

Candidate 10032

Perception of micro non-verbal behavior

Bacheloroppgave i Psykologi, PSY2900: BA07

Veileder: Hojjat Daniali

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Norges teknisk-naturvitenskapelige universitet
Fakultet for samfunns- og utdanningsvitenskap
Institutt for psykologi



Kunnskap for en bedre verden

This is an individually written thesis, and all writing has been conducted individually with continuous guidance and feedback from the supervisors Daniali and Paoli. This thesis is written according to the APA Manual seventh edition.

All procedure regarding the primary aim was planned by the supervisor beforehand, which also includes which analyses to use. The coders were given six articles to start with, and it was voluntary to read and use these. The articles were about how to code NBs, how healthcare personnel can affect a patients treatment outcome by their NBs, and placebo effects. Other literature than this, has been found by the author herself.

I have cleaned the data set used in analyses and done all calculations and interpretations myself, with guidance and feedback from Daniali and Paoli. All tables and figures were created by the me.

Regarding Study 2, a group of 12 coders teamed up to develop and distribute an online questionnaire. The whole study design and procedure was designed by me and seven of the coders. All analyses, literature, figures, and tables are conducted individually by me, but have been reviewed by the supervisors. I have contributed to the online questionnaire by editing videos used in the questionnaire, choosing the BFI-10 questionnaire and through the entire process been an active and engaged discussion partner for the group.

Firstly, I would like to thank my supervisor, Daniali, for patiently guiding me through the experience on carrying out a research project and broadening my knowledge of the field of psychologi. Thank you for all feedback and quickly answered e-mails.

Thanks to Paoli for being a hero and always answering all mye questions regarding APA-rules.

I would also like to thank my peers for all long study-days, cinnamon buns on Wednesdays, and endless discussions.

Last, but not least, I would like to thank my roommate, Hansen, for being supportive when my motivation has been low and cooking dinner when I've spent long days at school.

This thesis aims to investigate how micro non-verbal behavior (NB) can be perceived. It includes some of the first experiments studying how micro-NBs (facial expressions, tone of voice, body movement) isolated affects the perceiver. Two studies were conducted to examine this topic.

Study 1 tested the reliability and validity of videos that are a part of a bigger project which investigates how micro NBs can affect a patients placebo effect. The videos show actresses performing the non-verbal behaviors positive facial expression, positive tone of voice, positive body movement, as well as some all-neutral postures. Coders (n = 15) rated 21 video slices on nine different micro- and macro- NBs. This study has strengthened the assumption that the manipulated NBs express the intended NB (such as positive facial expression). The videos are successful in their manipulation of micro-NBs.

Study 2 is a pilot study that investigated how personality dimensions mediates the relationship between acted NBs and hypothetical pain through an online questionnaire (n = 80). It examines whether personality dimensions within the BFI-10 mediates the relationship between acted NBs and hypothetical pain. The respondent first filled out the BFI-10, before watching a video. The videos used in the pilot study are bins of the videos used in the mother study. After the video, the questionnaire asked the respondent to imagine severely burning their hand and how intense they think this pain would be. There were no proven mediational relationships, neither was there a significant relationship between NBs and hypothetical pain.

When thinking of “communication”, one may think of verbal communication and dialogues between two parties or more. However, verbal information only comprises a minor proportion of a humans communicational channels, and non-verbal communication plays a vital role in how a message can be perceived (Rosenberg & Ekman, 2020; Scherer et al., 2005). The modern study of non-verbal behavior stretches across a number of fields, such as psychology, social anthropology, sociology, and medicine.

Hall and Knapp (2013) defined non-verbal communication as:

Visible non-verbal cues including facial expressions, body movements and postures, self- and other touching [...] Auditory non-verbal cues include discrete nonlinguistic vocal sounds (e.g., sighs) as well as qualities of the voice such as pitch and pitch variation, loudness, speed and speed variation, and tonal qualities. (p. 6)

Verbal and non-verbal communication between healthcare personnel and patients has been shown to alter treatment outcomes in clinical settings (He et al., 2018). Verbal information is an established method to generate positive expectations and placebo effect, but placebo can also be induced by classical conditioning (Daniali & Flaten, 2019; Flaten et al., 2006; Pollo et al., 2001). The placebo effect is a psychobiological response to medically inactive interference (Daniali & Flaten, 2019), which lowers the symptoms and improve treatment (Aslaksen & Lyby, 2015). Even though there is no pharmaco-active ingredient, placebo still plays a role in treatment outcome (Savvas et al., 2014). There are, however, few studies that examine how the healthcare personnel can affect the treatment course by isolated micro non-verbal behavior (hereby shorted to NB), neither are there any studies looking at how each micro-NBs differs in their influence on treatment outcome.

NBs are divided into micro-level behavior such as smiling, eye contact, tone of voice or body gesture, or macro-level NBs. Macro-level NBs are a collection of micro-level behavior which transfers to a psychological meaning such as dominance, gesticulation, or positive impression (Ambady et al., 2000; Daniali & Flaten, 2019). NBs are generally also divided into positive or negative NBs, based on how they convey an emotion or relationship positively or negatively (Daniali & Flaten, 2019).

This thesis is a part of a mother study that examines the effects of micro-level non-verbal behaviors. The isolated micro-level NBs that this study looks into are positive body movement (PBM), positive facial expressions (PFE), positive tone of voice (PTV) and a

neutral control group (NE) where all NBs should be as neutral as possible. By neutral, it is meant that all micro-NBs are equally decreased.

The mother-study investigated how micro non-verbal behaviors affect treatment in healthcare. By isolating the specific NB, we can investigate how that NBs affects the patient's placebo effect and if the NBs differs in how they influence the treatment. This study wants to fill the knowledge gap about how isolated NBs is perceived. The end goal is that by identifying the effects of a personnel's NBs during treatment, one can potentially help healthcare personnel increase the placebo response in a patient's treatment by implementing these NBs as a standard.

According to Ambady, Koo, Rosenthal and Winograd (2002), a therapist's non-verbal communication impacts the patient's health outcome. For example, when a healthcare provider demonstrates positive non-verbal behaviors, such as nodding, smiling and body movement, it is predictive of better cognitive and physical functioning for the patient. One of the studies included in their meta-analyses followed patients ($n = 48$) over a three-month period. Patients who experienced positive NBs reported better physical function such as improved ability to walking across a room, get up from a chair, dressing and bathing by themselves. The study also reported better cognitive functioning for patients when it came to confusions, such as difficulty in focusing attention, disorganized speech, and their level of consciousness (Ambady et al., 2002).

One study reported that when physicians showed engaging body language such as leaning forward and facing the patient during interaction, the patient later reported that they experienced a greater understanding of their medical issue than patients where the physician did not show engaging NBs (Larsen & Smith, 1981). Ruben, Blanch-Hartigan and Hall (2018) reported that if the healthcare provider showed supportive macro-NB the patient experienced several positive effects. These effects were increased patient satisfaction, increasing pain tolerance and attenuated experience of pain. The same results have been found in other studies executed by the same researches (Ruben et al., 2017).

