Meaning in life in chronic pain patients over time: associations with pain experience and psychological well-being

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Abstract

We explored the relationship between meaning in life and adjustment to chronic pain in a three-wave, 2 year, longitudinal study of 273 Belgian chronic pain patients. We examined the directionality of the relationships among the meaning in life dimensions (Presence of Meaning and Search for Meaning) and indicators of adjustment (depressive symptoms, life satisfaction, pain intensity, and pain medication use). We found that Presence of Meaning was an important predictor of well-being. Secondly, we used a typological methodology to distinguish meaning in life profiles, and the relationship of individual meaning in life profiles with indicators of adjustment. Five meaning in life profiles emerged: High Presence High Search, High Presence Low Search, Moderate Presence Moderate Search, Low Presence Low Search, and Low Presence High Search. Each meaning in life profile was associated with a unique adjustment outcome. Profiles that scored high on Presence of Meaning showed more optimal adjustment. The profiles showed little change over time and did not moderate the development of adjustment indicators, except for life satisfaction. Practical implications and suggestions for future research are discussed.

Keywords

Meaning in life; Pain patients; Longitudinal analyse; Adjustment

Introduction

Chronic pain (CP), defined as recurrent or enduring pain lasting for at least 6 months, is a stressful and widespread condition. In Europe, 19 % of the population suffer from chronic pain. The prevalence of CP in the US ranges from 12 to 25 % (National Center for Health Statistics 2006; Reid et al. 2011). Chronic pain has a significant impact on patients' intrapersonal (e.g., depression, suicidal ideation) and interpersonal (e.g., job loss, social isolation) functioning (Breivik et al. 2006). Moreover, chronic pain often threatens patients' perceptions about what is meaningful to them and the amount of meaning they find in their daily life. Experiencing chronic pain often requires a revision of one's life goals and expectations (Pinquart et al. 2009). Hence, the impact of a chronic condition is not limited to patients' biopsychosocial functioning but impacts the existential domain as well (Dezutter 2010; Dezutter et al. 2013). Patients wonder how their life can be meaningful if they experience chronic pain and they are often less able to engage with those aspects of their life that gave their life meaning because of the pain.

Meaning in life

Patients' functioning on an existential level also plays an important role in adjustment to CP. Elliott et al. (2002, p. 133) stated that 'cognitive activity associated with optimal adjustment… is often conveyed in constructions of personal meaning and purpose'. Other scholars (e.g., Janoff-Bulman 2004; Park 2010) stated that optimal adjustment can be facilitated by constructive types of cognitive and emotional processing of the disruptive experience (such as positive re-appraisal) and by re-establishing a sense of meaningfulness for patients. A preserved or restored sense of personal meaning is considered as an important resource for adjusting to an illness (Sherman and Simonton 2012). Breast cancer patients, for example, with a strong global meaning showed better physical and psychological functioning at the 4-month follow-up assessment (Sherman et al. 2010). Further, experiencing meaning in life was related to lower distress and greater well-being in Italian and US cancer patients (Park et al. 2008; Scrignaro et al. 2014). Finally, meaningfulness was positively related to psychological well-being in spinal cord injury patients (deRoon-Cassini et al. 2009) and osteoarthritis patients (Smith and Zautra 2004).

Steger et al. (2006) pointed out that the concept of meaning in life consists of two components. The first aspect, *Presence of Meaning*, is defined as 'the extent to which people comprehend, make sense of, or see significance in their lives, accompanied by the degree to which they perceives themselves to have a purpose, mission, or overarching aim in life' (Steger 2009, p. 682). The second aspect, *Search for Meaning*, focuses on how individuals develop their sense of meaning in life and is defined as the strength, intensity, and activity of people's desire and efforts to establish and/or augment their understanding of their lives.

Historically, Search for Meaning received theoretical interest from Frankl (1963) who described searching for meaning as 'the primary motivational force in man' (p. 121) and a natural, healthy part of life. Baumeister (1991), on the other hand, regarded searching for meaning as a dysfunctional process that only occurs when an individual's need for meaning has been thwarted. The empirical literature is similarly complex with some studies linking Search for Meaning to less well-being (Steger et al. 2008a, b) and less life satisfaction

(Steger et al. 2009, 2011) more hopelessness, and more anxiety (Scrignaro et al. 2014); conversely other studies found Search for Meaning to be positively related to open-mindedness and curiosity (Steger et al. 2008a, b). The impact of searching for meaning on adjustment when confronted with a medical stressor is very limited (see Scrignaro et al. 2014). The majority of available studies investigating the Search for Meaning focus on searching for event-related or illness-specific meaning (i.e., how one tries to make sense out of the event or find meaning in the event), rather than considering the broader construct of searching for a general meaning of life (e.g., Kernan and Lepore 2009).

Although searching for meaning is often seen as a natural reaction to an absence of meaning, empirical studies showed that Search for Meaning and Presence of Meaning are only moderately related and are actually distinct from one another (Steger et al. 2008a, b). In addition, several scholars (e.g., Cohen and Cairns 2012; Steger et al. 2008a, b) point to the dynamic interplay between Search for Meaning and Presence of Meaning as an important research aim. Dezutter et al. (2013, 2014) studied this interaction between Presence of Meaning and Search for Meaning and found specific meaning in life profiles which held distinct associations with psychosocial functioning and illness. However, the few available studies focusing on both Presence of Meaning and Search for Meaning as important resources in the adjustment process are limited by their cross-sectional designs.

