# Prospective research on the influence of positive affect and psychological wellbeing on work-related factors and depression in a chronic pain sample

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## Abstract

Objective: About 20% of the European population suffers from chronic pain and its consequences which include depression and work loss. The body of research on resilience mechanisms in chronic pain needs more exploration. In this study, the influence of positive affect (PA) and psychological wellbeing (PWB) in a sample of chronic pain patients is explored. According to the resilience model and the broaden-and-build theory, PA and PWB can have positive effects on the lives of people in all different situations. From this point of view, we explored if high levels of these two aspects can have a positive influence on the working situation and the level of depression in chronic pain patients one year later. Methods: The sample was gathered through the LISS panel in the Netherlands, and included 479 participants who indicated to regularly have pain in the knee, hip or back. Pearson correlation coefficients and regression analyses were computed between the independent variables PA and PWB at baseline and the dependent variables work status, absenteeism and depression one year later. Results: Regression analyses indicated a positive influence of PWB on work status and a negative influence of PA on absenteeism one year later. Discussion: Psychological wellbeing had a positive influence on the work status of chronic pain patients. Existing psychological therapies for chronic pain patients who mainly suffer from the loss of work might be expanded by modules which promote psychological wellbeing. Long-term measurements of positive affect might clarify possible effects.

## Nederlands abstract

Achtergrond: Rond 20% van de Europese bevolking heft last van chronische pijn en zijn gevolgen waaronder werkverlies en depressie. Onderzoek op het gebied van veerkracht factoren onder chronische pijn patienten moet daarom uitgebreid worden. In het kader van deze studie zal de invloed van positief affect (PA) en psychologisch welbevinden (PWB) in een sample van chronische pijn patienten bekeken worden. Volgens het veerkracht model en de broaden-and-build theorie kunnen PA en PWB positieve effecten op de levens van mensen in allerlei verschillende situaties hebben. Vanuit dit oogpunt werd onderzocht of deze twee factoren een positieve invloed op de werk situatie en het depressieniveau van chronische pijn patienten een jaar later hebben. Methode: Het sample werd verzameld door middel van het Nederlandse LISS panel, waarbij 479 participanten geïncludeerd werden die aangaven regelmatig last te hebben van pijn in het knie, de heup of de rug. Pearson correlatie coëfficiënten en regressieanalysen werden berekend tussen de onafhankelijke variabelen PA en PWB op baseline en de afhankelijke variabelen werk status, absenteïsme op werk en depressie een jaar later. Resultaten: De regressieanalysen lieten zien dat PWB een positieve invloed op werk status en PA een negatieve invloed op absenteïsme een jaar later had. Discussie: PWB toonde een positieve invloed op de werk status van chronische pijn patienten. Bestaande psychologische therapieën voor chronische pijn patienten die werkloos zijn zouden uitgebreid kunnen worden met modules die gericht zijn op de bevordering van psychologisch welbevinden.

# Introduction

Chronic pain is a common problem. Up to 22 % of primary care patients report persistent pain according to a study of the World Health Organization. In these primary care patients, pain complaints are for the most part located in the back, the head and joints (Gureje, von Korff, Simon & Gater, 1998). More recently, chronic pain was reported by 19% of the European population (Breivik, Collett, Ventafridda, Cohen & Gallacher, 2006). Chronic pain is loosely defined as pain that lasts longer than three months. In people suffering from chronic pain, severity is often not related to tissue damage and can persist long after an antecedent injury has resolved (Turk, Wilson & Cahana, 2011). Several factors influence the onset of chronic pain disorders. For example, the experience of a trauma, early social exclusion and being female increase the risk of developing chronic pain (Simons, Elman & Borsook, 2014). Furthermore, there seem to be positive correlations between chronic pain and social status, including obesity, low levels of education, and unequal health care.

