luciano, Wilson & Hayes, 2005; Keogh, Bond, Hanmer & Tilston, 2005; Kröner – Herwig et al., 2011; Veehof et al., 2011; Vowles et al., 2014). In the context of chronic pain this means that patients have to accept the experience of pain when pain eradication is not possible (Vowles et al., 2014). Studies show that patients benefit from acceptance – based therapies as much as they benefit from more traditional forms of CBT (Veehof et al., 2011).

Predictors of Treatment Outcome

A multidisciplinary approach, based on CBT or ACT, has shown to be a promising way of treating chronic pain. However, the question is whether this approach is equally effective for every patient, independent of diagnosis, characteristics or other variables. Unfortunately, existing literature indicates that there are differences among patients concerning treatment success (De Rooij, Roorda, Otten, van der Leeden, Dekker & Steultjens, 2013; McCracken & Turk, 2002; Turner et al., 2007). This leads to the question, where those differences come from and whether there are predictors that promote or penalize treatment outcome. A considerable amount of research has been done concerning this question. But literature about predictors of treatment outcome presents mixed results. Hence, further research about predictors of treatment outcome appears to be necessary in order to change treatment accordingly by matching patients with the most effective treatment. While examining possible predictors of treatment outcome, it seems advantageous to take into account demographic, as well as physiological and psychological variables, so as to get a broad picture.

There is not much recent research that systematically tested age as a predictor of treatment outcome of multidisciplinary chronic pain treatment. However, those studies that did, do not provide explicit conclusions and are at least partly outdated (De Rooij et al., 2013; McCracken & Turk, 2002) which leads to the assumption that age as a predictor of treatment outcome cannot be excluded. Furthermore, there is literature that indicates that the number of

elderly people is ever – growing (Kröner – Herwig et al., 2011) and that chronic pain is more common in elderly people (Brochet, Michel, Barberger – Gateau & Dartigues, 1998; Kröner – Herwig et al., 2011; Morrison & Bennett, 2012; Pateinakis, Amygdalas, Pateinaki, Pyrpasopoulou, 2013). Another review study about chronic pain in the elderly suggests that treatment of the elderly is difficult because of comorbidity and increased sensitivity for medical side – effects (Pateinakis et al., 2013). Therefore one could assume that treatment effect for the elderly is affected as well. Given the fact that in the future more and more elderly people are supposed to suffer from chronic pain, new research about age as a predictor seems to be relevant, in order to adapt treatment to that effect.

Another variable that is strongly related to pain is the level of activity that a chronic pain patient has. Research indicates that chronic pain patients tend to protect themselves against pain through lowering activity level throughout various areas of life (Kröner – Herwig et al., 2011; Morrisson & Bennett, 2012). But extreme protection facilitates rumination which can promote depression (Kröner – Herwig et al., 2011). This gives reason to conclude that extreme protection can facilitate a negative course of disease. In contrast remaining active in spite of pain turns out to be advantageous (De Rooij et al., 2013; Kraaimaat & Evers, 2003; Kröner – Herwig et al., 2011; Morrison & Bennett, 2012). Besides this, there is research that suggests, that extreme overload in phases where pain is lesser leads to more pain in general, which is an indication that extreme activity is a dysfunctional pattern as well (Kröner – Herwig et al., 2011). The question is whether the level of activity also alters treatment effect, given that neither extremely low, nor extremely high levels of activity are beneficial in the course of disease. Literature concerning level of activity as a predictor presents inconclusive and ambiguous results (De Rooij et al., 2013) which is why it seems essential to systematically examine activity level as a predictor.

Most evidence can be found for emotional factors as predictors of treatment outcome. One important emotional concept in pain is catastrophizing. Catastrophizing is basically conceptualized as an extremely high negative orientation towards noxious stimuli, an excessive focus on negative aspects of the pain situation, expectations of negative outcomes and expressions of worry (Sullivan et al., 1995). Research indicates that catastrophizing is generally associated with a negative course of disease (Keefe, Rumble, Scipio, Giordano & Perri, 2004; Kröner – Herwig et al., 2011). But the question is, whether the degree of catastrophizing affects treatment outcome as well. On the basis of literature that systematically examined catastrophizing as a predictor of treatment outcome, it can be concluded that patients who catastrophize more benefit less from treatment (McCracken &

Turk, 2002; Turner et al., 2007). However, those results are outdated and therefore new research concerning catastrophizing as a predictor of treatment outcome appears to be essential.