These studies are a few examples to emphasize that many factors. Contextual factors such as body language, facial expressions or tone of voice, the patient's previous experiences, or caregiver's appearance can modulate treatment outcome (Daniali & Flaten, 2019). Understanding the physicians or healthcare providers non-verbal behaviors is essential to understanding clinical interactions (Blanch-Hartig an et al., 2018). By singling out the effect of the healthcare provider's NBs on the treatment outcome, it's hypothesized that it should be possible to increase the placebo effect by implementing specific NBs during treatment.

The mother study used three professional actresses to film videos that would guide the participants through the experiment. There were two main phases through the experiment: pre-conditioning and conditioning. In the pre-conditioning phase there were four neutral videos (introduction, calibration and pre-test). The conditioning phase introduced the participant to different micro-behaviors (PBM, PFE, PTV, NE). The mother study claimed that the NBs of the pre-conditioning phase are neutrally acted and all NBs are equally decreased, and in the conditioning phases one channel of NBs (PBM, PFE, PTV) has been increased. However, this claim should be tested.

This thesis's main aim, study 1, is to test reliability and validity of the videos to ensure that the video expresses the wanted micro-NB. By validating that the videos express the wished NBs and test the inter-reliability, one also makes sure that the results in the mother project are valid. Coding NB is complex, and there is not a set framework for how to code (Blanch-Hartigan et al., 2018; Scherer et al., 2005), which makes it important to ensure that the videos used in the mother project are both valid and reliable. In study 1, videos and actresses will serve as the independent variable, while the rated items serves as the dependent variable.

When understanding how the different NBs affect the patient, it is also important to understand how the patient perceives the non-verbal cues. Studies have shown that personality can modulate how a patient perceives a healthcare personnel's NB, which can affect how strong or weak of a placebo response the patient experiences (Darragh et al., 2014), but the results are not all consistent. For example, Geers, Kosbab, Helfer, Weiland and Wellman (2010) have found that traits like positivity or negativity affects the placebo response, and extraversion has been shown to predict placebo effects only when in the presence of an empathic practitioner (Geers et al., 2007; Geers et al., 2010; Kelley et al., 2009). It has also been shown that the personality trait neuroticism can be correlated with a reduced placebo effect or a nocebo effect (Aslaksen & Lyby, 2015; Peciña et al., 2013).

To understand which personality traits have the most placebo effect, it is useful to investigate how the different personality dimensions mediate the effects of NBs on hypothetical ratings of pain intensity. In Yoshino, Okamoto, Onoda, Shishida, Yoshimura and Kunisao's (2010) study, the participants were subjected to painful stimulation while looking at a presentation of a sad, happy or neutral facial expressions. The study's results show that participants that looked at sad facial expressions reported higher ratings in pain intensity than the participants that looked at happy or neutral presentations (Yoshino et al., 2012). Other studies have also investigated how personality mediate the perception of NBs and which

affect the placebo/nocebo effect, but found that there was no mediational effect (Aslaksen & Lyby, 2015; Valentini et al., 2014).

The findings in studies like these are contradictory and few of them use isolated micro-NB in their studies. This thesis will therefore also investigate the personality aspect by asking the question: Do different personality dimensions affect or mediate the relationship between the acted NBs and hypothetical pain?

We designed an online study in which the respondents were asked to fill out a personality questionnaire and see a video which presents a pain-relieving cream. The respondent would then be asked to imagine burning their hand severely on a stove and enter how painful they imagine this would be. In this equation the NBs will serve as the independent variable, and hypothetical pain will be dependent. The different personality dimensions will be studied as a mediator between the dependent and independent variable.

Study 1: Video coding

Coders:

The coders were all students in the psychology department at NTNU writing their bachelor thesis. To be a coder the student had to be a part of the bachelor-group studying non-verbal behavior. There were 11 women and 4 men in total coding the videos, $M = 22,8$ years, $SD = 1.32$ years, ranging from 21-25 years old. The students are all Norwegian-speaking, and fluent in English. 11 students have no university degree, and 3 people have completed a one-year study at university.

Measurements, equipment and instruments

NB rating scale

Coders used a Google form which have been used in the mother study earlier. The coding system used was especially developed for the mother study's purpose (Blanch-Hartigan et al., 2018), by Mollie Ruben; an expert in non-verbal behavior. A NB-rating scale was made to rate the NBs expressed 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.

The coders rated the items on a Likert scale from 1-9, where 1 = not at all and 9 = extremely. They were asked "From "not at all" to "extremely" how much did the experimenter do or give off each of the following?" and coded how they perceived that the actresses amounted on the Likert-scale based on these micro- and macro-items: gesture, smile, eye

contact, positive tone of voice, dominant, overall positivity impression, expressiveness and attractiveness.

Procedure

Before coding the videos, the coders went through training. The training process was designed after Blanch-Hartigan, Ruben, Hall and Schmid Mast (2018) recommendations on how to train new coders and how to code NB, and all coding were subjective and manual (Blanch-Hartigan et al., 2018; Scherer et al., 2005). Since the coders did not have a code log with clearly defined items, the training ensured that the coders had the same understanding of each item.

First the coders were divided into four groups with a focus on one conditioning video (PBM, PTV, PFE, NE), and each group focused on reading relevant literature on how to code their given theme. The groups searched for how micro-NBs have and could be coded, and did not focus on researching macro-NBs. The authors group examined how tone of voice has been coded before and looked after validated methods in this area. In this phase the coders made themselves familiar with how to think when coding, and exploring validated methods that are used in the field (Blanch-Hartigan et al., 2018).

The literature search was mainly through oria.no or Google Scholar. The groups found literature themselves, and the supervisor did not have a role in which articles that were read through this process. During and after literature search, the group of coders watched several of the videos used in the mother project while guided by the supervisor. The supervisor and the coders then discussed how one could code the videos based on the literature search and how the codings should be.

After looking into different ways NBs could be coded, all 15 coders had a group session with Mollie Ruben to learn how to code the specific items used in the mother study. Both auditive and visual information were important while coding. In this group session, Ruben guided the coders through a video and then presented the Google form that the codes were going to use. The coders were then asked to code the video themselves through the very same Google form and repeating the process presented by Ruben.

The item “attractiveness” was only coded once for each actress, while the other seven items were coded for each slice with each actress.

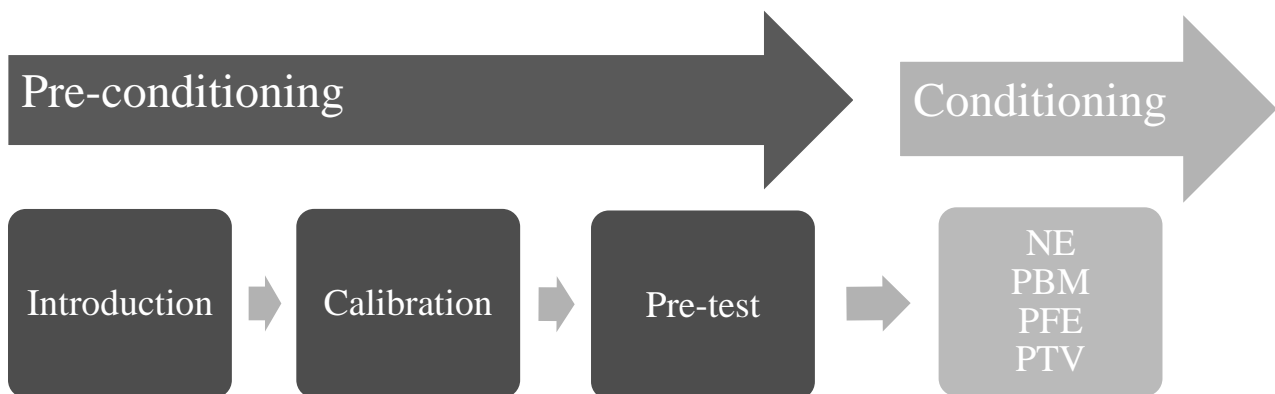
Videos

During the mother study, two of the actresses were introduced to the participant. One during the pre-conditioning phase and another during the conditioning phase. During conditioning,

the participant was induced to one of the micro-NB, either PBM, PFE, PTV or neutral NB. In the conditioning-phase one of the micro-NBs were overexpressed, such as positive tone of voice, while the other NBs remained neutral. See figure 1 for an overview of the pre-conditioning and conditioning phases.