Chronic pain patients experience different negative outcomes due to the pain in several life domains. One of the prominent problems pain patients have, is an increased risk of developing depression and anxiety (Gureje et al., 1998; Lopéz-Lopéz, Montorino, Izal & Velasco, 2008; Turk et al., 2011; Davis, Zautra & Smith, 2004; Simons et al., 2014). The risk of getting a psychological illness is increased fourfold for chronic pain patients, and studies reveal that 30-50% suffer from depression (Gureje et al., 1998; Davis et al., 2004). Another crucial domain in which chronic pain sufferers are impaired is the work situation. Results from both qualitative and quantitative research show that many pain patients are unemployed (MacNeela, Doyle, O´Gorman, Ruane & McGuire, 2013; Breivik et al., 2006; Turk et al, 2011). Pain patients who are employed report feelings of less productivity (MacNeela et al., 2013) and days they cannot work because of pain (Breivik et al., 2006). Additionally, chronic pain patients suffering from depression are less likely to return to work after treatment (Vowles, Gross & Sorrell, 2004). This loss of work productivity brings with it costs for the society as well as for the individual. At first, pain patients suffer from the lack of money after losing their job (MacNeela et al., 2013). The strain of financial problems due to lost work can be enhanced by additional costs for the patients that come up through travel expenses to see a doctor or through expenditure for medicine (Ruhe, Wager, Schmidt & Zernikow, 2013). Also for the society, loss of work, absenteeism and heightened use of health care imply a large economic burden. In the US, present annual national costs for pain range from $560 to $630 billion (Gaskin & Richard, 2012). In Europe, actual costs range from €740 million in Portugal up to €50 billion in Germany (Breivik, Eisenberg & O´Brien, 2013). Overall, important negative outcomes of chronic pain are thus the increased risk for mood disorders, social restrictions and loss of work productivity followed by enormous economic costs.

Different psychosocial factors, including cognition and emotions, contribute to the onset of chronic pain and the experience of its consequences. One of the most important aspect regarding the persistence of chronic pain is catastrophizing. In the Fear Avoidance Model (FAM), catastrophizing is defined as the threatening interpretation of pain which induces pain-related fear (Vlaeyen & Linton, 2000; Crombez, Ecclestone, van Damme, Vlaeyen & Caroly, 2012). According to the FAM, this fear is followed by avoidance behavior and hypervigilance to bodily sensations which triggers depression and disability. Catastrophizing often goes along with an increased pain severity and is more common in female pain patients (Ong, Zautra & Carrington Reid, 2010). Contrary, a decrease in catastrophizing is predictive for a decrease in pain intensity and disability (Parr et al., 2012). Chronic pain patients who are involved in catastrophizing therefore experience more (severe) pain as well as more accompanying disabilities, which make them get stuck in the cycle of chronic pain. A second important cognitive factor for the adaptation of chronic pain patients to their life with pain is pain acceptance. Acceptance can be seen as the shift of the focus from pain to non-pain aspects of life and the acknowledgement that cure is unlikely (Viane et al., 2003). As discussed above in light of catastrophizing, avoidance of activities and experiences as the counterpart of acceptance contributes to the vicious circle of chronic pain. Contrary, pain acceptance has positive effects in pain patients, and can lead to less pain, disability, depression, and pain-related anxiety. Also, acceptance is positively related to higher daily uptime and better work status (McCracken & Eccleston, 2003). Furthermore, acceptance is positively correlated with mental health (Viane et al., 2003). Acceptance based therapies for chronic pain successfully increase physical and social functioning and lead to a decrease in pain-related medical visits (McCracken & Vowles, 2014). These results indicate the importance of cognitive factors like catastrophizing, acceptance and avoidance in the daily life of pain patients.

Beside cognitive factors, emotions (or affect) play a key role in the pain experience. Much research focuses on the consequences of negative affect in the context of chronic pain. Several studies show that negative affect is positively related to pain intensity (Sturgeon et al., 2014; Strand, Kerns, Christie, Haavik-Nilsen, Klokkerud & Finset, 2007; Zautra, Johnson & Davis, 2005). Furthermore, an increase in pain intensity also contributes to social withdrawal which in turn predicts heightened negative affect (Sturgeon et al., 2014). Additionally, more intense negative affect also correlates with more catastrophizing (Jones, Rollman, White, Hill & Brooke, 2003). In light of the FAM mentioned above, this is not surprising, as catastrophizing and depression commonly come together. Overall, we can conclude that negative emotions and cognitions are influencing each other, and furthermore, that pain is strongly related to negative affect.

