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It's like being in another world - patients' lived experience of magnetic resonance imaging

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## Abstract

**Aim.** The aim of this study was to illuminate patients' lived experience during magnetic resonance imaging.

**Background.** Magnetic resonance imaging has increased in importance since the early 1980s and is today a common useful diagnostic tool. Although magnetic resonance imaging are non-invasive and considered painless, many patients experience anxiety, sometimes so strong that the scan has to be terminated.

**Design and methods.** The study had an inductive design and a hermeneutic phenomenological methodology was used.

**Results.** The essential theme of going through magnetic resonance imaging was a feeling of *being in another world*. The strange environment and isolation inside the scanner made the participants' experiences unusual, with varying degrees of difficulty dealing with it. Being in the other world caused a threat to the participants' self-control. There was a relation between threat to self-control, effort and need for support in the sense that the magnitude of threat to self-control had an impact on the effort it took to handle the situation and on the need for support, and conversely that the support received could affect the effort and threat to self-control.

**Conclusions.** The study shows that the information received and the interaction between patients and staff have a significant influence on patients' lived experiences.

**Relevance to clinical practice.** The individual experience of threat to self-control requires the need for support to be individualized and care need to be adjusted for each patient.

Keywords: anxiety, lived experience, magnetic resonance imaging, nursing, patient care, qualitative research

## BACKGROUND

Magnetic resonance imaging (MRI) has increased in importance since the early 1980s and is now a common useful diagnostic tool (Di Salle *et al.* 1999, Rivkin 2000, Miller *et al.* 2003, Accardo *et al.* 2004, Goswami 2004). Although MRI scans are non-invasive and considered painless, studies have shown that 25%-37% of patients experienced moderate to high levels of anxiety (Katz *et al.* 1994, Blanchard *et al.* 1997, McIsaac *et al.* 1998), and that 1.5%-6.5% did not terminate the scan (Avrahami 1990, Kilborn & Labbe 1990). It is thus important for the sake of the patients' experiences, the diagnostic value, and because of the great costs associated with the scan, to help patients through MRI scans.

The MRI technique is based on the principle that the hydrogen protons in the body inserted in a strong magnetic field absorb pulses of radiofrequency. The affected protons then emit detectable signals, which can be reconstructed into computerised images (Rink 2001). The strong magnetic field surrounds a tunnel where the patient is placed during the scan. To send the radiofrequency pulses and receive signal from the examined area a coil is placed close to it. Different image sequences, normally with duration of 1-9 minutes, are performed and, while image data are collected, there is a hammering noise. For the patients this entails that they will be in the scanner for 30-90 minutes, with the examined area in the centre of the tunnel and, to obtain good image quality, the patient cannot move during data collection (Westbrook & Kaut 1998).

Quirk *et al.* (1989a) suggested that the causes of the unpleasant experiences during MRI scanning are associated with the narrow space in the tunnel, examination duration, the hammering noise and the temperature inside the tunnel. Katz *et al.* (1994) concluded that the

distress also involved fear of pain, the unknown, as well as apprehension about what the test might reveal.

To handle the situation, patients use different kinds of strategies, such as imaginative visualization, blinding, breathing relaxation techniques (Quirk *et al.* 1989b, Nazemi & Dager 2003) or use problem-focused strategies such as seeking social support, counting one's blessings and religiosity during the scan (Nazemi & Dager 2003). Information and help with guided imagery (Thompson & Coppens 1994) and relaxation intervention (Lukins *et al.* 1997) can decrease the patients' anxiety. It has also been proven that increased information about the procedure and relaxation strategies together with more interaction between patients and staff give a significant decrease in anxiety during the scan (MacKenzie *et al.* 1995, Youssefzadeh *et al.* 1997, Grey *et al.* 2000). Over 50% of the patients in the study by MacKenzie *et al.* (1995) found part of their visit 'pleasant' and the most frequently mentioned factor was general staff interaction. Prior explanation of procedure, providing reassurance, communication throughout the scan, and staff manner were interactions rated highest by these patients.

For patients experiencing claustrophobia the panic attack is often unexpected (Avrahami 1990, Kilborn & Labbe 1990, Lukins *et al.* 1997, McIsaac *et al.* 1998) and may even cause patients to develop phobia to enclosed spaces after the examination (Kilborn & Labbe 1990, Lukins *et al.* 1997, McIsaac *et al.* 1998). Lukins *et al.* (1997) showed a 38% increase in MRI related fear seven months or more after the MRI was performed. Sedation (Murphy & Brunberg 1997) and in some cases hypnosis (Friday & Kubal 1990, Simon 1999) have been proven successful in helping patients with strong feelings of unpleasantness or claustrophobia

during the scan. Murphy and Brunberg (1997) showed that 14.2% of 939 patients needed sedation to tolerate MRI.

