

10112

Bachelor's thesis

Non-verbal Communication and Expectation Generation

May 2022

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Norwegian University of Science and Technology
Faculty of Social and Educational Sciences
Department of Psychology

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Non-verbal Communication and Expectation Generation

Candidate number: 10112

PSY2900 Bachelor Thesis in Psychology

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Supervisor: Hojjat Daniali

Pre-face

This bachelor thesis marks the end of a three-year bachelor's program in Psychology at Norwegian University of Science and Technology in Trondheim. This project is a part of a larger project in which the effects of positive micro-level non-verbal behaviors are tested on experimentally induced pain. I chose to be a part of this project because it sounded interesting and I wanted to write about something I could learn a lot from.

All students in the bachelor groups coded the videos using a numeric rating scale made by Dr. Molly Ruben. The questionnaire used in the online study was made by the bachelor students, and everyone contributed to the collection of participants. The writing process was done individually, combined with good help and constructive feedback from our supervisor throughout the whole semester. The statistical analysis of the data material was done in a smaller group of 4, with good help and guidance from our supervisor through personal meetings.

The process of writing this thesis has been challenging but has taught me a lot. It has given me valuable insight into psychology as a field and the quantitative psychological research process. I am very grateful for all this new learning, which has given me a deeper understanding of how to carry out a research project.

I would like to thank my supervisor, Hojjat Daniali, for all the guidance he has given us during this project. He has contributed with literature suggestions that are used in this study, combined with the literature found individually on Oria and Google Scholar. He has also arranged lectures and group meetings every week and given feedback throughout the semester. Thank you for always being available for guidance, answering all my questions, and using your time to help me with the analysis in SPSS. I have learned a lot from you during this process.

I would also like to thank our supervisor's assistant, Stephanie Anne Paoli, for having lectures on how to write the different sections of this thesis, and for helping us with how to write and report the statistics. A big thank you to all the participants who participated in the online study. Finally, thank you to my fellow students for helping one another with what we found challenging and for sharing our knowledge.

I couldn't have completed this bachelor thesis without any of you.

Abstract

The aim of the current study was to systematically test the differences between the non-verbal communicative channels of experimenters as healthcare personnel on a form of treatment, a placebo cream. This study had a focus on positive non-verbal behavior on a micro-level; for example, smiling and having a positive tone of voice. The mother project of this study had three professional actors presenting positive non-verbal behaviors while they were recorded. The positive non-verbal behaviors were facial expressions, body gestures, and tone of voice. These videos were coded in this study using a general impression method to code the videos manipulating the non-verbal behaviors. A reliability test showed that the non-verbal behaviors were reliable, and an ANOVA showed that there were differences between the different non-verbal behaviors acted in the videos, which they were claimed to be.

As a secondary aim, the study investigated whether it was a difference between how males and females reported expected pain intensity before and after watching an acted non-verbal behavior. An online study was created and 100 participants were recruited in this study. Based on the findings in already existing studies, there was an expectation that a gender difference should have been found in this study as well. A repeated measure ANOVA showed that there were no differences between females and males in reported pain intensity before and after interacting with an actor enhancing positive non-verbal behaviors.

Keywords: Non-verbal behavior, pain, specific behaviors, general impression, expectations, gender

Non-verbal behavior

Non-verbal behaviors (NBs) are an important foundation for social adaptation in humans and are defined as “perceptible non-linguistic behaviors that are not instrumental to manipulating the physical state of the world” (Ambady & Weisbuch, 2010, p.464). This definition includes subtle facial expressions, body gestures, social touching, and tone of voice. Sending and receiving thoughts and feelings via non-verbal behavior is called non-verbal communication. Non-verbal behavior can be divided into encoding and decoding, also called non-verbal production and non-verbal perception (Ibid, p.465). Non-verbal production (encoding) is the production and communication of non-verbal behavior, while non-verbal perception (decoding) is the recognition and interpretation of non-verbal behavior. Non-verbal behaviors are almost the only means of social organization in other species. Non-verbal behaviors include such as facial movement, body position, interpersonal distance, and vocal cues, which all are elements of interaction besides the spoken word. “Non-verbal behavior includes everything but the words; it’s not what is said but how people sound and behave while saying it” (Blanch-Hartigan et al., 2018, p.2209). Every aspect of non-verbal behavior has meaning, including its absence, where neutral non-verbal behavior can be interpreted as negative feelings.

Micro vs macro-level non-verbal behaviors

Non-verbal behaviors have been categorized in different classifications, mostly for research purposes. For example, there is a distinction between micro-level and macro-level NBs. Micro-level NBs are referred to as “cues”, or specific non-verbal behaviors, such as smiling, raising eyebrows, leaning forward, and nodding. Macro-level NBs are the collection of micro NBs that convey a broader psychological meaning, such as displays of warmth, dominance, and immediacy (Ambady & Weisbuch, 2010, p.465). NBs have also been divided into positive (i.e., conveying a positive status) or negative.