Figure 1

Demonstrative process video of the mother study



These videos were about one hour each in total, and the codings presented in this thesis are based on slices from the mother study's videos. These slices were about 4-7 bins at about 30 seconds each, from the same phase in a sequential order amounting to 3-5 minutes in total. Slices can be used to code longer videos and has been shown to be a secure way to ensure that a video is valid and is much less time consuming than coding all of the videos (Ambady & Rosenthal, 1992, 1993; Blanch-Hartigan et al., 2018; Murphy et al., 2015). The bins were extracted from the same place in each phase across all different actors, so the verbal script was the same. There were totally 21 videos based on the slices which were extracted from the mother study (Murphy et al., 2015).

Actresses

In the mother project, three female actresses played the role as experimenters in the videos. All actresses were Norwegian and fit a regular health personnel stereotype; Caucasian, dressed in a white lab coat with light make-up on (Mercer et al., 2008). They received 10 hours of training from Mollie Ruben. During this training, the actresses learned how to only

express one NB at a time and decrease the other two NBs to be as neutral as possible, or how to decrease all NBs at the same time.

Data screening

During the preparation of data there were no missing values in the data set. One of the coders converted the excel-file generated by Google form into a SPSS-file.

I ran descriptive statistics to get an overview of the dataset. Before doing the ANOVA analyses with videos and actresses as the independent, new variables were made. These were based on the sums of all ratings on each item. After this the data was checked for normal distribution, and the assumption of normality was met.

Statistical analysis

IBM SPSS statistics version 27 were used in all analyses with an alpha level of .05. To check the reliability between the coders, I used Cronbach's alpha. This is an appropriate reliability analysis when comparing more than one coder who has coded all items (Bland-Hartigan et al., 2018).

To compare means between the videos and expressed NBs, or the actresses and expressed NBs, ANOVA was used. When doing an ANOVA analysis, it is important that the assumptions of normal distribution is met (Stoll, 2017). The dataset met the criteria for doing an ANOVA, and when running the analysis it was possible to see which post hoc test was a fitting choice.

In both ANOVA analyses there were a significant F-ratio, and both ANOVAs had groups of equal size, which makes it natural to use Tukey post-hoc test for both. Tukey is a fitting post hoc test when one wishes to compare all pair of means (Field, 2013; Stoll, 2017).

Results

Table 1

Descriptive statistics of all items based on the sum-variables

Items	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
Gesture	21	30.57	28.98	16.00	109.00
Smile	21	35.24	26.01	15.00	112.00
Eye contact	21	63.29	28.30	33.00	127.00
PTV	21	59.71	19.66	35.00	99.00
Positivity impression	21	50.81	18.01	29.00	91.00
Expressiveness	21	43.57	17.85	23.00	84.00
Dominance	21	47.52	7.11	38.00	66.00
Attractiveness	21	70.71	14.46	52.00	87.00

Note. *N* = number of videos, *M* = mean, *SD* = standard deviation, *Min* = minimum rating, *Max* = maximum rating.

Table 2:

Descriptive statistics within each item when videos serve as the independent variable (N = 21)

Video Types	Eye contact		Smile		Gesture		NB-PTV		Expressive		Positivity		Dominance	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
a	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
b	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
c	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
d	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
e	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
f	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
g	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. *a* = introduction, *b* = calibration, *c* = pre-test, *d* = PBM, *e* = PTV, *f* = PFE, *g* = NE. Attractiveness is not reported because it has not been rated the same way as the other items.

The reliability test among all coders on the items gesture, smile, eye contact, PTV, overall impression of positivity, expressiveness, and attractiveness all scored $\alpha > .96$.

Dominance scored $\alpha = .72$.

Differences in NBs between videos

Levene's test showed that the items gesture, $p = .01$, and expressiveness, $p = .05$, were significant and a Brown-Forsythe F is reported for these items.

The micro-NB "eye contact", $F(6,14) = 21.60$, $p < .001$, had a significantly high rating of eye contact when the video "PFE" was compared to the preconditioning videos, ΔM range = 68.00 – 81.33, $SE = 8.62$, $p < .01$, and the conditioning videos, ΔM range = 53.00 – 76.67, $p < .01$.

The micro-NB "smile", $F(6,14) = 16.93$, $p < .01$, had a significantly high rating of smiling when the video "PFE" was compared to the pre-conditioning videos, ΔM range = 67.33 – 70.33, $SE = 8.83$, $p < .01$, and the conditioning videos, ΔM range = 59.33 – 72.67, $p < .01$.

The micro NB "PTV", $F(6, 14) = 28.16$, $p < .01$, had a significantly high rating of positive tone of voice when the video "PTV" was compared to the pre-conditioning videos, ΔM range = 47.67 - 50.00, $SE = 5.30$, $p < .01$, and conditioning videos, ΔM range = 26.33 - 58.67, $p < .01$. The video "PFE" also had significant findings when compared to the pre-conditioning videos, ΔM range = 21.33 – 23.76, $SE = 5.30$, $p < .02$, and all conditioning videos except from the video "PBM", ΔM range = - 26.33 – 32.33, $SE = 5.30$, $p < .01$.

The macro-NB "overall positive impression", $F(6,14) = 14.22$, $p < .01$, had the significantly highest rating of positivity when the video "PFE" was compared to the preconditioning videos, ΔM range = 37.33 – 42.33, $SE = 6.61$, $p < .01$. "PFE" was also significantly high ratings when compared to the conditioning video "PBM" and "NE", ΔM range = 23.00 – 47.67, $p < .04$, but it was not significant when compared to the "PTV"-video. The "PTV"-video had a significant rating of positivity compared to the pre-conditioning videos, ΔM range 25.00 – 30.00, $SE = 6.61$, $p < .03$, and the conditioning video NE, $\Delta M = 35.33$, $SE = 6.61$, $p < .01$. The video "PBM" had a significant high positivity score, ΔM range = -23.00 – 24.67, $SE = 6.61$, $p < .04$, when compared to the conditioning videos "NE" and "PFE".

The macro-NB "gesture", Brown-Forsythe $F(6,2.59) = 206.09$, $p < .01$, had a significantly higher rating of gesture when "PBM" was compared to the preconditioning videos, ΔM range = 77.67 - 82,67, $SE = 2.99$, $p < .01$; and the conditioning videos, ΔM range = 79.67 – 82.67, $p < .01$.

