Exploring Perceptions of a Health Information Video

Shennelle J. Muller

Department of Psychological Medicine, The University of Auckland

Professor Elizabeth Broadbent

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1.Introduction

Posture plays an important role in maintaining the body's equilibrium and stability during any given functional tasks in any given environment (Shumway-Cook & Woollacott, 2007) and it can be adapted to the requirements of the situation (Everett & Kell, 2010). According to the American Academy of Orthopaedic Surgery, a good posture is one that provides skeletal and muscular balance which enables the body's supporting structure's to be protected against injury and progressive deformation in either the lying, erect, stoop or sitting position (Grimmer-Somers et al., 2008). Whereas, a poor posture is defined as a problematic relationship between body segments that results in less efficient functioning, less balance, and an increase in strain (Kendall et al., 2005). A constant use of a poor posture will therefore, consequently, lead to pain, muscle fatigue and a decrease in quality of life (Scheer et al., 2013).

Posture is not only limited to providing balance and protection against injury. Observation and experimental research suggests it can also influence an individual's psychological state, particularly their emotional state. Observation of patients with depression supports the notion that posture can influence psychological states. The slumped posture is a commonly observed symptom in patients diagnosed with major depressive disorder (American Psychiatric Association, 2013). In the neo-Kraeplin era, one of the primary diagnostic features of depression was the slumped posture (Kraeplin, 1968). Studies have also reported that when individuals are brooding over a negative event, their bodies collapse, their backs become more arched, and they move into a slumped posture but when individuals feel happy and confident, they tend to walk upright and stand more erect (Canales et al., 2010; Michalak et al., 2009). Likewise, studies have also shown that people manipulated to sit or walk in an upright posture experience an increased feeling of pride, higher arousal in mood and positive affect and an

increased perception of power (Hackford et al., 2019; Nair et al., 2015; Stepper & Strack, 1993).

According to James (1890), an individual's body posture also has a direct effect on emotional and cognitive processing. For example, studies have suggested that adopting an upright posture may lead to the recall of more positive memories and less negative memories than a slumped posture. Wilson and Peper (2004) provided evidence showing that individuals who were in a collapsed, slouched posture recalled more negative thoughts and memories whereas individuals manipulated to sit in an upright posture recalled more positive memories and thoughts. A study by Riskind (1984) reported that adopting an upright posture and expressing positive emotions (such as smiling) led to a faster retrieval of positive autobiographical memory than negative autobiographical memories. Likewise, a study by Michalak et al. (2014) stated that imagining a positive or negative event in a stooped posture led people to recall more negative words after the event compared to the upright posture. This effect is not only present in the seated stooped postures. A study showed that walking in a slumped posture caused people to recall more negative memories compared to an upright posture (Michalak et al., 2015). Studies have also shown that the electroencephalogram (EEG) activity was different when individuals adopted different postures. For example, Tsai et al. (2016) provided evidence that individuals sitting in a slumped posture required more brain activation and had a higher reaction time to recall positive thoughts compared to the upright posture. This suggests that it takes more effort and time to recall and maintain positive memories in a slumped posture. Thus, based on these results, it can be inferred that posture may have a significant role in evoking cognitive processing related to emotions (Veenstra et al., 2017).

Past research has reported that emotions are involved in decision-making and judgement and therefore emotion is considered a constitutive part of cognitive functioning

(Veenstra et al., 2017). It is generally agreed among researchers that emotional valence and the intensity of emotions plays a role in the cognitive processing of information (Megalakaki et al., 2019). Often, people retain information better if they judge it to be important. According to Van Dijk and Kintsch (1983) emotions can guide a person's attention and aid in deciding which information is important and relevant to the situation. Bower (1981) reported that positive emotions can elicit positive interpretations of events, pleasant thoughts, and memories. Whereas, negative emotions can bring about negative interpretations, thoughts, and memories. Thus, there is an emotion-congruent effect in place. Evidence exists to support that information congruent to an emotional state can enhance the retrieval of that information (Bower, 1987). Studies have shown that, following the induction of a positive mood state, participants show greater memory for pleasant information, while participants who underwent a negative mood induction procedure showed greater memory for unpleasant information (Rusting, 1998). Likewise, a study by Storbeck and Maswood (2016) showed that individuals who had been induced in a positive mood had better performance on a working memory task.