Changes in personal meaning over time have only been studied in a handful of community samples. King et al. (2006) used the Meaningfulness subscale of the Sense of Coherence Scale (Antonovsky 1987) to assess meaning in life and found modest stability ($r = .46$) in a sample of healthy adults within a 2-year span. Mascaro and Rosen (2008) used the Life Regard Index (LRI), the Spiritual Meaning Scale (SMS) and the Personal Meaning Profile (PMP) to tap into the 'existential meaning' of undergraduate students. Across 2 months, they found high stability coefficients (LRI $r = .74$, SMS $r = .78$, PMP $r = .78$). In addition, the authors found an increase in PMP over time, but no change for LRI or SMS. Only Kashdan and Steger (2007) focused on both components of meaning in life and found in a sample of students that Presence of Meaning and Search for Meaning were relatively stable across a 13-month time period ($r = .41$ and $r = .50$, respectively). This paucity of previous studies limits our understanding of how both constructs develop over time and how their development affects the adjustment to a medical stressor.

Study aims

The present study used a longitudinal design and applied both a variable-oriented (cross-lagged analyses) and a typological approach (quantitative latent class growth analysis). Using both statistical methodologies enabled us to investigate the relationship between meaning in life and psychological functioning deeper than using either of the methodologies alone.

In our variable-oriented approach, we used cross-lagged analyses to test the valence of relationships among meaning in life dimensions and psychosocial well-being. The variable-oriented approach focused on the unique effects of each meaning in life dimension on psychological functioning (or vice versa) over time.

Addressing the data from a typological perspective, latent class growth analysis (LCGA; Nagin 2005) enabled us to empirically define groups of individuals with a similar profile based on both Presence of Meaning and Search for Meaning. This approach takes into account that the two meaning in life dimensions co-exist within individuals and that it is the combination of both dimensions that creates a specific meaning in life profile. Each profile type in turn, may be differently related to outcomes.

Previous research in this area was limited to two time points and relied only on healthy participants. Our study expands on this research by focusing on medical patients and by including three time points, which additionally allows for assessing the stability of meaning in life profiles over time. Questions of meaning in life and meaningfulness are particularly salient for individuals dealing with a chronic medical condition. Consequently, we focused on chronic pain, a condition that is often perceived as infringing on an individual's goals and life plans and seriously impacting his/her feelings of meaningfulness in life (Park 2010).

Directionality of effect—Psychological theory and previous cross-sectional findings suggest that meaning in life is an important predictor of the psychosocial functioning of pain patients. Therefore, we expected Presence of Meaning and Search for Meaning to be stronger predictors of psychological functioning than the reverse relationship (Janoff-Bulman 2004; Park 2010; Sherman and Simonton 2012). Viewed from within the meaning-making framework, for example, one might see meaning in life as an important aspect of the orienting system that individuals use to cope with stressful experiences (see Park 2010). In line with earlier studies, we expected that especially Presence of Meaning would positively predict psychological adjustment and negatively predict pain-related variables.

Meaning in life-profiles and their developmental trajectories—Based on earlier cross-sectional findings of meaning in life profiles in chronically ill patients (Dezutter et al. 2013), we hypothesized that at least four meaning in life profiles would emerge over time: Low Presence Low Search (patients experiencing no meaning in their life and not engaged in any Search for Meaning), Low Presence High Search (patients experiencing no meaning but engaged in a Search for Meaning), High Presence Low Search (patients experiencing meaning in their lives and not engaged in a Search for Meaning), and High Presence High Search (patients experiencing meaning and searching for meaning in their lives). No detailed hypotheses were made with respect to the developmental changes of the individual meaning in life profiles because previous research examining changes in meaning in life is very limited.

Based on earlier cross-sectional studies using a typological approach (Dezutter et al. 2013, 2014), we hypothesized that profiles with high levels of Presence of Meaning (i.e., High Presence High Search; High Presence Low Search) would show more optimal adjustment (reflected in lower levels of depressive symptoms and greater life satisfaction) in comparison to profiles characterized by low Presence of Meaning (i.e., Low Presence Low Search; Low Presence High Search). A recent experimental study (Smith et al. 2009) revealed that a sense of purpose in life was related to the ability to habituate faster to laboratory-induced heat and cold pain stimuli. In line with these findings, we hypothesized that pain patients experiencing greater levels of meaning (High Presence High Search or

High Presence Low Search) would also report lower pain intensity and less frequent use of pain medication in comparison to their counterparts who do not experience such high levels of meaning. Similar to previous cross-sectional findings (Dezutter et al. 2013, 2014; Steger et al. 2011), we hypothesized that low presence combined with high search might indicate a stressful search (Baumeister 1991; Klinger 1998), resulting in a less than optimal adjustment to chronic pain. On the other hand, high levels of Search for Meaning combined with high levels of presence of meaning might indicate an adaptive search pattern (Frankl 1963) and be accompanied by more optimal adjustment. Finally, no theoretical or empirical basis is available to formulate specific hypotheses regarding the degree to which meaning in life profiles would moderate the development of adjustment variables over time. Hence, analyses looking into differential change patterns in adjustment over time based on the meaning in life profiles were exploratory in nature.

Method

Participants and procedure

Patient data were gathered in Belgium in collaboration with the Flemish Pain League, a national patient organization. This umbrella organization includes smaller support and information dissemination groups that organize informative and leisure activities for pain patients. Members are diagnosed as pain patients following the definition of the National Institute for Health and Disability Insurance (RIZIV) that describes chronic pain as pain that persists for at least 3 months after optimal curative treatment. The study received full institutional review board approval and participants were informed on confidentiality and provided informed consent.

In March 2012, the Flemish Pain League distributed 750 questionnaires by mail to a random selection of their members. Out of their full membership data ($n = 2,000$), every fourth member of the list was selected and invited to participate in the study. Patients who decided to participate added contact information at the initial (T1) data collection that would allow the researchers to reach them for follow-up. Participants received their questionnaires at the beginning of March 2012, 2013, and 2014 and were given 2 months to send back the questionnaire. Questionnaires that were received after this time interval were not included in the study. Twenty-five questionnaires were returned as non-deliverable (e.g., moved, passed away) and 273 questionnaires were received at Time 1 (T1). At T2, 164 patients (59.2 %) and at T3, 163 patients (58.8 %) returned the questionnaire. A total of 125 patients filled out the questionnaire at all three measurement points.