Other than catastrophizing, is pain transformation an important emotional concept in pain as well. Pain transformation is the ability to change thoughts about the own experienced pain from very violent and distracting into less painful thoughts (Kraaimaat & Evers, 2003). Although there seems to be a positive relation between active coping styles, including pain transformation, and physical and psychological adjustment (Kraaimaat & Evers, 2003), there is no indication whether pain transformation is a predictor of treatment outcome or not. In contrast to catastrophizing there is no study that systematically examined pain transformation as a predictor of a treatment approach based on CBT or ACT. But one of the main goals of a CBT is that patients change dysfunctional attitudes and thoughts towards pain into more adaptive thoughts, emotions and actions, which is basically what pain transformation is. Therefore, one could assume a relation between pain transformation and success of treatment. Hence, it seems essential to examine whether pain transformation alters the effect of treatment.

Those findings lead to the general aim of the current study, which is to examine whether chronic pain treatment is effective and thereby to identify predictors that predict the effect of treatment outcome. A predictor is in this study defined as a variable that influences the effect of an intervention. Research indicates that not all patients benefit to the same extent from treatment and that there seem to be predictors for treatment success. But research is outdated and, furthermore, presents mixed results. One of the variables that need further investigation is age. Research leads to the hypothesis that age is a predictor of treatment outcome in the direction that older patients benefit less from chronic pain treatment then younger patients. Based on literature concerning the level of activity of chronic pain patients, hypothesis is that extremely low, as well as extremely high levels of activity are supposed to predict worse treatment outcome in comparison to mean levels of activity. On the basis of research concerning catastrophizing as a predictor of treatment outcome, hypothesis is that higher degrees of catastrophizing indicate worse treatment effects. The last hypothesis is that pain transformation is a predictor of treatment outcome with patients with more pain transformation being more likely to benefit from treatment.

Method

Setting, Participants, and Procedures

The data for the current study come from the Roessingh Rehabilitation Center in Enschede, Netherlands. This rehabilitation center treats annually 800 patients with chronic pain and chronic fatigue complaints in a multidisciplinary setting. Treatment in this center is based on both CBT and ACT. There is no distinction made between diagnosis of the patient and all patients were treated semi - clinical. 137 patients, which were assigned to receive treatment in the period of 2010 – 2011, were recruited in the current study. The ratio between male and female was 20.43 % to 79.56%. The age of the patients ranged from 18 to 65. The average age of the participating patients was 40.65 years with a standard deviation of 11.65. Patients were asked to compile a sample of standard questionnaires about demographic background data as age and gender, and about physical and psychological themes. There were four measuring moments to guarantee a continuous clear view of patients' progress: 1. Intake (t0) 2. Start of treatment (t1) 3. End of treatment (t2) 4. Three month follow – up (t3). For this study data was used from t0, t1 and t2. Patients were able to determine whether to agree that personal data was potentially used for scientific research. An informed consent at the start of measurement told patients about the goal of the questionnaires and anonymous treatment of personal data.

Measurement Instruments

The Roessingh Rehabilitation Center uses a wide range of questionnaires. The questionnaires that were relevant for this study are described below. Those include the Multidimensional Pain Inventory (MPI), the Pain Coping Inventory (PCI) and the Pain Catastrophizing Scale (PCS).