Non-verbal behavior in health care

NBs are one important aspect of our daily communications and in any communication, NBs play a role in the transmission of information. With a specific focus on health settings, verbal information is not the only source of information for patients. Effective communication skills are important to health care workers in providing quality care, and being aware of NBs’ effectiveness can help quality care (Hall & Lloyd, 1990, p.383). The patient’s mind,

cognition, and emotions play a role in any therapeutic outcome (Benedetti, 2013, p. 1207). Using positive non-verbal behaviors when communicating with patients can affect the treatment outcome (Blanch-Harrigan et al., 2018, p. 2210).

However, most of the documents on the effects of health providers' NBs on treatment outcomes come from a compound of NBs, and it is still not clear which independent NBs can have the most effects. A study by Daniali & Flaten (2019) found that positive NBs contributed to lower reported pain and that negative NBs contributed to higher reported pain. We already know that the suggestive verbal information will give the patient lower symptoms. Classical conditioning where the patient has the experience that treatment has reduced symptoms will reduce the pain, meaning that if a patient found a treatment to be effective in the past, they are more likely to be susceptible to a similar placebo in the future. (Daniali et al. (in progress)). However, the role of NBs, and more specifically the role of micro-level NBs have not been thoroughly investigated.

Coding non-verbal behavior

To describe better what happens in clinical interactions, there is a need for more coding of non-verbal behavior (Blanch-Hartigan et al., 2018, p. 2209). When coding non-verbal behavior, specific non-verbal behaviors such as smiles and gestures should be coded. In addition to that, general impressions that are based in part on NBs, e.g. dominant and general impressions of positivity, should also be coded (Ibid, p. 2211). A coding format that could be used for NBs is rating scales, where specific behaviors get a score from 0 (not at all) to 5 (a lot). Specific behaviors can be how much a person smiled during an interaction. The challenge with this format is to know what represents the different scores (Ibid, p. 2212). When it comes to the number of coders, two is the minimum number of coders needed for establishing reliability. The reliability increases when more coders are added (Ibid, p.2114). The coders should receive training where they watch or listen to interactions and discuss what they observe together (Ibid, p. 2213).

Communication style

Despite the lack of studies on non-verbal behaviors, three studies showed that a warm communication style of clinicians resulted in positive expectations, which include lower pain intensity reports and expectations for shorter pain duration (Kaptchuk et al, 2008, p.999; Van Osch et al, 2017, p.1482; Verheul et al, 2010, p.304). A warm communication style is for

example gazing at the patient, having an open posture, and having a friendly manner. Kaptchuk and colleagues (2008) showed that an augmented communication style of clinicians, including a warm and friendly manner, resulted in increased pain intensity reports. A cold communication style, e.g. body postures away from patients and directing gaze, resulted in expectations of a shorter time of pain (Verheul et al, 2010, p.304).

About the mother project

This project is a part of a larger project that investigates the effects of positive micro-level NBs on experimentally induced heat pain. The main aim of the larger study is to test if there are differences in the effects of micro NBs on pain and placebo effects. The study uses experimentally induced heat pain, wherein participants are guided through the steps of an experiment by a videotaped health care provider who has manipulated NBs. Participants are also given a cream introduced as a pain-relieving cream which is in fact a placebo cream. Participants are randomized into four different groups wherein the NB type of the actors would differ, but the verbal information is identical. Each group would either see the facial expression (PFE), tone of voice (PTV), or body postures (PBM). A control group is also added where the NBs are kept neutral. Facial expressions are for example nodding, smiling, and looking straight at the participants. The tone of voice is where the actor speaks with a warm, friendly strong, and expressively loud tone of voice. Body postures are for example leaning forward frequently and different hand movements. In the control group, the actor would not look much at the camera, have a flat and plain face, no body movement, and keep a monotonous tone of voice.

