Bachelor's thesis

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

10061

Validity of micro nonverbal behavior, and nonverbal behaviors´ effect on pain relief

Bachelor's thesis in PSY2900 BA07
Supervisor: Hojjat Daniali
May 2022

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Kunnskap for en bedre verden

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Self decleration

This study was individually conducted by the author of this bachelor thesis. The primary study in its entirety was designed by the supervisor. The supervior also provided articles related to the study, both on previos research on NBV and on how to code NVB. Additional litterature was found by the autor. All statistical analyses, interpertations of data, tables and figures are made by the autor, excluding figur 2 and 3, which are reproduced with permission by fellow student Nora Trohaug.

The secondary study was made indivudually, and conducted solely by the author. The ideá, design, data collection, sources, analyses, interpretation and figures was all done by the autor. The videoslices used in the question was edited by one of the fellow students, using the videos from the mother project. The questionnaire in the secondary aim was used by all the students in the bachelor group, and was made by one of the fellow students. All students participated in the design and choice of questions. One shared questionnaire was used because the students were using some of the same questions, and to make recruitment of participants more effective.

The supervisor was avalible for feedback during the process of writing this thesis, and gave comments about the thesis at two occasions.

I would like to thank the supervisor Hojjat Daniali for motivating, engaging and informing lessons, patient and helpefull feedback in the writing process and dedication to the project. I would also like to thank Stephanie Anne Paoli for giving thorough and informative lectures regarding the formalities in this bachelor thesis. I am also gratefull for the pruductive discussions and motivating conversations with fellow studens.

Abstract

This study consists of to parts. The primary study examines the validity of non-verbal behavior in videotaped clinicians, by having a group of coders code and anlyse micro and macro non-verbal behavior. The secondary study aims to resarch the possible influence on placebo pain relief, indiced by clinicians non-verbal behavior. The study is of significans, bacuse it contributes to bringing clarity to how non-verbal behavior can be used to increase health dfits in patients. The primary aim was conducted by having 15 coders code the non-verbal behavior of three videotaped actors, on a numeric scale. The secondary study had 100 anonymus participants answer a questionnaire regarding hypotetical pain and pain relief and their perception of the videotaped actors' non-verbal behavior. The results from the primary study indicates that the videos and actors managed to express the desired non-verbal behavior at the right time. On the other hand, the results from the secondary were not significant, and gave no indication of that the NVB affected placebo pain relief. The results give an indication of that the videos displayed what they were supposed to, but that they did not induce the expected pain-relieving placebo effect.

Keywords: Non-verbal behavior, placebo, pain, coding, health, videotaped actors.

1.1 The Field

Research on placebo and nocebo has shown that the patients' expectation and belief in a particular treatments' efficiency both affect and can be a predictor of the actual treatment outcome (Doering et al., 2018, p. 257). Placebo and nocebo are to opposite psychobiological responses. Placebo effects can be described as beneficial effects that is not caused by an active treatment, but rather as a result of different contextual cues or positive expectations regarding the treatment (Meeuwis et al., 2020, p. 325). Nocebo effects are unfavorable treatment outcomes, such as reduced efficacy or increased side effects, elicited by a non-active treatment, due to negative expectations regarding the treatment efficiency (Meeuwis et al., 2020, p. 325). To strengthen the prediction, it is therefore relevant to examine which factors that generate this expectation in the patient. There is growing consensus regarding nonverbal behaviors' (NVB) effect on the medical and psychological treatment efficiency (Daniali & Flaten, 2019, p. 1). NVB is understood as the micro properties of communicative signals between humans, that is not the semantics, but rather the body gestures, tone of voice, and facial expression. One of the theories for NVB's involvement in placebo and nocebo, is that the patients' perception of the clinician is affected by clinicians' NVB, which subsequently influences the success of the treatment, by inducing placebo/nocebo effects within the participant (Daniali & Flaten, 2019, p. 2). In other words, the patient's perception of the experimenter, is an expression of how they view, perceive, and interpret the experimenters different emotional and sociopsychological communicative properties. With that, this study is looking for a better understanding of which NVB that affects placebo, with an aim to bring clarity to the question that is; whether micro NVB, the small and specific elements of NVB, such as smiling, leaning forward, hand movement, eye contact, tone of voice, and body gesture, can affect the perception enough to induce placebo effects, or not (Daniali & Flaten, 2019, p. 2). To answer this question, this bachelor will both examine the validity of coding NVB and test the effect of the NVB.

1.2 The mother project

The two studies conducted in this bachelor thesis are based on a mother study, both in terms of research content and choice of subject. The mother study aims to examine what particular micro NVB that has the most effect on pain and placebo. The study is based on participants watching videos of actors playing the role of health care personnel that are guiding the participants through the study. To answer the research question, the study is designed to contain of two main phases, that both have under groups. The first phase is called

pre-condition, and consists of three types of videos, i.e., Introduction, calibration, and pre-test. In this phase, all NVB is claimed to be kept neutral. The three different pre-conditioning videos have different verbal content and are all played by two different female actors. Next phase is conditioning, which is divided into four types of videos, i.e., positive tone of voice (PTV), positive facial expression (PFE), positive body movement (PBM) and neutral. In this phase, both the pain stimuli and the manipulation of the NVB are induced. The manipulation involves changing only one NVB channel, while the other channels are claimed to be kept neutral. Participants watched all three video types in the pre-conditioning phase, but only one video from the conditioning phase. This was to look for differences in participants' pain report, based on which conditioning video they watched. The goal is to see if micro-NVB can be standardized to increase placebo in patient's treatment course.

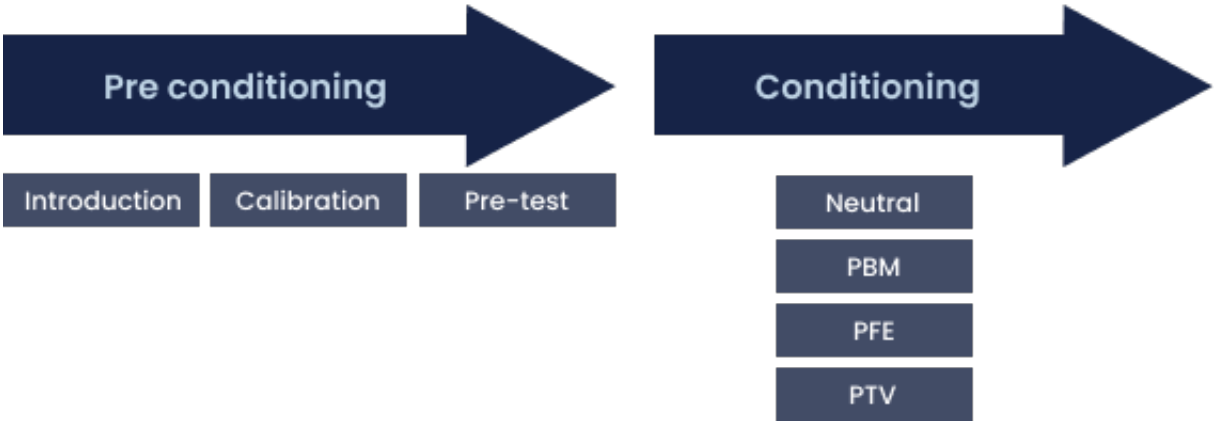

Figure. 1. *The phases of the mother project*

1.3 Previous research

In a study published in 2019, Daniali and Flaten studied the effects of provider characteristics and NVB on pain and placebo and nocebo effects. The results showed a tendency of lower pain reports and a higher placebo effect correlating with the participants' perception of positive NVB, higher confidence, competence, and professionalism in the clinician. On the other hand, clinicians showing negative NVB, and low confidence, competence, and professionalism had participants giving higher pain reports and nocebo effects. (Daniali & Flaten, 2019, p. 1).

