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## From Polyanna syndrome to Eeyore's Corner? Hope and pain in patients with chronic low back pain

**Abstract:** Chronic low back pain affects 50-80% of the population, while its consequences may impair the functioning of patients suffering from it, in many spheres of life. Hope is a factor which may influence coping with pain as well as cognitive reflection of pain experience. The aim of the study has been to check: 1) whether dependencies exist between hope-trait and hope-state and the perception of pain; 2) whether experiencing pain at the time of filling questionnaires matters for the assessment of the level of hope; 3) whether there is interaction between hope, the pain experienced at the moment of investigation, and memory of the intensity of previously experienced pain. 150 patients participated in the study, they all reported aggravation of the chronic low back pain syndrome. The study was a cross-sectional study, based on questionnaires. On the third day of treatment the subjects were given the following questionnaires: Trait Hope Scale, State Hope Scale, and Numerical Rating Scale of Pain to fill. Poor correlation was demonstrated to exist between hope-state and hope-pathways on the one hand, and the intensity of minimum pain level experienced during the first three days of treatment. It has been noted that the presence of pain at the time of filling questionnaires results in reducing the hope-state, but only in those persons, who had experienced severe pain previously. On the other hand, in case of patients who had experienced slight pain previously, the pain present when filling in the questionnaires is conducive to enhanced hope-state. The results of the study confirm the complex character of relations between hope and pain.

**Key words:** pain, hope-trait, hope-state, empathy gaps

### Background

Chronic pain in the lower part of the spine is a serious medical as well as social problem. The complaint affects 50-80% of the adult population, at some point in their lives, and the consequences comprise limited mobility, disability, deteriorated functioning in social roles, lowered life quality, or such psychic problems, as depression or anxiety disorders (cf. Kraemer, 2013; Walker, 2000).

Low back pain syndrome may be a consequence of anatomic anomalies, degeneration, and injuries, but may also be caused by functional or muscular mechanisms, or connected with motor activity patterns (Kraemer, 2013).

Pain itself is a multi-dimensional phenomenon, and is defined as an unpleasant sensory and emotional sensation, connected with real or potential tissue injuries, or may be described in categories of such an injury (cf. Witte & Stein, 2010). While the somatosensory aspect of pain may be modified by pharmacological treatment and physiotherapy, its cognition-evaluation and affective

aspect may be influenced by means of psychological actions (cf. Suchocka, 2008; Wojtyna, 2012). That fact that pharmacological and physical treatment of pain does not give fully satisfactory results makes it necessary to pay attention to psychic predictors of pain.

### Hope and pain

In accordance with the theory of C.R. Snyder (2002) "hope is a positive emotional attitude based on inter-related convictions concerning efficient (a) agency (goal-directed energy) and (b) pathways (planning to meet goals)" (p. 250). Hope is focused on achieving goals, which may belong to two categories: (1) "approaching" (connected with positive results concerning goals), and (2) "forestalling" (manifested by avoidance or delaying of negative events). The goals of an individual constitute the material for cognitive processes, which in turn control the behaviour of that individual. During thinking about pathways, people with high hopes

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create real and convincing ways of accomplishing goals, and have personal confidence concerning the value of those ways. On the other hand, people with low hopes are not so efficient in thinking about pathways, which results in less efficient finding the ways of goal accomplishment, and less certainty as to their value. Additionally, those people usually are not able to generate additional ways of achieving goals, which seems to be a common feature for individuals with high hopes.

The concept of C.R. Snyder distinguishes two types of hope: trait-hope and state-hope (Snyder et al., 1996). Trait-hope is a generalized disposition for efficient use of pathways and agency towards achieving goals, and is a constituent of general coping of an individual. State-hope is an ability – dependent on time and situation – of efficient generation of pathways and action timing at achieving the goal here and now. People with highly intensified trait-hope efficiently use both constituents of hope (*agency* and *pathways*) in almost any situation, whereas in case of people with low level of trait-hope – although they still may be efficient in constructing pathways and action – much depends on the specificity of the situation they are in (which is also characteristic for state-hope).