Given that evidence shows that posture and emotions have a bi-directional effect, and that an individual's emotional state can have an impact on one's cognitive processing, there is merit in examining whether postures can evoke certain emotional states which in turn can influence an individual's cognitive processing. In other words, an individual's emotional state may mediate the relationship between posture and cognitive processing of information. The current study will investigate these effects by examining the retrieval of health-related information.

In order for patients to make decisions about their medical treatment and accurately carry out the recommendations provided by medical professionals, patients should understand the nature of their illness, the treatment options available for them, have a clear understanding of what to do and be able to recall these information (Watson & McKinstry, 2009). Given that

medical professionals verbally deliver large quantities of information to patients during a medical interaction, only a small proportion of information that is presented to them is successfully encoded and retrieved (Sanderberg et al., 2012). Past research have shown that if a mental task is carried out immediately after presenting information that needs to be remembered, less than 10% of information is successfully recalled (Peterson & Peterson, 1959). Research has also shown that an individual's emotional state can influence medical information recall. A study showed that when individuals have high anxiety levels, their recall ability is negatively impacted (Kessels, 2003). These can clearly have an impact on the amount of information patients remember after a consultation.

Strategies have been implemented to enhance the recall of medical information such as the use of visual aids, written or recorded materials and cognitive methods such as utilising mind-maps and acronyms (Watson & McKinstry, 2009). These strategies are put in place to prioritise the recall of the most important pieces of information presented during the consultation. However, despite the number of strategies put in place to aid information recall, no study has looked at postural interventions to aid in the recall of medical information. The question of whether postural interventions can have an effect on patient's recall of positive and negative health information are of particular interest because it may have beneficial implications for health outcomes. Research has shown that the recall of clinical information is often suboptimal (Lewkovich &, Haneline, 2005; Pickney & Arnason, 2005) and has an impact on patient satisfaction, expectations of a medical treatment and adherence to the recommended treatment (Stewart et al., 2000; Watson & McKinstry, 2009).

2. Aim of Study and Hypotheses

The primary aim of this study is to experimentally examine the effects of upright versus slumped seated posture on the recall of health information. The secondary aim is to investigate

the effects posture has on medication attitudes including expectations of the drug, willingness, and confidence in taking the medication. The tertiary aim is to investigate whether there is a difference in the valence-arousal states between the upright and slumped posture and whether valence-arousal mediates the relationship between posture and cognitive processing of information.

As such, the primary hypothesis is that participants in the upright posture condition will recall more positive health information and less negative health information than the slumped posture group.

The secondary hypotheses are listed below.

(1) Participants in the upright condition will use more positive words and less negative words which indicates a higher recall of positive information than those in the slumped position.
(2) Participants in the upright condition will have more positive expectations that the drug will be helpful for them than those in the slumped position.
(3) Participants in the upright condition will have fewer negative expectations that the drug will cause them to experience side effects than those in the slumped position.
(4) The upright posture will result in participants being more confident and willing to take the medication compared to participants in the slumped posture group.
(5) Participants in the upright condition will report more positive valence and higher arousal than participants in the slumped posture after the task.
(6) Participants in the upright conditions will use more insight words and fewer first personal pronouns than the slumped group (indicating more external focus and cognitive processing).

3. Method

3.1 Study Design

The study will be a randomised control trial that follows a 1:1 randomisation ratio, where participants will be allocated to either the group that is seated in a slumped posture, or the group that is seated in an upright posture. The seating posture is discretely manipulated by altering the height of the iPad/ tablet tripod stand. This method has been previously used to manipulate posture successfully (Ahn et al., 2007). The study will be pre-registered with the Australian New Zealand Clinical Trial Registry.

3.2 Eligibility Criteria

The inclusion criteria for the study will be (1) participants are able to understand, read and write/type in English and (2) participants are aged 16 or more.

The exclusion criteria for the study will be (1) participants who have impaired vision or hearing that makes it difficult to use the computer or hear the researcher.

3.3 Study Outcomes

The primary outcome of this study is positive and negative health information recall. The secondary outcomes for this study are expectations of the medication, confidence to take medication, willingness to take medication and the individual's valence-arousal state.

