



Between hope and fear: A qualitative study on perioperative experiences and coping of patients after lumbar fusion surgery

Annemieke Y. van der Horst^{a,b,*}, Hester R. Trompetter^c, Dean F.M. Pakvis^d, Saskia M. Kelders^{b,e}, Karlein M.G. Schreurs^{b,f}, Ernst T. Bohlmeijer^b

^a Research Center for Nursing, Saxion University of Applied Sciences, Enschede, the Netherlands

^b Department of Psychology, Health and Technology, Centre for eHealth & Wellbeing Research, University of Twente, Enschede, the Netherlands

^c Center of Research on Psychology in Somatic Disorders (CoRPs), Tilburg School of Social and Behavioral Sciences, Department of Medical and Clinical Psychology, Tilburg University, Tilburg, the Netherlands

^d Centre for Orthopedic Surgery OCON, Hengelo, the Netherlands

^e Optentia Research Focus Area, North-West University, Vanderbijlpark, South Africa

^f Roessingh Research & Development, Enschede, the Netherlands

ARTICLE INFO

Keywords:

Coping
Emotion regulation
Interviews
Lumbar fusion surgery
Patient experiences
Qualitative research

ABSTRACT

Objective: Recovery following lumbar fusion surgery is frequently accompanied by post-operative pain, and patients often continue to experience some level of chronic pain. There is a scarcity of qualitative research focusing on patient experiences regarding lumbar fusion surgery. This study aims to clarify how lumbar fusion surgery patients experience the perioperative period; their hopes, their post-operative pain experiences, their fluctuating physical condition and accompanying emotions.

Methods: Semi-structured interviews were conducted with 12 lumbar fusion surgery patients. Transcripts of these interviews were open and axial coded by two coders using Atlas.ti software and Thematic Analysis.

Results: A total of thirteen categories and four overarching themes were generated from the data. Participants described their beliefs and experiences surrounding surgery, including a long preoperative illness process, tumultuous recovery and unfulfilled preoperative expectations. Participants used various forms of pain coping including activity avoidance and endurance, and emotion regulation strategies such as acceptance.

Conclusion: This study demonstrates that, for lumbar fusion patients, surgery seems to be a last resort. Professionals should fulfill the patients need for information and focus on managing realistic expectations while respecting the distress and strain the illness process has on a patient, thereby potentially increasing patient satisfaction and enhancing postoperative recovery.

1. Introduction

Low back pain is highly prevalent worldwide, affecting up to 80% of the population at least once in their lifetime, whilst 10% of these patients develop chronic pain (Baliga et al., 2015; Van Oostrom et al., 2011). Spinal lumbar fusion surgery is an option to treat chronic low back pain. About 65%–75% of spinal surgeries are effective in achieving reduction of pain and improvement of physical functioning (Hoffman et al., 1993; Turner et al., 1992). Nonetheless, recovering from surgery is often accompanied by moderate to severe postoperative pain, with a worldwide prevalence of 40–60% (Beauregard et al., 1998; Mc Hugh and Thoms, 2002; Hoofwijk et al., 2015). Postoperative pain can have severe consequences for a patient's health, such as prolonged hospital stay, prolonged physical and mental recovery, delayed

resumption of work and the development of chronic pain (Bay-Nielsen et al., 2004; Fortier et al., 1998; Joshi and Ogunnaike, 2005; Pavlin et al., 2002).

On average, around 20.8% of lumbar surgery patients experience persistent postoperative pain, also known as failed back surgery syndrome (FBSS), which in turn accounts for substantial long-term healthcare costs (Inoue et al., 2017; Weir et al., 2017). Unfortunately, the rate of success for subsequent surgeries for this persistent pain drops further with every following surgery (Hazard, 2006). As a consequence, these patients continue experiencing chronic pain. This is a major issue, because chronic pain affects many aspects of a patient's life including work, physical, emotional and social wellbeing, and quality of life (Dueñas et al., 2016; Walker et al., 2006). Additionally, it yields high economic costs, e.g. in the Netherlands alone, up to 20 billion euros per

* Corresponding author. Department of Psychology, Health and Technology, University of Twente, PO BOX 217, 7500 AE Enschede, the Netherlands.
E-mail address: a.vanderhorst-1@uwtente.nl (A.Y. van der Horst).

year (Koke et al., 2011). Thus, the recovery process following surgery is frequently accompanied by post-operative pain, and patients may continue to experience chronic pain in the long term.

The experience and intensity of perioperative and chronic pain is heavily influenced by the thoughts, emotions and expectations of patients. One specific pain-coping model is the Fear Avoidance model, which explains the trajectory from acute to chronic pain; through fear and catastrophizing, there is a tendency to enlarge the threat of pain and a feeling of helplessness, leading to an increase in pain avoidance as a dominant coping strategy (Vlaeyen and Linton, 2012). In addition, Hasenbring & Verbunt added a pathway of endurance coping with pain in their Avoidance-Endurance Model (AEM) to explain the chronification of pain (Hasenbring and Verbunt, 2010). An individual's mental state and specific coping strategies following surgery also influence several postoperative outcomes. Firstly, preoperative factors such as anxiety and depression have been found to be associated with more postoperative pain (Arpino et al., 2004; Granot and Ferber, 2005; Morone et al., 2010; Munafò and Stevenson, 2001). Secondly, fear and high levels of catastrophizing have been found to predict higher levels of (postoperative) pain, the development of chronic pain and reduced quality of life (Hoofwijk et al., 2015; Khan et al., 2011; Pavlin et al., 2005). Thirdly, unrealistic or unfulfilled expectations about surgery also play an important part in postoperative outcomes, including the experience of more postoperative pain (Iversen et al., 1998; Mancuso et al., 2016; 2018). On the other hand, coping strategies such as (pain) acceptance, engaging in beneficial social interactions and experiencing a value-based purpose in life have been found to be effective and promote resilience in the face of (chronic) pain (Sturgeon and Zautra, 2010).