The sample ($M_{age} = 53$, $SD = 13$) consisted of 69 % women and showed a wide range of civic states (14 % single, 62 % married, 9 % cohabiting, 4 % widowed, 9 % divorced) as well as educational levels (13 % primary school, 51 % secondary school, 31 % higher education). The mean duration of pain was 19 years ($SD = 13$) ranging from 2 to 74 years. Patients indicated which treatments they ever used for their pain condition: 90 % of the patients used pain medication, 85 % used physiotherapy, 36 % used psychotherapy, 41 % used an alternative treatment (i.e., mindfulness, Reiki) and 52 % had an operation/interventional therapy as treatment for their pain. With regard to the main diagnosis, 31 % experienced back or neck pain, 17 % fibromyalgia, 9 % chronic fatigue syndrome, 4 %

chronic headaches/migraine, 3 % neuropathy, and 23 % other (i.e., Sudeck/Reflex Sympathetic Dystrophy, arthrosis/osteoarthritis, ulcerative colitis, Crohn's disease/Irritable Bowel Syndrome).

Instruments

Meaning in life—Participants rated the 10 items of the *Meaning in Life Questionnaire* (MLQ, Steger et al. 2006) on a 6-point Likert scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). One subscale taps into Presence of Meaning (Cronbach's alpha = .82 at T1, .83 at T2, .83 at T3) and one into Search for Meaning (Cronbach's alpha = .88 at T1, .87 at T2, .88 at T3). Sample items include ''I understand my life's meaning'' (Presence) and ''I am always looking to find my life's purpose'' (Search).

Psychological well-being—The 5 items from the *Satisfaction with Life Scale* (SWLS; Diener et al. 1985) were rated on a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*). A sample item is 'If I could live my life over again, I would change almost nothing.' Mean scores were computed. Cronbach's alpha was .87 at T1, .90 at T2, .86 at T3. Participants completed a short version of the Centre for Epidemiological Studies Depression Scale (CES-D; Radloff 1977) consisting of 8 items of the original version.[1] Cronbach's alpha was .77 at T1, .83 at T2, and .76 at T3. Participants indicated on a 4-point scale (1 = *seldom*, 4 = *most of the time or always*) how often they experienced cognitive, psychological, and somatic symptoms of depression during the last week (e.g., 'During the last week… I felt everything I did was an effort').

Pain experience—Pain intensity was measured with three questions ('what is your level of pain at this moment', 'what was your highest pain level last week', and 'what was your lowest pain level last week' (Bush et al. 1999; Dezutter et al. 2011). Questions were scored on a 10-point scale (1 = *no pain at all*, 10 = *very high levels of pain*). Cronbach's alpha was .86 at T1, .87 at T2, and .86 at T3. In line with Bush et al. a composite pain index was obtained through the mean of these items. Frequency pain medication use was measured with a single-item 'How often do you take pain medication'. Answering possibilities were seldom or never, monthly, weekly, several times a week, and daily. Pain tolerance was calculated as pain intensity controlled for pain medication use.

Data-analysis

Participants with and without complete data were compared using Little's (1988) Missing Completely At Random (MCAR) test on all study variables. A non-significant MCAR test statistic, $\chi^2(513) = 551.17$, ns, suggested that missing values could be reliably addressed within this dataset. We used the expectation maximization algorithm to estimate missing data for all preliminary analyses in SPSS 20.0. Cross-lagged path analyses and latent class growth analyses (LCGA) were performed in Mplus 6.0 using Full Information Maximum Likelihood (FIML) to handle missing data.

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[1]The current study is part of an ongoing international study on spirituality and pain. To match the questionnaires of the research partners whose data already was collected, we used the same 8 items of the CESD. Those items were 'I felt depressed', 'I felt everything I did was an effort', 'My sleep was restless', 'I was happy', 'People were unfriendly', 'I enjoyed life', 'I felt that people disliked me', and 'I could not get going'.

Results

Preliminary analyses

Within-time correlations (Table 1) were calculated at each time point. As expected, Presence of Meaning was negatively related to depressive symptoms, pain intensity, and frequency of pain medication use. We only found a non-significant correlation between Presence of Meaning and pain intensity at T2 and between Presence of Meaning and pain medication at T2 and T3. Presence of Meaning was positively related to life satisfaction at every time point. Search for Meaning was positively related to depressive symptoms at every time point. All correlations between Presence of Meaning and Search for Meaning were non-significant.

Means and standard deviations of all variables at each time point can be found in Table 2. Repeated measures ANOVAs showed that only Life Satisfaction scores significantly changed over time. Correlations were calculated among the study variables at the different time points to assess the differential stability and all correlations were found significant at $p < .01$ (Table 1).

Cross-lagged analyses

The cross-lagged model included all within-time associations, all stability coefficients, and all cross-lagged paths among the variables. Standard fit indices were used (Kline 2005). The Chi square index should be as small as possible; RMSEA should be <.08, and CFI should be [.90. Path analyses were performed in two steps. First, all cross-lagged paths were freely estimated ($\chi^2(30) = 37.45$; RMSEA = .030; CFI = .995). Second, cross-lagged paths were constrained as equal across both time intervals; for example, the path from Presence of Meaning T1 to depressive symptoms T2 was set equal to the path from Presence of Meaning T2 to depressive symptoms T3. This model resulted in a good fit, $\chi^2(60) = 72.54$; RMSEA = .027; CFI = .992 (Orth et al. 2012). The more parsimonious constrained model fit the data equally well ($\chi^2(30) = 35.09$, $p = .24$) and was retained. Figure 1 displays all (marginally) significant standardized cross-lagged relations and Table 1 displays the stability coefficients. Presence of Meaning negatively predicted depressive symptoms ($p < .05$) and marginally positively predicted life satisfaction ($p < .10$) and Search for Meaning positively predicted depressive symptoms ($p < .01$). Pain intensity indirectly predicted Presence of Meaning via the frequency of pain medication: pain intensity positively predicted pain medication use over time and the latter negatively predicted Presence of Meaning ($p < .10$) over time.