3.4 Sample Size

A power analysis will be conducted using the G*Power (3.1.9.7) software to determine the necessary sample size, prior to recruitment (Faul et al., 2009). A systematic review and meta-analysis exploring the effect of expansive and contractive postures on affective and behavioural responses disclosed that all the combined self-reported outcomes reported a medium effect size (g = .45) (Elkjær et al., 2020). Furthermore, research looking at the effects

of posture on positive and negative recall found an effect size of η2 = .12, which is Cohen's d of .73 (Michalak et al., 2014). Using d = .50, choosing a power of .80 and an alpha of .05, a total sample of 128 people (64 participants per group) would be required to find a difference between two independent means between the postures (upright versus slumped) and on positive and negative information recall. Given that the study is cross-sectional, there should no loss to follow-up, so the sample size will not need to be adjusted to compensate for attrition.

3.5 Participant Recruitment

128 participants will be recruited via advertising posters including at the University of Auckland City and Grafton campus, through Facebook announcements and through emails to the Faculty of Medical and Health Sciences junk mail group. To enhance the recruitment of Māori participants, fliers will also be distributed the University of Auckland Tuākana programme. Additionally, researchers will also use their connections with a Māori health organisation and local community to talk, distribute flyers/ information on the study and build relationships (whakawhanaungatanga) with potential participants and their whānau. Those who respond will receive a participant information sheet and screened for eligibility. Participants are also welcomed to talk with their Whānau or support person, before choosing to participate in the study. For participants enrolled in the study, an email with a participation schedule will be provided where they can select a time to participate from the given available times. If a time was booked, participants will receive an email reminder the day before.

3.6 Study Procedure

The study is a single-centre study which will be conducted at the University of Auckland Grafton Clinical Centre. Group allocation will be concealed from the researcher until fifteen minutes prior to the arrival of each participant. On the day of the experimental sessions, before each participant's arrival, a sealed, consecutively numbered opaque envelope will be

opened which will allocate the participant to one of the groups. The group allocation will be done before the participants arrive to allow the researcher to set up the iPad/ tablet tripod stand to a set specific height that will manipulate the participant's posture without them knowing. For participants in the upright posture group, the stand will be set 1.30 meters above the ground. For participants in the slumped posture, the stand will be set 0.65 meters above the ground. Those participants with a low height stand are expected to adopt a slumped posture to see the screen properly (intervention condition), whereas those with a high height stand are expected to adopt a more upright posture to see the screen (control condition). Participants in each group will be told that the height of the stand is equivalent to the height of a telepresence robot that can be used in health settings. This cover story will prevent the participants from altering the height of the tripod stand. This will also help maintain participant blindness and reduce the expectation effects of posture. A study by Riskind and Gotay (1982) suggested that by asking participants to maintain a particular posture, the participants will pay close attention to their posture and interpret their posture as an emotional expression which would influence results. Therefore by using a cover story and blinding the participants to postural manipulation, there is an elimination of bias. A similar postural manipulation has been carried out in previous research (Ahn et al., 2007; Nair et al., 2015). Due to this, the researcher will not be blinded to the participant's group allocation. However, the envelopes will be numbered and can be opened only in the numbered order. The group allocation sequence will be generated using a random number generator, in advance, by a researcher not involved in the study.

Upon arrival, each participant will be greeted and will get a chance to re-read the participant information sheet and ask any questions about the study before deciding to give their full free informed consent. Once participants have completed the consent form, a video camera mounted on a tripod will be turned on to serve as a postural manipulation check. To maintain participant blindness to the postural manipulation, participants will be told that the

video camera is set up to ensure that all the participants watch the full video and complete the questionnaires without being distracted (e.g. not using their mobile phone while watching the video). Participants will be then be told a cover story to further maintain participant blindness and to reduce any expectation effects. Participants will be told that the study will investigate whether a video is a good way to tell patients about health and medical information. The participants will not be told that they are randomized to one of two conditions to manipulate posture. Participants will be debriefed regarding the purpose of the study at the end of recruitment.

Participants in both groups will first complete the demographic questionnaire and then watch an 8-minute health information video. The video contains audio-recorded instructions for the task and a brief introduction of what psoriasis is. The main content is a recording of a mock consultation with Dr Paul Jarrett (Consultant dermatologist). The mock consultation explains a type of treatment recommended to treat severe psoriasis along with the benefits, side effects of the treatment and how to take the medication. After the participants have watched the video, they will complete a series of online questionnaires including memory tasks, questions that measures medication attitudes, valence-arousal state, and previous knowledge of video content. The design of the content of the video is partly based on a previous study showing that healthy participants have poor memory of information given about an anaesthetic (Sanderberg et al., 2012).

At the end of the study, the participants will be thanked for coming in and will be given a $20 gift voucher as a compensation for their time. It is expected their participation will take approximately 30 to 40 minutes.