It is important to gain insight into the thoughts, perceptions and expectations of spinal surgery patients, as these may reduce negative postoperative outcomes such as prolonged exacerbation of post-operative pain and, even, prevent the development of chronic pain or FBSS. Although some qualitative research has been done on experiences after lumbar fusion surgery (e.g. Damsgaard et al., 2017), knowledge of these patients and what they experience before, as well as after, surgery is still scarce. This study aimed to clarify how lumbar fusion surgery patients experience the perioperative period and to clarify how they cope with post-operative pain experiences, their fluctuating physical condition and accompanying emotions during the recovery process.

2. Methods

2.1. Participants

This study was approved by the Ethical Committee of the University of Twente (no. BCE15309). Participants were recruited at an orthopedic surgery center in the Netherlands. Participants had to have undergone a spinal fusion in the last 6 months and be at least 18 years of age. Selected patients received a letter at home informing them of the study and inviting them to participate. A week later the researcher called them, suggesting a meeting for the interview. Seven patients were included. However, these participants were predominantly older and, thus, retired from work. Moreover, in the coding and analysis process, saturation was not reached. Therefore, five more patients were included, including younger patients. In total, two patients declined to participate for personal or (not surgery related) health reasons. All other selected patients agreed to an interview (N = 12).

2.2. Data collection and procedure

Semi-structured interviews were conducted by one of the authors (AH) between August 2015 and December 2016. These interviews were held at the participants' home and were audio recorded. At the start of the interview, written informed consent was obtained from the participants. The interview scheme was based on conversations with health

care professionals at the orthopedic center, resulting in topics often discussed by spinal surgery patients, and on the interview scheme used in previous research focusing on experiences of (partners of) cancer patients (Köhle et al., 2015).

Firstly, participants were asked to clarify what they had experienced preceding the surgery, e.g. limitations in daily functioning due to their back pain, other health complaints or previous (ineffective) treatments for their back pain. Secondly, the period surrounding and following the surgery, i.e. preparation for surgery, hospital stay and recovery at home, were discussed. Thirdly, demographic characteristics of the participants were noted. The interviews lasted 50–90 min, mostly lasting around 60 min. After the interview participants received a box of chocolates to thank them for their time and effort.

2.3. Analysis

Thematic Analysis (Braun and Clarke, 2006) was used to analyze the data. The interviews were audio recorded and then transcribed verbatim by one of the authors (AH). Following transcription, the interviews were read and re-read by two authors (AH and HT) to familiarize themselves with the data.

For the coding and analysis process Atlas.ti software (version 7 and 8) was used. The first four interviews were open coded by AH and HT independently, with a discussion about irregularities afterwards, until consensus was reached. When a new code was generated, a description of the code was noted in the code manager, assuring consistent use by both researchers. The coding process started with an inductive approach (Patton, 1990; Ritchie et al., 2003), only deviating from this approach when elements of an existing theory were recognized in the data. An example of a deviation was the recognition of illness beliefs in the data. As a result of this process a primary code book was generated which was supplemented during the entire iterative coding process. Using this primary code book, the next three interviews were coded by AH and then reviewed by HT. Again, irregularities were discussed until consensus was achieved. This process of open coding continued until the interviews of the first seven participants were coded.

After the coding of the seventh interview, new codes were still being generated, suggesting insufficient information was available to achieve saturation. To ensure saturation, five more participants were included. For the coding of these five participants the existing, unaltered code book was used. No new codes were generated in the last interview indicating saturation.

After the coding of the seventh interview, axial coding started with the codebook of 122 codes. These codes were printed onto paper cards and were sorted by three authors (AH, HT and KS) into nineteen categories and four overarching themes. This procedure was repeated at the end of the coding process.

All codes, categories and themes were reviewed and defined. Two codes were combined, and several categories were integrated, resulting in a total of 138 codes, 13 categories and 4 themes. The names of the categories and themes were slightly adjusted until consensus was reached by three authors (AH, HT and KS) that they fully represented the data.

3. Results

Half of the participants were male and ranged in age between 47 and 84. These and other patient characteristics are shown in Table 1.

A total of 1,796 fragments were identified and coded using 138 different codes, clustered in 4 themes: illness trajectories, expectations and beliefs, pain coping and emotion regulation (see Table 2). Information about the illness process was mentioned by far the most (n = 576), followed by general expectations and beliefs (n = 190).

Table 1
Participant characteristics at time of interview.