Latent class growth analyses

We performed LCGAs on the two meaning in life dimensions simultaneously. In all the models, the path from the slope to the indicator at Time 1 was fixed to 0 so that the intercept would represent the initial level. Given the equally spaced measurement intervals, subsequent linear slope pattern coefficients were fixed at 0, 1 and 2, for T1, T2, and T3 respectively. We used several criteria to determine the number of classes (Mutheén and Mutheén 2000; Nagin 2005). First, sample-size-adjusted Bayesian Information Criterion (BIC) for a solution with k classes should be lower than for a solution with k-1 classes. This suggests that adding additional classes improves the model's fit. Second, we assessed

classification quality by entropy (*E*, Reinecke 2006), a standardized summary measure of classification accuracy. Entropy ranges from .00 to 1.00, with values of .70 or higher indicating accurate classification. Third, we used the Lo-Mendell-Rubin Adjusted LRT Test which provides a *p* value to determine if there is a statistically significant improvement in fit when including an additional class. Based on these criteria as displayed in Table 3, five classes were selected.

Table 4 provides estimates of mean intercepts and slopes for all classes. Class 1 (Low Presence Low Search, *n* = 42) included individuals scoring low on Presence of Meaning and on Search for Meaning. Class 2 (Moderate Presence Moderate Search, *n* = 109) included individuals scoring moderate on both Presence of Meaning and Search for Meaning. Class 3 (Low Presence High Search, *n* = 28) included individuals scoring low on Presence of Meaning and high on Search for Meaning. Class 4 (High Presence Low Search, *n* = 42) included individuals scoring high on Presence of Meaning and low on Search for Meaning. Finally, class 5 (High Presence High Search, *n* = 51) included individuals scoring high on Presence of Meaning and on Search for Meaning. For all classes, as well as for the total sample, both meaning in life dimensions remained stable over time.

External correlates

One-way univariate ANOVAs with subsequent post hoc Tukey's HSD tests were conducted to investigate whether the profiles differed on age, educational level, and pain duration at T1. Significant age differences ($F(4, 198) = 4.27$, $p < .01$, $h^2 = .08$) were found. Pain patients in the Low Presence High Search profile ($M_{years} = 44.94$, $SD = 12.79$) were significantly younger than pain patients in the Low Presence Low Search profile ($M_{years} = 56.00$, $SD = 10.19$) or in the High Presence High Search profile ($M_{years} = 58.97$, $SD = 13.07$). No significant differences were found on educational level, $F(4, 257) = 1.82$, $p = .13$, $h^2 = .03$, or on pain duration, $F(4, 253) = .941$, $p = .44$, $h^2 = .02$. Additional χ^2 analyses indicated that female patients were underrepresented in the Low Presence Low Search profile, $\chi^2(4) = 11.13$, $p < .05$, Cramer's $v = .21$, $p < .05$.

A second set of univariate ANOVAs were conducted to test whether our study variables differed among the meaning in life profiles at each time point. At all three time points, significant profile differences were found. Univariate *F* values, h^2, and pairwise comparisons (using Tukey's HSD test) are described in Table 5. In general, High Presence Low Search constituted the most optimal profile with low levels of pain intensity, pain medication use, and depressive symptoms and high levels of life satisfaction. The High Presence High Search profile showed similar results except for higher levels of depressive symptoms. The Low Presence High Search profile was the most maladaptive profile with high levels of pain intensity, pain medication use, and depressive symptoms and low levels of life satisfaction. The Low Presence Low Search profile also showed a problematic picture with only slightly lower levels of depressive symptoms compared to the Low Presence High Search profile. Patients in the Moderate Presence Moderate Search profile generally reported intermediate levels on all of the variables. Furthermore, pain intolerance (i.e., pain intensity when controlled for pain medication) was developed as an extrapolated variable by

using pain medication use as a covariate in the prediction of pain intensity. No significant differences in pain intolerance means were found among the profiles.

Ancillary analyses

To test whether changes in our study variables (depressive symptoms, life satisfaction, pain intensity, frequency of pain medication) differed for the distinct profiles, repeated measures ANOVAs were performed. Because age and gender differences between the profiles were found at T1, both were modelled as covariates in the analyses.

For pain intensity, no main effect of time was found,[2] and no significant interaction effect of time with age, gender, or class was found. For frequency of pain medication use, no main effect of time was found and no significant interaction effect of time with age, or class was found. For depressive symptoms, no main effect of time was and no significant interaction effect of time with age, gender or class was found.

For life satisfaction, no main effect of time was found and no significant interaction effect of time with age or gender was found. However, a significant interaction effect for time $\times$ class was found [$F(8, 386) = 2.35$, $p < .05$, $h^2 = .05$] (see Fig. 2). Subsequent repeated measures ANOVAs for the distinct profiles identified that the significant interaction effect was due to different trajectories in the Low Presence Low Search profile, $F(2, 105) = 4.73$, $p < .05$, $h^2 = .19$, the Moderate Presence Moderate Search profile $F(2, 105) = 6.76$, $p < .01$, $h^2 = .10$ and the High Presence High Search profile $F(2, 105) = 4.27$, $p < .05$, $h^2 = .16$. The Low Presence Low Search profile and the Moderate Presence Moderate Search profile showed a similar pattern with a decrease in Life Satisfaction at T2 and an increase at T3. The High Presence High Search profile, on the other hand, showed a distinct pattern with an increase in Life Satisfaction at T2 and a small decrease at T3.