Outcome variable: MPI – interference

The outcome variable MPI – pain interference was measured using the Dutch Language Version of the *Multidimensional Pain Inventory* [Multidimensionele Pijnvragenlijst – Dutch Language Version (MPI – DLV)]. According to Lousberg et al. (1999) the MPI determines the subjective consequences of chronic pain in various aspects of a patient's life. The MPI contains 61 items which are divided into twelve subscales. The subscale "pain interference" consists of nine items which give an indication about how much chronic pain interferes with the normal life of a patient. Questions in this subscale apply to the amount of change in abilities, activities, satisfaction, enjoyment, relationships, work related fields, household

chores, planning or friendships that chronic pain brought about. The MPI can be answered on a seven – point Likert scale, ranging from zero to six, with higher scores indicating greater pain interference in everyday life. The total score range of the subscale "pain interference" is 0 to 66. Cronbach's alpha coefficient is .89, indicating that the internal consistency of the scale is good (Lousberg et al., 1999).

Predictor variables

Four predictor variables were selected for further investigation. Those were Age, MPI – activity level at t1, pain transformation at t1 and catastrophizing at t1.

Age

The predictor variable age was measured at t0, using background information patients deliver at the start of treatment. Age was used as a continuous predictor.

MPI

The predictor MPI – activity level was measured using the complete third axis of the MPI, including the subscales "household chores", "outdoor work", "activities away from home" and "social activities" which in total consist of 18 items (Lousberg et al., 1999). The total score range of the axis activity level is 0 to 108. Cronbach's alpha coefficient is .69, indicating that the internal consistency of the scale is acceptable (Lousberg et al., 1999).

Catastrophizing

The predictor variable catastrophizing was measured using the *Pain Catastrophizing Scale (PCS).* The PCS consists of 13 items which are divided up into the three subscales "rumination", "magnification" and "helplessness" (Sullivan & Bishop, 1995). All of those scales together give an indication of a patients' degree of catastrophizing. The PCS can be answered on a four – point Likert scale ranging from zero to four, with higher total scores indicating a greater degree of catastrophizing. The total score range of the PCS is 0 to 52 (Sullivan & Bishop, 1995). Cronbach's alpha coefficient in this study is .91, indicating excellent internal consistency.

Pain transformation

The predictor variable pain transformation was measured using the *Pain Coping Inventory (PCI).* The PCI is a questionnaire that measures coping strategies. It consists of 34 items which are divided up into six sub – scales, of which one is "pain transformation" which consists of four items (Kraaimaat & Evers, 2003). The PCI can be answered on a four – point

Likert scale ranging from one to four, with higher scores indicating greater use of pain transformation. The total score range of the scale "pain transformation" is 1 to 16. Cronbach's alpha coefficient is .70, indicating that the internal consistency of the scale is good (Kraaimaat & Evers, 2003).

Analyses

Overview

For the predictor variables the measuring moments at t0 and t1 were required. For the outcome variable, the measuring moment at t2 was required.

Treatment effect

Treatment effect was defined as a difference in amount of pain interference at the start of treatment and at the end of treatment. The mean scores of MPI – Int at t1 and t2 were gathered with an analysis of the descriptive statistics. Treatment effect was tested using a paired sample T – test.

Predictor analyses

Linear regression models are assumed to prove whether a specific variable is a predictor. In the current study, a predictor was defined as a variable that predicts the effect of an intervention. The results of the linear regression were supposed to show whether there were variables that influence the effect of treatment in the Roessingh Rehabilitation Center on MPI – Int. To test whether there are statistically significant predictor variables, linear regression models were created for each predictor. After the Bonferroni correction a p – value of $\leq .01$ defined statistical significance. The dependent continuous outcome variable Y was MPI – Int at t2. The independent continuous variables P were Age, PCS and PCI – Transf. Because literature indicates that a mean level of activity is advantageous in chronic pain, two groups were formed via recode into different variable. The first group was the group of patients that were assumed to have a functional activity level. This group included all patients that scored about one standard deviation around the mean. The second group included all patients that scored either extremely low or extremely high on activity, which was in this study defined as a dysfunctional pattern. This group is composed of all patients that scored below one standard deviation of the mean and all patients that scored above one standard deviation of the mean. The new variable MPI – Act_D was used as a nominal variable P. An overview of the different variables used for linear regression models can be found in Table 1.