Participant	Gender	Age range ^a (years)	Time since surgery	Relationship	Education level ^b	Occupational status
P1	M	75–80	< 6 months	Yes	Middle	Retired
P2	M	60–65	< 6 months	Yes	High	Retired
P3	M	60–65	6–9 months	Yes	High	Paid work > 20 h a week
P4	F	80–85	6–9 months	No	Low	Retired
P5	F	65–70	< 6 months	No	High	Retired
P6	F	65–70	6–9 months	Yes	Middle	Retired
P7	F	50–55	< 6 months	Yes	Middle	Paid work < 20 h a week
P8	M	50–55	< 6 months	Yes	Low	Disability pension
P9	M	55–60	< 6 months	Yes	High	Paid work > 20 h a week
P10	F	45–50	< 6 months	Yes	High	Paid work > 20 h a week
P11	M	55–60	< 6 months	Yes	Middle	Paid work > 20 h a week
P12	F	65–70	< 6 months	No	Low	Retired

^a To ensure anonymity age ranges instead of exact ages are shown.

^b Low: primary and lower secondary education; middle: upper secondary education; high: higher vocational training and university.

3.1. Illness trajectories

Participants described many physical complaints in the preoperative period, including pain in their legs and back. These physical complaints impacted their daily life: *'Unbearable, it was very bad, really unbearable. This cannot continue this way. I don't know what to do. I cannot be in bed, I can neither stand nor sit.'* (P4). Due to these complaints, four out of the five participants performing paid work, reported that they had not been able to work for a long time.

For these complaints, all participants had sought help from several care professionals (e.g. general practitioner, neurologist and rehabilitation specialist). Participants mentioned previous treatments, including physical therapy, and even previous surgeries. For example, for one participant (P5) this was the third back surgery. Nevertheless, these treatments had limited or no effect on their perceived symptoms. Half of the participants mentioned that a doctor previously told them no treatment other than surgery was possible. Surgery then seemed to be the only solution and was a well thought through decision for the participants.

Unfortunately, after surgery, not all problems were resolved, so the process of care was not finished. All participants reported physical complaints and limitations after surgery, ranging from slight pain surrounding the surgical wound to feeling more pain postoperatively. Where several participants experienced a successful surgery and progress in recovery (P1, P4, P5, P6, P8, P11 and P12), others reported several relapses in their physical functioning during recovery (P2, P3, P7, P9 and P10). Participant no. 2 unexpectedly experienced more pain shortly after surgery than before, making him think *'Have I done the right thing in getting this operation?'*. At the time of the interview, several participants were completely pain free (P2, P4, P5, P6 and P8), others had been pain free, but experienced some recurrent pain at that

moment (P1, P7 and 12), whereas the other participants (P3, P9, P10 and P11) had not yet been pain free and were still struggling with physical discomfort.

Almost all participants (n = 11) mentioned using pain medication before and/or after surgery. Remarkably, many participants (n = 9) mentioned ending the use of pain medication prematurely, without deliberation with their medical doctor, due to side effects or the belief that *'the surgery was done, therefore the use of pain medication should also be over'* (P2).

Most participants (n = 8) mentioned that the relationship with their doctor and the nurses in the hospital ward was good, which was important and helpful to them. All participants mentioned a certain need for information which, for some (n = 6), was not met by the care professionals. These participants found the information to be too limited or felt they were not well-informed that preoperative complaints could, temporarily, be worse during recovery. Several participants (e.g. P3) admitted that the doctor told them there was no pain free guarantee but, seeing surgery as a last resort, they did not process this information at the time.

3.2. Expectations and beliefs

The theme "Expectations and beliefs" consists of two categories; 1) specific beliefs about pain and 2) general expectations and beliefs. Participants saw pain as a warning signal from their body, telling them to rest more or that their body was *'working'*: recovering from surgery. Pain also made participants insecure, thinking that the pain was a sign the surgery had gone wrong or that *'something in their back had shifted'* (P10).

The general expectations and beliefs (n = 190) were mainly about surgery and recovery. One participant believed that undergoing this

Table 2
Themes and categories describing participants' experiences surrounding back surgery.

Theme	Categories	No. of times coded	No. of participants
Illness trajectories	Information about illness process	576	12
	Information and interaction hospital	185	12
	Pain medication	48	11
Expectations and beliefs	Expectations and beliefs in general	190	12
	Beliefs and cognitions about pain	41	11
Pain coping	Maintaining autonomy	96	11
	Activity avoidance/Pacing/Rest	100	12
	Endurance coping	115	12
	Social coping	33	8
	Adjusting environment	55	11
Emotion regulation	Experiencing positive emotions	19	7
	Experiencing negative emotions	56	12
	Dealing with fear and insecurity	119	12
	Strategies to maintain emotional balance	163	12

surgery would be the start of more hospital visits and surgeries in the future: *'once they start cutting in your body it never stops, one thing leads to another. And it turned out to be true, during the preoperative screening they found a small problem with my heart' (P9)*. More than half of the participants (n = 7) had expected recovery to be easier or at least a more upwards trajectory instead of the struggle they experienced in reality.

Several beliefs could be qualified as illness beliefs (Leventhal et al., 2007). Participants believed they knew the cause (n = 7) and timeline (n = 1) of the illness; for instance, working too hard, experiencing a lot of stress which turned *'inwards to my back' (P10)* or physical trauma in the past. Some participants (n = 4) felt they had control over the illness, reducing complaints by resting or worsening complaints by undertaking too many activities. A few participants (n = 3) felt that being a patient did not fit with their image of themselves, linking to beliefs about the identity of the illness.