Present research mostly focuses on negative outcomes and distress management of chronic pain. Both in the area of chronic pain, as in other areas of psychology, over the last decade researchers have expressed the need to further examine the positive side of emotions, cognitions and behavior in addition to a focus on negative outcomes of a disease (Davis et al., 2004; Turk et al., 2011; Hamilton et al., 2004; Fredrickson, 2004). The researchers who dedicate their work to positive psychology are actually studying various factors which can help pain patients to fully use their resources and potentials (Westerhof & Bohlmeijer, 2010). In this study, the focus will be laid on such positive mechanisms for patients with chronic pain to manage their lives. Therefore, different recently developed frameworks will be presented and used to define the variables for this study.

The first theoretical framework around the successful overcoming of the consequences of chronic pain is introduced by Sturgeon and Zautra (2010) who define the term "resilience". According to the authors, resilience defines the strength of chronic pain patients to manage their life despite of the illness and can be of positive influence on the following three dimensions: First of all, a resilient pain patient can more easily recover from stress and therefore get back to his everyday life faster. Second, resilience can help patients to sustain positive functioning, such as a regular engagement in valued activities. Third, resilient people can experience growth in different fields of life due to chronic pain, resulting in new learning, lower reactivity to pain and benefit finding. One source of resilience is positive affect. Further research about positive affect led Fredrickson (2004) to develop the broaden-and-build theory of positive emotions. She states that positive emotions, in general, broaden peoples` repertoires in thought and action and build enduring personal resources (Fredrickson, 2004). The broaden-and-build theory, which states that positive emotions are helpful for people in every living situation, implies that positive emotions can also help pain patients to successfully overcome difficult times.

The two frameworks above and several other studies have shown that positive emotions can positively influence people´s cognition. Hamilton et al. (2004), for example, confirm this conclusion through relating positive emotions and goal-setting. They conclude that positive emotions activate long-term, broaden-and-build, goals. Also, positive affect leads to more complex information processing (Davis et al., 2004). Furthermore, positive affect is negatively correlated to pain (Strand et al., 2007) and seems to be associated with fewer self-reported symptoms, less pain sensitivity and a higher pain tolerance (Pressman & Cohen, 2005). Positive affect also has the potential to be a protective factor against an increase in pain when negative affect is high (Finan, Quartana & Smith, 2013). The existent literature makes clear how important the presence of positive affect in stressful and painful periods is to ensure a positive life, but more research is needed to understand all the potential of positive affect. Therefore, positive affect is included in this study.

In the field of positive psychology there is another aspect- besides positive affect- that may have a major influence on the life management of pain patients, namely psychological wellbeing (Keyes, 2005). In this study, the focus will lie on psychological wellbeing, which is a factor contributing to positive mental health (Westerhof & Bohlmeijer, 2010), because this component represents the self-realization of an individual and is still closely related to the total positive mental health of people. Psychological wellbeing includes i.e. dimensions as autonomy, personal growth and purpose in life (Keyes, 2005) and is also closely related to resilience (Lightsey, 2006). This relation implies that not only the resilience factor positive affect, but also psychological wellbeing could have the potential to be a source of strength for chronic pain patients. Research has shown that the absence of mental illness is not the same as being mentally healthy, these are two different, but related, continua (Keyes, 2005). This fact implicates that having a mental illness combined with being mentally unhealthy is the worst combination leading to dysfunctions in different areas (Keyes, 2005). But it also shows the potential of working with psychological wellbeing as one important part of mental health to reduce effects of mental illnesses. For pain patients this could mean that through the enhancement of psychological wellbeing, the consequences of chronic pain like depression or anxiety may be reduced.