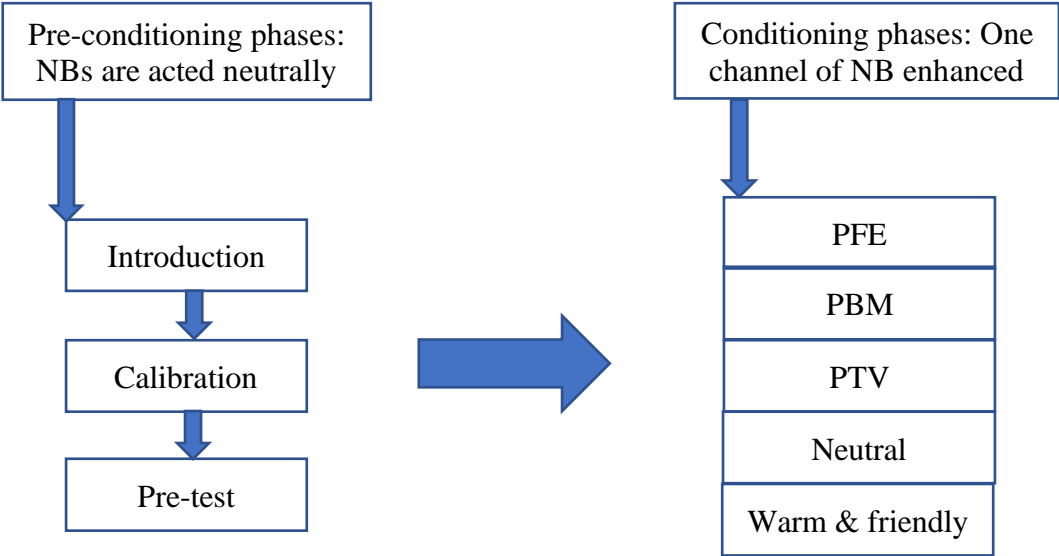
The aims of the current study

Before the videotaped experiments could be used in the experiment, they have to be tested by the reliability and validity of the NBs performed in each video. This is the main aim of the present project. The project will try to study the differences between the non-verbal communicative channels of videotaped actors as health care personnel on a form of treatment, a placebo cream. To do so, three professional actors played the scripts that were written to guide the participants through the experiment. The verbal information given to participants was identical across groups, and only the NB was differing. However, the scenarios still need to be tested for validity and reliability, before they can be used in the main project. Therefore, in the current project, the main purpose is to see if non-verbal behaviors are valid and reliable.

The mother project has four main phases that are all guided by videotaped actors, and it is claimed that the NBs expressed in these phases are systematically manipulated. It is claimed that the NBs of the first three steps is acted neutrally, and this is the pre-conditioning phase. In the conditioning phases, only one channel of NB has been enhanced. However, this claim should be ascertained before the videos can be used in the experiment.

Figure 1

The phases of the experiment



Gender differences in reported pain

There are few studies on gender differences in how different NBs affects people’s expectations of pain. Most of the existing studies investigate how the experimenters’ gender affects the participants’ reports of pain.

Ruben and colleagues (2017) found that when participants were interacting with a provider conveying high non-verbal support, they showed increased pain tolerance and reduction of pain compared to those who interacted with the low non-verbal support providers. The researchers found that when the non-verbal support of the provider was high, women reported higher pain, whereas men reported lower pain (Ruben et al, 2017, p.973). Higher non-verbal support means more non-verbal communication like facial expressions, eye contact, body gestures, etc. (Ibid, p.970). A gender difference found in Daniali & Flaten’s (2019) study was a tendency for participants to report lower pain when the experimenter was of the opposite sex. Two studies showed that male experimenters decreased the reported pain of female subjects (Vigil et. al, 2015, p.1; Kállai et. al, 2004, p.142).

Secondary aim

As a secondary investigation, this thesis will also look at gender differences in the effects of NBs on reports of hypothetical pain. Using the videos from the main project, an online study was designed in which the effects of such channelized NBs were tested in a situation in which participants imagined themselves in pain and therefore in need of medicine to ease the pain. Participants would read about a condition in which they burn their hand and then are in pain. They then search on the internet to find an over-the-counter heat pain-relieving cream and end up on a webpage in which a female videotaped provider recommends them a pain-relieving cream.

This thesis investigated if males and females are different in how they rate their expectations on hypothetical pain after they get presented with a pain relieving cream from an actor providing different NBs. The participants are randomized into four groups and will get presented with different NBs which are positive facial expressions, positive tone of voice, and positive body gestures. The last group will see the neutral video. Before they watch the video included in the online study, they have to report how much pain they expect they would feel when they burn themselves on a heating pan. After watching the video where the actor is presenting the pain-relieving cream, “Embla”, every participant will rate their expectations on how much pain they would feel after using “Embla”. This study wants to see if gender influences how the participants expect how much pain they will receive and the gender differences between the different non-verbal communicative channels.

First aim

Methods

Coders and training

Coders for the main aim were bachelor students writing their bachelor thesis. The coders included 11 females and 4 males who coded 21 videos on Google form February 2022. All of the responders do not have a completed degree but are bachelor’s students in psychology at NTNU Trondheim. Every student who joined the coding coded all the videos and there were no drop-outs or missed data. The main aim of the study was to investigate the reliability of the micro-level non-verbal behaviors of the actors, and since everyone coded everything, all responses in the total sample size of 15 participants, were included in the analysis. The students were asked to code the videos separately from each other and were trusted to do so.