Participants had to deal with certain expectations or beliefs that did not come true. The majority of the statements that dealt with unexpected situations were linked to the postoperative period, e.g.: *'I had not expected it to be as bad as this after the surgery.'* (P2, sentiment echoed by P3, P9 and P10). Participants had overly optimistic expectations about recovery and dealing with continuously changing circumstances during recovery made them feel insecure and question themselves. This situation required flexibility from the participants in dealing with disappointment (i.e. their preoperative hope for pain improvement not coming true), grief and acceptance. Some of the participants were capable of this flexibility (n = 7), e.g. P6: *'I believe it is important to let go of the tension, the fear. I did cry, I will not deny that. Something can go wrong, but finding a way to deal with your feelings can help.'* Others were more rigid in how they coped with the pain and, for instance, blamed the care professionals for not giving them accurate information.

3.3. Pain coping

Five categories were found, related to pain coping: maintaining autonomy, activity avoidance/pacing/rest, endurance coping, social coping and adjusting the environment.

'Maintaining autonomy' describes the dilemma participants experienced in maintaining their independence, even whilst in pain. Participant no. 1 described it as follows: *'I have been independent all my life and that was no longer possible. I kept doing things I wasn't allowed or able to do. That was hard, to be dependent on my wife or the nurses.'* The majority of participants (n = 9) showed own initiative, and a desire to have an active say, in their care process. Other participants (n = 3) completely put their fate in the hands of the doctors, trusting them to make the right decision.

The ways participants responded to pain, could be divided in two categories: 1) activity avoidance/pacing/rest 2) endurance coping. Although different in nature, elements of both categories were mentioned by all participants. In situations where participants chose the avoidance/pacing/rest approach, they stated they listened to their bodies (as opposed to forcing rules or fierce goals upon themselves), were cautious and careful with their body, rested and sometimes avoided certain activities in order to avoid accompanying pain.

All participants also described behavior which was categorized as endurance coping. For instance, persisting with a normal lifestyle despite disabling pain, struggling to keep up with others and not wanting to be different because of physical complaints. This behavior was reported by participants before the surgery and during recovery, forcing themselves to perform certain tasks, all whilst in pain. Participant no. 2: *'When I went to the zoo with my children and grandchildren, I had to drag myself from bench to bench. I couldn't make it any further. It is unpleasant, you push it away, you don't want to accept the consequences. Until you just cannot go on and you need the surgery.'*

The social environment also played a role in the context of pain coping for eight participants, this was labelled social coping. Participants were torn between the need for help from others and at the

same time not wanting to burden them too much.

Lastly, participants (n = 11) coped with pain in a practical way, adjusting their environment by altering their home or using aids such as a walking stick.

3.4. Emotion regulation

The theme emotion regulation consists of three categories, namely "experiencing positive and negative emotions", "dealing with fear and insecurity" and "strategies to maintain emotional balance".

Both pre- and postoperatively, participants reported experiencing positive and negative emotions. Almost all participants (n = 10) reported negative emotions before surgery and the number of times negative emotions were mentioned in the entire perioperative period (n = 56) far exceeded the mentioning of positive emotions (n = 19). Preoperatively, participants mentioned frustration from not being able to live their normal life, despair due to failing treatments, grief from all the complaints, faith in the doctor and in a good outcome, the hope for a better life after surgery and fear that the surgery might go wrong or be ineffective. Participant no. 12 describes the hope as follows: *'Shortly before surgery I didn't worry about the pain anymore. Because I was having the surgery, and after the surgery, my pain would be gone, I hoped it would all be better.'* In the postoperative period participants mentioned frustration due to disappointing recovery or failure to meet goals, fear of making a *'wrong movement which could harm'* their back and relief due to experiencing improvement.

Participants (n = 11) also mentioned they had to deal with fear and insecurity in the period before and after surgery. For instance, participant no. 6 had *'the fear of ending up in a wheelchair.'* Participant no. 10 showed signs of catastrophizing fear after surgery: *'And then you start to worry. Did I make a wrong movement? Is it all still alright inside? Have I followed the doctors' guidelines correctly? And what if it goes wrong, will it be alright again? Do I have to do it all over again? Those things cross my mind.'* Participants indicated it was hard for them to deal with the insecurity, not knowing what was going to happen, and to deal with this they were searching for control and structure.

To maintain an emotional balance in the face of all these emotions, participants displayed a wide variety of strategies. The most frequently mentioned (n = 10) strategy to maintain emotional well-being was acceptance. Participant no. 2: *'The first weeks were hard. But I was also at peace with the situation. It had to heal and that had to be done right.'* Several participants (n = 7) minimized the severity of the situation to prevent it from becoming overwhelming. Other participants tried to put things in perspective (n = 10), tried to remain positive (n = 3), used relaxation or mindfulness exercises (n = 2) or found peace in religion (n = 2). Almost all participants (n = 11) mentioned comforting activities they found valuable and rewarding, such as being able to play with their grandchildren, as an aim to reach after the surgery.