Although studies have been performed to examine patients' experiences of going through MRI scans no study, to our knowledge, has emanated from the patients' own narratives. To shape and improve the care we need to know patients' lived experiences of going through a MRI scan.

## AIM

The aim of the study was to illuminate patient's lived experience during an MRI scan.

## DESIGN AND METHODOLOGICAL DESCRIPTION

The study had an inductive design and a hermeneutic phenomenological methodology was used to capture the lived experience of patients undergoing MRI scans. Hermeneutic phenomenology is the study of the meaning of a phenomenon and acquiring a deeper understanding of lived experience (van Manen 1997). This study attempts to give insightful descriptions of patients' prereflective experiences. Ethical approval and permission to undertake the study was given by the Ethics Committee at Lund University, Sweden (LU: 535-02).

## METHODS

### Setting

All MRI scans took place at a university hospital in the south of Sweden. The MRI department is situated in the basement of the hospital. Two MRI scanners, Siemens Magnetom Vision (1.5 T) and Siemens Magnetom Expert (1 T) were used. The tunnels were

200-cm long and 60-cm wide. Both MRI scanners had light and fan inside the tunnel and two-way intercom between control room and scanner.

### Participants

Nineteen persons who underwent an MRI scan were interviewed about their experience of the examination. Patients were selected during a 1½-month period in 2003. The inclusion criteria were that the participants could speak and understand Swedish, be over 18 years old, and be outpatients scheduled for an MRI scan performed with the head inside the tunnel. To get a wide range of experiences the selection of participants was strategic in the sense that both men and women of different ages and persons with different experiences of their MRI scan were chosen to participate. On predetermined days, patients who did not complete the scan because of strong worries (four), patients who pronounced worries before the scan but did complete the scan (six) and patients who did not show worries before and did complete the scan (10) were asked to participate in the study. One patient who did not complete the scan declined to participate. The participants went through different kinds of MRI scans, such as brain, spine, abdomen and wrist, thus different coils were used. The scan duration varied from about 30-90 minutes. Of the 19 participants 12 were women and seven men, and the age varied from 22 to 73 years.

### Procedure

The patients were invited to participate in the study after the MRI scan was completed and then received oral and written information about the study. The information stated that participation was voluntary and that all information would be treated confidentially.

Participants were offered to choose a time and place for the interview and all chose to be interviewed in a separate room at the hospital immediately after the examination. The

interviews lasted between 30 and 90 minutes, were tape-recorded and later transcribed literally by the first author (ET).

Conversational interviews inspired by van Manen (1997) were conducted. When studying lived experiences the participants' experiences are in focus and guide the dialog; thus no prepared questions were used. All interviews started with the question. 'Can you tell me spontaneously about your experiences during your MRI scan?' During the dialog, the interviewer strove to encourage the participants to clarify their experiences by questions like 'What do you mean?', 'How did you feel?' or 'What did you think?' For a full understanding of the situation of going through the MRI scan, the interviewer tried to grasp areas such as the person's lived space, lived time, lived body and lived relations (van Manen 1997, p.32).

#### Analysis

A hermeneutic phenomenological analysis inspired by van Manan (1997) aimed to capture the variation in the participants' lived experience during MRI scans. The first author, as described by van Manen (1997, p. 46), made explicit her preunderstanding from working as a radiological nurse and as a teacher in the field to ensure that the preunderstanding was useful in the interview and analysis process but did not influence the findings of the study in a biased way. Three of the authors (ET, ÅM, IH) read all interviews to get an overview of the participants' experiences. The first author (ET) read the interviews several times, as an holistic approach, and made summaries of each interview for later comparison. After this the first author studied the transcripts line by line asking 'what does this line say about the person's experience?' and selected meaning units found to describe the participants' lived experiences (van Manen 1997, p. 92). Different aspects and the context of the variation of the experience identified through the detailed approach were compared with the summaries.