Table 1

Descriptive statistics for the participants

Gender	min _{age}	max _{age}	Range _{age}	<i>M</i> _{age}	<i>SD</i> _{age}
Female	21	25	4	23	1.23
Male	22	25	3	23.5	1.12
Total	21	25	4	23	1.28

The coders received the training for the coding in class through a PowerPoint presentation from an assistant professor of Psychology. They watched an acting scene in German, which was a language the students didn't understand. After watching the scene, they got asked about what happened in the scene, the characters' feelings, and what non-verbal cues led them to think about what they thought. After that activity, they received a short lesson about non-verbal behaviors such as facial expressions and tone of voice. After the lesson, they got to know the design of the codings, where they had to rate the different items of NBs on a scale of 1 (not at all) to 9 (extremely). They got to code a couple of the videos with the Assistant professor in class, before coding the 10 first videos by themselves at home. The reliability was then checked for after the ten first videos, and it was satisfactory. Then the rest of the videos got coded.

Actors

There were recruited three females to act as experimenters. The actors looked like a usual health personnel stereotype; a Caucasian individual, slim, adult, white lab coats and, light makeup. This look was for credibility purposes. All three actors are very similar and have pale skin, light makeup, and a low ponytail. Actor 1 and 2 has dark blond hair, while actor 3 has brown hair. Actor 1 has a smaller face and nose than the other two. Actor 2 has a more marked face and eyebrows, while actor 3 has a bigger nose and forehead.

The actors received training by NB scholars to perform the channelized NBs, and they also received training for the pre-conditioning phases. The training consisted of 10 hours of training to play NB scripts by an expert in the field of NBs. After the training was completed, they recorded the performances of the actors. The script the actors performed were identical in every video and it contained information about the experiment and the procedure. They

also presented the pain-relieving cream “Embla” where they gave information on how it works and how they are going to use it.

Videoclips and non-verbal scenarios

The experiment had two phases, one with the pre-conditioning including *introduction*, *calibration*, and *pretest*, and the other phase that included *PFE*, *PBM*, *PTV*, and *neutral*. The preconditioning phases are all acted neutrally, and in conditioning phases, only one channel has been over-expressed. For example, facial expressions such as smile and eye contact were over-expressed in PFE, body gestures in PBM, and tone of voice in PTV. The main aim was to see where these videos are non-verbally different as they are claimed to be.

The videotaped actors express each set of these NBs separately while they keep the other NB channels neutral. The actors keep their NBs neutral in the fourth group, which is used as a control group. When the NBs channels are kept neutral, the actor does not look much at the camera, has a standard distance (1 meter) from the camera, monotonous tone of voice, plain face, and no hand or body movements. One of the actors also recorded one video called “warm and friendly” where all of the positive micro NBs were combined and included.

The acted NBs were similar in all pre-conditioning phases; “introduction”, “calibration” and “pretest”. In PBM there were a lot more body gestures and expressiveness. The actors had more smiling and enhanced eye contact in PFE while having a positive tone of voice resulting in a more general positive video. The actor talked more slowly and kept a positive tone of voice in PTV. In “warm and friendly” all of the positive NBs were included, such as eye contact, body movements, and smiling.

Measures

A NB rating scale was made to rate the NBs existing in videos. The aim of the scale was to test the observed NBs based on the general impression of coders on the amplitude of each NB, even though the micro-level NBs were in focus. A Google form was made to test the validity of the performed NBs. The form included 8 questions with a numeric rating scale with numbers from 1 to 9, where 1 represents “not at all” and 9 represents “extremely”. A non-verbal behaviors and communications scholar (Mollie A. Ruben, Assistant Professor of Psychology, University of Maine) made the NB rating scale which is developed for this study. The items asked the coders to rate on a scale from 1 to 9, how much of every item the videotaped actor included in each clip. The items were: eye contact, gesture, smile, eye

contact, friendly/positive tone of voice, dominant and in charge, overall impression of positivity, expressive and attractiveness. Eye contact was how much the actor stared into the camera and when the coders rated that item, they gave a higher score when the actor stared into the camera often, same with gesture and smile. If the actor had a lot of body movements or smiled a lot, the coders would rate a higher score on those items. Friendly/positive tone of voice, dominant and in charge, the overall impression of positivity, expressive, and attractiveness were items the coders had to rate based on their subjective general impressions. For example, if they didn't think the actor was dominant and in charge, they would rate a lower score for that item.