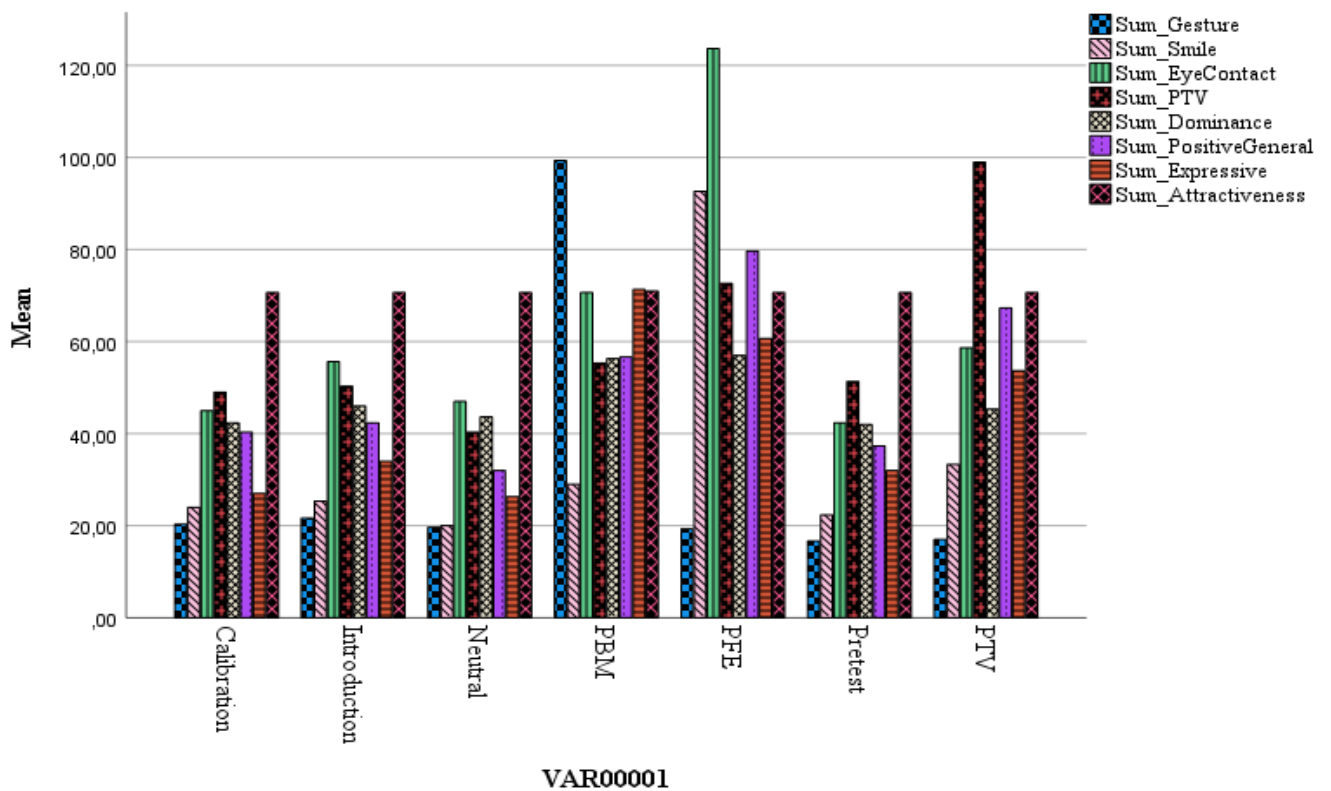
The macro-NB “expressiveness”, Brown-Forsythe $F(6,5.99) = 28.34, p < .01$, had significantly highest rating of expressiveness when “PBM” was compared to the pre-conditioning videos, ΔM range = 37.33 – 44.33, $SE = 4.80, p < .01$, and the conditioning videos “NE” and “PTV”, ΔM range = 17.67 – 45.00, $p < .01$. The video “PFE” had also significant high ratings of expressiveness when compared to the pre-conditioning video “NE”, $\Delta M = 34.33, SE = 4.80, p < .01$. The video “PTV” had significant ratings in expressiveness when compared to the pre-conditioning videos, ΔM range = -7.00 -26.67, $SE = 4.80, p < .01$, and the conditioning video “NE”, $\Delta M = 34.33, p < .01$.

The macro-NB “dominance”, $F(6,14) = 6.48, p = .02$, had significant high rating of dominance when the video “PBM” was compared to the pre-conditioning videos “calibration” and “pretest”, ΔM range = 14.00 – 14.33, $SE = 3.56, p < .02$, and to the conditioning video “NE”, $\Delta M = 12.67, p < .04$. The video “PFE” showed significant high ratings rating in when compared to “calibration” and “pre-test”, ΔM range = 14.67 – 15.00, $p < .02$, and the video “NE”, $\Delta M = 13.33, p < .03$.

The item attractiveness was not significant, $p = 1.0$. See figure 2 for a visual representation of the sums compared to each other based on video types.

Figure 2

Descriptive statistic bar showing item-ratings compared to each other based on videos



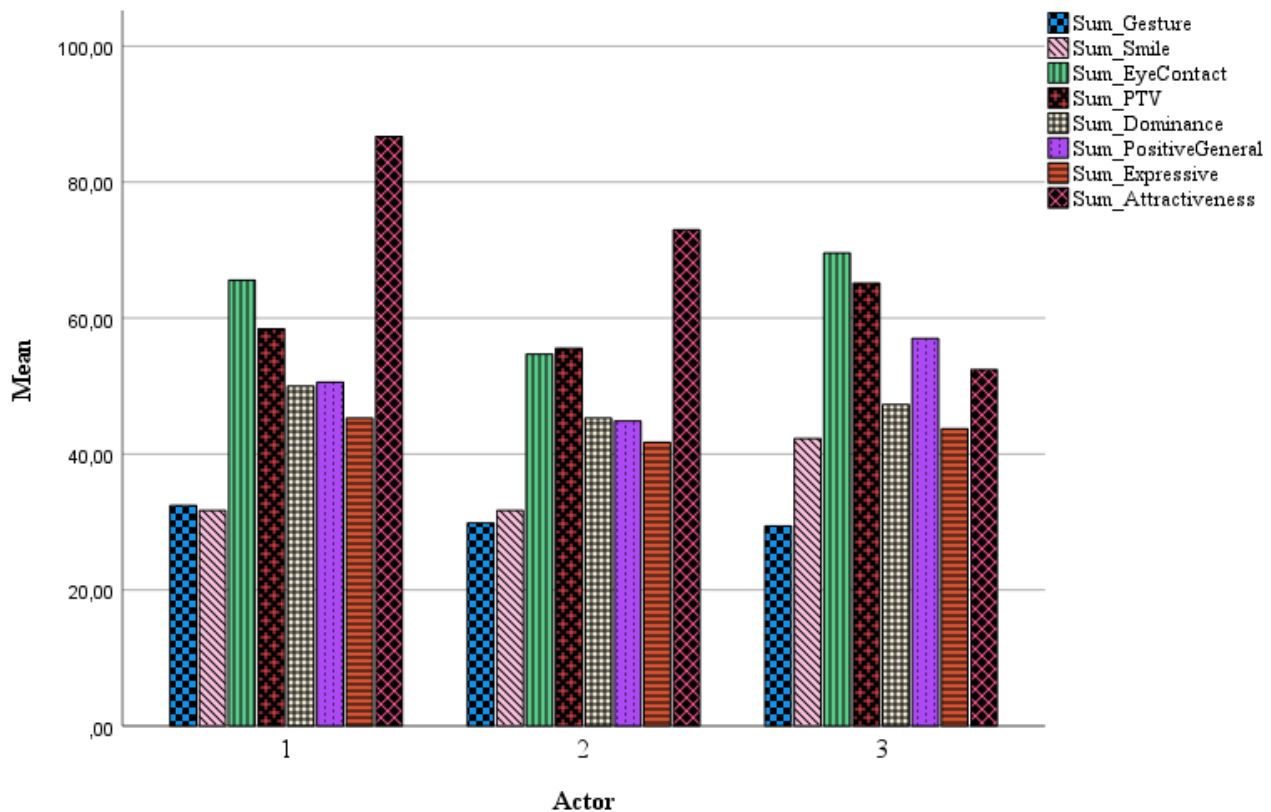
Note. The figure is made in and retrieved from SPSS.