Discussion

In this study, we investigated how meaning in life related to the psychological functioning of pain patients over a two-year time span. Therefore, we studied the directionality of effects among the dimensions of meaning in life (Presence of Meaning and Search for Meaning) and adjustment variables. We also identified how meaning in life profiles change over time in chronic pain patients.

Meaning in life and psychological well-being: directionality of effect

Both Presence of Meaning and Search for Meaning were highly stable over time. This suggests that meaning in life reflects more of a trait aspect, rather than a state aspect, of individual functioning. These results justify previous theoretical accounts describing meaning in life as a stable intrapersonal resource that can be used to maintain well-being and adaptive functioning (Frankl 1963). Other scholars also assume that an existential outlook may remain stable until a major destabilizing event occurs (Pargament et al. 2005). For example, Park (2010) hypothesizes that a highly stressful event will have an impact on

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[2]The exact statistical results for the non-significant findings can be requested at the first author.

individual's global life meaning and their sense of meaningfulness. We might assume that the high stability of meaning in life in our sample is an indication that the chronic pain condition of the participants is generally no longer perceived as a substantial destabilizing factor. This is probably due to the specific nature of our sample, that is, members of a pain patient organization with a longer duration of their pain condition (M = 19 years) who have already completed the psychological process of accepting that their pain condition is chronic. Future research replicating this study in a sample of newly diagnosed chronic pain patients might reveal more changes over time given that those patients are still experiencing the destabilizing event and have not yet accepted their condition or restored their meaning in life.

In line with our expectations, meaning in life dimensions predicted pain patients' functioning. Especially psychological functioning (depressive symptoms and life satisfaction) were predicted by meaning in life whereas pain variables were not. High levels of presence of meaning resulted in fewer depressive symptoms and greater life satisfaction 1 year later. These findings point to meaningfulness as an important factor in the psychological adjustment of pain patients. These empirical findings affirm humanistic and existential theorists that have put forth the importance of meaning in life for individuals coping with severe life stressors (e.g., Frankl 1963; Janoff-Bulman 2004). High levels of Search for Meaning, on the other hand, resulted in higher levels of depressive symptoms 1 year later. This finding resembles the idea that searching for meaning is a stressful process, resulting in less adaptation (e.g., Baumeister 1991).

Pain intensity had an indirect effect on Presence of Meaning via the frequency of pain medication use. A speculative interpretation for this finding might be found in the dysregulation of neural circuitry involved in opioid analgesic medication addiction. Research (Koob and Le Moal 2001) showed that chronic pain combined with increased levels of opioid use resulted in decreased reward responsiveness (Garland et al. 2013, 2014) due to drug-induced changes to the dopamine system. This insensitivity to naturally rewarding experiences might result in a decreased sense of meaning in life. Alternatively, a pain patient might use their opioids to self-medicate for existential distress related to the chronic pain condition (Wachholtz and Makowski 2012). Escaping the existential distress through psychological numbing, combined with decreased cognitive activity resulting from escalating opioid use, might inhibit the pain patient's ability to resolve the existential distress and positively adapt to the chronic pain condition, resulting in lower levels of experienced meaningfulness.

Meaning in life profiles and adjustment to chronic pain Based on earlier cross-sectional studies, at least four distinct meaning in life-profiles were expected to emerge: Low Presence Low Search, Low Presence High, High Presence Low Search, and High Presence High Search. In addition to these four profiles found in our sample, a fifth profile appeared characterized by moderate levels on both Presence of Meaning and Search for Meaning scales. This profile was also present in a cross-sectional study with emerging US adults who were described as not substantially engaging with an existential meaning in life (Dezutter et al. 2014).

The profiles showed clear differences in their relationships with external correlates. Similar to earlier studies, our findings identify that experiencing meaning in life is an important factor for optimal adjustment. Patients in the High Presence Low Search and in the High Presence High Search profile showed more optimal adjustment to their pain condition compared to their counterparts in the other profiles. This pattern was especially prominent for the psychological variables (depressive symptoms, life satisfaction) indicating that experiencing meaning is more important for psychological adjustment than for the physical experience. However, the less robust findings for the pain variables might also be due to the measurements used in the study. Bower et al. (1998), for example, showed that the recovery of meaning after a stressor (HIV + diagnosis) may be linked to positive immunologic and health outcomes. Future studies on meaning in life among patients might prefer to use biomarkers to investigate differences in physical functioning instead of relying on self-reports of pain experience and medication use.

Patients in the High Presence High Search profile showed slightly (but significantly) less optimal adjustment compared to their counterparts in the High Presence Low Search profile. This might indicate that patients who feel that they have a strong meaning in their lives but continue to search for even greater meaning may display an underlying trait anxiety that there is yet ''more'' meaning to be had in life which they are currently missing. This may account for the slightly less positive mental and physical health outcomes in the High Presence High Search group compared to the High Presence Low Search profile. The role of the continual searcher may be positive with regard to other aspects of the person's life, such as intellectual curiosity (see also Steger et al. 2008a, b), but in this situation it may result in less than optimal adjustment compared to those who have identified high levels of meaning in their lives and are satisfied with it.

Patients in the Low Presence High Search profile showed the most problematic adjustment. This is similar to earlier findings in a cross-sectional study of chronically ill patients (Dezutter et al. 2013) in which patients in the Low Presence High Search profile reported very low levels of well-being and acceptance. This parallels the idea of Steger et al. (2011) who suggest that individuals with low meaning in their life might be better adjusted if they are not actively searching for meaning. This is, however, in contrast with the cross-sectional findings in emerging adults where those with a Low Presence-Low Search profile are the most poorly adapted, closely followed by individuals with a Low Presence-High Search profile (Dezutter et al. 2014). A possible explanation can be found in the different life stage of the samples. In the earlier study, the emerging adults were healthy youth for whom searching might be part of the appropriate developmental phase and related to identity formation. The chronic pain patients in this sample as well as the chronically ill patients sampled in Dezutter et al. (2013) are established adults for whom searching is no longer as fundamental to their life stage. For these older patients, searching for meaning might be associated to their compromised health condition and might reflect a more dysfunctional process.