Procedure

Coders were asked to watch the videos individually and answer the NB rating scale. The videos were watched carefully and one by one, and then the coders gave the actor a score for each item. The coders got access to all the videos on a link their supervisor shared on Microsoft Teams.

Data screening

Before using the data in the analyses, the coding from every coder and video was sorted in an excel-sheet. The excel-sheet showed that there was some coding missing, where some students have forgot to code one video or the data had gone missing. These students were asked to code those videos again with the same rating scale and give the same scores they originally had given. After fixing that error, every student had completed the coding and there were no other missing data. Another excel-sheet was made with the coders' age, gender and degree.

The analysis wanted to study the differences between more than two groups, which makes analysis of variance (ANOVA) a suitable choice. ANOVA will test if there are any differences between groups, and if there are any, a post-hoc test will tell where they are.

Statistical analyses

The data were analyzed with IBM SPSS for Statistics. Since every coder coded all the videos, a reliability analysis testing including alpha Chronbach was an appropriate choice to use in this study (Blanch-Hartigan et al., 2018, p. 2214).

To study the differences of NBs in video conditions, two one-way ANOVAs (analysis of variance) were used. One to study the differences in NBs between video conditions and the other to study the differences in NBs between actors. In one ANOVA, video type was the between group factor, while actors was the between group factor in the second ANOVA.

Results

A reliability analysis was conducted to test the reliability of each NB rating scales. The analysis found that the Cronbach alpha, α , was $> .72$ for every variable, with the highest result for smile = .99 and the lowest result for dominance = .72.

Table 2

Reliability test for the NBs rating scales

NB rating scales	α
Smile	.99
Gesture	.99
Eye contact	.99
Attractiveness	.97
Positive tone of voice	.96
Expressive	.96
Positive general	.96
Dominance	.72

Note. $N = 15$

Table 3

Descriptive statistics for the NB rating scales, $N = 21$

NB rating scales	<i>M</i>	<i>SD</i>	<i>F</i> (6, 14)
Smile	35.24	26.01	16.93***
Gesture	30.57	28.98	206.09***
Eye contact	63.29	28.30	21.60***
Tone of voice	59.71	19.66	28.16***
Dominance	47.52	7.10	6.48**
General positivity	50.81	18.01	14.22***
Expressive	43.57	17.85	28.34***
Attractiveness	70.71	14.46	.00

Note. 95% CI. *** $p < .001$, ** $p < .01$

A one-way ANOVA was performed to test the differences between the NB rating scales and the video types. The *F*-test showed that the video PBM was rated as having more gestures than the other conditioning videos, ΔM min-max = 79.67 – 82.33, $p < .001$, and also as compared with the preconditioning videos, ΔM min-max = 77.67 – 82.67, $p < .001$.

The video PFE was rated as having more smile and eye contact than the other conditioning videos, ΔM min-max = 53.00 – 76.67, $p < .001$, and as compared with the preconditioning videos, ΔM min-max = 67.33 – 81.33, $p < .001$

There was also a difference in ratings for tone of voice in the video PTV than the other conditioning videos, ΔM min-max = 26.33 – 58.67, $p < .001$, and as compared with the preconditioning videos, ΔM min-max = 47.67 – 50.00, $p < .001$

For the general impression items, PFE was rated as more dominant than the pretest video, $\Delta M = 15.00$, $p < .001$. PFE was also rated as generally more positive than the pre-conditioning phases, ΔM min-max = 37.33-42.33, $p < .001$, and also with the neutral video, $\Delta M = 47.67$, $p < .001$. PTV was also rated as generally more positive than the pretest video, $\Delta M = 30.00$, $p < .001$, and the neutral video, $\Delta M = 35.33$, $p < .001$.

The conditioning videos (PFE, PBM & PTV) were rated as more expressive than the pre-conditioning videos, ΔM min-max = 21.67 – 44.33, $p < .001$, and the neutral video, ΔM min-max = 27.33 – 45.00, $p < .001$.

There was no difference in any of the NB aspects in the preconditioning videos. The ANOVA also showed that there was no difference in the rated NB aspects between the preconditioning videos (introduction, calibration, and pretest), $p > .05$

Another one-way ANOVA was performed to test the difference between the NB rating scales and the actors. There was no significant difference in NBs between actors, $p > .05$.

Discussion and limitations

The results from the reliability analysis showed that the coding from the coders was consistent. For example, when the coders coded smile for the video with positive facial expression, they all rated it around 7-9. Based on these results, there are differences between the non-verbal communicative channels. The actors did successfully express the different channelized NBs when they were supposed to. The actors' training did work since they managed to express the same behaviors they were supposed to. If the coders did code the NBs

rating scales differently, the results would probably not be significant, or the alpha Cronbach's wouldn't be that high.