4. Measures

4.1 Demographics

All participants will complete a questionnaire to obtain demographic information including gender, age, self-identified ethnic group, marital status, current education level and current occupational status.

4.2 Memory

The primary outcome, memory will be measured using a free recall task. The transcript of the video was coded for informational units. A total of 50 discrete information will be delivered in a five-minute video. A quantity score for the free recall task is calculated by summating the number of information units accurately provided in the participants' written response. The information units will be categorised into seven content categories. These include:

1. Diagnosis
2. Treatment
3. Medication instruction
4. Follow up + monitoring
5. Side effects
6. Benefits
7. Provider

Each of these categories will also be scored on three separate dimensions: presence, completeness, and accuracy. This coding system has been used in past research and derived from Sanderberg et al. (2012).

4.3 Linguistic Inquiry and Word Count

The use of language is the most common way for people to express their internal thoughts and emotions. Therefore, the way an individual talk or write can provide an insight into their emotion and cognitive worlds (Pennebaker et al., 2007). The Linguistic Inquiry and Word Count (LIWC) is a text analysis program that can analyse the cognitive, emotional, and structural components present in a written or spoken language (Pennebaker et al., 2007). For this study, the LIWC 2007 version will be used. The LIWC software will be used to assess emotionality, particularly the valence and arousal of the emotion and the participants' thinking styles. LIWC has been reported to be highly reliable in analysing different types of written language (Cohn et al., 2004; Pennebaker & King, 1999) and has demonstrated high external validity when compared to a judge's rating of written content (Pennebaker et al., 2001).

The way people react to important events can tell a lot about how they choose to cope with the event and the extent to which that event will play a role in their future. Past research suggests that LIWC can accurately identify emotion in language (Kahn et al., 2007). The use of positive and negative emotion word will be considered as indicators of the participants valence and arousal states. The use of more positive emotion words and less negative emotion words will suggest that the participant has a more positive valence and higher arousal state.

Language can also provide an insight into people's attentional focus and how people process information and make sense of it. Studies have shown that the use of different types of words can reveal how individuals process information. For example, it has been suggested that the use of tentative language and filler words can reveal that the person is uncertain or insecure about the given topic (Tausczik & Pennebaker, 2010). Additionally, the use of pronouns has been suggested to indicate an individual's attentional focus (Tausczik & Pennebaker, 2010). A person's attentional focus reflects their priorities, intentions, and thoughts. The use of

pronouns, and cognitive processing words will be considered as indicators of cognitive processing of information.

4.4 Expectations of Medication

Expectation of the medication described in the video will be measured using selected questions from the Beliefs about Medication Questionnaire-Specific scale (BMQ-Specific) (Horne et al., 1999) and selected questions from the Brief Illness Perception Questionnaire (Brief IPQ) (Broadbent et al.,2006). The questions were adjusted slightly given that the health information video was about a particular treatment.

The BMQ-Specific questionnaire comprises of two subscales: the concern subscale and the necessity subscale. Each question uses a 5-point scale rated from 1 (strongly agree) to 5 (strongly disagree) where participants are asked to rate how much they agree or disagree with each statement (Horne et al., 1999). Past research have shown that this scale has good psychometric properties (Horne et al., 1999). A study by Jónsdóttir et al. (2009) reported that both the concern and necessity subscale has good internal reliability (α = .76 and .90 respectively).

The Brief IPQ questions uses a 10-point scale. One of the questions selected was to measure participants concerns which ranged from 0 (not at all concerned) to 10 (extremely concerned). The second question chosen was to measure what they think about the medication which ranged from 0 (not at all) to 10 (extremely helpful). Past research has shown that the scale has good psychometric properties including reliability and validity (Broadbent et al., 2015; Machado et al., 2019). Additionally, it has also been shown that the item "concern" has a good test-retest reliability (α = .66) (Broadbent et al., 2006). The correlations between these items and the BMQ will be examined along with factor analysis. If the questions load on the

same factor, with a satisfactory internal reliability, then a total score of all the items will be calculated.

4.5 Willingness and Confidence

Individual's willingness and confidence in taking the medication will be measured using two questions (one question for each) derived from past studies. For the willingness question, participants are asked to rate their willingness to take the medication on a 4-point scale ranging from 1 (definitely willing) to 4 (definitely not willing). This question is derived from a research letter that explored the effects engagement has on increasing patients' willingness to take medication (Johnson et al., 2019). The study reported a significant difference in participant's willingness to take medication between groups given different amounts of information.