The general aim of this study is to supplement the small body of research on resilience factors in chronic pain. As research greatly focusses on the management of negative outcomes of this illness, less is known about the effects of positive affect and psychological wellbeing on the long-term behavior of pain patients while the consequences for the patients and the costs for society are still enormous. For this reason data from the Netherlands` LISS panel are used to prospectively examine the following questions: (a) Does positive affect positively influence the work situation and the level of depressive symptoms in chronic pain patients one year later? And (b) does psychological wellbeing positively influence the work situation and the level of depressive symptoms in chronic pain patients one year later?

Regarding the fact that work loss and absenteeism are common consequences for many pain patients (MacNeela et al., 2013; Turk et al., 2011) it would be interesting to see whether positive affect and psychological wellbeing moderate the influence of chronic pain on the working situation one year later. According to Sturgeon's resilience model (Sturgeon & Zautra, 2004), one would expect pain patients with higher levels of positive affect to be more often employed than the ones with less positive affect. The fact that positive mental health can be present despite of mental illness leads to the hypothesis that pain patients with a high psychological wellbeing are more involved with valued actions and may be more often employed. Furthermore, it was mentioned that depression seems to play a role in the after-treatment job status of pain patients (Vowles et al., 2004), so it

would be helpful to see whether positive affect and psychological wellbeing correlate with the existence of depressive symptoms one year later. In terms of the resilience model, positive affect may have the potential to bring pain patients back to an ordered inner life and so be a moderating variable between chronic pain and depression. As could be seen, a mental illness like depression is not the same as mental health, but there seems to be a correlation between the two (Keyes, 2005). Therefore it could be stated that patients with a high level of mental health are expected to suffer from depression less often than patients with a lower level.

# Method

**Sample**

This study drew on data of the LISS (Longitudinal Internet Studies in the Social Sciences) panel of CentERdata, which is a representative internet panel including thousands of households in the Netherlands. Household members are regularly invited to fill in online questionnaires. In total, data from 479 Dutch participants of the LISS panel who indicated to regularly have pain in the back, knee or hip were included in this study. In this sample, the mean age was 53.68 years (SD=16.31), with the youngest participant being 16 years and the oldest 86 years, and 55.1% (N=264) of the sample was female. 82 (17.1%) of the participants regularly having pain had a diagnosis on (osteo-) arthritis, rheumatism or bone decalcification. 36.5% (N=175) of the sample had a paid job and 8.4% (N=40) of the group was not able to go to work, school or to do the household because of illness more than ten days in the last month. Positive affect had a mean rate of 46.67 (SD=9.77), while the mean score on depression was 12.30 (SD=4.12). Psychological wellbeing reached in a range from 1 to 6 a mean of 4.08 (SD=1.02). A detailed description of the pain sample is given in Table 1.

**Table 1. Descriptives of the pain group (N=479)**

| Variable | N (%) | Mean (M) | Standard deviation (SD) | Range |
|---|---|---|---|---|
| **Gender** | 479 | | | |
| Male | 215 (44.9) | | | |
| Female | 264 (55.1) | | | |
| **Age** | 479 | 53.68 | 16.31 | 16-86 |
| **Depression (RAND-36)** | 479 | 12.30 | 4.12 | 5-29 |
| **Positive affect (PANAS)** | 479 | 46.67 | 9.77 | 10-70 |
| **Psychological Wellbeing** | 479 | 4.08 | 1.02 | 1-6 |
| **Working situation** | 479 | | | |
| Paid work | 175 (36.5) | | | |
| Retired | 137 (28.6) | | | |
| Housekeeping | 60 (12.5) | | | |
| School | 23 (4.8) | | | |
| Disabled | 19 (4.0) | | | |
| Other | 65 (13.6) | | | |
| **Absenteeism (days)** | 479 | 1.64 | 1.21 | 1-5 |
| 0 | 339 (70.8) | | | |
| 1 or 2 | 65 (13.6) | | | |
| 3 to 5 | 24 (5.0) | | | |
| 5-10 | 11 (2.3) | | | |
| >10 | 40 (8.4) | | | |

**Measurements**

Besides questions about gender and age, the constructs *pain, positive affect, psychological wellbeing, depression* and *work status* including absenteeism were measured through different questionnaires. Participants with chronic pain were identified through items of the health questionnaire. The 479 participants who indicated to regularly have back-, knee- or hip-pain were included in the pain sample and used in analyses.