An ANOVA tested if there were differences between the videos. The videos were made so that there should be differences between them, for example, there should be a difference in facial expressions between PFE and the other videos. The results showed that the hypothesis was correct and that there were differences between the different NB rating scales between the videos. For the specific non-verbal behaviors, it was shown that PBM had the most gestures, PFE had the most eye contact and smile, and PTV had the most positive tone of voice. These were the specific NBs the different videos were claimed to have.

For the general impression items, the post-hoc test showed that positive body movements produced the highest expressivity, and the facial expressions generated the higher general positivity than other conditions. All the videos expressing positive NBs were perceived as more expressive than the other videos. This shows that positive non-verbal behaviors such as facial expressions and gestures generate higher positive general impressions.

The second ANOVA tested the differences between the different NB rating scales and the actors. The results showed no significant differences between the actors and the NB rating scales. That means that the actors acted the same in all videos. The coders gave the same scores for each item, for example, smile between all the actors. The different actors did not affect the impressions the coders got, only the non-verbal behaviors the actors were expressing in the videos.

These significant results might be due to several factors. The coders may have coded the videos together without anyone knowing it, or they may have had a different opinion on how to code the different items and what the items represent. For example; some people can perceive a darker tone of voice as more dominant rather than a lighter tone of voice. The results can also be caused by an unknown factor that the model does not include, like earlier experience with similar coding.

Limitations

The limitations in the first aim are the coders being aware of the manipulation of the NBs, and their training. There were in total 15 coders, where everyone was in the same bachelor group and had the same research question. The coders knew the procedure of the videos where the NBs were manipulated, which is a limitation. Since they knew the research question beforehand, they could probably know how to code each video so they could get the results they wanted. They knew that they should give the PFE video higher scores on eye contact and smile, and low scores for the same items for the pre-conditioning videos and the “neutral” video. A solution to solve this problem could be to recruit more participants who would have received the same training as the others and that would also have done the same coding. In that way, it would be avoided to have participants who were aware of the manipulation of the acted NBs, and not have participants giving higher or lower scores for the items they knew were included or not in each video.

Another limitation is the coding method. This study used a general impression method to code the different NBs. Half of the items included specific non-verbal behaviors, but although these items were coded, there were also coded items of general impressions such as “dominant and in charge”, and “overall impression of positivity”. This study had a focus on micro-level non-verbal behaviors, while general impressions are macro-level NBs. This is a limitation because it is not the best coding method for specific non-verbal behaviors. Another method that could be used to code specific behaviors, such as smile and eye contact, could be counting the frequency and duration of each item (Blanch-Hartigan et al., 2018, p. 2211). For example, count how many times the actors smiled in 1 minute. However, rating scales are a great method to code both specific behavior and general impression, but it depends on the research question and what the study wants to focus on. Researchers need to make a choice whether they want to study the behavior itself, or the impression the non-behavior makes (Ibid, p. 2212). After making that choice, the researchers should use a suitable coding method.

Secondary aim

Methods

Online study

It was designed an online study in which participants were asked to imagine a situation in which they burn their hand on a heating pan. Then, they decide to look up on the internet to find something that will help them deal with the pain, and find a videotaped healthcare provider suggesting a heat pain-relieving cream called “Embla”. Before watching this video, they were asked to rate on a numeric rating scale from 1 to 9, how much pain they have following that painful situation. “9” is the maximum for the pain they expected to feel. After watching the video, they got asked to rate how much pain they would have after using the pain-relieving cream recommended in the video.

The online study included one video with a NB scenario, but it was randomized whether the participants got to see the video with positive facial expression, positive body gesture, positive tone of voice, or the neutral one. Participants were also asked about their age, gender and degree.

The last question in the online study was a control question that asked about the side effects of the pain-relieving cream. The correct answer was provided in the video, which was “no known side-effects”.

Participants

Participants ($N = 100$), between the age of 15 and 52 were recruited to conduct the online study. The majority of the sample (82%, $n = 82$) answered correctly on the control question. Based on the answers to the control question, only the ones who answered correctly were included in the analysis to guarantee that they watched the video and completed the online study with no walkover. The control question made sure that the participants watched and captured what was said in the video. 18 participants were excluded due to not answering correctly on the control question.

Therefore, a total sample size of 82 participants, including 57 females and 25 males, were included in the analyses. 49% of the sample held an academic degree equivalent to a bachelor’s degree.