NBs between actors

A one-way ANOVA showed no significant findings for all items except for attractiveness, $F(2,18) = 3367.39, p < .00$. When running a test for homogeneity of variance, the test showed no significant findings. A Tukey post hoc test showed that the only significant finding was within the item “attractiveness”, $\Delta M = 13.71 - 34.29, SE = 0.42$. It was a significant difference, $\Delta M = 13.71, SE = .42, p < .00$, when actor 1 ($n = 7$), $M = 86.71, SD = .76$, was compared to actor 2 ($n = 7$), $M = 73.00, SD = .00$. It was also a significant difference, $\Delta M = 34.29, SE = .42, p < .00$, when actor 1 was compared to actor 3 ($n = 7$), $M = 52.43, SD = .43$. When comparing actor 2 to actor 3, the difference was also significant, $\Delta M = 20.57, SE = .42, p < .00$. See figure 3 for a visual representation of how the items were rated for each actress.

Figure 3.

Bar that visualizes the item-ratings for each actress



Note. The figure is made in and retrieved from SPSS.

Discussion

The results of Study 1 shows that there is a significant difference between the pre-conditioning and the conditioning videos, as well as a significant difference between the conditioning videos themselves. The coders started with the assumption that the NBs of the pre-conditioning phase were neutral in their expressed NBs, and in the conditioning phases one of the NBs were enhanced.

The ANOVA with video as the independent variable had several significant findings. The item “gesture” was the highest rated item in the conditioning video “PBM” across both pre-conditioning and conditioning videos. The micro-NBs “smile” and “eye contact” scored significantly highest in the video “PFE” than in any other videos. The micro-NB “PTV” was rated significantly highest in the conditioning video “PTV” when compared to both the neutral pre-conditioning videos and the conditioning videos “PBM” and “NE”. The item “PTV” was also significant in the video “PFE”, although the significance level was a bit

lower than the video “PTV”. These results support the assumption that the conditioning videos *differ from each other* and that the pre-conditioning and conditioning videos *differ in how the NBs are perceived*.

An ANOVA between the actresses and the NBs show that the actresses did not differ significantly in how their acted NBs are perceived on any items except “attractiveness”. This supports the assumption that the actresses are similar in how they present the different NBs, and indicates that the results and findings we see cannot be attributed to individual differences between actors, but are instead more likely the results of differing NBs.

The item-rating NBs between videos had high internal consistency and therefore high reliability. The coders were consistent in how they perceived and coded the different items in each video. When measuring both micro- and macro NBs, reliability plays a vital role (Scherer et al., 2005), and by having a high reliability within as many as 15 different coders, this strengthens the validity of the videos (Blanch-Hartigan et al., 2018; Murphy et al., 2015). Reliability increases the higher the numbers of coders because it’s a joint function of intercoder correlation and how many coders there are (Blanch-Hartigan et al., 2018). Obtaining a high level of reliability when coding micro- and macro-NBs is challenging, especially when longer slices are coded. That is because the longer the slice, the more information has to be perceived (Blanch-Hartigan et al., 2018; Scherer et al., 2005).

Both the items “smile” and “eye contact” were the only significant ratings for the video “PFE” when compared to both the pre-conditioning and conditioning videos. This was an expected outcome because both smiling and engaging eye contact is associated with positive facial expression; they are both central micro-NBs when looking at facial expressions (Ekman, 1993; Scherer et al., 2005). In the study by Ambady et al (2002), positive facial expressions consisted of smiling and nodding, which corresponds to the findings presented here (Ambady et al., 2002; He et al., 2018).

The micro item “PTV” had significantly high ratings on both “PTV” and “PFE” videos. It was hypothesized that the item “PTV” would be closely related to the video “PTV”, but not that the item would be closely related to “PFE”. This may be because the NB “PTV” affects the perception of facial expressions to be more positive than it is. These results indicate that the NB “PTV” affect how facial expressions are perceived, in this case to be more positive. Since the facial items “smile” and “eye contact” do appear neutral in the “PTV”-video, it is likely that the NB “PTV” only affects how facial expressions are perceived, but positive facial expressions do not affect how one perceives the NB “PTV”. The finding that vocal expression

is closely intertwined with facial expression has also been found in other studies (Ekman, 1993; Juslin et al., 2018).

Another possibility for this outcome is that the actors struggle with having a positive tone of voice without also showing signs of positive facial expressions. Because the actresses have high consistency in how they are perceived on the other items, it does seem that the training has been sufficient, and that the manipulation of NBs have been successful. This can mean that

“Overall positive impression” showed that the videos “PBM”, “PFE” and “PTV” induced a more positive impression than the videos which expressed neutral NBs. Earlier studies have also found that when healthcare personnel show positive micro-NBs such as smiling, eye contact, engaging vocal expression or body language, it is perceived as more positive than neutral NBs (He et al., 2018). The highest rating for “general positive impression” was in the video “PFE”. A natural assumption is that facial expressions are the strongest factor for inducing a positive impression, closely followed by tone of voice. When comparing “PBM” to “NE” it was a significant difference, leading us to conclude that there is a non-verbal difference between the two videos even though they have the same verbal script. The verbal script does not seem to have the same effect on other items or videos.

The results on the item “gesture” showed that the video “PBM” was rated as having the highest levels of gestures compared to other videos, both pre-conditioning and conditioning. It was hypothesized beforehand that the item could be highly significant with “PBM”, because during training the coders were mainly focused on bodily gestures. Other studies may have a broader definition of “gesticulation”, like movement in the entire body; facial expressions, head movements and bodily movements (Shattuck-Hufnagel & Ren, 2018). This thesis findings supports the assumption that “PBM” has more gesture than other NB conditions.

The macro-item “Expressiveness” was rated high in the conditioning videos with one increased NB, while in the videos with neutral NBs the item was not significant. This supports the assumption that the neutral videos where all NBs are decreased are less expressive than the videos with one increased NB. The highest rating was in the video “PBM”, followed up by the video “PFE”. This means that one perceives micro-NBs such as body movement, smiling and eye contact as expressive, but videos that have decreased NBs are not.