Another study from 2019, conducted by Chen et al., showed corroborating results. Their research implied that subtle changes in the clinician's facial expression, triggered either placebo or nocebo effects in the participants, leading to respectively lower or higher pain reports (Chen et al., 2019, p. 1-2). This once again stresses the importance of health care

providers' NVB and shows that patients can benefit from getting treatment from health workers with positive NVB.

Both the primary and the secondary study uses so called thin slice videos. A thin slice can be defined as a brief extract of expressive behavior. All available channels for communication, including body movement, facial expression, tone of voice etc., can have samples of thin slices taken out (Ambady et al., 2000). In this study, thin slices is referring to the shortened versions of the videos from the mother project that the primary and secondary study uses. In this study, thin slices is referring to the shortened versions of the videos from the mother project that the primary and secondary study uses. Ambady and collogues claim that the thin slice method is an adequate, and sometimes also better way of presenting a stimuli, than presenting a longer version, because their research show that humans often are able to make the right interpretation from very little information. (Ambady et al., 2000).

The use of videotaped experimenters has been a successful method to communicate NVB information from the person in the video, to the participant watching in former studies, e.g., Ruben et al., 2017, (Blanch-Hartigan et al., 2018).

1.4 What is missing?

What is missing, is scientific knowledge about what or which micro NVB that has the most effect on pain and placebo, which the mother project has designed a study to answer.

There are also unclarities about several details regarding how the NVB must be presented and designed, in order to induce placebo or nocebo. This applies to, among others, how an isolated positive NVB is perceived when associated NVB is kept natural, and how much time is needed for the NVB in the video to have an effect on pain and placebo.

Another interesting question, which has not yet been adequately explored, is what creates the expectation in the mind of the patient. To come closer to an understanding of how expectations, both experimenters' and patients', can induce placebo and nocebo, it is necessary to know both how humans express expectations, and how they are perceived and interpreted by the recipient, i.e., the patient. Information about whether NVB is one of the sociopsychological properties that convert the experimenters' expectation of treatment outcome into expectation, and subsequently placebo or nocebo effects within the patient, is also missing and would be of great interest.

1.5 My research question / contribution

This study contains of two independent parts, that both are connected to the mother project.

The primary aim of this study is to examine the validity of three videotaped actors' NVB from 21 different videos. The videos used are approximately three minutes long slices of the videos used in the mother project. The dependent variable is thus the different types of NVB rated by the coders, referred to as "items", and the independent variables are respectively the seven types of videos and the three different actors. The purpose of the coding is to ensure that the NVB of the actors and videos is perceived as similar when they are supposed to be similar, and different when they are supposed to be different. To achieve this, the coders watched the 21 videos, and were provided with a coding sheet, containing several micro-NVB, that they were supposed to rate from one to nine, depending on the NVB's presence. After collecting the data, they will be analyzed to answer the question.

The secondary study aims to examine whether the micro NVB of clinicians affects the patients' expectancy of pain relief effectiveness from the imagined heat-pain-relieving cream, called Embla, in a hypothetical painful situation. The dependent variable is thus the expected pain relief, and the independent variable is the micro four types of NVB, presented in the videos. The intention is to explore if and how the patients are affected by different NVB, and if how they perceive and interpret the experimenter's NVB affects how they rate the expected efficiency of the treatment, in this case, the heat-pain- relieving cream Embla. To test this, the bachelor group created an online study, consisting of four one-minute-long slices of four of the conditioning videos from the mother project in addition to different related questions. Participants were asked to imagine pain and pain relief in a given hypothetical situation, and these scores were compared with their ratings of the actors NVB.

1.6 Why important, and for who?

The results from this study are important for researchers interested in NVB, micro and macro, and how to code them. Most of the existing research on NVB is on macro NVB, and therefore this study can be used to fill the knowledge gap between the two, and bring clarity to how micro NVB can be coded in a valid and reliable way.

The results in this study have relevance to the field of placebo and nocebo because they explore the fact that psychosocial components, such as NVB, might induce placebo or nocebo effects. They can be of great importance in teaching health workers how they can alter their nonverbal behavior in a way that is more beneficial to their patient's treatment success.

The statement about relevance assumes that how the patient perceives the health worker, and the degree of belief in the treatment may affect the actual efficiency of the treatment, due to placebo- or nocebo effects, which the literature shows several examples of.

The examination of how videotaped persons' NVB is perceived by the watcher, is also of great interest to the future of health care. With today's technological progress, constant desire to become more efficient, and also in the wake of the Covid-19 pandemic, the desire for digital medical and psychological consultation is increasing. The use of videotaped actors can therefore give important information about optimal use of NVB that is specific to video interactions.

1.7 Hypothesis

The primary hypothesis is that the videos that are supposed to display neutral NVB, i.e., introduction, calibration, pretest and neutral, will be rated with lower scores on all the NVB-items, and the videos that have one of the NVB channels played positive, i.e., PFE, PBM and PTV are believed to be rated with higher scores on the NVB-items.

The secondary hypothesis is that the patients' expectation of the cream's efficiency will change depending on the NVB of the videotaped clinician, which will induce placebo effects or no significant effect, depending on if the NVB was viewed as respectively positive or neutral/negative.

2.0 Method Primary aim

2.1 Coders

The coders were 15 psychology bachelor students from NTNU Trondheim, Norway. There were 11 female, and 4 male coders, between the ages of 21 and 25 years, $M = 22.8$, $SD = 1.28$. 12 of them had no finished degree, and three had completed a one-year study, in addition to the ongoing bachelor.

They were trained by a NVB expert, in how to define the different items. The training focused on which micro NVB the coders should be looking at and evaluate for each different item. As a tool to explain what the coders should be looking after, and to describe what was meant by the different items, the NVB-expert showed the coders short videoclips of actors preforming different NVB. Afterwards, the coders were asked in community to rate the actors on the different items, and the NVB-expert gave feedback regarding if the score on each item was a suitable score for the NVB in question. The implementation of the training was done once, and with all the coders present. The NVB-expert held a one-hour long online live

lecture on the subject, and the coders were able to ask questions to clarify any ambiguities.

Training on coding skills was viewed as important, to make sure that all coders understood the written items correctly, so that they knew what they should be looking after, and so that they would have the same basis for carrying out the task.

For one item, the actors' attractiveness, the coders were not given any training. Attractiveness is not a communicative NVB, and the view of attractiveness is subjective and is known to have an influence on how we experience a person. The question was therefore put in to control for variance based on this subjective view of attractiveness that can confound with NVB. Training on this item therefore was excluded, to avoid possible bias and influence on the coders' objective first impression of attractiveness.

2.2 Actors

The actors in the videos were three Norwegian women in their early to mid-twenties. The reason for having three actors, was to be able to control for the variability of actors' NVB. For credibility purposes, the actors were type casted to fit the stereotype for health personnel. All were slim, slightly above average in height, not too young looking and wearing a light make up and white lab coats (Mercer et al., 2008). They were professional actors and had gone through one month of training with an NVB-expert. They were given the same written manuscript, and the NVB-expert supervised the training to validate the NVB of the actors. The goal was to train the actors to act the NVB in the same way, with the same level of respectively positivity and neutrality and at det same time. The actors are sitting behind a desk and guides the watcher through a procedure including heat pain and a made up heat pain relieving cream, called Embla. They first give information about the experiment's general procedure and questions they are supposed to answer, and secondly informs the watcher about the experiment condition and cream. The cream is presented as an active cream, and the watcher is not informed about that the cream has no effect on heat pain. Use of videotaped actors have successfully been used to communicate both verbal and NVB information to participant in other studies, e.g., Ruben et al., 2017.