Table 1. *Predictor analysis with four predictor variables*

	Analysis[a]
Variable	*Predictor*
Continuous	
Age	*P* = Age
Catastrophizing	*P* = PCS
Pain transformation	*P* = PCI – Transf
Nominal	
Activity level	*P* = MPI – Act_D

[a]Predictor analysis with Control = MPI – Int at t1; *Y* = MPI – Int at t2

Results

Treatment Effect

An analysis of treatment effect shows that there is a statistically significant effect. Table 2 gives an overview of the descriptive statistics of the sample.

Table 2. *Descriptive statistics and significance level of investigated predictors*

	N	*M*	*SD*	*Minimum*	*Maximum*	*Sig.*
Variables						
Age	136	40.65	11.65	.00	65.00	
MPI – Act_D	114	2.63	.76	.73	4.46	
Functional	74					
Dysfunctional	40					
PCI – Transf	100	9.95	3.21	4.00	16.00	
PCS	99	21.51	9.11	3.00	47.00	
MPI – Int t1	109	4.26	.84	2.00	6.00	
MPI – Int t2	106	3.53	1.03	.44	5.78	.00**

** $p \leq .01$ is defined as statistically significant

The results of the paired sample T – test indicate that there is a decrease in mean scores and that MPI – Int at t2 is lower than MPI – Int at t1 [*M* (SD) = 3.53 (1.03) versus 4.26*SD* (.84), $p \leq .01$].

Predictor Analyses

The results of the predictor analyses that were conducted are summarized in Table 3. Predictor analysis shows no significant effect for the predictor age [B = .01, t (82) = .82, p = .42]. There is also no significant effect found for the predictor MPI – Act. Both, functional levels of activity and dysfunctional levels of activity are not significantly correlated with treatment outcome [B = .06, t (83) = .25, p = .80]. The third analysis also provides no significant predicting effect for the predictor PCI – Transf [B = -.02, t (74) = -.66, p = .51]. Finally, there is no significant effect found for the predictor PCS [B = .03, t (67) = 3.20, p = .05].

Table 3. *Predictor analysis for four predictors*

	B	*T*	*Sig.*
Variables			
Age			
MPI – Int t1	.53	4.09	.00
Age	.01	.82	.42
MPI – Act_D			
MPI – Int t1	.51	3.92	.00
MPI – Act_D	.06	.25	.80
PCI – Transf			
MPI – Int t1	.53	4.09	.00
PCI – Transf	-.02	-.66	.51
PCS			
MPI – Int t1	.43	3.20	.01
PCS	.03	2.04	.05**

** $p \leq .01$ is defined as statistically significant

Discussion

Results

The current study could find significant evidence that treatment in the Roessingh Rehabilitation Center was effective in general, which provides further support for CBT and ACT models (Jensen et al., 1999; Sharp, 2001; McCracken & Turk, 2002; Veehof et al., 2011; Williams et al., 2012). The aim of the present study was to identify predictors that

influence the effect of treatment outcome on pain interference. Summarized, no significant result for predictors of treatment outcome emerged.

Age seemed not to be a predictor of pain interference at the end of treatment. For that reason the hypothesis that older patients benefit less from treatment can be falsified. Hence, one can assume that a multidisciplinary approach based on CBT or ACT works equally effective for all patients regarding age. Against the background of optimizing chronic pain treatment, this is a beneficial outcome, given that this way patients of all age can benefit from the same treatment. The outcome of the current study corresponds to existing literature which could not find reliable and definite indication that age is a predictor of treatment outcome (McCracken & Turk, 2002). This leads to the assumption that although there seem to be complications in chronic pain treatment of the elderly (Pateinakis et al., 2013), those do not affect treatment outcome.

In contrast to the hypothesis that patients with extremely low or extremely high levels of activity which was declared dysfunctional pattern of behavior did not benefit less from a multidisciplinary pain treatment than patients with a mean level of activity. Therefore, research from De Rooij et al. (2013) who found weak evidence for a better treatment outcome for patients with higher, but not extreme levels of activity cannot be confirmed with this study. This leads to the conclusion, that even though dysfunctional patterns of activity lead to a negative course of disease, they do not affect treatment outcome.