With regard to the degree to which meaning in life profiles moderated the development of adjustment variables over time, no significant group trajectory differences emerged over time, except for life satisfaction. Hence, the degree to which the adjustment variables

develop over time is not influenced by the specific meaning in life profile. Only for life satisfaction, we found that patients in the Low Presence Low Search, the Moderate Presence Moderate Search or the High Presence High Search trajectory classes showed differential development over time. In our study, life satisfaction constituted the only indicator of positive adjustment or positive functioning whereas the other variables focused on negative functioning. One might wonder whether meaning in life has a more profound impact on positive functioning compared to psychopathology or negative functioning. Hence, future studies need to include more indicators of positive functioning, such as aspects of Psychological Well-being (Ryff 2014), to examine if this interaction effect can be replicated.

An in-depth view on the relation between meaning in life and adjustment

The different methodological approaches used in this study offered a more in-depth view on the connections among meaning in life, the pain experience, and psychological adjustment. All results clearly pointed to the importance of having meaning in one's life as part of the process of adapting to chronic pain. Cross-lagged analyses revealed a direct effect of the meaning in life dimensions on psychological well-being. The pain variables (pain intensity and pain medication use) were not predicted by the meaning in life dimensions. However, the typological approach showed a more nuanced view indicating that profiles with high levels of Presence of Meaning (High Presence High Search, High Presence Low Search) do report lower levels of pain intensity and medication use although differences were less pronounced than for the well-being variables. In addition, Search for Meaning was a positive predictor for depressive symptoms in the cross-lagged analyses. The typological analyses offered more detailed results and showed that the impact of Search for Meaning seems to depend on the level of Presence of Meaning especially for individuals with a High Search Low Presence profile showing difficulties in adapting to chronic pain (reflected in higher levels of depressive symptoms and lower life satisfaction). However, when Searching for Meaning is combined with high levels of Presence of Meaning, this negative effect of the search component is no longer present.

Limitations

While this study has a number of unique strengths, there are some limitations that should be noted. First, although the present study clearly points to the unique relationships among meaning in life profiles and indicators of adjustment over a two-year time span, we cannot asses *how* meaning in life might impact adjustment. Therefore, future studies need to investigate possible underlying cognitive-emotional processes which might explain the link between meaning in life and adjustment. In addition, our sample was heterogeneous regarding the etiology (e.g., disease or injury) of the chronic pain condition. Research in the field of positive psychology and health showed that the type of disease might influence the mental health outcomes (Aspinwall and Tedeschi 2010). For example, the relationship between positive phenomena and cancer outcomes is less clear than for heart disease. While this study provides a first step toward understanding how a broader chronic pain population searches and experiences meaning in life, future studies could focus on distinct diseases/ injuries, as well as on different stages of disease. A final limitation is the use of questionnaires. Although questionnaires are appropriate to gather information about subjective and internal concepts such as meaning in life, the sole reliance on self-report

measures may have led to an overestimation of some of the correlations among variables due to shared method variance. The present findings might be followed up by narrative or mixed-method studies in order to obtain more detailed information on the experiences of meaning and the Search for Meaning in individuals' lives.

Conclusion

The present study is the first study that examined meaning in life profiles among chronic pain patients as well as the psychological and physical correlates of these profiles over a 2 years time span. The findings provide further insight into the complex relationship between Presence of Meaning and Search for Meaning, and the role that these constructs may play in the psychological adjustment of individuals with chronic pain. meaning in life, however, is a complex concept that cannot be easily screened and treated in a brief visit to the physician's office but it does appear to be a critical component to the well-being of chronic pain patients. The ability to find meaning and purpose despite physical challenges can change the lens through which the individual views the destabilizing events of his/her life. Experiencing a strong sense of meaning can enhance the adjustment to a major stressor such as chronic pain by replacing a 'threat' perspective by a 'challenge' perspective. A possible theoretical explanation can be found in the ''upward spiral'' model of Finan and Garland (2014). This model assumes that positive affect will stimulate cognitive openness and psychological flexibility, by tuning the attentional system to previously unattended positive aspects. The re-aligning of attention would create the possibility to positively re-appraise the chronic pain condition. This positive re-appraisal might result in higher levels of experienced meaningfulness. However, if patients have a stable trajectory of having low meaning and high search over the course of 2 years, it indicates prolonged existential distress. Whereas short term existential searching may be helpful, previous research has indicated that prolonged existential distress may have serious health consequences (Pargament et al. 2001). Therefore, it may be important to identify individuals who have experienced long term existential struggles and help them to resolve these struggles. Resolution of these struggles (regardless of how they are resolved, that is, either by giving up such a prolonged search or successfully finding meaning) appears to be of critical importance in improving mental health, physical health, and quality of life among those with severe medical disorders.