2.3 Videos

The primary study coded in total 21 different videos, all with a length of approximately three minutes. All videos were played one time by all of the three actors described earlier, and the videos were shortened versions of the videos used in the mother project. The use of so-called thin slices, i.e., short lasting stimuli, in this case videos, is validated in the literature and broadly accepted in the research environment and is especially

inspired by the extensive research of Nalini Ambady (Ambady et al., 2000). The videos in this study also included videos of a third actor, that had been excluded from the mother project. The composition of videos followed the same structure as the mother project, showed in figure 1., with a pre-conditioning and conditioning phase, consisting of their respective subgroups. That is introduction, calibration and pretest for the pre-calibration phase, and neutral, PFE, PBM and PTV for the calibration phase. The three subgroups in the pre-conditioning phase all have different verbal content, but they have in common that they all have all NVB channels kept neutral, and that the actor is giving information and instructions to the watcher on how to perform the procedure. The four subgroups in the conditioning phase have the same verbal content, giving instructions about the procedure, but all subgroups differ in what kind of NVB channel is activated and not. Depending on the name of the video, the NVB was thus kept neutral, had positive body movement, positive facial expression, or positive tone of voice. It was only the NVB mentioned that is positive in the video in question, and all other NVB should be neutral.

2.4 Measures

The coders watched the 21 videos of the actors and were after each video asked to evaluate and rate the actors NVB using a 9-digit scale, from 1 i.e., “not at all”, to 9 i.e., “extremely”, on the question “How much did the actor do or give of each of the following?”. The eight items the coders rated the actors on were gesture, smile, eye contact, friendly/positive tone of voice, dominant and in charge, overall impression of positivity, expressive and attractiveness. The coders got instructed to rate the different items based on the general perception of how strongly present they were during the videos. E.g., for smiling the coders rated how much the person smiled on a scale from 1 on 9. The items and 9-digit scale were made by the same NVB expert that trained the coders on how to code the videos and were designed to capture the components of NVB the expert believed were important to the mother and primary study.

2.5 Procedure

The primary study was conducted by having all the coders watch the 21 videos and then answer the questions regarding NVB separately, after they had gone through and oral instruction on how to do the coding. The coders got access to the questionnaire on a private online platform, only available to them and the supervisors of the study.

The sampling of this study was systematic, because the participant i.e., the coders, were the bachelor group conducting the study.

The coders got information about the mother project, and that the aim of the primary study was to validate a shortened version of the videos from the mother project. The validation meant to examine whether the NVB in the videos were similar when they should be, and unsimilar when they should be. In other words, the coders for example evaluated if all the videos that was supposed to show positive facial expression actually were perceived as so, and therefor got higher scores on the items regarding positive facial expression. On the other hand, they evaluated if the videos without positive facial expression had considerably lower scores on the items considering positive facial expression.

The inclusion criteria for this study were good written and oral English skills, and participation in the bachelor project.

The Declaration of Helsinki for research on humans was followed. No additional ethical approval was needed for this study, because no sensitive or personal data were collected, and no physical impact was done to the coders neither in the primary study, nor to the participants in the secondary study.

2.6 Statistical analyses

The statistical analysis used in the primary aim was a reliability analysis, ANOVA and Tukey post hoc. An analysis to check for normality was also done. A reliability analysis was done to find the Cronbach's alpha level, i.e., the internal consistency among coders ratings. The ANOVA was conducted to look for difference between video NVB and items, and actor NVB and items. ANOVA was chosen because it is a robust analysis, and results in fewer type 1 error (Field, 2018, p. 536-537). Tukey post hoc test was done to find more detailed information about the significant differences from the ANOVA. Tukey was chosen because it is robust against type 1 error, and suitable for equal groups (Field, 2018, p. 550).

The programs used were Excel and SPSS with alpha level 0.05. Excel was used to plot in the variables, and SPSS was used to do the statistical analyses.

2.7 Data screening

There were no missing data, and no outliers. The data was converted from excel to SPSS. Descriptive statistics was done to get an overview of the data. Before doing the ANOVA, eight new variables of the sums of all items were made in SPSS. The data was checked for normality, and the assumption of normality was meth.

3.0 Results primary aim

3.1 Descriptive statistics

Table 1

Descriptive statistics based on the results from the video sum-variables

Variable	N	M	SD	Min	Max
Gesture	21	30,57	28,98	16	109
Smile	21	35,24	26,01	15	112
Eye contact	21	63,29	28,30	33	127
Positive tone of voice	21	59,71	19,66	35	99
Dominance	21	47,52	7,70	38	66
Positive general	21	50,81	18,01	29	91
Expressive	21	43,57	17,85	23	84

Table 2

Descriptive Statistics of Video types (N=21)

Video	Eye contact		Smile		Gesture		PTV		Expressive		Positivity		Dominance	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Intro.	55.67	12.66	25.33	7.02	21.67	2.52	50.33	7.37	34.00	7.55	42.33	10.02	46.00	3.61
Cali.	45.00	17.44	24.00	6.56	20.33	1.15	49.00	6.08	27.00	1.73	40.33	8.08	42.33	1.15
Pretest	42.33	9.29	22.33	5.86	16.67	0.58	51.33	8.39	32.00	3.46	37.33	7.51	42.00	3.46
PBM	70.67	6.66	29.00	13.23	9.07	9.07	55.33	6.66	71.33	11.15	56.67	9.61	56.33	9.07
PTV	58.67	11.02	33.33	13.58	1.00	.58	99.00	.00	53.67	4.61	67.33	3.21	45.33	1.15
PFE	123.67	3.51	92.67	16.87	1.15	1.15	72.67	7.23	60.67	3.51	79.67	10.26	57.00	3.61
NE	47.00	7.21	20.00	7.00	19.67	1.15	40.33	6.11	26.33	3.51	32.00	5.20	43.67	3.21

Note: Intro.=Introduction, Cal.=Calibration.

3.2 Reliability analysis

The internal consistency among coders on the different items was tested using a reliability analysis. The reliability analysis showed that all the items, except from dominance, had a Cronbach's alpha between α .96. and α .99. The item dominance had a Cronbach's alpha α .72.

3.3 ANOVA

Videos. A one-way ANOVA analysis with the dependent variables being the seven NVB items, and the factor being the videos, showed that the items: gesture, Brown-Forsythe $F(6,2.59) = 206.09$, smile $F(6,14) = 16.93$, eye contact $F(6,14) = 21.6$, positive tone of voice $F(6,14) = 28.16$, overall impression of positivity $F(6,14) = 14.22$ and expressiveness Brown-Forsythe $F(6,5.99) = 28.34$, were significant at $p < .01$, and that the item dominance $F(6,14) = 6.48$ was significant at $p=.02$.

The test of homogeneity of variance showed that gesture $p=.01$, and expressiveness $p=.05$ were significant. This means that assumption from Levene's test of equal variance was broken, and an adjusted Brown-Forsythe F-value was reported.

The remaining items were not significant in this test.