Table 4

Descriptive statistics for participants in the online study before and after data cleaning

	Full sample					Sample included in the analysis				
	Min _{age}	Max _{age}	Range	M _{age}	SD _{age}	Min _{age}	Max _{age}	Range	M _{age}	SD _{age}
Gender										
Female	15	52	37	25.13	8.36	15	52	37	25.65	8.29
Male	19	52	33	25.76	7.77	21	49	29	25.81	6.17

Note. Each number is in number of age

Before the data cleaning, 25 participants were distributed to each video. The total number of participants for each video became smaller due to the data cleaning.

Table 5

The distribution over participants and the video types

Video type	Female	Male	Total
PFE	15	8	23
PBM	12	7	19
PTV	16	5	21
Neutral	14	5	19
Total	57	25	82

Procedure

A questionnaire made on “nettskjema.no” was used. The study got first shared with new students at NTNU Dragvoll. They got recruited for the study through announcements in their lectures. Later, friends and family of the bachelor’s students got asked to answer the questionnaire. The participants got access to the study via a QR code they could scan, or a link that got shared on the internet or through direct messages. This study did not need any ethical approval since the participants’ identities were kept completely anonymous. There was no data or personal information that could be traced back to the specific participant.

Data screening

The data got exported into SPSS. The participants who answered incorrectly on the control question were removed from the sample by deleting the data from these participants manually in SPSS.

The majority of the participants in this online study were females. By keeping the data from all 100 participants, including those who answered the wrong alternative on the control question, the number of male participants would be higher.

Statistical analyses

The data were analyzed with IBM SPSS for Statistics. A trend analysis, using a repeated measure analysis of variance (ANOVA), was performed to investigate gender differences between males and females experiencing pain before and after interacting with different channelized NBs. The ANOVA was performed with groups (four) and gender (two) as between-subject factors and the time (two, pain intensity before the video and pain intensity after the video) as within-subject factors.

Results

Table 6

Mean and standard deviation for rated pain intensity before and after watching the video

	Pain intensity before video		Pain intensity after video	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Female	6.46	1.46	3.84	1.63
Male	5.84	1.60	3.84	1.57
PFE	6.30	1.66	3.87	1.69
PBM	5.89	1.41	3.63	1.61
PTV	6.52	1.30	3.90	1.45
Neutral	6.32	1.34	3.95	1.78
Total	6.27	1.43	3.84	1.61

Note. $N=82$

A repeated measure analysis of variance (ANOVA) testing the gender differences in reported pain intensity both before and after watching the different videos showed that there was no

significant difference between gender and the two, hypothetical pain intensity time-points, $p > .05$.

Discussion and limitations

The results showed that there were no significant differences between the groups and how men and women reported pain intensity before and after they were presented with the different channelized NBs. This means that men and women reported around the same score for how much pain intensity they expected they would feel, as seen in table 6.

The participants reported a lower pain intensity score after watching the videos. Table 6 shows that the means and standard deviation for reported pain intensity decreased after the participants got to see the video. This means that after interacting with the actors enhancing different NBs and presenting them with the pain-relieving cream, the participants expect to feel less pain.

It is already known that a warm communication style of clinicians results in positive expectations including lower reported pain intensity (Kaptchuk, T.J et. al, 2008, p.999). The positive channelized NBs in this study make the actors have a warm communication style, which could make them be perceived as more positive. A positive therapist can spread his positivity onto the patient, which can lead to positive emotions (Benedetti, 2013, p. 1207). These emotions can have a positive effect on how the patient expects pain intensity. A warm communication style and positivity can contribute to lower the participants' expectation of pain intensity, and table 6 shows that the reported pain intensity was decreased after the participants interacted with the acted NBs.

The reported pain intensity was decreased for all the videos, including the neutral one. Since the neutral video didn't enhance any positive NBs that could possibly give the participants positive expectations, it is uncertain whether it is the non-verbal behaviors or the information itself provided in the video that caused the participants to report lower pain intensity after watching the videos. They were given information that they were going to use a pain-relieving cream, which can make them expect a lower pain intensity based only on that information. The descriptive statistics in Table 6 show that the verbal information given in the videos makes the participants lower their expectations of pain intensity.

An important factor in this study that could affect the reported pain intensity, was the health care personnel who presented the information. With classical conditioning, the

participants could expect lower pain from earlier experiences interacting with a health care personnel where treatment has reduced their pain and symptoms (Daniali et al. in progress). A health care personnel can make the patients lower their pain intensity expectations only because of classical conditioning, where the patients associate them with reduced pain from earlier experiences. A health care personnel who also is providing positive non-verbal behaviors might lower the expectations of pain even more.