In certain aspects hope is similar to discretionary optimism (Snyder et al., 2000). Both in the case of hope and of optimism, the thinking about results of one's action is crucial. What is more, for both notion goal-oriented thinking and perceived ability to cope with incoming difficulties are characteristic. The basic difference between hope and optimism may, however, be illustrated by the fact that hope contains planning a solution and subjective conviction that the plan will turn out to be efficient after implementation, whereas optimism does not contain that very element of planning and action (Snyder et al., 2000; Snyder, 2002). What is more, optimism is an autonomous trait, whereas hope is probably an element of cognitive mechanism, which is responsible for creating sense in an individual's life (Feldman & Snyder, 2005).

On many occasions, several dependencies have been demonstrated between hope and health condition, quality of life, or pain. In reference to the perception of the latter, persons with high level of hope focus more strongly on achieving the goal and ignore the undesired stimuli at the same time, thus they cope with pain better (e.g. Rawdin, Evans & Rabow, 2013; Snyder et al., 2005). Hope turned out to be a mediator between personality traits (in the Big Five personality model) and quality of life (Halama, 2010). It is also connected with social support and coping with stress: *agency* correlated positively with the use of instrumental support, while *pathways* – with direct coping with problems, planning, positive thinking, religious coping, diverting attention, and generally a higher score of state-hope (Roesch et al., 2010). Moreover, hope is related to more frequent use of active strategies of coping with signs of a disease (Irving, Snyder and Crowson, 1998), as well as with more frequent application of more adaptive strategies of coping with pain, such as diverting attention, ignoring the pain sensation, or intensifying activity (Scoville, 2013). Hope is also a factor responsible for adaptation to chronic

back pain syndrome, by deconstructing specific fears, constructing an acceptable model explaining the origin and meaning of pain, as well as reconstruction of one's identity (Toye & Baker, 2012). It is worth noting that in the study of Wright et al. (2011) hope ceased to be an important predictor of pain, once the influence of discretionary optimism has been simultaneously included in analyses.

Important and interesting observations have also been provided by the Taiwan-based study of Chen et al. (2003), conducted in the group of patients with cancer. In that study, the level of pain and the image of pain have been compared, in persons who experienced or did not experience pain complaints at the given time. Although no difference has been demonstrated as to the level of hope in patients from both groups, still in the group of patients with pain a correlation was demonstrated between hope and convictions concerning pain manifestations, whereas no such dependence was demonstrated to exist with the very features of pain, such as its duration, intensity, or possibility of feeling relief. It is thus worth looking for mechanisms by which hope affects pain perception, taking into account the issue whether the subject experiences the pain at the given moment or not.

### Aim

The aim of the study was to find answers to the following questions:

1. Is there a dependence between the level of hope and the pain experienced by patients with chronic low back pain syndrome?
2. Are there differences in the level of hope in patients with low back pain syndrome, resulting from the presence of pain while filling in the Trait and State Hope Scales?
3. Is there an interaction between hope, the intensity of previously experienced pain and the presence of pain during filling in the questionnaires?

### Material and methods

#### Participants and course of the study

The study comprised 150 treated for at least one year, due to chronic low back pain syndrome. The patients were recruited in orthopaedic or rehabilitation outpatient clinics, as well as pain management outpatient clinic, where they came because of currently intensified pain complaints. They were requested to define the pain intensity at the time of coming to the outpatient clinic, and subsequently – on the third day after their visit (on the third day of treatment) – were handed a set questionnaires which they were requested to fill in. The socio-demographic characteristic of that group has been presented in Table 1.

**Table 1. Characteristics of participants.**

Socio-demographic data	All (n=150)		Subgroups: presence of pain during filling questionnaires (after three days of treatment)						
			Without pain (n=67)		With pain (n=83)				
	n	%	n	%	n	%			
Sex									
Female	72	48.0	33	49.3	39	47.0			
Male	78	52.0	34	50.7	44	53.0			
Education									
Primary	12	8.0	7	10.5	5	6.0			
Vocational	61	40.7	23	34.3	38	45.8			
Secondary	26	17.3	15	22.4	11	13.3			
Higher	51	34.0	22	32.8	29	34.9			
Employed	92	61.33	34	50.7	58	69.9			
Age[years] [M(SD)]	50.45 (14.22)		49.76 (11.02)		52.97 (13.14)				
Characteristics of the disease	All (n=150)			Subgroups: presence of pain during filling questionnaires (after three days of treatment)					
				Without pain (n=67)			With pain (n=83)		
	M	SD	min-max	M	SD	min-max	M	SD	min-max
Duration of the low back pain syndrome [years]	11.07	7.72	1-22	8.32	8.03	1-22	12.46	7.77	1-20
Pain intensification when seeing the doctor	6.95	1.65	4-10	6.44	1.72	4-10	7.39	1.52	5-10