When structures of meanings emerged the first author started to write as a part of the analysis process (van Manen 1997, p. 131). The three authors, discussed throughout the analysis process themes and relations within the interview texts as a whole. At the end of the analysis process the fourth author (E-ML), with long-term experience of MRI, read the findings to further increase the credibility. After discussions and repeated rewriting, consensus among the researchers was reached. Themes and sub themes are illustrated with quotations. The number of the quoted participant (P) is stated in parentheses.

## RESULTS

The essential theme of going through an MRI scan was identified from the participants' lived experience as a feeling of *being in another world*. The strange environment and isolation inside the scanner made their experience unusual and requiring varying degrees of difficulty to deal with it.

Three structures of experience, described as sub-themes, related to the experiences of being in another world were identified: *threat to self-control*, *effort to handle the situation*, and *need for support*. The experience of being in the scanner caused a threat to the participants' self-control. There was a relation between threat to self-control, the effort it took for the participants to handle the situation, and the need for support, in the sense that the magnitude of the threat to self-control had an impact on the effort it took to handle the situation and need for support. On the one hand an immense feeling of threat to self-control and a great effort to handle the situation could be decreased if the support was felt to be sufficient and adequate. On the other hand, feelings of threat and effort to handle the situation could increase if the support was found inadequate (Fig. 1).

## Being in another world

The participants' overall experience of going through the MRI scan was a sense of being in another world. The environment, the enclosed space, the hammering metallic noise and sometimes the discomfort of lying on a hard bed, made the experience special and something out of their normal frame of reference. The experience of being in 'another world' was derived from the participants' feelings of being isolated, far away, confined, lonely and dependent on others. 'You feel confined, there is no door you yourself can open if you want to go out of there' (P11). Being in the scanner was often associated with other enclosed spaces like coffins, a wooden sofa with a lid, a space capsule or 'like lying almost as for cremation' (P16). All associations with other enclosed spaces were of a negative kind except for one man who had previously been inside a space capsule. He experienced that 'I got a feeling, which is quite natural, that I entered a space capsule in NASA, Houston... I was lucky I have been there' (P17). The fact that the MRI department was situated in the basement contributed to the feeling that it was a different and scary place. Walking down the culvert made some participants imagine that this must be special as the MRI scanners had to be down here. A participant experienced a feeling of going to his own execution (P8).

The hammering noise added to the feeling of unreality and was associated with other sounds familiar to the participants. 'When you have this sound in your ears it's like listening to those who chop asphalt or concrete' (P12). The unusual situation with the enclosed space and the sound at irregular intervals made the participants experience difficulties keeping track of time.

## *Threat to self-control*

The experience of being in another world caused a threat to the participants' control over their thoughts and reactions. They experienced shortness of breath, heart rate going up, dizziness,

thoughts going 'everywhere', fear, and a need to get out. The extent of the threat to self-control varied among the participants and could also vary for a participant over time during the MRI scan. The threat varied from no threat at all, a small experience of threat to feelings of panic. If there were no feelings of threat during the scan the unusual situation was acknowledged but did not influence the feelings during the scan. 'You just relax and lie there, and think it is cramped as hell' (P6). If the experience of panic could not be handled the MRI scan was prematurely interrupted:

I felt pressure over my chest, it felt like I couldn't breath, panic, I had to get out of there... It went great at first, and I thought that I could make it. My husband said, you are doing great, he held my foot. I started to relax and felt that I could relax with my legs on the cushion. But, then it came, it was like ppssscchh, and I thought it wasn't even me, it was nothing I could control. I was so surprised... I wanted to make it, but it wasn't me, my body took over. (P8)

The threat to self-control was, for some of the participants, a fact before coming to the department. They suspected that they would have problems going into the scanner. 'I felt that I was terrified, I could hardly sleep for a couple of days and was 100% sure that I wouldn't make it' (P4). The sight of the machine and the narrow tunnel was another source of threat to self-control. There were experiences of doubts about the reactions in the enclosed space. A participant describes it as 'when I saw the small tunnel I thought, shall I go in there, and then I felt panic' (P7). As the participants were lying up on the bed and were prepared for the scan, the coils were placed close to the examined part of the body. The visor on the head coil came close to the face and sometimes increased the threat to self-control. 'That hood (the visor on the head coil), the first time when they lowered it I said, 'I can't do it, I'm choking, I can't

breathe.’ (P19). Almost all participants were experiencing some threat to self-control whilst inserted into the tunnel, although the participants feeling least threat to self-control recovered quickly and were then able to relax. Others had to struggle with their feelings and reactions and for some it meant that they had to terminate the scan.