*Positive affect* (PA) was measured using the Positive and Negative Affect Schedule (PANAS; Watson, Clark & Tellegen, 1988). Participants had to rate their momentary feelings on a 7-point Likert scale from completely inapplicable (1) to completely applicable (7). The amount of positive affect was

scored by adding the values of the positively loaded items (e.g. enthusiastic, interested, excited etc.) of the PANAS. Higher scores indicated a higher level of PA. Cronbach´s alpha for our measurements of PA, which included ten items, was .85.

*Psychological wellbeing* (PWB) was assessed using the Mental Health Continuum- Short Form (MHC-SF), a well validated measuring instrument (Keyes, Wissing, Potgieter, Temane, Kruger & van Rooy, 2008). It consists of 14 items and measures the degree of emotional wellbeing (3 items), social wellbeing (5 items) and psychological wellbeing (6 items). The latter subscale, which was included in our study, consists of six distinct dimensions which are: autonomy, personal growth, environmental mastery, positive relations with others, purpose in life, and self-acceptance (Ryff & Keyes, 1995). Participants rated the frequency of each feeling, for example "…that your life has a direction or meaning", in the past month on a Likert scale from never (1) to every day (6). A higher score on the subscale of PWB indicated a higher degree of psychological wellbeing. In the present study, Cronbach´s alpha was .85 for PWB, which indicated a good reliability of this subscale.

*Depression* was assessed using the score on the subscale for mental health on the RAND-36, which assesses feelings of depression and nervousness (van der Zee & Sanderman, 1993). Based on five items, participants had to indicate in which amount they experienced feelings of for example happiness, nervousness or depression in the last month on a scale from (1) never to (6) the whole time. A higher score on the RAND-36 indicated a higher level of depression. As for PWB and PA, the subscale of the RAND-36 was found to have a similar Cronbach´s alpha of .82.

*Work status* was on one hand examined through one statement ("I perform paid work"), which had to be rated with *yes* or *no*. On the other hand, to get a more flexible and precise view on what happens in the field of work, an analysis of *absenteeism* ("How many days during the last month were you unable to go to work, perform housekeeping work or attend school, due to diseases?") was done. The participants had to choose an answer to the latter question from the following categories: (1) 0 days, (2) 1 or 2 days, (3) 3 to 5 days, (4) 5 to 10 days, and (5) more than 10 days. This gave us not only an indication of the job status, but also insight into the absenteeism of the participants in their jobs.

**Procedure**

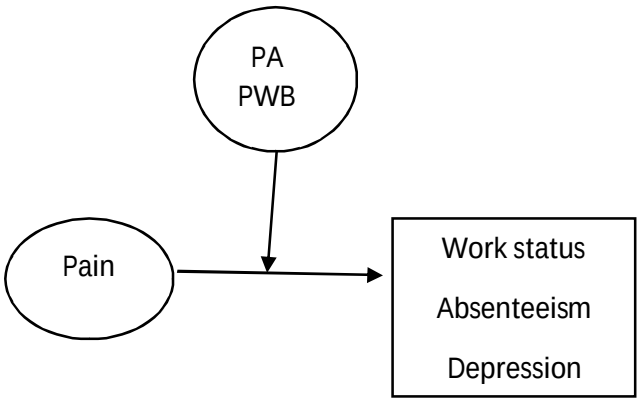
In this study, data from the years 2007 until 2009 were used for analysis. Answers on the questionnaires of 2007/2008 brought data for the baseline, or *T0,* measurements, while the second measurements in 2009 gave data for *T1*. Data for analysis came from answers on four different questionnaires. To filter on health and pain status of the participants, data from the health core study at T0 and T1 were used. At T0, data from 6698 respondents were collected, T1 brought

answers from 6119 participants. To check on psychological wellbeing and depression of the sample at T0 and T1, 1804 answers on the MHC-PWB and RAND-36 were included. Furthermore, to get sight on the rates of positive affect in the sample, answers on the PANAS at T0, were included. There, we had access to 6808 scorings. At last, the work status of the participants was checked with the help of data gathered at T1 during the work and schooling core study. Here, the data of 5701 respondents were accessible. All in all, 979 participants responded to all of the questionnaires and 479 of them were included in the present sample, because of their pain experiences.