## Tools

The questionnaire used in the study contains questions about basic sociodemographic data, and the course of the low back pain until the present moment; the following tools have been used:

### Trait Hope Scale

Trait Hope Scale (Snyder et al., 1991; Feldman & Snyder, 2000) is a 12-item scale used for measuring dispositional hope. It contains four items that make up the Pathways subscale (e.g. "There are lots of ways around any problem"), four items constituting the Agency subscale (e.g. "I energetically pursue my goals") and four distractor items. The subjects assume their attitude to the statements provided, using the 8-point Likert scale (from 1 = *definitely false* to 8 = *definitely true*). Higher score indicates higher level of hope. In the study reported here the Cronbach's  $\alpha$  coefficient amounted to 0.81 for the general score, 0.80 for Pathways, and 0.83 for Agency.

### State Hope Scale

The State Hope Scale (Snyder et al., 1996), serves the purpose of defining the level of hope in a given moment ("here and now"). It consists of 6 statements (among others: "There are lots of ways around any problem that I am facing now"; "At the present time, I am energetically pursuing my

goals"), to which, like in the Trait Hope Scale, the subject makes reference, using the 8-point Likert scale (from 1 = *definitely false* to 8 = *definitely true*). Higher score indicates higher level of state-hope. In the study reported here the Cronbach's  $\alpha$  coefficient amounted to 0.89.

### Pain - Numerical Rating Scale of Pain

It is an 11-point scale, on which the subjects mark the intensity of pain they experience, on which 0 stands for no pain, while 10 – the most excruciating pain imaginable. The study has been applied in the research to assess the pain experienced by the patient at the moment of coming to the doctor (in order to determine the level of initial pain, and check whether there are any differences – depending on initial complaints – between subgroups distinguished later), as well as determination of average, as well as minimum and maximum intensity of the pain experienced by the subject during the first three days of treatment, after coming to the doctor. On the basis of such data, the factor "intensification of previously experienced pain" has been established, which serves the purpose of defining two subgroups of patients. Persons who, during the first three days of treatment usually experienced – on the average – pain at the level of 0 to 5 points in the NRS scale were qualified to the group experiencing slight pain, whereas persons who – on the average – experienced pain at the level of >5, were referred to the group of patients with strong pain.

In order to check whether the subject experiences pain at the moment of filling the questionnaire (further referred to as "current pain"), the following question has been asked: "do you experience pain at the moment?" with the possibility of answering "yes" or "no". On that basis, the groups with or without pain at the moment of investigation have been distinguished.

### Statistical analysis

The package STATISTICA 10 has been used for statistical analysis. Descriptive statistics have been presented in the form of averages and standard deviation for quantitative variables, while as well as numbers and percentages for qualitative variables. In order to examine dependencies between variables, Kendall's *tau-b* correlation coefficient analysis has been applied. In order to answer the research question asked, *t*-Student's test has been applied, as well as the two-factor variance analysis in scheme 2 (current pain: without pain, with pain) x 2 (pain intensity experience: slight pain, severe pain).

### Results

After three days of treatment, 67 filled in the questionnaires in the absence of pain, while 83 experienced pain when answering the questionnaire questions. The characteristics of subgroups thus created is included in Table 1. Those groups did not differ in terms of intensity of pain when concluding the doctor ( $t=0.41$ ;  $p=0.263$ ). After three days of treatment, in the group experiencing the pain during filling the questionnaire (current pain), a slightly greater number of men, persons with vocational education, and persons professionally active has been noted, in comparison with the group with no current pain. In the group with currently experienced pain, the patients also demonstrated a longer history of low back pain ( $t=2.87$ ;  $p<0.01$ ) and more advanced age ( $t=3.43$ ;  $p<0.01$ ).