Not knowing what was going to happen sometimes increased the threat to self-control. ‘I felt insecure, thought about my children, she is waiting for me... my husband doesn’t know if something is happening to me. I felt that maybe something is going to happen to me’ (P2). Contrarily, for some participants with experiences of previous scans, this did not decrease the threat. ‘I have done this many times, but I thought this was the worst... It doesn’t get better over time’ (P3).

#### *Effort to handle the situation*

The magnitude of the threat to self-control affected the effort it took to handle the situation. The participants who felt no threat did not need any effort to control their reactions and thoughts. They did not have an urge to flee from the reality inside the scanner but could relax, look around and think about what was going on.

Different strategies were used as the experience of threat grew, the greater the threat, the greater the need to find useful strategies. Participants who felt a small threat to self-control relaxed easily by thinking about something else. If a greater effort was needed the participants had to work harder to relax and ‘be somewhere else in the mind’. They closed their eyes, thought about their breathing, about later rewards (like a cup of coffee, a glass of beer or a walk), and/or motivated themselves. ‘The information from this examination is very important. You have to think about that. If I terminate the scan now I’m back to square one. I

thought a lot about that' (P7). If the participants had difficulties relaxing on their own they looked for help from others. They also tried to keep track of the time, for instance by counting the tunes if they listened to music.

Participants experiencing feelings close to panic did not try to relax, but to get a sense of control, not only over reactions and thoughts, but over the whole situation. To feel in control over the whole situation, the participants looked for detailed information, trust and reassurance from the staff. They needed to feel in control over the decision to persist in the situation or interrupt the scan:

I was a marvel of self-control in there. I really just wanted to scream... You feel a need to concentrate the whole time, to feel that you are in reality, so to speak. I asked the girl to speak to me and tell me, the whole time, what she was doing. That helps. Between the series, she told me exactly how many series there were left and exactly how long it would take. Then I started to count... It helps you keep it together. (P3)

Sometimes the effort was not enough. 'I tried to persuade myself to take it easy, breathe calmly and take deep breaths... It felt like it would take too long for them to come in and take me out' (P1).

### *Need for support*

As the ability to face the situation varied and, thereby, the effort it took to handle the situation, the need for support varied as well. The need for support, may be described in simplified terms as a variation from: reaching someone when needed, need of reassurance to be able to relax and need for help to stay in control over the situation.

Participants who experienced little or no threat to self-control could master the situation on their own. They wanted some information about what was going to happen and preferably about the duration of the examination. They wanted the buzzer, to be able to get in contact with the staff, appreciated but did not need other reassurance of contact. 'You do want to hold it (the buzzer). It's a kind of emergency exit and I can reach people... Then, I liked it when they came in after half the time and said something, 'we are here, how are you?', asking how you feel' (P12).

Participants who experienced greater threat to self-control needed support from others. The buzzer felt extremely important, but besides the possibility to contact someone they needed reassurance or trust to feel confident enough to be able to relax. Someone being in the room, maybe holding on to one foot, or staff 'being there for them' during the examination could reassure them that they were not alone. 'My wife is there with me now. I can feel her hand on my leg, and then I know there is someone, she is there. It's an enormous support' (P19). Some participants found that the music helped them to relax.

The participants with feelings close to panic, looking for control over the situation, needed more support. They wanted contact with the nurse throughout the scan and they needed to trust that the nurse would respond directly if they needed to get out:

We were only going to try it, because I was worried. She (the radiological nurse) showed me how it worked and took me inside for a bit. Then she lowered the visor in front of my face. I felt panic then and thought that I can never do it. But then she said, 'We'll take it in intervals and if you want you can terminate the scan, we'll try for 3 minutes.' OK we

would try. But then I had been out of there once and was prepared to leave the room. I thought that it's all or nothing, I just can't do it. But then I thought, OK, I'll try for 3 minutes and that went well... 'Can we try now for 4 minutes?' and that was OK too... 'Three minutes more and then I'll get you out of there.' She was very comforting the whole time. Very good she was. You feel a bit vulnerable. I thought that if I want something and I pressed (the buzzer) will she come then? But she told me, 'I'm here,' she told me that she was beside me and you could hear her voice between each sequence... That's what made me feel secure, that you knew that somebody was there.

(P9)

The participants with feelings close to panic also wanted detailed information about what was going to happen, how it would feel and how long it would take. 'It was great to know (the number and duration of sequences), 'now there's one more left,' she said, maybe because I was so frightened' (P4). Another way to experience control was to use a special mirror that gave an impression of more space.