**Analysis**

In our analyses, PA and PWB were used as independent variables, while the scores on the RAND-36, work status and absenteeism were the dependent variables in this study. First of all, Pearson correlation coefficients were calculated between the independent variables at T0 and the dependent variables at T1 to examine the association between the chosen concepts. Hereafter, regression analyses were performed to examine possible moderating effects between the independent variables and the dependent variables in our sample of chronic pain patients. For a clear picture of the moderating function see Figure 1. First, PA at T0 was used as predictive variable to assess the influence on RAND-36 and work status as well as absenteeism at T1. Scores on the dependent variables at T0 were used as controlling variable in the analyses to ensure that the observed effects were due to the independent variable. Second, three more regression analyses were also done with PWB at T0 as predicting value and again the three dependent variables, RAND-36, and the two work related variables at T1 as outcomes. As in the before mentioned case, we controlled for scores on the dependent variables at T0 to exclude possible influences. A significance level of .05 was handled.

**Figure 1. The independent variables PA and PWB as moderating factors between pain and the dependent variables work/absenteeism and depression.**



# Results

In this section the results of our computations are presented. First, the Pearson correlation coefficients between the independent variables PA and PWB at T0 and the dependent variables at T1 will be given, then the results of the regression analyses of PA and PWB respectively will be mentioned. In the case of PA, no significant correlations with work status, absenteeism or RAND-36 were found (see Table 2). This means that there is no significant correlation between the PA at baseline, T0, and the dependent variables one year later, at T1. Contrary, PWB showed significant correlations with two of the dependent variables. For PWB, the positive correlation with work status reached significance (r=.171, p=.000). Also, a significant negative correlation of PWB with RAND-36 was observed (r=-.149, p=.001). The correlation between PWB and absenteeism did not reach significance. PWB at T0 therefore positively correlated with work status and negatively with RAND-36 at T1. Regression analyses were done to indicate whether the independent variables PA and PWB at T0 could be predictors for the dependent variables work status, absenteeism and RAND-36 at T1.

**Table 2. Pearson Correlation between variables**

| | T1 | | |
|---|---|---|---|
| T0 | Work status | Absenteeism | RAND-36 |
| PA | .072 | .086 | -.046 |
| PWB | .171* | -.021 | -.149* |

*correlation is significant at the level of .01

In Table 3 the results of the regression analyses of PA at T0 with the dependent variables absenteeism, work status and RAND-36 at T1 respectively are presented. The results brought to light a significant predictive value of PA at T0 on absenteeism at T1 (B=.093, p=.035) while controlling for baseline absenteeism. The $R^2$ was .076. For the two other variables PA had no predictive value.

**Table 3. Regression analyses for PA**

| | B | p | $R^2$ |
|---|---|---|---|
| *Absenteeism* | | | |
| Absenteeism T0 | .262 | .000 | .076 |
| PA | .093 | .035 | |
| *Work* | | | |
| Work T0 | .777 | .000 | .583 |
| PA | .015 | .611 | |
| *RAND-36* | | | |
| RAND-36 T0 | .485 | .000 | .200 |
| PA | -.014 | .733 | |

What follows is the explanation of the regression analyses regarding PWB (Table 4). As can be seen, PWB at T0 also turned out to have significant predicting value on one of the three dependent variables at T1. PWB at T0 had a significant predictive value on work status at T1 (B=.084, p=.009) while controlling for baseline work status. The $R^2$ of this model was .522. What concerns the other dependent variables, PWB did not predict absenteeism (p=.410) or RAND-36 (p=.490) significantly.