The macro-NB “dominance” had significant high ratings when the videos “PBM” and “PFE” were compared to the videos “pretest”, “calibration” and “NE”. The item was rated

highest in the video “PBM”. This shows that the micro-NBs that characterizes “PBM” are perceived as the most dominant. The video “PFE” had also significantly high ratings, which shows that when “PBM” or “PFE” are expressed, it is more likely to appear dominant than when all NBs are neutral. Other studies have also found that body movement and facial expression is an important factor for how dominant they are perceived. Frequent eye contact while talking, more gestures, open body posture, and talking with a loud voice are some of the micro-behaviors that have been reported to occur as dominant (Carney, 2020; Keltner et al., 2003; Larsen & Smith, 1981; Ruben et al., 2017; Vacharkulksemsuk et al., 2016). These results mean that when NBs are decreased, such as they are in the “NE”-video, it is not perceived as dominant.

The post hoc test showed that the pre-conditioning video “introduction” had no significant differences in dominance when compared to the videos “PBM” or “PFE, while the other pre-conditioning videos did. This means that “introduction” is perceived as more dominant than the other neutral videos. This is the only place where the pre-conditioning videos differ in how they are perceived compared to the conditioning videos. Because the neutral videos are consistent with each other on all items except “dominance”, it is likely that the difference is based on the verbal script. The verbal information make it seem more dominant, since the NBs in the other neutral videos are not perceived as a dominant trait.

Within the conditioning videos, the video “NE” was meant to be a neutral video and serve as a point of reference compared to PBM, PFE and PTV. Based on the findings in the results this seem to be successful.

“Attractiveness” was the only item with no significantly high ratings in the ANOVA analysis with videos as the independent variable, and it was the only significant finding when an ANOVA were run to look at the differences between actresses.

The item “attractiveness” was just coded once for each actress, not for each video as the other items were. It is natural to look at how the coders were trained on each item to see if there were any difference. While the four different groups of coders investigated micro- and macro-NBs within facial expressions, tone of voice and body movement, none of the groups investigated how attractiveness should be rated. During the training with Mollie Ruben, she also told the coders that the “attractiveness”-item is very subjective and did not rate this item during the presentation. The coders do not have a common understanding of what attractiveness is, and therefore it has been coded as the individual coder sees fit themselves.

The coders did, however, rate actress 1 as the most attractive. Even though attractiveness is highly subjective, it is also cultural culturally conditioned. All coders were

Norwegians and have the same cultural beauty standards. Actress 1 may meet these standards better than the other two actresses.

Limitations

The codings were all subjective, and one can question the procedure was subjected to bias. When coding, the coders were aware of which NB was increased in the given video. By having this knowledge, it is uncertain if it has affected the coders impression of the acted NB. In further studies, a better design could be coding the videos without knowing which NB was increased. This way, one makes sure the coder is minimally biased in the process. To ensure that the coder is minimally distracted, one could code the visual and auditive information separately.

The codings were all done simultaneously, so it is unknown if one item affected how the coder rated the others. When the coder rated the item “expressiveness”, did this affect how he/she perceived general positivity?

When coding, one could also use more accurate ways to code the different items, such as a code log. This can be a possible way to prevent bias. This depends on what role the coders are intended to have; is the coder supposed to code micro- and macro-NBs from a coding log which has all items clearly defined, or should the codings be based on the coder’s impression rather than a defined NB?

It is also possible to use already proved reliable and valid instruments to code the items. There are for example studies that have investigated vocal expression that have used instruments to measure high and low pitch (Scherer et al., 2005). However, even though there already are several acknowledged ways to measure and code NBs already (Scherer et al., 2005), these have not been used to study isolated micro-NBs. Using a new way to code opens up for new discoveries (Blanch-Hartigan et al., 2018; Rosenberg & Ekman, 2020). Since there are few other studies that investigate isolated micro-NBs, the known instruments may not be a good fit.

The actresses had a significant difference amongst them based on attractiveness, and one does not know how that might affect the participant in the mother study. All actresses were females, and based on several findings it has been shown that the sex of healthcare personnel affects the patient’s pain tolerance (Daniali & Flaten, 2019).

Study 2: Online questionnaire

Respondents

Respondents were between the age of 15-52 years old, $M = 25.34$, $SD = 8.22$. There were 100 responders in total, but only 79 are included because of data-exclusion criteria (see data screening). There were 53 women, and 26 men in total. 1,3% have completed primary school, 11,4% have finished high school and 20,3% have finished a one-year study at university. The majority of 49,4% have a Bachelor's degree, and 17,7% have completed a Master's degree or a Doctorate.

To be included in the online questionnaire the respondents must have an internet connection and understand English. People on other campuses than Dragvoll in NTNU Trondheim, such as Gløshaugen, Tunga or Øya were excluded from this pilot study because the mother study targeted these students. The pilot study should not intervene with the mother study. Coders are also excluded from the questionnaire since they are too familiar with the conditioning video and are considered biased.

Since the questionnaire does not register any information besides the actual submission of the questionnaire, it is impossible to know if there have been any dropouts during the completion of the questionnaire. No-one has wished to withdraw their participation after submitting the form.

Measurement, equipment, and instruments

We used nettskjema.no for the questionnaire, which is a secure site made by the University in Oslo to conduct online questionnaires.

The questionnaires consisted of 36 questions in total, divided on 14 subscales and four videos in total. There were four different questionnaires differentiated by the videos, so a respondent would only answer one questionnaire and see one video. This pilot study had 100 respondents in total, 25 respondents for each questionnaire.

Nettskjema.no randomized which of the four questionnaires the respondent would fill out. When one questionnaire got 25 respondents, nettskjema.no automatically redirected newly recruited respondents to other videos so all four questionnaires would get an equal amount of responders.

The scales included in this thesis is a question about hypothetical pain intensity, a BFI-10 questionnaire, and one control question. This thesis excludes the fear of pain scale, questions about online teaching, questions about pain reduction and the PANAS.

Pain intensity

The respondent was asked to imagine a scenario where they severely burned their hand on a stove and answer how much they think it would hurt on a scale from 0-9, where 0 = no pain, 5 = moderate pain, and 9 = worst possible pain. This question serves as the independent variable in the equation.

The Big-Five inventory-10

We measured personality traits with the self-reporting questionnaire Big-Five Inventory-10 (BFI-10). The BFI-10 is based on the Big Five questionnaire and is a cut down version that measures the five-factor model of personality (Rammstedt & John, 2007). The BFI-10 is considered a suitable personality test when personality is not the primary aim (Rammstedt & John, 2007), and has been proven to be a valid and reliable way to measure personality (Aslaksen & Lyby, 2015; Rammstedt & John, 2007). It measures the personality dimensions extraversion, agreeableness, conscientiousness, neuroticism and openness (Aslaksen & Lyby, 2015; Rammstedt & John, 2007).

Neuroticism is the tendency to experience negative emotions such as anger, stress, depression, or low self-esteem. Extraversion is correlated to experiencing positive emotions, and being social and outgoing (Costa & McCrae, 1987). People who score high on conscientiousness tend to be organized and respect norms and social rules (Carvalho et al., 2020). The dimension openness refers to how open a person is to intellectual experiences (e.g. art) and new experiences (Carciolo et al., 2016). High scores in agreeableness predicts that a person is compliant and altruistic (Soto & John, 2009).