4. Discussion and conclusion

4.1. Discussion and conclusion

This is one of the first studies to qualitatively investigate lumbar fusion surgery patients' perioperative experiences. Whereas care professionals may see surgery as a singular event, the current study shows it takes context from a history full of health-related experiences, beliefs and expectations that require coping and emotion regulation to maintain emotional well-being.

First of all, the interviews demonstrated that patients preoperatively experienced long episodes of pain, had undergone several unsuccessful treatments and still experienced pain or discomfort after surgery. The hope for a better life after surgery was not (immediately) fulfilled, which in turn led to frustration or even fear of chronic complaints. Patients found the illness process imposing and struggled with frustration and loss of quality of life, which corresponds to qualitative

findings of other orthopedic patients (Damsgaard et al., 2017; Mats Sjöling et al., 2005; Nyvang et al., 2016; Parsons et al., 2009; Strickland et al., 2018). As participants in the current study often endured pain for several months or years before surgery, their stories also show overlap with chronic pain patients in mentioning a sense of loss, challenges of their identity and difficulty in maintaining their social role (Clark and Iphofen, 2008; Walker et al., 2006).

Secondly, several beliefs of patients in the current study were categorized as illness beliefs concerning illness identity, timeline, control over the illness, cause or consequences of the illness (Leventhal et al., 2007). Some patients developed beliefs that seem to promote ineffective coping strategies such as avoidance or endurance. Whereas other patients developed beliefs that seem to promote effective coping such as acceptance. Related to these beliefs, this study demonstrates that most participants had unrealistic expectations. These expectations can potentially have a negative effect on a patient's recovery and mental well-being during recovery. Prior research has shown that having more numerous pain relief expectations before spinal surgery, was associated with more pain and less satisfaction with pain relief after surgery (Iversen et al., 1998); and that having greater preoperative expectations was associated with less fulfillment of expectations post-operatively, which, in turn, led to less improvement in postoperative pain (Mancuso et al., 2016). Conversely, the fulfillment of preoperative expectations can have a positive effect on psychological well-being after surgery; Mancuso et al. found that depressive as well as anxiety symptoms improved more for lumbar surgery patients when more expectations were fulfilled and more pain improvement took place (Mancuso et al., 2018).

Participants used two forms of pain coping strategies: 1) "Activity avoidance/Pacing/Rest", including listening to your body, avoiding painful activities and resting when needed, and 2) "Endurance Coping", i.e. persisting with activity regardless of pain or physical discomfort. These findings can be framed in the Avoidance-Endurance Model (AEM) (Hasenbring and Verbunt, 2010), which describes the same two response patterns to pain. Hasenbring & Verbunt state that the fear-avoidance pattern heightens the risk of chronification of pain via physical disuse, while the endurance-related pattern heightens the risk of chronification via an overuse of physical structures (Hasenbring and Verbunt, 2010). The transition from acute (e.g., postoperative) pain to chronic pain is also explained in the Fear Avoidance Model (Vlaeyen and Linton, 2012). This model also includes mental processes such as catastrophizing and fear, which leads to avoidance, disuse and, thereby, to the chronification of pain. As fear was mentioned by several participants and catastrophizing thoughts were found by at least one participant, the current participants may be at risk of developing chronic pain.

Noteworthy is that several of the emotion regulation strategies the participants used are described in positive psychology, e.g. acceptance, maintaining meaningful activities or use of mindfulness exercises. This is promising, as earlier research links elements of positive psychology to a more beneficial recovery from and long-term prognosis of physical illness (e.g. Lamers et al., 2012; Sturgeon and Zautra, 2010). Participants showed different emotion regulation strategies throughout the pre- and postoperative period, suggesting a certain flexibility. The capacity to switch between different strategies, tailored to the situation, seems to be the most effective way to regain or maintain emotional well-being (Bonanno and Burton, 2013).

A possible weakness of this study is the fact that participants were recruited from one orthopedic center. Future research should focus on confirming our findings at other hospitals. While representing the heterogeneity of the patient group regarding age, sex and education, our study population also displayed similarity in the complexity and variety of their illness process and postoperative recovery. This suggests a common plan of action is possible that could alleviate the burden of the perioperative process for these patients.

4.2. Implications for future research

Even though Powell et al. reviewed several perioperative interventions, these interventions do not cover the full complexity of our current findings and lack a long-term focus (Powell et al., 2016). As the current study shows, surgery is just one event in a patients' lifetime full of health-related experiences; future research and possible interventions should focus on long-term, sustainable recovery.

As patients are not always capable of correctly processing medical information, especially whilst in pain, future research should focus on influencing factors regarding information processing, such as beliefs and expectations, the amount and timing of information, specifically for lumbar fusion surgery patients. Knowledge of these influencing factors could help care professionals improve patient satisfaction, patient care and postoperative outcomes.

Future research should also focus on strategies that help patients cope with their pain, fluctuating physical condition, and accompanying emotions throughout the perioperative process. Positive health, with a focus on positive psychology, might be a promising concept to prevent long-term disability from low-back pain and enhance patients' long-term resilience, as was also recently stated in the Lancet (Buchbinder et al., 2018; Hartvigsen et al., 2018).