3.4 Tukey post hoc

The main effect of the NVB gesture, Brown-Forsythe $F(6, 2.59) = 206.09$, $p <.001$, was due to the video condition "PBM" having a significantly higher rating of gesture compared to the preconditioning videos, ΔM range = 77.67 – 82.67, $p < .001$; and conditioning videos, ΔM range = 79.67 – 82.33, $p < .001$. $SE = 2.99$

The main effect of the NVB smile $F(6,14) = 16.93$, $p <.001$, was due to the video condition "PFE" having a significantly higher rating of smile compared to the preconditioning videos, ΔM range = 67.33 - 70.33, $p < .001$; and conditioning videos, ΔM range = 59.33 – 72.67, $p < .001$. $SE = 8.83$.

The main effect of the NVB eye contact $F(6,14) = 21.6$, $p <.001$, was due to the video condition "PFE" having significantly higher rating of eye contact compared to the preconditioning videos, ΔM range = 68 – 81.33, $p < .001$; and conditioning videos, ΔM range = 53-76.67, $p <.001$. $SE = 8.62$.

The main effect of the NVB positive tone of voice, $F(6, 14) = 28.16$, $p <.001$, was due to the video condition "PTV" having a significantly higher rating of positive tone of voice compared to the preconditioning videos, ΔM range, = 47.67-50.00, $p < .001$; and conditioning videos, ΔM range, = 26.33 - 58.67, $p < .003$. $SE = 5.31$.

The main effects of the NVB dominance $F(6,14) = 6.48$, $p =.02$, was due to the video conditions "PBM" and "PFE "having some significantly higher ratings of dominance compared to the preconditioning videos, PMB: ΔM range = 14-14.33, $p < .02$; and conditioning video "neutral" $\Delta M= 12.67$, $p < .039$. PFE: preconditioning videos, ΔM range = 11.67 – 14.67, $p < .014$; and conditioning video "neutral", $\Delta M = 13.33$, p .028. $SE = 3.56$.

The main effects of the NVB overall impression of positivity, $F(6,14) = 14.22$, $p < .001$, was due to the video conditions "PBM", "PFE" and "PTV" having some significantly higher rating of overall impression of positivity compared to the preconditioning videos, PBM: conditioning videos, ΔM range = -23 – 24.67, $p < .044$. PFE: preconditioning videos, ΔM range = 37.33 - 42.33, $p < .001$; and conditioning videos, ΔM range = 23 – 47.67, $p < .044$. PTV: preconditioning videos ΔM range = 25 - 30, $p < .03$; and conditioning video "neutral" $\Delta M = 35.33$, $p < .002$. $SE = 6.6$

The main effects of the NVB expressiveness, Brown-Forsythe $F(6,5.99) = 28.34$, $p < .001$, was due to the video conditions "PBM", "PFE" and "PTV" having some significantly higher ratings of expressiveness compared to preconditioning videos PMB: preconditioning videos, ΔM range = 37.33 – 44.33, $p < .001$; and conditioning videos, ΔM range = 17.67 - 45, $p < .031$. PFE: preconditioning videos, ΔM range = 26.67-33.67, $p < .001$; and conditioning video "neutral" ΔM range = 34.33, $p < .001$. PTV: preconditioning videos ΔM range = 19.67 – 26.67, $p < .015$; and conditioning videos ΔM range = -17.67 – 27.33 $p < .031$. $SE = 4.8$.

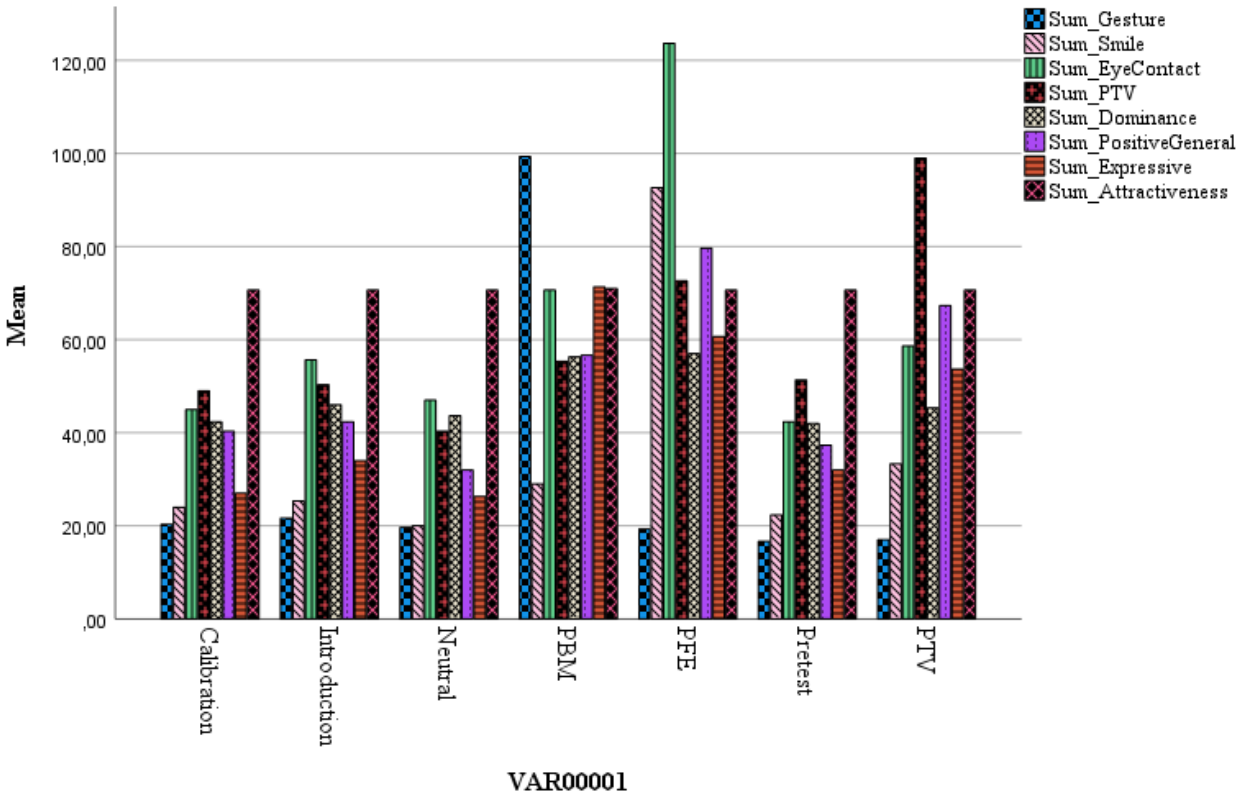

Figure 2. *Videos' mean score on NVB items. Reproduced with permission from Nora Trohaug*

Actors. A one-way ANOVA analysis with the dependent variables being the eight items, and the factor being the actors, showed only one significant finding, for attractiveness F (2,18) = 3367.39, p < .00.

The test of homogeneity of variance showed no significant findings.

A Tukey post hoc test showed that the only item with significant findings was attractiveness. On the item attractiveness actor 1 (A1) was rated M = 86.71, SD =.76, actor 2 (A2) was rated M = 73.00, SD = .00, and actor 3 (A3) was rated M = 52,43, SD = 1.13. The difference in attractiveness between actors: A1 and A2, ΔM = 13.71, A2 and A2, ΔM = 20, 57, A1 and A3, ΔM = 34,29, SE = .42, p < .001.