The current study gives no indication that pain transformation is a significant predictor of treatment outcome. Although the concept pain transformation shares basic assumptions with the concept of CBT, the extent to which a patient uses pain transformation before treatment does not predict treatment outcome, which is why the corresponding theory has to be falsified. The other coping style, catastrophizing, seemed not to be a predictor of treatment outcome as well. Therefore, the hypothesis that patients that catastrophize more benefit less from treatment cannot be confirmed. This is in contrast to existing literature which could well find that catastrophizing predicts treatment outcome (McCracken & Turk, 2002; Turner et al., 2007). The question is why the current study could not find any significant evidence for active as well as passive coping styles, even though they were the most promising according to literature. Pain transformation is until now not systematically tested as a predictor of treatment outcome. Therefore, the current study can be seen as a first attempt. Accordingly it is to assume that pain transformation really is no predictor of treatment outcome. Another

explanation could be that the results of the current study were influenced by methodological impairments as sample size or missing values. In explaining why catastrophizing provides no significant results although existing literature does indicate it as a predictor of treatment outcome, one could mention that the current study includes patients with both, high and low levels of catastrophizing. Therefore, it is possible that not enough real "catastrophizers", thus patients that scored high on catastrophizing, were included, hence, no clear and definite results were received.

Methodological Reflexion

One problem of the study design is related to the distinction between CBT and ACT. In this study, no distinction was made between CBT and ACT but the question is whether different kinds of treatment could work differently for patients with different patient characteristics. Furthermore, also differences in duration of treatment, medication or other features of multidisciplinary treatment were not taken into account in the current study even though they could possibly be associated with differences in treatment outcome as well. Those difficulties are probably due to the fact that even though multidisciplinary programs generally include the same components, there is no internationally accepted definition of what multidisciplinary treatment really is (De Rooij et al., 2013; Turner et al., 2007; Scascighini et al., 2008). That means that multidisciplinary treatment must be understood as a rather generic term instead of a clear definition which makes it difficult to make definite general statements concerning the effects on treatment outcome of different treatment approaches.

Another problem in the current study design is the considerable amount of missing values. The sample is with 137 participants rather adequate, but apparently a large number of participants did not complete the survey entirely. As a result the sample was reduced to a relevant extent. Still, the remaining sample is acceptable. Those missing values were not taken into account during SPSS analysis. Nevertheless, this is an important point in discussing the relevance of this study, not the least because those missing values regard the topics examined in this study, such as MPI – Int at t1 and t2, MPI – Act, PCI – Transf and PCS. No analysis of missing values was done in this study, therefore against the background of this, the results must be considered under conditional acceptance.

Conclusion for Research and Practice

Given the above mentioned problems in this study design, there arise to be a few ideas for improvements in future designs. First of all, in systematically examining predictors of

treatment outcome, one should concentrate on differences in chronic pain treatment. Here, especially the distinction in analysis between on the one hand CBT and on the other hand ACT should be investigated in more detail. Furthermore, future research should identify explanations for missing values in order to minimize them. Finally, a greater sample could improve the results as well, given that statistical significance increases with more participants. On the basis of the limitations of the current study, and the fact that former research presented mixed results, further research on possible predictors of treatment outcome, especially on emotional factors, appears essential.

Conclusion

Chronic pain treatment in the Roessingh Rehabilitation Center in Enschede has proven to be effective; patients report less pain interference after treatment than in the beginning. The decrease in pain interference is seen as treatment effect. The general aim of the current study was to examine whether the four variables age, level of activity, pain transformation and catastrophizing were predictors of treatment outcome of a multidisciplinary treatment based on CBT or ACT. Analysis proves that there is no significant result. Generally, the fact that there are no predictors of treatment outcome can be seen as beneficial, given that this way patients with different characteristics are supposed to benefit from treatment to the same extent. Still, future research on predictors appears essential on the basis of the limitations of this study.

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