**Table 4. Regression analyses for PWB**

| | B | p | $R^2$ |
|---|---|---|---|
| *Absenteeism* | | | |
| Absenteeism T0 | .268 | .000 | .069 |
| PWB | .037 | .410 | |
| *Work* | | | |
| Work T0 | .707 | .000 | .522 |
| PWB | .084 | .009 | |
| *RAND-36* | | | |
| RAND-36 T0 | .414 | .000 | .180 |
| PWB | -.030 | .490 | |

# Discussion

The aim of this study was to supplement the growing body of research in the field of positive psychology. In the present study, the potentially moderating influences of positive affect and psychological wellbeing between chronic pain and work-related factors as well as depression were investigated. The first research question was, whether positive affect has a positive influence on the work status, absenteeism at work and depression in chronic pain patients one year later. It was hypothesized that positive affect would positively influence the working situation of chronic pain patients, and that depressive symptoms would wane. This hypothesis was not validated in the present study.

The analyses showed that positive affect negatively influenced absenteeism at work of chronic pain patients one year later. This means that participants with a higher baseline positive affect turned out to be more often absent at work one year later. Furthermore, positive affect did not influence the work status nor the level of a depression of chronic pain patients one year later. In our sample 36.5% (175 participants) of the participants had a paid job of which 85% (119 participants) indicated that they were off work on one or more days during the last month due to pain. Compared to another study, where the rate of absenteeism under people with chronic knee pain was 14%, this rate is very high (Agaliotis et al., 2013). The found results were opposite to the expected effects of positive affect based on the broaden-and-build theory of positive emotions (Fredrickson, 2004). Positive affect has according to this theory the potential to broaden people´s thoughts and attention, undo negative arousal and build personal resources. Therefore, a positive influence of positive affect on the working situation of chronic pain patients was expected. The same was expected for the level of depression one year later, because "*positive emotions (…) trigger upward spirals towards greater well-being in the future"* (Fredrickson, 2004). In line with our hypotheses, but contrary to our results, other researchers found positive affect to be associated with fewer reported symptoms, with less pain sensitivity and a higher pain tolerance as well as the establishment of long-term goals in chronic pain patients (Pressman & Cohen, 2005; Hamilton et al., 2004). In turn, less pain symptoms are associated with a higher rate of patients who return to work and stop long time absenteeism (Eilat-Tsanani, Tabenkin, Lavie, Cohen Castel & Lior, 2010; Fayad et al., 2004). As stated in the resilience model of Sturgeon (Sturgeon & Zautra, 2010), the way of experiencing positive emotions and the way patients react to their emotions play a key role. Also for the patients in the present study this might have been a hinder to benefit from their positive feelings and for positive affect to influence the

working situation and depression. Based on the existing literature, it is difficult to explain the found results. Questions about methodological shortcomings might arise. Regarding the used questionnaire for positive affect, it can be stated that it is validated and often tested (Crawford & Henry, 2004). One limitation might have been the short-term instruction of the questionnaire, because participants had to rate their feelings of the *moment*. This resulted in ratings which are sensitive to fluctuations in mood (Watson, Clark & Tellegen, 1988) and might not have had the potential to have influence on the working situation and depression one year later. One possibility would be the use of a longer-term instruction (e.g. *past year*) to get a more stable examination of positive affect.

The second factor which was investigated in the present study was psychological wellbeing. It was hypothesized that psychological wellbeing can positively influence the work status, absenteeism and depression in chronic pain patients one year later. The results indicated that psychological wellbeing had a positive influence on work status one year later, but did not affect depression and absenteeism. Concordant to the present findings, dimensions within psychological wellbeing are self-actualization and being a fully functioning person, as well as the tendency towards personal development which can be related to the engagement in work (Ryff, 2014). The found influence of psychological wellbeing on work status is therefore in line with the work of Ryff (1995, 2014). The present results are also supported by the work of Lightsey (2006), who stated that psychological wellbeing and resilience are closely related. Resilience is defined as the successful living despite of chronic pain, resulting among other things in the ability to go to work despite of pain (Sturgeon & Zautra, 2010). The proven influence of psychological wellbeing on work status shows that chronic pain patients who apparently suffer from the loss of work very often (MacNeela et al., 2013; Turk et al., 2011; Breivik et al., 2006) might benefit from interventions which aim at this factor. One recently developed therapy which aims at enhancing psychological wellbeing is the *well-being therapy* (Fava & Ruini, 2003), which was originally construed for the treatment of affective disorders. The authors propose that it also could have effects on psychosomatic and chronic diseases. According to the present findings, the influence of well-being therapy could be tested in a chronic pain sample which has predominantly problems with the loss of work.