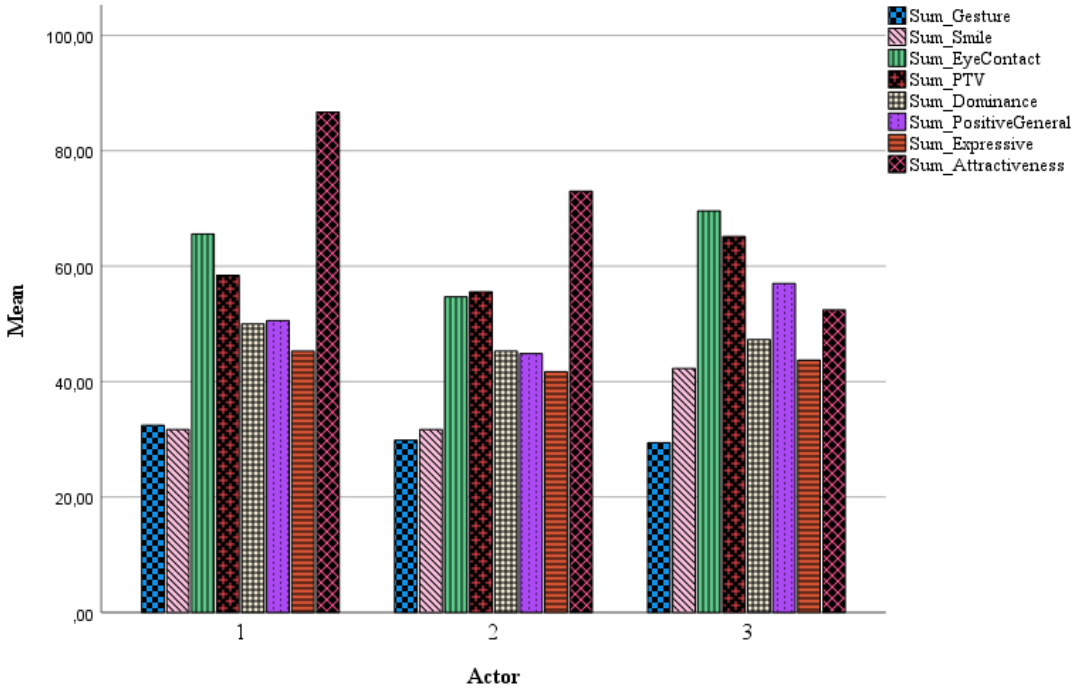

Figure 3. *Actors' mean score on NVB items. Reproduced with permission from Nora Trohaug*

4.0 Discussion primary aim

The results in the primary study show that there is a significant difference between videos and the seven items regarding NVB. There were no significant differences between actors on the items regarding NVB, only on ratings of attractiveness.

Videos. A reliability analysis among coders was done to look for internal consistency. This analysis showed that all items except for dominance α .72, had a Cronbach's alpha between α .96. and α .99. A Cronbach's alpha between over .95 is rated as excellent, and over

.70 is rated as good (Fields, 2018). Therefore this means that the internal consistency among coders is very strong, and that there are small differences in how the coders rated the NVB.

A oneway-ANOVA analysis with the NVB items as the DV, and the videos as the factor showed that all the items was significantly different across videos. Attractiveness was not included, because the coders were instructed to only rate the actor's attractiveness once, which means that including the attractiveness in the analysis for the videos does not make sense, because all videos of the same actor would have the same score of attractiveness. The test of homogeneity of variance showed that Levene's test for gesture p=.01, and expressiveness p=.05 were significant. This means that the assumption of equal variance was broken, and a adjusted F-value from Brown-Forsythe was therefor reported for these two items.

A Tukey post hoc test gave insight to more detailed information about the significant differences from the ANOVA. The post hoc indicated that the item gesture was highest rated in the PBM videos, the item smile was highest rated in the PFE videos, the item eye contact was highest rated in the PFE videos and item PTV was rated highest in the PTV videos. Dominance was rated high both in the PBM and the PFE videos. The overall impression of positivity and the expressiveness was both rated highest in the PBM, PFE and PTV videos.

Actors. A oneway-ANOVA with the seven NVB items and attractiveness as DV and actors as factor, showed the actors had significant differences on the item "attractiveness", but not on the other items regarding the different NVB. This means that the three actors were rated similar on all the NVB items, but not on attractiveness. The difference in ratings on attractiveness does not affect the study, and it was not a goal that the actors would be rated similar. This question was only put in by the mother project to be able to control for differences in perception of NVB affected by subjective view of the actor's attractiveness.

It is desirable to see as significant differences in the items among videos because that is a sign of that the different NVB in the videos are actually perceived as different. On the other hand, it is desirable to see as little difference among the actors on the items regarding NVB as possible, because that is an indication of that the actors manage to act the NVB in a similar way. The item attractiveness was included in the analysis of actors, because this item was of interest to the mother project, to be able to check for bias based on the participants subjective view of the actor's attractiveness.

These results therefore support the assumption in the hypothesis about the videos and actors being similar and unsimilar where they are supposed to be.

The results give important information about how the NVB is perceived. The fact that all the pre-conditioning videos, and the natural conditioning video got similar scores on all the items, and also significantly lower scores that all the conditioning videos with one positive NVB channel, gives an indication that the actors did in fact manage to keep their NVB neutral.

Looking at the three conditioning videos PFE, PBM and PTV it is also clear that they differ in which items are rated the highest. This is a good indication of that the actors managed to display the NVB in the three conditioning videos with positive channels, in a different way. Each video has one item that stands out, and by that show what micro-NVB was perceived as strongest present.

Both for the video PBM and PTV, the results are quite as expected. The highest score for the video PBM was gesture, followed by expressiveness and eye contact. These are all micro and macro NVB's associated with PBM. The highest scores for the video PTV were the item PTV, and secondly item general positivity, which are both associated with the perception of a positive voice. This results mean that these are the NVB that the coders found most prominent in the videos in question.

The results for the video PFE on the other hand, show a score that is not as clear. The three items with the highest score are eye contact, smile and general positivity, as expected. But by looking at the fourth highest rated item, PTV, it can look like the actor did not manage to keep her voice as neutral as it should have been. Nevertheless, there are researchers that believe the high score is not only expression of the objective level of positivity in the voice, but also influenced by the watcher's interpretation. One explanation is the isolation of the NVB channels. A highly important quality of the brain is its ability to predict future scenarios, by using information from past experiences. Because this is a more energy-efficient way of interpretating the signals from the world, the brain does this constantly, and in all situations (Barrett, 2018, p. 59. In everyday life, a positive face is usually combined with a positive voice. The brains tendency to predict the future based on similar scenarios in the past, can therefore be responsible for the high ratings of the item PTV in the video PFE. Because the coders might associate a positive face with a positive voice, they might also have been primed to hear the voice as more positive than it objectively was.

5.0 Limitations primary aim

There are several possible limitations to the primary study. One has to do with the cultural aspects. The participants in the study, both the actors and the coders were so called

WEIRD people. WEIRD stands for western, educated, industrialized, rich and democratic. Research on this topic has shown that this small group of people differ severely from the rest of the world, both in terms of how to think and how to behave (Henrich et al., 2010). Nevertheless, it is often assumed that WEIRD people are a representative group in general. The knowledge gap regarding the similarities between WEIRD people's perception of NVB, and people from other cultures' perception of NVB makes it difficult to know if the results can be generalized to other cultures.

Another limitation is what Lisa Feldman Barrett in her book "How emotions are made", calls "the myth of universal emotion". The highly recognized professor in psychology stresses the importance of context when interpreting the NVB of others, and how easily we make interpretation mistakes when only presented with a divided picture of reality. The isolation of the NVB channels might therefore be problematic because we might need the input from the connected channels to be able to interpret the NVB.

Another limitation is the small amount of research that has been done on the coding of micro-NVB. There is not conducted a lot of coding studies on isolated micro-NVB in the past, and this study therefore works as a pilot study, and cannot rely on carefully tried and tested methods for this exact purpose. Most of the studies concern macro NVB, which might not be good enough for coding micro-NVB.