For the confidence question, participants are asked to rate their confidence in taking the medication on a 5-point scale ranging from 1 (not at all confident) to 5 (extremely confident). This question was derived from the Treatment Satisfaction Questionnaire for Medication scale (TSQM) (Atkinson et al., 2004). The TSQM consists of four subscales and the confidence question falls under the global satisfaction subscale. The TSQM is reported to be a psychometrically sound and valid measure.

4.6 Valence-Arousal State

Visual Analogue Scales (VAS) will be administered after the task to assess participants' valence-arousal state. Participants will be instructed to rate their current valence and arousal levels through an "X" on a 100mm long horizontal line (Freyd, 1923; Wewers & Lowe, 1990). Emotional valence can be described as the extent to which an emotion is positive or negative. Arousal, on the other hand, refers to intensity of the emotion (Russell, 2003). Two VAS scales will be used to measure valence. Based on previous mood and emotion research, the chosen

anchor labels beyond the ends of each line are not positive at all and very positive to measure positive emotion, not negative at all and very negative to measure negative emotion (Andrews-Smith, 2016; Collin & Broadbent, 2017; D'Souza, 2014). Two VAS scale will be used to measure arousal. The chosen anchor labels are not sleepy to very sleepy to measure sleepiness, not alert to very alert to measure alertness. VAS have been considered as a reliable way to detect subtle shifts in mood (Ahearn, 1997; Folstein & Luria, 1973) and arousal (Srivastava et al., 2013).

4.7 Postural Manipulation Check

A manipulation check will be done to ensure that all the participants maintain the manipulated postures throughout the study. Participants will be asked permission to turn on the camera to make sure they are aware that they will be recorded. They will also be told that they will be videoed to ensure that they do carry out the task without being distracted. The true purpose of recording will not be revealed until after all participants have completed the experiment to ensure that all participants remain blinded to the postural manipulation. A similar postural manipulation have been conducted in past research (Ahn et al., 2007).

Videos capturing three postural angles (head, neck, and shoulder) will be taken at four time points: baseline, during the video task at two minutes and three minutes and during the follow-up questionnaire. The baseline demographic and follow-up questionnaire will be displayed on the screen and participants will complete the questionnaires on the computer. The three postural angles at the four time points will be measured using manual analysis. Still frames will be printed in colour and the angles will be measured using a protractor. Similar manual analysis have been used in past research to measure postural angles (Ahn et al., 2007).

5. Statistical Analysis

IBM SPSS Statistics software will be used to conduct data analysis. The datasets will be checked for data entry errors. Missing items will be replaced by the participant's mean score but only if at least half of the corresponding items had been completed. If not, that participant's data will be dropped.

To analyse if the primary outcome, memory, is different between the two groups, independent t-tests will be conducted. To investigate whether there is a change in scores between the posture groups on the medication attitudes (positive and negative expectation, willingness, and confidence) independent t-tests will be conducted. To analyse if there are differences between the valence-arousal state between the two groups, independent t-tests will be conducted. To analyse if valence-arousal effects mediate the relationship between posture and cognitive processing, a Sobel test will be conduct. To analyse if the written responses between the two groups differed in the number of positive emotion words, negative emotion words, pronouns, and cognitive processing words, independent t-tests will be conducted. To analyse if the postural manipulation is maintained throughout the study, a mixed Analysis of Variance (ANOVA) (4 timepoints by 2 groups) will be conducted. Sensitivity analysis may be conducted based on measures of prior knowledge of the medication and condition (psoriasis).

All results obtained will be considered statistically significant if p-values $< .001$. The results will be analysed and reported as described in the consolidated standards of reporting trial (CONSORT) guidelines to maintain transparency (Moher et al., 2010).

6. Ethics

Participants will be given a participant information sheet via email and on the day of the experimental session which details the nature of the research. This will ensure that the participants can make an informed decision about volunteering in the study. They will be required to complete a written informed consent form before the study session commences. To ensure participant anonymity and to maintain confidentiality, each participant will be given a unique participant number code. All the information obtained in this study including informed consent forms, participants contact details, demographics, and post-intervention measures will be securely stored in password-protected files on encrypted servers. Participants names and contact details will be stored separately from their data and will only be linked to the data via a master sheet stored in a locked file. Only the researcher will have access to all these files. No information that will identify the participant will be published.

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