Videos

Microsoft Video Editor version 2021.21120.8011.0 was used to edit. Three of the coders, including the author, edited the videos for the questionnaire. Before editing, we chose which bins should be included in the questionnaire-videos. These bins are based on the slices that the coders analyzed for the mother study, and came from the conditioning videos “PFE”, “PBM”, “PTV” and “NE”. The videos presented the analgesic cream Embla, and that the respondent would answer some questions after watching the video. The videos lasted for around 1 minute and 20 seconds. The videos shared the same verbal manuscript but differed in which micro-NB they presented.

Control question

Respondents also had to answer a control question that the coders put in. “What were the side-effects of Embla, presented in the video?”. The respondent could choose either “nausea”, “no known side-effects”, “dizziness”, or “numbness in the affected area”. The video presented that there were no known side-effects to Embla, so this was the correct answer. This control question was to ensure that the responders were attentive throughout the questionnaire.

Procedures

Study 2 has been planned and executed by the coders from beginning to end. The supervisor had a consulting role when the coders had a question but did not contribute to how we designed the study. The idea was that the coder himself/herself should learn the research process and has therefore come up with the research question, research design and execution of the entire project by themselves. Some of the coders grouped together to make the online questionnaire, so it would be easier to get enough participants.

The questionnaire was distributed from 28.02.22 – 25.03.22 by an online link through snowball method. Social media (Facebook and Facebook Messenger) were the main sampling method, as well as handing out flyers. The questionnaire took approximately 5-10 minutes to fill in.

Respondents were told that the questionnaire was a research project investigating of the effects of expectations on hypothetical pain conducted by bachelor students at NTNU. The first page of the questionnaire was the Informed Consent Form (ICF). Respondents could only access the questionnaire if they consented to the ICF.

The respondent would first fill out the BFI-10, before watching the conditioning video. After the conditioning, the respondent was asked to imagine burning their hand severely on a stove and how intense they think this pain would be. The last question the respondent had to answer, was a control question that the coders put in to check for the respondents attention throughout the questionnaire.

Data screening

One of the coders transported the questionnaire data set from an Excel file to an SPSS file. The responders had to answer all of the questions in order to be able to turn in the questionnaire, and therefore missing data has not been an issue.

Respondents who answered wrong on the control question or used more than 25 minutes to answer the questionnaire were excluded. By excluding these respondents, I made

sure that the respondents I included had paid attention throughout the entire questionnaire 20 respondents in total were excluded.

Before being able to use the dataset in any analysis, five new variables were made: extraversion, agreeableness, conscientiousness, neuroticism and openness. The variables were based on the answers from the BFI-10 (Rammstedt & John, 2007).

Before executing the process analysis v.4.1. by Andrew F. Hayes, I had to check for assumptions by linear regression. This was to check for normality that the process analysis is a fitting analysis, and the assumption for normality was met.

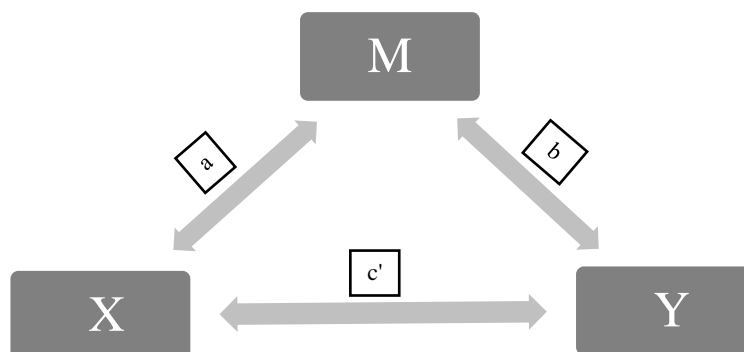
Statistical analyses

IMB SPSS statistic version 27 were used to carry out the analysis for the online questionnaire, and an alpha level of .05 were used for all tests.

To investigate the mediational relationship personality dimensions have on the relationship between NBs and hypothetical pain, I used a linear regression analysis macro process version 4.1 by Andrew F. Hayes. Model 4 was used, where hypothetical pain intensity served as the y-variable and video-NBs were the x-variable. Model 4 is a mediating model which allows for multiple mediators between X and Y (Hayes, 2012). Figure 4 demonstrates how the model 4 investigates relationships. By doing a macro analysis it allows to investigate multiple relationships at once, and investigate the multiple mediational variables effects. The macro process has been told to be a valid and reliable analysis (Hayes & Rockwood, 2017).

Figure 3

Mediational regression analysis, model 4.



Note. M = personality dimensions, variable Y = hypothetical pain intensity, variable X = NBs, a = relationship between X and M, b = relationship between Y and M, c' = relationship between Y and X. Model 4 investigates relationship a, b and c'.

Ethics

This pilot study has been conducted according to The Declaration of Helsinki. The online questionnaire does not register any personal information and therefore we did not need to apply for ethical approval of any kind.

Results

Table 3

Descriptive for items in Study 2

Items	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
Video	80	2,50	1,11	1,00	4,00
Pain intensity	80	3,89	1,59	0,00	9,00
Extraversion	80	3,38	1,12	1,00	5,00
Agreeableness	80	3,34	.80	1,00	5,00
Neuroticism	80	3,13	1,11	1,00	5,00
Openness	80	3,60	.93	1,00	5,00
Consciousness	80	3,63	.86	1,00	5,00

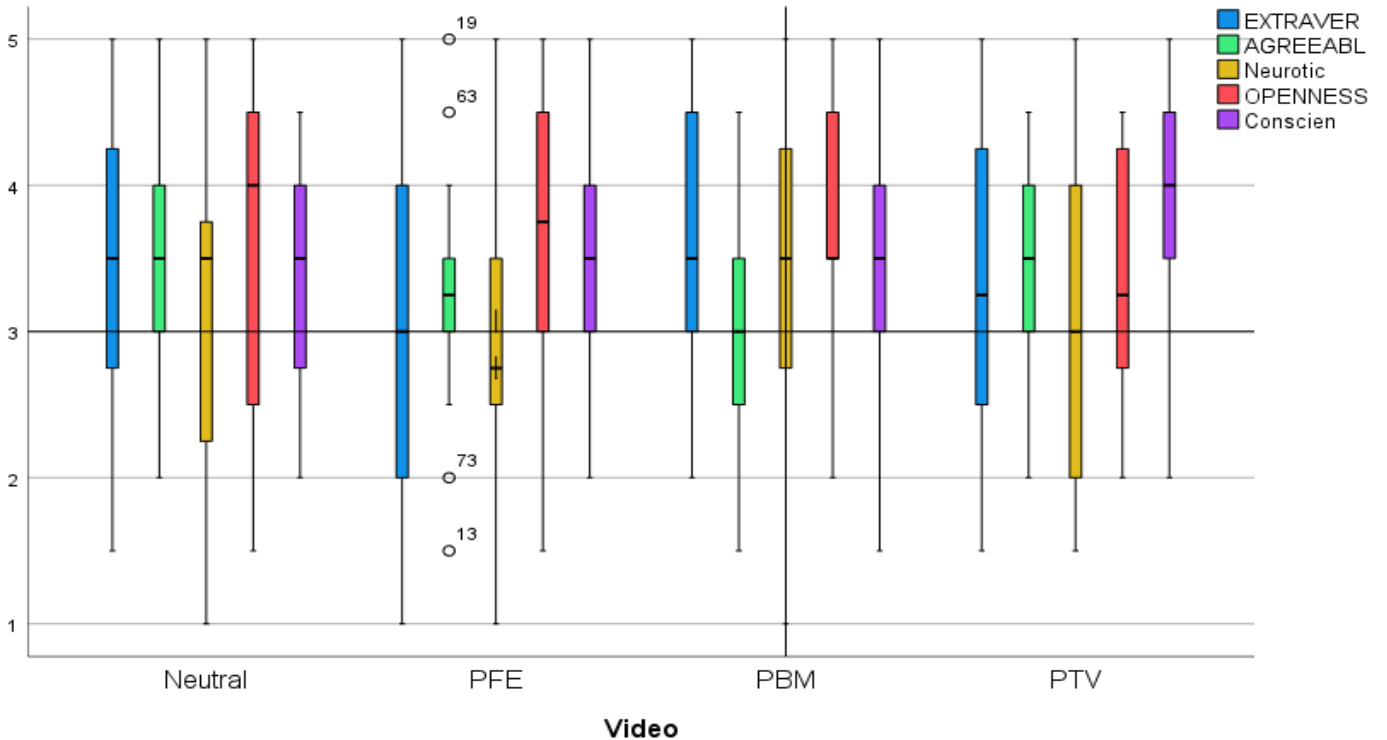
Note. *N* = number of videos, *M* = mean, *SD* = standard deviation, *Min* = minimum rating, *Max* = maximum rating.