The fact that the coders could see the names of the videos they watched, and therefor knew which NVB channel was supposed to be positive, might have biased the coder. Just by reading a word connected a visual stimulus, humans can easily be primed to see what they expect to see, and also making them more sensitive to the particular NVB (Barrett, 2018, p. 42-44).

All the actors, and the majority of the coders were female. This might limit the results because gender is known to influence the perception of NVB. Gender has an effect both when it comes to sender and recipient of the NVB, because there can be gender differences in how to interpret, but also when it comes to which NVB is expected from the genders.

6.0 Method Secondary aim

6.1 Participants

The secondary study includes 100 participants, 67 females and 33 males, between the ages 15 and 52, M: 25,34, SD: 8,22. The majority were students at NTNU Trondheim.

The inclusion criteria were good understanding of oral and written English, access to internet connection and to a device showing video and sound. The participant also had to be able to give an informed consent in alignment with the Declaration of Helsinki for research on humans.

The exclusion criteria were if the participant used more than 45 minutes or less than 2 minutes to answer the questionnaire, in addition to answer the control question wrong. Another exclusion criteria was if the participant gave the same numeric score on all answers, because it indicates that the participant did not pay attention and gave a unserious answer.

Because it was not possible to skip questions, and because the data only was collected when the participant completed the entire questionnaire, there were no dropouts.

15 participants answered the control question wrong, which might be an indicator of that they did not pay attention to the video and the questions. What all these 15 participants have in common, is that they all answered “Numbness in the affected area”, instead of the correct answer “No known side-effects”. The alternative “Numbness in the affected area” might not have been a good answer alternative for the control question, because it can cause confusion and unclarity. Since Embla is declared as a pain-relieving cream, the participant might have thought it would cause numbness as a part of its pain reliving effect. Effect and side-effect can easily be mixed, and the expression “side-effect” was not explained to avoid this possible confusion. Based on this reasoning, and the fact that all the participants that answered wrong answered the same, it is viewed as likely that the reason for the wrong answers is not that the participants did not pay attention to the video, but rather that the questionnaire was not clear enough on this question. The 15 participants are therefore included in the study.

6.2 Measures

To collect data about the dependent variable; pain relief, three questions, each with a 11-digit numeric rating scale were presented to the participants. On the first two questions regarding the DV, the participants were asked to rate pain intensity, given a hypothetical heat pain scenario, from 0 i.e., no pain, to 10 i.e., worst possible pain, both before and after watching the video. After watching the video, they were also asked to rate the pain reduction from 0 i.e., no pain reduction, to 10 i.e., 100% pain reduction, given that they used the pain-relieving cream Embla, presented in the video.

The goal was to collect and assess data regarding levels of *pain relief*, and eventual difference in assumed hypothetical pain before and after watching the video. If only pain

relief was assessed, it would not answer the question sufficiently. An approach with comparison of intensity and relief is therefore necessary, because it shows how much pain the participant believed they were in to begin with, hence enables the data to say something about the pain relief per se.

Data about the independent variable; the actor's NVB, was collected using PANAS questionnaire. For this study, a shortened version of 10 items was used, instead of the version with 20 items. There are five items for positive affect: attentive, active, alert, determined and inspired, and five for negative affect: hostile, ashamed, upset, afraid and nervous. A shorter version was used because it was seen as an adequate questionnaire for the questions the study wanted to answer.

The other questions were of a demographic kind. Age was freely stated in number, gender in male, female or other, and for education the participant was asked to choose between six different levels of education, from less than 10 years to a master's degree/PHD.

Lastly, the participants were asked a control question, with four answer options. The question was: What were the side-effects of Embla, presented in the video? And the answer options were: 1. Nausea, 2. No known side-effects, 3. Dizziness, 4. Numbness in the affected area. The correct answer to the question was "No known side-effects".

The internal consistency is ensured by the five respectively positive and negative items, that works as both reversed and affirmative questions. This strengthens the internal consistency, because it makes it possible to check if the participant is paying attention to the question, and gives opposite scores to the reversed questions i.e., the opposite NVB, and more similar scores to the questions regarding to NVB that is viewed as more related.

6.3 Procedure

To test the effects of NVB on placebo pain relief, the secondary study was conducted using an online questionnaire, consisting of different types of questions. The questionnaire was made in the online platform Nettskjema.com by one of the participants in the bachelor group, with consultation form the rest of the group. This study only used the demographic questions, PANAS, questions about pain intensity and pain reduction, and the control question regarding the side effects of the pain-relieving cream Embla. The other questions in the online questionnaire were ignored in this study because they did not have relevance to the research question, and were in the questionnaire because other students used them for their bachelor thesis.

The questionnaire also included four different one-minute-long videos that the participants were asked to watch. The videos were shortened version of the conditioning videos from the primary aim. These four videos were only played by actor 1 from the primary aim, and they were all one minute long. Each participant only watched one video, and the particular video included in the participant's questionnaire was randomized by Nettskjema. The questionnaire was set to gather 100 participants, and to distribute which video the participant was presented with, evenly. This resulted in that the four different videos all were watched by 25 participants.

A convenience sampling was used, mainly focusing on students on NTNU Dragvoll. This method was used to save time, in this time limited process, and because it was viewed as a sufficient sample. The research question did not consider possible demographic differences in perception of NVB, and the convenience sampling, mainly consisting of students in their early to mid-twenties was therefore considered adequate.

Participants were recruited both on campus and online by the bachelor group. This was done either in person with a QR-code, or by sending out a link with the questionnaire.

After receiving the QR-code, the procedure started with that the participant was given information about the study and were asked to give consent to participation in the study. The participant was then asked to answer different demographic questions. They were also asked to answer other non-sensitive questions about their life, that was not used for this study. Then the participant was asked to imagine a hypothetical painful heat pain scenario, were they burned their hand, and rate the imagined pain from 0 to 10. Next the participant watched the randomized one-minute video, displaying one of the versions of NVB. After the video, they were asked to rate the imagined pain relief, given that they used the pain relief cream Embla, presented in the video, from 0 to 10. Next, they were asked to imagine how much pain they would be in after using Embla, given the hypothetical scenario imagined before watching the video. Lastly, the participants were asked to answer the control question, and to submit their answers.

Because the aim of the study was to collect data about how the participants perceive different NVB, and if differences in perception effects hypothetical pain relief, it was necessary to us a cover story when informing the participants about the study. The participants were told that the aim of the study was to investigate the effects of expectations on hypothetical pain. They were also told that the demographic questions were there to examine if factors such as age, gender, personality could influence how we perceive pain. A cover story can present ethical challenges because it in its nature is meant to deceive the

participant. Because the participant does not know what they are participating in, it can be claimed that their consent is in fact not informed, which is one of the most important criteria for consent. Nevertheless, the ethical aspects of the cover story were viewed as intact, firstly because the questionnaire is completely anonymous, secondly because it contains no sensitive information, and thirdly because it does not deal with health or medical information about the participants. Therefore, a separate ethical approval, in addition to the approval of the mother project, was not necessary for the secondary study.

6.4 Statistical analyses

The statistical analyses conducted in the secondary study was a t-test, ANOVA, correlation, and comparison of means. The t-test was chosen because it is a good tool to compare two means (Field, 2018, p. 445), ANOVA because it is a robust analysis, and results in fewer type 1 error (Field, 2018, p. 536-537).