Furthermore, it was hypothesized that psychological wellbeing positively influences depression one year later. This expectation was not confirmed in the present study. To some degree, our findings supported the two continua model of Keyes (2005) which was laid at the base of the stated hypothesis. According to this model, mental health and mental illness are two distinct concepts which both can be present in an individual. They can be measured separately, but also show some correlation with each other. As the present results showed, there was no influence of psychological wellbeing on depression, which supports the statement that these two are distinct concepts. Our

results also strengthen the finding that pain and depression are directly linked and causally related to each other (Kroenke, Wu, Bair, Krebs, Damush & Tu, 2011), so that a moderating factor cannot have an influence on this relation. The present findings do not support the use of well-being therapy as an intervention for affective disorders like recurrent depression as was supposed by its inventors (Fava & Ruini, 2003). In fact, this therapy turned out to increase psychological wellbeing and to reduce residual symptoms of depression. Again, no support for the present results is found in the existing literature.

**Strength and limitations**

As other studies, this study has some limitations. First of all, the definition and inclusion of the sample has been difficult, because of the broad definition of the term "chronic pain". We chose to use data of people who indicated that they regularly suffered from pain, because there may have been patients who did not have a diagnosis yet, but would otherwise fit well into the sample. We also could have chosen for only the participants with a diagnosis on arthritis or rheumatism to ensure that the symptoms of the sample were well examined. These would have been only 82 (17.1%) of our actual sample. This would have minimized the sample size, so that much information of participants who suffer from chronic pain, but did not have a diagnosis (yet) would have been missed.

One strength of the present study was the use of validated and often tested questionnaires like the MHC-SF (Keyes et al., 2008) and the PANAS (Watson, Clark & Tellegen, 1988). Therefore the scores on the measurements of positive affect and psychological wellbeing can be treated as valid. As mentioned before, the ratings of positive affect might have been too momentary and short-termed. Besides longer-term registrations of positive affect, the use of recent techniques to repetitively rate positive affect could be an option for future research. One possible method would be the ecological momentary assessment (EMA) which is already used in some research fields (see for example Ratcliff, Lam, Arun, Valero & Cohen, 2014). With the help of EMA people could be asked several times a day to indicate their positive affect, so that more information could be gathered for evaluation. EMA could be gathered through the help of computer programs or applications for the mobile phones of the participants. This may be a topic for future research.

Another strength of this study concerns its longitudinal character. Researchers criticize that little longitudinal work is done in the field of chronic pain, mainly for children (Jones, 2011). In addition, there are many therapies for chronic pain patients which only have moderate short-term effects, but it turned out that interventions that aim at resilience and wellbeing show good results in comparison

to other programs (Evers, Zautra & Thieme, 2011). With the present study, it is revealed that psychological wellbeing can have a long-term effect on the work status of chronic pain patients.

**Conclusion**

The present study shows the potential of psychological wellbeing in chronic pain patients to positively influence their working status on the long term. This finding indicates possibilities for further research in the field of positive psychology and chronic pain. With the help of experimental research, the effects of the two factors could be studied more thoroughly. Therapies for chronic pain patients who mainly show problems in the field of work, could be added with components which support psychological wellbeing and the effects could be compared to a control group that gets a treatment as usual. Also, well-being therapy (Fava & Ruini, 2003) could be administered to chronic pain patients so that long-term effects on the work status could be registered. Several psychological therapies exist, which successfully address chronic pain patients, for example cognitive-behavioral therapy, mindfulness-based stress reduction and acceptance and commitment therapy (Sturgeon, 2014). Looking at the still high percentage of chronic pain patients and the consequences which come along with this illness, the need for future longitudinal research to support affected patients gets clear. With this study, a further step to clear the working mechanisms of chronic pain is done.

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