Damsgaard et al. (2017) found that patients who undergo spinal surgery experience hope for a life without pain but, paradoxically, feel a sense of existential insecurity facing the future and its new possibilities when the pain is (mostly) gone after surgery. Finding new meaning in life, including meaningful activities, should be a focus of health care professionals, according to Damsgaard et al. (2017). As this is a focus of positive psychology, e.g. Acceptance and Commitment Therapy, their findings are in line with the above mentioned implications for future research.

4.3. Implications for health professionals

Health professionals should realize they are not treating a patient for acute, postoperative pain but are, in fact, treating a patient with chronic pain and, possibly, persistent or recurrent postoperative pain. For many spinal surgery patients, this surgery seems to be a last resort, with resultant high hopes, potentially unrealistic beliefs and expectations. Focusing on managing realistic expectations, discussing the high, possibly unrealistic, hope patients have regarding the surgery and fulfilling the need for information, while respecting the distress and strain the illness process has on a patient, could lead to greater patient satisfaction and better postoperative recovery. As the experiences described in the current study correspond to those of other orthopedic patients, the abovementioned implications are not only suitable for spinal surgery related professionals, but for health professionals in the orthopedic field in general.

Declarations of interest

None.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CRediT author statement

Annemieke van der Horst: Conceptualization, Methodology, Validation, Formal Analysis, Investigation, Data Curation, Writing – Original Draft, Project Administration, Funding Acquisition.

Hester Trompetter: Conceptualization, Methodology, Validation, Formal Analysis, Data Curation, Writing – Original Draft, Supervision.

Dean Pakvis: Resources, Acquisition of Data, Writing – Reviewing

& Editing.

Saskia Kelders: Formal Analysis, Writing – Reviewing & Editing, Supervision.

Karlein Schreurs: Conceptualization, Methodology, Validation, Formal Analysis, Writing – Reviewing & Editing, Supervision, Funding Acquisition.

Ernst Bohlmeijer: Conceptualization, Writing – Reviewing & Editing, Supervision, Funding Acquisition.

Additional author statements

- The authors confirm all patient/personal identifiers have been removed or disguised so the patient/person(s) described are not identifiable and cannot be identified through the details of the story.
- This study was carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki).
- This study was approved by the Ethical Committee of the University of Twente (no. BCE15309).
- This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.
- Declarations of interest: none

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijotn.2019.07.003>.