Table 2 contains results of comparisons of groups with current pain and without current pain, at the moment of measurement, on the third day of treatment, in reference to the variables examined. Those groups did not differ as regards the experienced hope level, understood as trait.

**Table 2. Pain and hope in persons with and without pain at the time of filling questionnaires (after three days of treatment)**

Factor	With pain ( <i>n</i> = 83)		Without pain ( <i>n</i> = 67)		<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Pain during the three days of treatment					
Average pain intensity	6.35	2.11	4.06	1.94	5.46***
Minimum pain intensity	3.60	2.05	0	0	22.24***
Maximum pain intensity	8.50	2.08	6.72	2.51	6.35***
Trait-hope	24.11	3.51	24.83	3.61	-1.02
Pathways	11.97	2.12	12.47	2.14	-1.64
Agency	12.14	1.79	12.36	1.96	-0.84
State-hope	27.12	7.15	34.03	6.27	-3.73***

Note. \*\*\*  $p<0.001$ ; *t* – Student's *t* test

**Table 3. Pain vs hope and age, as well as duration of chronic low back pain syndrome.**

Factor	Assessment of pain experienced during the three days of treatment		
	minimum	average	maximum
Age	0.18*	0.15*	0.14
Duration of low back pain syndrome	0.05	0.16*	0.13
Trait-hope	-0.13	-0.04	-0.07
Pathways	-0.18*	-0.07	-0.10
Agency	-0.04	0.02	0.02
State-hope	-0.19**	-0.10	-0.06

Note.  $n=150$ ; \*  $p<0.05$ ; \*\*  $p<0.01$ ; analysis of Kendall's *tau-b* correlation

On the other hand, a higher level of state-hope has been observed in patients, which did not experience pain at the moment of filling the questionnaires.

The analysis of correlation demonstrated that state-hope and trait-hope, understood as search for solutions (pathways), were significantly connected only with lower intensity of minimum pain (table 3), whereas the strength of those correlations was weak.

The two factor variance analysis revealed a statistically significant main effect of the "current pain" variable,  $F(1, 146)=2.04$ ;  $p=0.028$ ;  $\eta^2=0.08$ . In patients experiencing pain during investigation, the level of state-hope is significantly lower than in persons experiencing no pain during answering questions in the questionnaire. No statistical significance has been demonstrated for the main effect of the variable "intensification of the previously experienced pain". The effect of interaction of the factors "current pain" and "intensification of previously experienced pain during the three days of treatment" turned out to be crucial and most interesting. It has been noted that the presence of pain during filling the questionnaires causes reduction of state-hope, but only in those persons, who had previously experienced severe pain (table 4, fig. 1). On the other hand, in patients who had previously experienced slight pain, the pain present during filling in the questionnaires causes increase of state-hope level. The above is the evidence of the existence of interactions between pain intensity and the presence of pain when answering the questionnaire. The interaction factor explains 19% of the state-hope variance.