If the participants felt that they could trust the staff they sometimes could diminish the need for control and instead relax. On the contrary, if something unexpected happened or the participant did not experience a sense of control, this could be enough for the panic to take over. The radiological nurses were able to support participants by their appearance and actions. The participants who needed to trust the staff watched the radiological nurse to 'judge' whether they could trust them. If they looked calm that reassured the participants that they had the nurses' full attention and that they could trust them:

I was scared. As I understood it, I wasn't supposed to feel anything. I had fought to overcome the claustrophobia and was prepared to go on. Then something happened to my body that nobody had told me about, it felt like vibrations... She said she would come in at once, but I pressed it [the buzzer] at least 17 times before she came. If she had come straight away, maybe I could have asked what it was, maybe I could have made it then. Instead they tried to calm me down, I had to fight then, it felt dangerous and I was terrified. I wish she had come directly. I didn't trust them then... You feel powerless and you have no control. (P8)

## DISCUSSION

The lived experience of 19 participants going through MRI scans felt like 'being in another world'. The strange, unusual environment and situation was experienced as a threat to the participants' self-control, although with a variation from no threat at all to a feeling of panic. The magnitude of the threat to self-control affected the effort it took for the participants to handle the situation and their need for support.

In phenomenological studies there is less interest in what actually happens or how often things happen, and more in how a phenomenon is experienced (van Manen 1997). Thus, this study focuses on how the participants experienced their MRI scan, without consideration of how many or how often things were experienced or said. The aim was to capture the variation and structure of meaning of the participants' experiences to understand more deeply their experiences and thereby identify their need for support.

Nineteen patients were interviewed to obtain wide-ranging variations in experiences, but not too large a body of material to handle for the phenomenological analysis. All participants

chose to be interviewed directly after the MRI scan, which can be seen as an advantage as it is the immediate, prereflective consciousness of the lived experiences that is important (van Manen 1997). In this study, three authors with different backgrounds (only one with experience of MRI, ET) read all the interviews and participated in the whole analysis process, which ensured that focus was maintained on the participants' lived experiences of going through MRI scans, and which increases the credibility. At the end of the analysis process the fourth author, with long experience of MRI, read the findings to further increase credibility. Although, the results can not be generalized to all persons going through a MRI scan, useful information can be interpreted for use in clinical practice.

The environment in the scanner had an impact on the participants, as has been shown in other studies (Quirk *et al.* 1989a, Katz *et al.* 1994, Nazemi & Dager 2003). In this case, the fact that the department was situated in the basement contributed, for some participants, to the discomfort. The environment in the scanner made them feel isolated, vulnerable, and dependent on others. Although new scanners with a shorter tunnel than those used in the present study are now available, there are still patients who experience discomfort and need sedation. This indicates that the participants' lived experiences reported in this study might be similar to the experiences patients have when they go through MRI scans in the new scanners.

Katz *et al.* (1994) concluded that the apprehension about what the examination might reveal is a factor that may induce anxiety during the scan. None of the participants in the present study mentioned anxiety about the outcome of the examination as a factor that affected their worry or discomfort. At the end of the interview several of them asked when and how they would receive the outcome of the scan, but when asked if they had thought about what the scan might reveal during the scan, the answer was no. It seems that during the scan they focused on

handling the present situation and thoughts about the outcome came when they had relaxed for some time. Several participants, however, said that they thought of the importance of the examination and used that as a motivation to 'stay in the scanner'.

The participants used different strategies depending on the threat they experienced. Relaxing through breathing technique, thinking about something else, motivation, closing eyes and seeking reassurance were common strategies. Many of them listened to music and used that as a help for relaxation or to keep track of the time. For those who felt close to panic the strategy aimed to let them feel in control of the situation. Quirk *et al.* (1989b) also found that patients used imaginative visualisation, blinding and breathing relaxation technique during the scan, but strategies concerning gaining control over the situation were not mentioned. Nazemi and Dager (2003) found, however, that patients with panic disorder are capable of effective coping when faced with a highly stressful but structured situation if they experience relative control over the situation.