6.5 Data screening

There were no missing data. Also, there were no outliers. The data was checked for normality, and the assumption of normality was meth. The data was transferred from the questionnaire program “Nettskjema” to SPSS. A new variable, called pain difference, was created from the pain intensity rating before watching the video, minus the pain intensity rating after watching the video. This was done to be able to see a possible placebo effect induced by the NVB in the video the participants watched. The answers from PANAS were also manipulated, to make the results in SPSS clearer. The sums of the five items regarding positive affect, i.e., attentive, active, alert, determined and inspired were made into one variable, called “positive”, and the sums of the five items regarding negative effect, i.e., hostile, ashamed, upset, afraid and nervous were made into the variable “negative”. In this way, it is possible to look for differences in pain relief based on if the participant rated the actor in the video’s NVB as positive or negative.

7.0 Results secondary aim

7.1 T-test

A t-test showed that there was a significant difference between the total ratings of the items positive and negative, positive being the highest rated, when looking at the mean score for all videos, positive $M = 13.76$, $SD = 3.91$, $t(99) = 35.18$, and negative, $M = 8.7$, $SD = 3.86$, $t(99) = 25.56$, $\Delta M = 5.06$, $p < .001$.

7.2 ANOVA

A one-way ANOVA showed that there was not a significant difference between the videos neither regarding the item positive $M = 13.76$, SD = 3.91, M range = 12.48 – 15.76, nor the item negative $M = 8.7$, $SD = 3.86$, M range = 7.52 – 9.76. However, the difference in positivity between videos was borderline significant, $p < .069$.

The Tests of Homogeneity of Variances showed that the item "positive" was not significant, Brown-Forsythe $F(3,81.1) = 2.45$, p < .070. Brown-Forsythe was reported because Levene´s test was significant for item "positive", and the assumption of equal variance is broken.

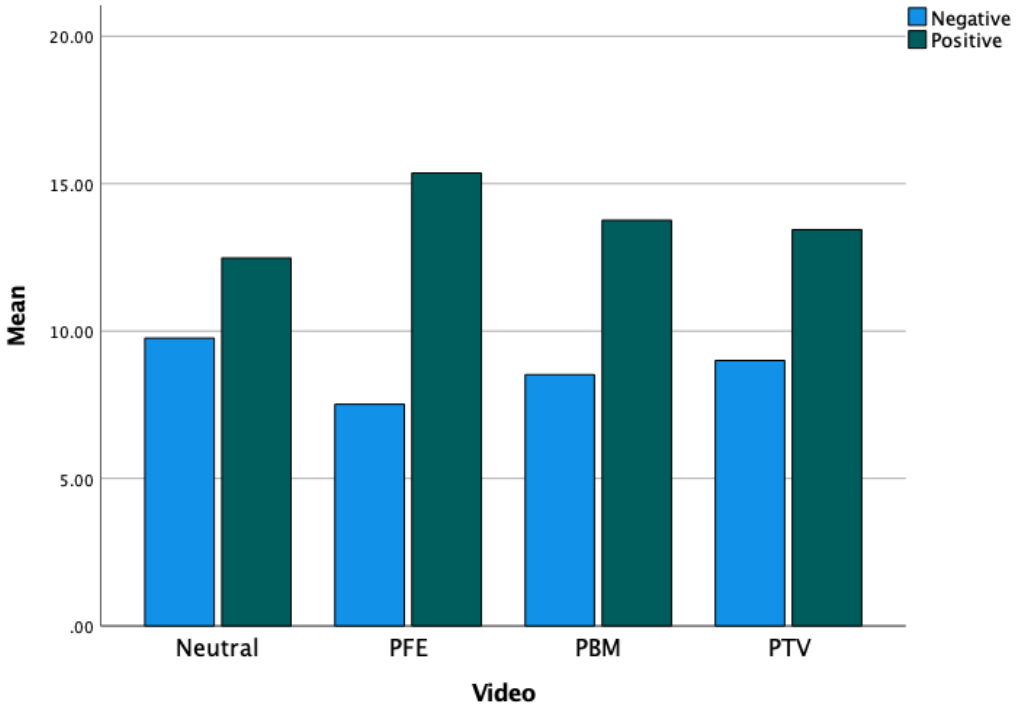

Figure 4. *Mean of positivity and negativity for each video.*

7.3 Pearson Correlation

A Pearson Correlation indicated that there was no significant correlation between video and pain reduction. Neutral, $r = -.004$, $M = 2.48$, $SD = 1.73$, $n = 25$, $p < .485$. PFE, $r = .011$, $M = 2.52$, $SD = 1.87$, $n = 25$, $p < .456$. PBM, $r = -.077$, $M = 2.28$, $SD = 1.21$, $n = 25$, $p < .222$. PTV, $r = .070$, $M = 2.68$, $SD = 1.46$, $n = 25$, $p < .244$

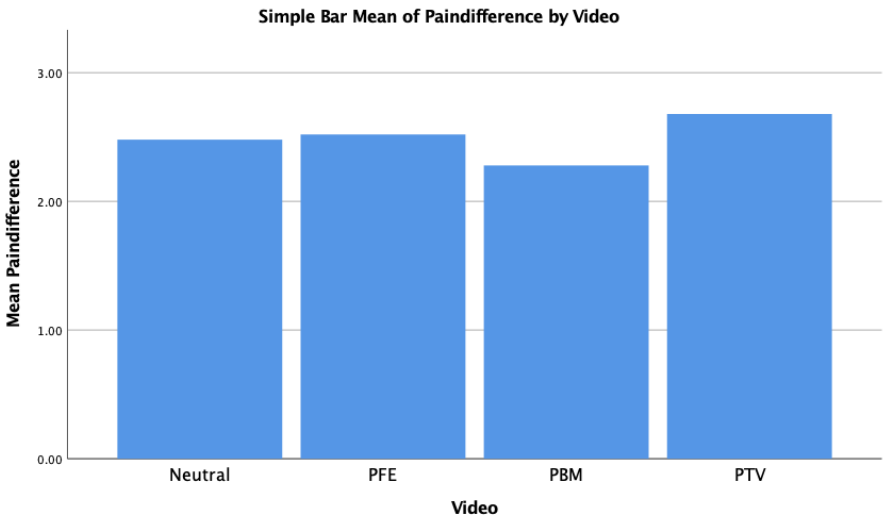

Figure 5. *Mean pain difference for each video.*

7.4 Compare means

A comparison of means was done to look for the correlation between the item pain difference and pain reduction. The results showed that the difference between pain difference and pain reduction was stabile across videos.

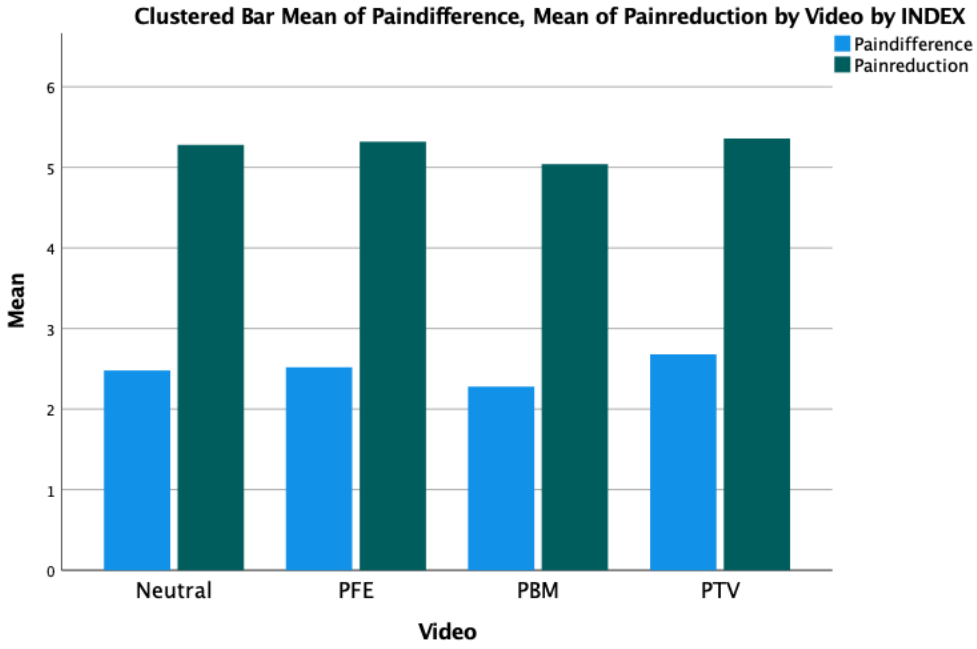

Figure 6. *Mean of pain difference and pain reduction for each video.*

8.0 Discussion secondary aim

The t-test show that there is a significant difference in ratings of negative and positive NVB, which indicates that the videos are successful in displaying positive NVB.