References

- Arpino, L., Iavarone, A., Parlato, C., Moraci, A., 2004. Prognostic role of depression after lumbar disc surgery. *Neurol. Sci.* 25 (3), 145–147. <http://doi.org/10.1007/s10072-004-0248-x>.
- Baliga, S., Treon, K., Craig, N.J.A., 2015. Low back pain: current surgical approaches. *Asian Spine J.* 9 (4), 645–657. <http://doi.org/10.4184/asj.2015.9.4.645>.
- Bay-Nielsen, M., Nilsson, E., Nordin, P., Kehlet, H., 2004. Chronic pain after open mesh and sutured repair of indirect inguinal hernia in young males. *Br. J. Surg.* 91 (10), 1372–1376. <http://doi.org/10.1002/bjs.4502>.
- Beauregard, L., Pomp, A., Choinière, M., 1998. Severity and impact of pain after day-surgery. *Can. J. Anaesth.* 45 (4), 304–311. <http://doi.org/10.1007/BF03012019>.
- Bonanno, G.A., Burton, C.L., 2013. Regulatory flexibility: an individual differences perspective on coping and emotion regulation. *Perspect. Psychol. Sci.* 8 (6), 591–612. <http://doi.org/10.1177/1745691613504116>.
- Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. *Qual. Res. Psychol.* 3 (2), 77–101.
- Buchbinder, R., van Tulder, M., Öberg, B., Costa, L.M., Woolf, A., Schoene, M., Croft, P., 2018. Low back pain: a call for action. *The Lancet* 391 (10137), 2384–2388. [http://doi.org/10.1016/S0140-6736\(18\)30488-4](http://doi.org/10.1016/S0140-6736(18)30488-4).
- Clark, K.A., Iphofen, R., 2008. The effects of failing to believe patients' experiences of chronic pain. *Nurs. Times* 28.
- Damsgaard, J.B., Jørgensen, L.B., Norlyk, A., Birkelund, R., 2017. Spinal fusion surgery: from relief to insecurity. *Int. J. Orthop. Trauma Nurs.* (24), 31–39. <http://doi.org/10.1016/j.ijotn.2016.06.001>.
- Dueñas, M., Ojeda, B., Salazar, A., Mico, J.A., Failde, I., 2016. A review of chronic pain impact on patients, their social environment and the health care system. *J. Pain Res.* 9, 457–467. <http://doi.org/10.2147/JPR.S105892>.
- Fortier, J., Chung, F., Su, J., 1998. Unanticipated admission after ambulatory surgery — a prospective study. *Can. J. Anaesth.* 45 (7), 612. <http://doi.org/10.1007/BF03012088>.
- Granot, M., Ferber, S.G., 2005. The roles of pain catastrophizing and anxiety in the prediction of postoperative pain intensity. *Clin. J. Pain* 21 (5), 439–445. <http://doi.org/10.1097/01.aip.0000135236.12705.2d>.
- Hartvigsen, J., Hancock, M.J., Kongsted, A., Louw, Q., Ferreira, M.L., Genevay, S., Hoy, D., Karpinnen, J., Pransky, G., Sieper, J., Smeets, R.J., Underwood, M., 2018. What low back pain is and why we need to pay attention. *The Lancet* 391 (10137), 2356–2367. [http://doi.org/10.1016/S0140-6736\(18\)30480-X](http://doi.org/10.1016/S0140-6736(18)30480-X).
- Hasenbring, M.I., Verbunt, J.A., 2010. Fear-avoidance and endurance-related responses to pain: new models of behavior and their consequences for clinical practice. *Clin. J. Pain* 26 (9). https://journals.lww.com/clinicalpain/Fulltext/2010/11000/Fear_avoidance_and_Endurance_related_Responses_to.3.aspx.
- Hazard, R.G., 2006. Failed back surgery syndrome: surgical and nonsurgical approaches. *Clin. Orthop. Relat. Res.* 443. https://journals.lww.com/clinorthop/Fulltext/2006/02000/Failed_Back_Surgery_Syndrome_Surgical_and.31.aspx.
- Hoffman, R.M., Wheeler, K.J., Deyo, R.A., 1993. Surgery for herniated lumbar discs. *J. Gen. Intern. Med.* 8 (9), 487–496. <http://doi.org/10.1007/BF02600110>.
- Hoofwijk, D.M., Fiddelaers, A.A., Peters, M.L., Stessel, B., Kessels, A.G., Joosten, E.A., Gramke, H.F., Marcus, M.A., 2015. Prevalence and predictive factors of chronic postsurgical pain and poor global recovery 1 year after outpatient surgery. *Clin. J. Pain* 31 (12). <http://doi.org/10.1097/AJP.0000000000000207>.
- Inoue, S., Kamiya, M., Nishihara, M., Arai, Y.C.P., Ikemoto, T., Ushida, T., 2017. Prevalence, characteristics, and burden of failed back surgery syndrome: the influence of various residual symptoms on patient satisfaction and quality of life as assessed by a nationwide internet survey in Japan. *J. Pain Res.* 10, 811–823. <http://doi.org/10.2147/JPR.S129295>.
- Iversen, M.D., Daltroy, L.H., Fossel, A.H., Katz, J.N., 1998. The prognostic importance of patient pre-operative expectations of surgery for lumbar spinal stenosis. *Patient Educ. Counsel.* 34 (2), 169–178. [http://doi.org/10.1016/S0738-3991\(97\)00109-2](http://doi.org/10.1016/S0738-3991(97)00109-2).
- Joshi, G.P., Ogunnaike, B.O., 2005. Consequences of inadequate postoperative pain relief and chronic persistent postoperative pain. *Anesthesiol. Clin.* 23 (1), 21–36. <http://doi.org/10.1016/j.atc.2004.11.013>.
- Khan, R.S., Ahmed, K., Blakeway, E., Skapinakis, P., Nihoyannopoulos, L., Macleod, K., Sevdalis, N., Ashrafian, H., Platt, M., Darzi, A., Athanasiou, T., 2011. Catastrophizing: a predictive factor for postoperative pain. *Am. J. Surg.* 201 (1), 122–131. <http://doi.org/10.1016/j.amjsurg.2010.02.007>.
- Köhle, N., Drossaert, C.H.C., Oosterik, S., Schreurs, K.M., Hagedoorn, M., van Uden-Kraam, C.F., et al., 2015. Needs and preferences of partners of cancer patients regarding a web-based psychological intervention: a qualitative study. *J. Med. Internet Res.* 17 (2), e13. <http://doi.org/10.2196/cancer.4631>.
- Koke, A.J.A., Heuts, P.H.T.G., Vlaeyen, J.W.S., Weber, W.E.J., 2011. Chronische Pijn, vol 20. <http://doi.org/10.1111/j.1574-695X.2010.00680.x>.