The need for support thus varied for the participants. All of them needed some basic information, the buzzer to be able to contact the staff and they appreciated that the radiological nurse contacted them during the scan. The greater the threat to self-control, the more they wanted support from the staff. Those with experiences close to panic needed detailed information, not only about the procedure, but also about the duration of the sequences and what they might experience during the examination. As they looked for control they needed information and reassurance throughout the scan and they needed to trust the staff to feel secure. They also needed to be reassured that they could terminate the scan directly when or if they needed to. The importance of staff-patient interaction is also shown by MacKenzie *et al.* (1995). Patients who found part of the visit pleasant most frequently

mentioned general staff interaction as the reason. They also showed the importance of prior explanation of procedure, providing reassurance, and communication throughout the scan.

Studies with the aim of reducing anxiety for patients undergoing MRI scans (except for studies directly addressing claustrophobic patients) gave the same intervention to all patients (Thompson & Coppens 1994, Lukins *et al.* 1997, Youssefzadeh *et al.* 1997, Grey *et al.* 2000). Although they have successfully decreased anxiety for the patients as a group, not all patients seem to benefit from the interventions. The present study suggests that patients need individualized support. Some patients do well with little support while others are in the need of more support to be able to relax and others need help to experience control over the situation.

#### RELEVANCE TO CLINICAL PRACTICE

This study shows that the information received and the interaction between patients and staff have an important influence on patients' lived experiences. All patients need basic information, means to get in contact with the staff (buzzer), and appreciate contact with the radiological nurse during the MRI scan. Music can be used as an aid to relaxation, but also as a way to keep track of time. For the most anxious patients, however, this is not enough; they need more information and regular contact with the staff. The individual experience of threat to self-control requires the need for support to be individualized and care need to be adjusted for each patient. Identifying each patient's individual need may be time-consuming but may save both time and money in the long run.

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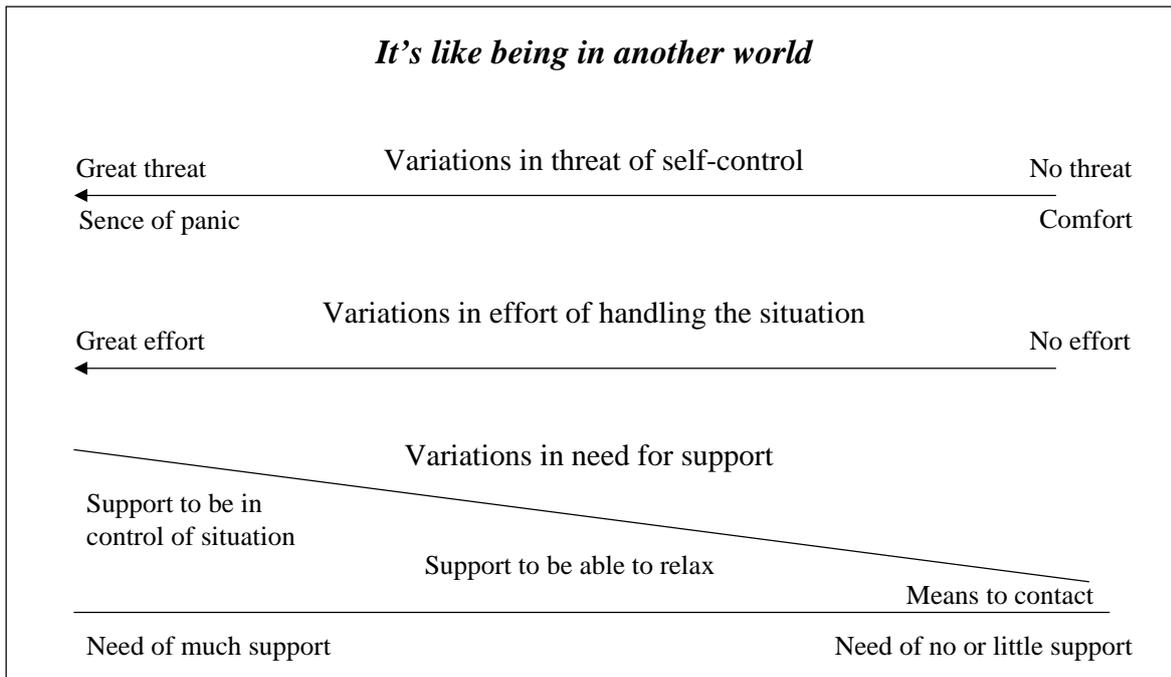
### **Contributions**

Study design: ET, ÅM, E-ML, IH; data analysis: ET, ÅM, E-ML, IH; manuscript preparation: ET, ÅM, E-ML, IH.

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**Figure 1.** The variations in and relations between threat to self-control, effort in handling the situation, and need for support.