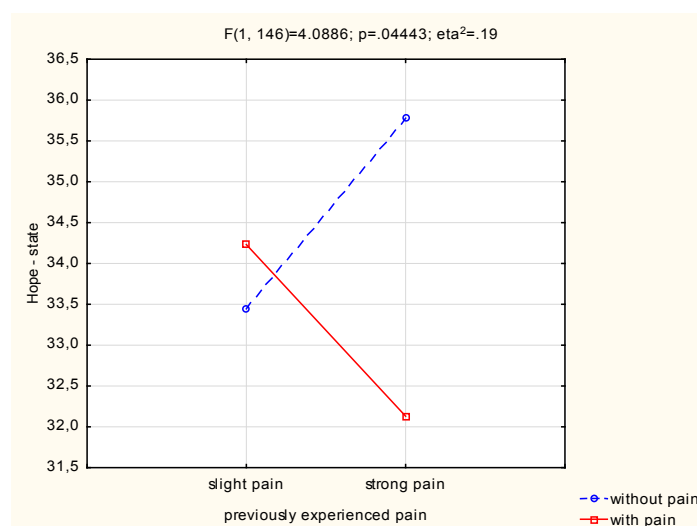
## Discussion

The results of the study indicated a complex type of connections between hope and perception of pain in patients with chronic low back pain. Although a poor correlation has been demonstrated to exist between the intensity of minimum pain and the component of trait-hope, which is searching for pathways to solutions, in case of correlation with maximum and average pain such a dependence does not exist. It is even more clearly visible in case of the correlation between state-hope and pain intensity. The correlation of state-hope with intensity of the minimum pain at the level of 0.19 is statistically significant, yet for averaged pain the correlation coefficient amounts to merely -0.10 and does not reach statistical significance, while in case of maximum pain the correlation coefficient is very close to zero. Those results are coherent with the assumption that hope is connected with internal conviction about availability of a given aim (cf. Dufault & Martocchio, 1985). If a man is convinced about the possibilities of attaining a goal, e.g. reduction of pain or possibility of continuing her/his activity despite the pain experienced, s/he more often focuses on the search for solution and the level of hope-state and hope -pathways increases. On the other hand, when the pain is duly severe, the relation between hope and the conviction about being able to cope with pain may either disappear or stop being explicit. It has been demonstrated many times that people with chronic pain manifest their anxiety about being able to cope with intensifying ailments (cf. Suchocka, 2008; Wojtyna, 2012). Snyder et al. (1996) demonstrated that the subjects who obtain positive information concerning

**Table 4. State-hope [ $M(SD)$ ] vs intensity of average pain experienced during the three days of treatment, and presence of pain during filling of questionnaires**

Presence of pain while filling questionnaires (current pain)	intensity of average pain experienced during the three days of treatment	
	Slight pain	Severe pain
With pain	34.23 (6.27)	32.13 (7.49)
Without pain	33.44 (6.64)	35.78 (4.47)

**Figure 1. Interaction between intensity of previously experienced pain and current pain (during filling questionnaires), in reference to state-hope**



solving a given problem are characterized by increase of hope, whereas those who – besides positive information – receive also negative ones, or receive merely negative, are characterized by no change in hope level or reduction of hope, respectively. It is much easier to find proofs that it is possible to reduce the pain or accomplish goals in spite of pain, when that pain gets slighter. The result of our study corresponds with that, indicating that in case of people who have experienced rather a slight pain, hope-state may increase when the current pain sensation occurs. Gum and Snyder (2002) indicated that emotional reaction to goals the attainment of which is blocked depends on four dimensions: importance of the goal, the number of goals being blocked, the extend of blocking, as well as the framework of temporary block. Perhaps severe pain interferes with all those dimensions strongly enough, resulting in vanishing hope for attaining the goal, which is alleviation of pain or normal functioning with chronic low back pain syndrome.

Blocking of life purposes may also cause the occurrence of intensification of depression symptoms (cf. Boersma et al., 2005). Depression, in turn, is conducive to intensification of pain (cf. Li, 2015; Wojtyna, 2012), as well as cognitive distortions, consisting of negative perception of self, reality, and the future, thus it may be directly connected with reduction of hope (cf. Williams, 1997; Wójcik & Wojtyna, 2008). In further studies on pain, it is thus worthwhile to take into account both hope and depressiveness, in order to get to know their mutual interactions better.

The fact that the presence or absence of pain at the time of filling questionnaires matters for the perception of one's own condition in subjects, allows to make reference to the phenomenon of empathy gaps. It has been noticed many times, that there are differences in the assessment of a given visceral event, depending on whether a given person experiences that condition, or not. In case of physical pain, the effect of empathy gaps may be demonstrated by the fact that an individual not presently experiencing pain does not correctly estimate its severity and influence upon behaviour (e.g. Nordgren, van der Pligt, and van Hareveld, 2006; Read and Loewenstein, 1999; Christensen-Szalanski, 1984). Likewise, a doctor may assess the patient's pain as less severe than the patient himself does (Hodgkins, Albert, and Daltroy, 1985; Kappesser, Williams, and Prkachin, 2006; Marque et al., 2003; Pasero and McCaffery, 2001). It seems to us that a significant role in explaining the phenomenon of empathy gaps is performer by differences in cognitive availability of the individual's convictions concerning pain and possibilities of coping with it, depending on how a given person perceives her/his present health condition. The perception of definite features of events (e.g. health deterioration) launches suitable emotional programmes, which make the global assessment of the importance of those events for an individual. This assessment, in turn, enables activation of cognitive and behavioural schemes in order to adjust to a given situation (Prinz, 2008). Regular reaction in a definite way to a given class of events entails establishing lasting associations between elements that the individual identifies (not necessarily consciously) with that