Acknowledgments

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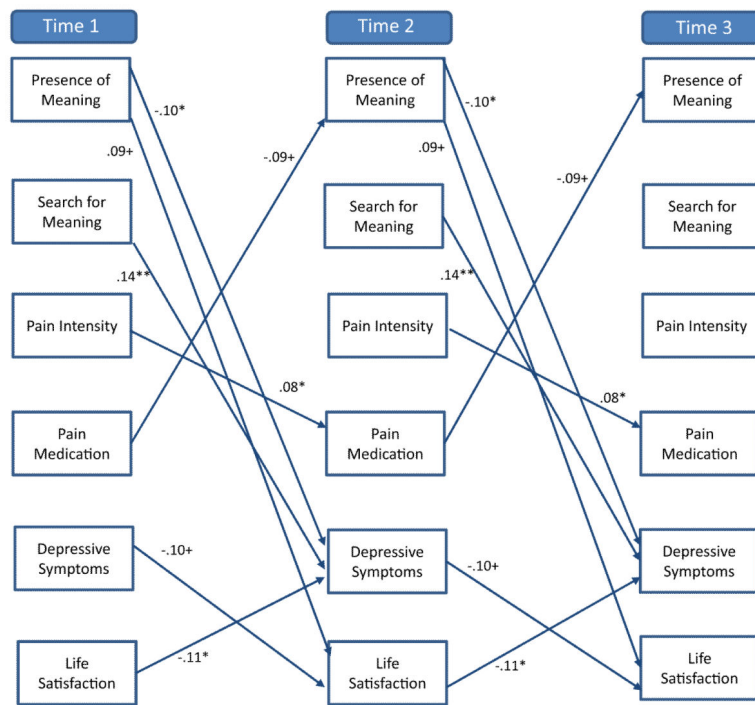
Fig. 1.
Path model linking meaning in life, well-being and pain variables. Within-time correlations are not presented for reasons of clarity. Path coefficients are significant at $^+p < .10$; $^*p < .05$; $^{**}p < .01$
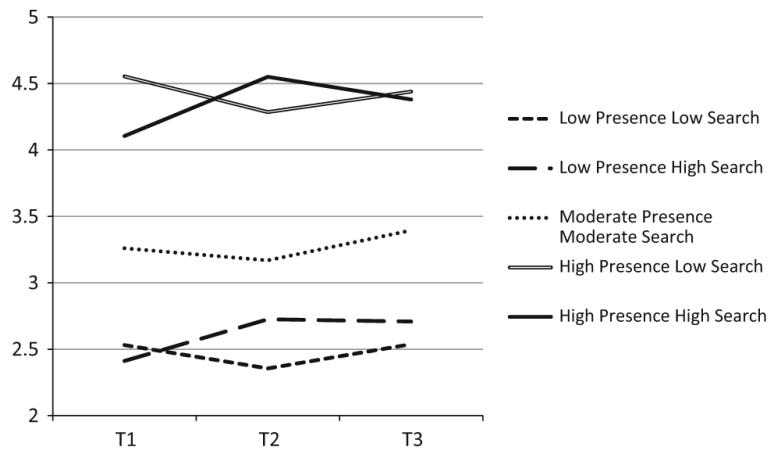
Fig. 2.
Interactional effect of time × class in the prediction of life satisfaction

Table 1

Correlations between the study variables

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Pain intensity T1 (a)	–	.22[*]	−.33[***]	.38[***]	−.25[**]	.04	.77[***]	.29[**]	−.32[***]
Medication T1 (b)		–	−.29[**]	.37[***]	−.19[*]	−.05	.20[*]	.72[***]	−.34[***]
Life satisfaction T1 (c)			–	−.55[***]	.60[***]	−.07	−.40[***]	−.27[**]	.72[***]
Depressive symptoms T1 (d)				–	−.54[***]	.23[**]	.34[***]	.29[**]	−.50[***]
Presence of Meaning T1 (e)					–	.01	−.20[**]	−.15	.50[***]
Search for Meaning T1 (f)						–	.04	.03	.10
Pain intensity T2 (g)							–	.28[**]	−.39[***]
Medication T2 (h)								–	−.27[**]
Life satisfaction T2 (i)									–
Depressive symptoms T2 (j)									
Presence of Meaning T2 (k)									
Search for Meaning T2 (l)									
Pain intensity T3 (m)									
Medication T3 (n)									
Life satisfaction T3 (o)									
Depressive symptoms T3 (p)									
Presence of Meaning T3 (q)									
Search for Meaning T3 (r)									

	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
Pain intensity T1 (a)	.40[***]	−.13	.05	.62[**]	.26[**]	−.34[**]	.34[**]	−.14	.10
Medication T1 (b)	.29[**]	−.17	−.02	.18	.86[**]	−.31[**]	.30[**]	−.17	.06
Life satisfaction T1 (c)	−.54[***]	.49[***]	−.09	−.28[**]	−.22[**]	.76[***]	−.49[***]	.39[***]	−.16
Depressive symptoms T1 (d)	.62[***]	−.37[***]	.18[*]	.21[*]	.33[***]	−.42[***]	.61[***]	−.22[*]	.28[**]
Presence of Meaning T1 (e)	−.39[***]	.69[***]	.01	−.11	−.12	.41[***]	−.35[***]	.58[***]	−.03
Search for Meaning T1 (f)	.23[*]	.08	.68[***]	−.03	−.10	.04	.23[*]	.07	.62[***]
Pain intensity T2 (g)	.45[***]	−.09	.11	.73[***]	.22[*]	−.35[***]	.34[***]	−.15	.14
Medication T2 (h)	.35[***]	−.09	.04	.25[**]	.76[***]	−.31[**]	.23[**]	−.20[*]	.02
Life satisfaction T2 (i)	−.58[***]	.56[***]	.07	−.30[**]	−.29[**]	.71[***]	−.46[***]	.42[***]	.02
Depressive symptoms T2 (j)	–	−.40[***]	.20[*]	.28[**]	.30[**]	−.55[***]	.68[***]	−.31[**]	.21[*]
Presence of Meaning T2 (k)		–	.12	−.14	−.18	.49[***]	−.43[***]	.66[***]	.10
Search for Meaning T2 (l)			–	.04	−.08	−.03	.24[**]	.05	.71[**]
Pain intensity T3 (m)				–	.22[*]	−.29[**]	.32[***]	−.18[*]	.04
Medication T3 (n)					–	−.33[***]	.33[***]	−.14	−.02
Life satisfaction T3 (o)						–	−.56[***]	.46[***]	−.06