The fact that the difference between pain difference and pain reduction was stabile across videos, indicates that how the participants rated pain before and after watching the video are correlated with how much pain reduction, they anticipated they would get. This is a good indicator of that the participant was focused when answering and was able to imagine the hypothetical heat pain and pain relief scenario.

The ANOVA, looking at how the different NVB in videos were rated by the participants, showed that the video with neutral (NE) NVB was the video that got the lowest mean on positivity, and the highest mean on negativity. The videos with positive facial expression (PFE) were rated with the highest mean on positivity, and the lowest levels of negativity. Positive body movement (PBM), and positive tone of voice (PTV) were rated quite similar, in the middle of the two other NVB. These findings were not significant, but give an indication of that the four videos might have been perceived a bit different.

Next, the Pearson correlation show that there is no significant correlation between which video the participant watched, and the level of pain difference or pain relief they imagined feeling.

9.0 Limitations secondary aim

There may be many reasons for these results. One is that the videos were too short to induce a feeling in the participant, and subsequently a placebo effect.

Another reason might have been the unnatural way the NVB was displayed. Previous research on the effect of NVB on placebo have not been done on isolated NVB. It is highly likely that the incongruency between the NVB channels can cause a negative perception of the videotaped actor, rather than a positive. PBM can for example be perceived as aggressive, when it is performed without a positive face and tone of voice.

The fact that the pain scenario was hypothetical, is also limiting the study and its results. It might be difficult to imagine pain, and there is little known about if placebo have an effect on hypothetical pain.

This study, like the primary study, only uses female videotaped actors. This is limiting the study, because it does not make it possible to check for possible gender difference.

It can also be discussed if the number of participants in the study was high enough, and also the fact that they all did the study alone and online. It is not possible to control if the participants paid attention, and since the control question might not have been good enough, it made it even more difficult to control for this. Therefore, it might have been better to perform the study in person.

10.0 Conclusion

These two study's are trying to fill the knowledge gap between micro and macro-NVB, by contributing to how code them in a valid way, and how they both work and effect people in real life. The results from the primary aim were significant and show that the videos were able to display what they should, and that the actors acted the same. The results also gave an indication of that the method of coding the NVB was valid, because the internal consistency among coders were high. The results from the secondary on the other hand were not significant, meaning that a correlation between NVB and hypothetical placebo pain relief was not found. However, even though the results were not significant, they are pointing in a direction of positive NVB having more effect on the hypothetical placebo pain relief than the negative NVB. It would therefore be interesting for future research to further investigate this possible link, using other methods that might be more effective for finding the effect. The results from the primary aim indicates that the method is both valid an effective, and future research can therefore benefit from using this method when further investigating human NVB.

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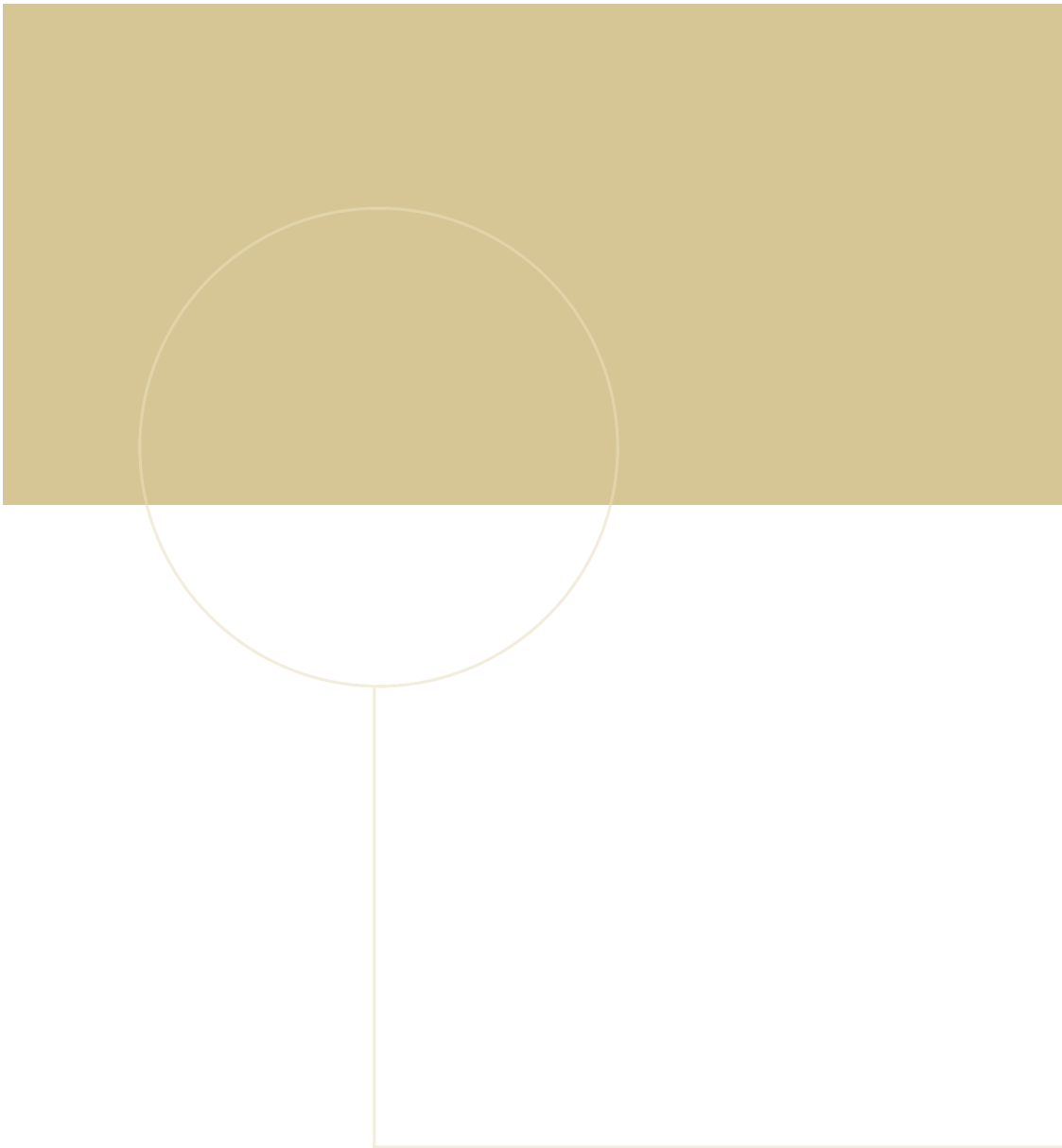

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