Limitations

There were several limitations regarding the online study. One factor that probably plays a big role in the results, and which is a limitation in this study, is the number of participants. The sample size was small. There were 100 participants in total, where 18 participants got excluded from the analysis because they answered incorrectly on the control question. In addition, this sample was divided into four groups, as they were presented with different NBs. Before participants were excluded, there were 25 participants in each group. When it also was dividing the four groups into males and females, the size of each group does not become very big. Small sample sizes will affect the statistical strength. A bigger sample size help with the statistical power, which is defined as “the probability of detecting as statistically significant a clinically or practically important difference of a pre-specified size, if such a difference truly exists” (Batterham & Atkinson, 2005, p. 153). Too small a sample size can lead to type II errors, which produce a false negative, and are more likely to occur when the sample sizes are too small (Ibid, p. 153). Recruiting more participants would help the sample size to get bigger, which can help avoid type II errors. The results from the study showed that there were no gender differences, but the study had low statistical power due to the sample size.

An online study has both its strengths and weaknesses. You can recruit participants both in-person and online, by either clicking on a link or scanning a QR code. It doesn't require a lot from the participants. It only requires them to answer the online form when they got time, compared to the effort they had to give if they needed to attend a place at a specific time. It is also easy to keep the anonymity of the participants, which is ethically good. No personal information is collected and therefore the data can't be used to track the specific participant. Information such as telephone number and name might have been necessary if the participant was required to have attended the study physically, to be able to inform them about the time and place.

Another limitation associated with the study was that it was just fantasy and imagination. The participants had to imagine that they burned themselves on a heating pan, which is not very easy to do. The imagination is also different from person to person and because of that, the answers are not completely representative. A person who imagines that he will not get hurt when he burns himself would probably rate the pain intensity 4 or lower, but if it had actually happened in the reality, the pain intensity could have been perceived as an 8. This example can also be the other way around. A solution for this limitation is if they actually got to burn themselves and feel real pain, but practically it was not possible in terms of time, resources, and ethical approval. Many researchers might also not be comfortable inflicting pain on other people to find answers to their research questions.

General discussion

This study investigated if different NBs were significantly different from each other. NBs were manipulated in different videos students watched and coded. Following these manipulations, coders would rate different items differently between the videos. The coders perceived the NBs differently for each video enhancing NBs. The ratings were similar across the coders, which indicates that the coding was consistent, and the different NBs were reliable.

More generally, the results of this study are consistent with the idea that the different channelized NBs are different as they are claimed to be. There were significant results in the first aim and no significant results in the secondary aim. The NBs performed by the actor in each video are also reliable. These channelized NBs can also contribute to a warm communicative style, which existing studies have found as a communication style for clinicians to induce lower pain reports for participants.

The warm communicative style was also a case in the secondary aim, but the results from the analysis showed no gender difference in the reporting. Other studies have found gender differences in pain intensity reporting when the experimenters were of the opposite sex, but this was not a factor in this study where it only had female actors. However, the participants in the online study rated lower pain intensity after being exposed to actors enhancing channelized NBs and giving verbal information about a pain-relieving cream. Positive NBs can lower the expectation of pain but in this study, there were not found any gender differences.

Conclusion

In conclusion, this study has tested if different channelized NBs are reliable and valid. Professional actors were trained to act the different positive non-verbal behaviors, which were facial expressions, tone of voice, and body gestures. To be able to control these behaviors, a control group was added where the different behaviors were kept neutral. The experiment was separated into two different phases, pre-conditioning and conditioning. In the pre-conditioning phase, the acted NBs in each video were the same. In the conditioning phase, one channelized NB was enhanced at a time. A group of bachelor students was set to code the videos of the acted NBs. Using a reliability test and analyses of variance (ANOVA), it was found that the NBs were reliable and different from each other.

As a secondary aim, an online study was conducted where gender differences in reported expected pain intensity before and after watching a video with an acted NB were studied. No gender differences were found. Women and men had reported the same expected pain intensity.

Recommendations for Future Research

Based on the significant findings in this study it should be replicated to see if the same results will be found again. Future replications should recruit coders who do not know about the manipulation of the different NBs. It would be interesting to see whether the channelized NBs are reliable when the participants are not the researchers themselves, or not aware of the research question. In the current study, the participants who coded the videos were the bachelor students who arranged the study, but future research should recruit participants who are not involved in the study.

Regarding the secondary aim, it should be done a similar study to see if they can find any gender differences. Future replications should use a larger number of participants to strengthen the statistical power. They should also try to recruit 50/50 of both males and females so that the genders are represented equally. Existing studies have shown that there is a gender difference in reported pain when both genders of experimenters are present. This could be something to bring into future research, where the participants get to see both genders expressing different micro-level NBs.

Future research could also do a similar study as a real experiment, where the participants can actually feel real pain. In this study, the participants did an online study where they had to use their imagination on how much pain they were expected to feel. It would be interesting to see if any gender differences are present when the participants have to report real pain and not just imagination and expectations.

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