- Lamers, S.M.A., Bolier, L., Westerhof, G.J., Smit, F., Bohlmeijer, E.T., 2012. The impact of emotional well-being on long-term recovery and survival in physical illness: a meta-analysis. *J. Behav. Med.* 35 (5), 538–547. <http://doi.org/10.1007/s10865-011-9379-8>.
- Leventhal, H., Leventhal, E., Contrada, R., 2007. Self-regulation, health, and behavior: a perceptual-cognitive approach. *Psychol. Health* 13. <http://doi.org/10.1080/0887049808407425>.
- Mancuso, C.A., Duculan, R., Cammisa, F.P., Sama, A.A., Hughes, A.P., Lebl, D.R., Girardi, F.P., 2016. Fulfillment of patients' expectations of lumbar and cervical spine surgery. *Spine J.* 16 (10), 1167–1174. <http://doi.org/10.1016/j.spinee.2016.04.011>.
- Mancuso, C.A., Duculan, R., Cammisa, F.P., Sama, A.A., Hughes, A.P., Lebl, D.R., Girardi, F.P., 2018. Successful lumbar surgery results in improved psychological well-being: a longitudinal assessment of depressive and anxiety symptoms. *Spine J.* 18 (4), 606–613. <http://doi.org/10.1016/j.spinee.2017.08.260>.
- Mats Sjöling, R.N., Ylva Ågren, R.N., Olofsson, N., Ove Hellzén, R.N., Kenneth Asplund, R.N., 2005. Waiting for surgery; living a life on hold - a continuous struggle against a faceless system. *Int. J. Nurs. Stud.* 42 (5), 539–547. <http://doi.org/10.1016/j.ijnurstu.2004.09.009>.
- Mc Hugh, G.A., Thoms, G.M., 2002. The management of pain following daycase surgery. *Anaesthesia* 57 (3), 270–275.
- Morone, N.E., Weiner, D.K., Belnap, B.H., Karp, J.F., Mazumdar, S., Houck, P.R., He, F., Rollman, B.L., 2010. The impact of pain and depression on recovery after coronary artery bypass grafting. *Psychosom. Med.* 72 (7), 620–625. <http://doi.org/10.1097/PSY.0b013e3181e6df90>.
- Munafo, M.R., Stevenson, J., 2001. Anxiety and surgical recovery: reinterpreting the literature. *J. Psychosom. Res.* 51 (4), 589–596.
- Nyvang, J., Hedström, M., Gleissman, S.A., 2016. It's not just a knee, but a whole life: a qualitative descriptive study on patients' experiences of living with knee osteoarthritis and their expectations for knee arthroplasty. *Int. J. Qual. Stud. Health Well-Being* 11 (1), 30193.
- Parsons, G.E., Godfrey, H., Jester, R.F., 2009. Living with severe osteoarthritis while awaiting hip and knee joint replacement surgery. *Musculoskel. Care* 7 (2), 121–135.
- Patton, M.Q., 1990. Qualitative evaluation and research methods, 2nd ed. In: *Qualitative Evaluation and Research Methods*, second ed. Sage Publications, Inc, Thousand Oaks, CA, US.
- Pavlin, D.J., Chen, C., Penaloza, D.A., Polissar, N.L., Buckley, F.P., 2002. Pain as a factor complicating recovery and discharge after ambulatory surgery. *Anesth. Analg.* 95 (3), 627–634. <http://doi.org/10.1213/0000539-200209000-00025>.
- Pavlin, D.J., Sullivan, M.J.L., Freund, P.R., Roosen, K., 2005. Catastrophizing: a risk factor for postsurgical pain. *Clin. J. Pain* 21 (1), 83–90.
- Powell, R., Scott, N.W., Manyande, A., Bruce, J., Vögele, C., Byrne-Davis, L.M.T., Unsworth, M., Osmer, C., Johnston, M., 2016. Psychological preparation and post-operative outcomes for adults undergoing surgery under general anaesthesia. *Cochrane Database Syst. Rev.* <http://doi.org/10.1002/14651858.CD008646.pub2>.
- Ritchie, J., Spencer, L., O'Connor, W., 2003. Carrying Out Qualitative Analysis. *Qualitative Research Practice: A Guide for Social Science Students and Researchers*. pp. 219–262. <http://doi.org/10.4135/9781452230108>.
- Strickland, L.H., Kelly, L., Hamilton, T.W., Murray, D.W., Pandit, H.G., Jenkinson, C., 2018. Early recovery following lower limb arthroplasty: qualitative interviews with patients undergoing elective hip and knee replacement surgery. Initial phase in the development of a patient-reported outcome measure. *J. Clin. Nurs.* 27 (13–14), 2598–2608.
- Sturgeon, J.A., Zautra, A.J., 2010. Resilience: a new paradigm for adaptation to chronic pain. *Curr. Pain Headache Rep.* 14 (2), 105–112. <http://doi.org/10.1007/s11916-010-0095-9>.
- Turner, J.A., Ersek, M., Herron, L., Haselkorn, J., Kent, D., Ciol, M.A., Deyo, R., 1992. Patient outcomes after lumbar spinal fusions. *J. Am. Med. Assoc.* 268 (7), 907–911. <https://doi.org/10.1001/jama.1992.03490070089049>.
- Van Oostrom, S.H., Verschuren, W.M.M., De Vet, H.C., Picavet, H.S., 2011. Ten year course of low back pain in an adult population-based cohort - the Doetinchem Cohort Study. *Eur. J. Pain* 15 (9), 993–998. <http://doi.org/10.1016/j.ejpain.2011.02.007>.
- Vlaeyen, J.W.S., Linton, S.J., 2012. Fear-avoidance model of chronic musculoskeletal pain: 12 years on. *Pain* 153 (6), 1144–1147. <http://doi.org/10.1016/j.pain.2011.12.009>.

Walker, J., Sofaer, B., Holloway, I., 2006. The experience of chronic back pain: accounts of loss in those seeking help from pain clinics. *Eur. J. Pain* 10 (3), 199–207. <http://doi.org/10.1016/j.ejpain.2005.03.007>.

Weir, S., Samnaliev, M., Kuo, T.C., Ni Choitir, C., Tierney, T.S., Cumming, D., Bruce, J., Manca, A., Taylor, R.S., Eldabe, S., 2017. The incidence and healthcare costs of

persistent postoperative pain following lumbar spine surgery in the UK: a cohort study using the Clinical Practice Research Datalink (CPRD) and Hospital Episode Statistics (HES). *BMJ Open* 7 (9), 1–8. <http://doi.org/10.1136/bmjopen-2017-017585>.