Depressive symptoms T3 (p)	–	−.39[***]	.31[**]
Presence of Meaning T3 (q)		–	.03
Search for Meaning T3 (r)			–

*
p<.05;

**
p<.01;

***
p<.001

Table 2

Descriptive statistics

	Time 1	Time 2	Time 3	*F*-value	*h²*
Presence of Meaning	3.04 (.90)	3.01 (.88)	2.98 (.81)	1.05	.01
Search for Meaning	2.71 (.99)	2.73 (.87)	2.77 (.87)	.86	.01
Pain intensity	6.23 (1.78)	6.20 (1.64)	6.07 (1.64)	2.54	.08
Pain medication	4.25 (1.32)	4.25 (1.33)	4.15 (1.39)	1.64	.03
Depressive symptoms	2.33 (.54)	2.38 (.53)	2.35 (.48)	2.34	.02
Life satisfaction	3.47 (1.40)	3.42 (1.38)	3.57 (1.31)	5.43**	.04

* *p*<.05;

**
 p<.01

Table 3

Results of different latent class growth analyses

Solution	BIC	Entropy	LMR-aLRT	Trajectory group prevalence (%)					
				1	2	3	4	5	6
2-Class	3,157.357	.67	*p*<.001	46	54				
3-Class	3,111.646	.68	*p*<.05	52	28	20			
4-Class	3,074.883	.66	*p* = .95	15	18	35	32		
5-Class	**3,049.549**	**.72**	**_p_<.05**	**16**	**40**	**10**	**15**	**19**	
6-Class	3,058.413	.68	*p* = .09	13	6	24	28	14	15

N = 277. The solution in bold was selected

BIC Bayesian Information Criterion, *LMR-aLRT* Lo-Mendell-Rubin Adjusted Loglikelihood Ratio Test

Table 4

Final parameter estimates of latent class growth analysis

Parameters	Total sample	Meaning in life trajectory class				
		Low Presence Low Search	**Moderate Presence Moderate Search**	**Low Presence High Search**	**High Presence Low Search**	**High Presence High Search**
Presence of Meaning						
M Intercept	3.033***	2.129***	2.901***	2.212***	3.855***	3.852***
M Linear slope	−.013	−.065	−.039	−.017	.004	−.013
Search for Meaning						
M Intercept	2.690***	1.711***	2.824***	3.905***	1.712***	3.852***
M Linear slope	.052	.052	.009	.028	.020	.074

* *p*<.05; ** *p*<.01;

***
   p<.001

Table 5

Univariate ANOVA's and post hoc cluster comparisons based upon Tukey HSD tests for the meaning in life clusters

Variables	Clusters					*F* value	h^2
	Low Presence Low Search	**Low Presence High Search**	**Moderate Presence Moderate Search**	**High Presence Low Search**	**High Presence High Search**		
Time 1							
Pain intensity	6.56 (1.68)[a]	6.91 (1.99)[a]	6.40 (1.68)[a]	5.37 (1.93)[b]	5.80 (1.67)[b]	4.55**	.06
Pain medication	4.68 (.91)[a]	4.26 (1.41)	4.37 (1.26)[a]	3.62 (1.55)[b]	3.98 (1.58)[b]	3.88**	.06
Pain intolerance	6.58 (1.69)	6.79 (2.05)	6.45 (1.67)	5.58 (1.74)	5.77 (1.68)	2.08	.03
Depressive symptoms	2.53 (.48)[a]	2.74 (.67)[ab]	2.44 (.48)[ac]	1.89 (.44)[d]	2.13 (.50)[e]	15.91***	.19
Life satisfaction	2.87 (1.47)[ab]	2.29 (.92)[b]	3.26 (1.23)[a]	4.53 (1.14)[c]	4.19 (1.36)[c]	18.67***	.22
Time 2							
Pain intensity	6.57 (1.56)[a]	6.79 (1.37)[a]	6.42 (1.51)[a]	5.21 (1.79)[b]	5.76 (1.67)[b]	6.68***	.09
Pain medication	4.86 (.45)[ab]	3.75 (1.71)[bcd]	4.32 (1.22)[bc]	3.21 (1.79)[c]	4.26 (1.26)[bc]	6.34***	.14
Pain intolerance	6.75 (1.73)	6.42 (1.51)	6.31 (1.73)	4.87 (1.93)	5.92 (1.83)	2.31	.06
Depressive symptoms	2.54 (.42)[a]	2.89 (.45)[b]	2.47 (.49)[a]	1.93 (.43)[c]	2.15 (.51)[d]	20.32***	.23
Life Satisfaction	2.49 (1.12)[a]	2.51 (1.11)[a]	3.14 (1.11)[b]	4.33 (1.39)[c]	4.57 (1.18)[c]	29.00***	.30
Time 3							
Pain intensity	6.48 (1.34)[a]	5.96 (2.32)	6.30 (1.48)[b]	5.29 (1.85)[c]	5.77 (1.62)[bc]	3.99**	.06
Pain medication	4.78 (.85)[a]	4.12 (1.45)	4.18 (1.38)	3.65 (1.52)[b]	4.03 (1.52)	2.11**	.05
Pain intolerance	6.31 (1.48)	6.00 (2.38)	6.37 (1.63)	5.40 (1.95)	5.98 (1.91)	.99	.03
Depressive symptoms	2.43 (.40)[a]	2.83 (.42)[b]	2.43 (.44)[a]	1.93 (.44)[c]	2.19 (.40)[d]	19.44***	.23
Life satisfaction	2.90 (1.25)[a]	2.45 (1.01)[a]	3.39 (1.04)[b]	4.49 (1.32)[c]	4.37 (1.25)[c]	21.03***	.24

* $p<.05$;

** $p<.01$;

*** $p<.001$