situation (cf. Back, Schmukle, and Egloff, 2009; Greenwald et al., 2002). As a result, one may expect that the given situation will entail – in line with cognitive availability – automatic activation of elements associated with it. For that reason we believe that in pain its strong predictors will rather be negative attitudes and dispositions (e.g. negative illness perception, depression, anxiety etc.), whereas in the absence of pain the predictors of assessment of the pain experienced will be – first of all – positive attitudes (e.g. optimism, hope etc).

The result of hope-state going up or down, depending on whether the patient experiences pain at present and what has been his experience with pain so far also has its practical implications. A patients who does not currently experience pain may overestimate his real health condition and belittle doctor's advice, thinking there is no need to worry about the ailments, and even if they do emerge, he is able to cope with them, anyway. Such a conviction may help retain a good mood and reduce the risk of behaviours leading to aggravation of ailments (such as, for example, avoiding physical exercises), yet on the other hand it may etherize the patient's responsibility for further maintaining her/his present fitness. This gives the physician a hint to, first of all, pay more attention to the present pain situation of the patient and his previous experiences with pain, second of all – in a discussion with the patient – stress the advantages arising from better coping with the disease, but also – third – at the same time indicate the necessity of conscious and intentional activation towards behaviours that maintain the desired somatic condition of the patient, and finally – fourth – to discuss the topic of potential recurrence of ailments and to indicate possibilities of coping with them.

Our study was of cross-sectional type, thus it is not possible to examine more closely the phenomenon of empathy gaps in reference to the level of hope and pain experienced by patients participating in our study – it is necessary here to perform longitudinal studies. Longitudinal studies would also allow for better recognition of the phenomenon of interaction between the factors studied.

Finally, a low level of variance of hope (19%) explained by means of factors related to presently experienced pain and intensification of pain experienced previously indicates the necessity of further search in the area of psychological conditions for the perception of pain and reaction to it. One of the suggestions for further research may be to draw more attention to the range of influences that cognitive factors have in case of strong pain stimuli, which are connected with intensified autonomous activation of the body, as well as different activation of central nervous system than in case of stimuli have lower strength or pain activation takes place in a specific situation, e.g. during experiment or in social isolation (cf. Eisenberger & Lieberman, 2008; Simons et al., 2014). Another suggestion would be to take a closer look at hope as a phenomenon, not only a cognitive one. It seems that the very cognitive approach to hope (such, for example, as the one presented in the concept of Snyder, 2002) is not sufficient and it would be worthwhile to look at hope not only as a belief (that may be subject to various deformations and cognitive bias, e.g.

wishful thinking), but also as an attitude – automated and not being subject of the same possibilities of description, by means of questionnaire methods only.

### Conclusions

Pain perception and hope and related phenomena, yet that relation is a complex one. The level of state-hope in patients with chronic low back pain syndrome depends on previous experiences with pain, as well as the presence of pain when the individual makes assessment of her/his own hope. It seems that insignificant pain is conducive to the increase of state-hope, whereas the experience of severe pain switches off hope – this, however, requires further longitudinal studies.

The presence or absence of pain during the procedure of answering questions asked in the questionnaire was related to obtaining diverse information, which appears to be the evidence of the phenomenon of empathy gaps as regards state-state, assessed in different pain conditions experienced by the subject; hence the need to control the presence of pain when conducting future studies in this area.

A practical conclusion is the necessity of making patients and doctors sensitive that the state of hope, thus also the patient's convictions concerning the possibilities of coping with the disease, depend upon the current pain condition; thus more conscious and responsible maintaining of health-promoting behaviour is necessary for the patient, also during remission of symptoms. It also becomes important to provide patients getting better with guidelines for coping with symptoms, in case of recurrence of severe pain complaints, as when strong pain recurs, the beliefs of the patient about coping possibilities may be switched off.

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