The analysis showed when pain intensity is the outcome variable, there was not a significant result, $R = .16$, $R^2 = .03$, $F(8,71.00) = .23$, $p = .98$. When looking at the total effect model with pain intensity as the outcome variable, it was not a significant result, $R = .09$, $R^2 = .01$, $F(3,76) = .2132$, $p = .89$.

An omnibus test of total effect of X on Y, where X serves as video-type (PBM, PFE, PTV, NE) and Y serves as hypothetical pain, showed no significant findings, $R^2\text{-change} = .01$, $F(3, 76) = .2132$, $p = .89$. The direct effect of relationship c' showed no significant relationship, $R^2\text{-change} = .06$, $F(3, 71) = .1283$, $p = .94$. There was no significant indirect effect on relationship c' neither. See figure 4 for a visualization of the descriptive statistics.

Figure 4

A boxplot showing how the different personality dimensions are compared to each other, based on the videos in the questionnaire



Note. The boxplot is made and retrieved from SPSS. Extraver = extraversion, agreeabl = agreeableness, neurotic = neuroticism, openness = openness, conscien = conscientiousness.

Discussion

No significant relationship between NBs and hypothetical pain was found, neither when looking at the direct nor indirect effects. This suggests that micro-NBs have no effect on hypothetical pain, or how personality dimensions mediate the relationship between them. Earlier studies have shown that personality indeed has a mediational relationship between pain and macro-NBs (Darragh et al., 2014; He et al., 2018). However, there are also studies that support this thesis' finding that personality does not mediate the perception of NBs. This has been proven before (Aslaksen & Lyby, 2015; Valentini et al., 2014). Although these studies support my findings, it is important to emphasize that they were based on a) macro-NBs and b) both Valentini et al. (2014) ($n = 27$) and Aslaksen and Lyby (2015) ($n = 111$) had low sample sizes. A low sample size adversely affects the reliability and validity of a study,

and therefore I suggest further studies of the relationship between micro-NBs, pain intensity and personality dimensions even though there were no significant findings in this thesis.

If further findings support the results of this pilot study, this strengthens my conclusion that personality traits of the patient are not decisive in how they perceive the healthcare personnel's NBs. If one standardizes certain NBs to increase a placebo effect, one can use the same NBs and methods regardless of the patient personality.

This thesis findings have several limitations, and therefore it is likely that the study design has been problematic and affected the results. The field of psychology is still debating the role of personality in perception of NBs, and it seems there is still much to discover within this area.

Limitations

There are several limits to the study design of Study 2. First of all, it has a low sample size which is a poor representation of the general population. Doing an online survey when studying micro-NBs is far from ideal, and there is a high possibility that the respondent was not fully attentive during the video. It is impossible to know the surroundings of the respondent, and there are many external factors that are out of control. Micro-NBs are subtle, and when a respondent is not fully attentive it is unlikely that the video has any sort of effect. The video used in this questionnaire is also very short. This was intentional to shorten the time of the questionnaire in total, to ensure that the respondents were as attentive as possible throughout the questionnaire without getting tired, bored or distracted. However, the video is probably too short to induce any effect based on the expressed NB.

Self-reporting hypothetical pain is highly subjective, and it is difficult to measure imagined pain. It is common to self-report pain, but even reporting physical pain brings a lot of limitations (Craig, 2009). Most people have experienced burning their hand in some degree, but their assumptions about how intense the pain would be is strongly colored by their earlier pain experiences. It is therefore difficult to compare the results: one does not know how much pain the respondent imagined.

The use of BFI-10 is also problematic. Using two items per scale gives no good assessment of the respondent's personality. The BFI-10 is thought to be a good and valid way to measure personality dimensions when personality is not the primary aim, but in this study, personality plays a big role. One should use a longer personality questionnaire such as the BFI-44.

In further studies it would be recommended doing this experiment in a lab to control as many external factors as possible. In this case one should stay away from hypothetical pain and induce a small amount of pain or some other sensory impact.

Conclusion

The purpose of this thesis was to investigate how micro-NBs can be perceived and how they affected perceivers. The studies have demonstrated that there are significant differences between the different micro-NBs we investigated, and that the videos were perceived differently when one NB was increased as opposed to videos where all NBs were decreased.

Study 1 tested the reliability and validity of the videos used in the mother study and we strengthened the assumption that the manipulated NBs express exactly what they are thought to. We also investigated the relationship between macro-NBs and micro-NBs. ANOVA analyses were used to compare the means of each video within pre-condition phase and conditioning phase, and ratings across actresses.

The video “PBM” were characterized by the item “gesture”. In “PFE” the coders rated the items “smile” and “eye contact” significantly higher than compared to any other video. When looking at the video “PTV” it had the most significant relationship with the item “PTV”. The micro-item “PTV” were also significant within the “PFE” video, which may mean that when a person perceives positive facial expressions, one also perceives the voice as more positive. The “NE”-video had no significant findings. These results support the assumption that the conditioning videos *differ from each other* and that the pre-conditioning and conditioning videos *differ in how the NBs are perceived*.

The macro-item “positivity” had high significant ratings for “PFE”, “PBM” and “PTV”, which means that positive micro-NBs are perceived as more positive than neutral videos. “Expressiveness” was also rated significantly high for all videos with one increased positive micro-NB. This leads to the conclusion that by either smiling, having frequent eye contact, gesturing or having positive tone of voice, a person will be perceived as more expressive than if the micro-NBs are all neutral. “Dominance” had significant findings when compared to the conditioning videos “PBM” and “PFE”. By gesturing or expressing facial expressions this is perceived as more dominant than having a positive tone of voice or expressing neutral NBs.

Study 2 tried to investigate how personality dimensions mediate the relationship between acted NBs and hypothetical pain intensity through an online questionnaire. The questionnaire consisted of a BFI-10 questionnaire, a question about hypothetical pain, a conditioning video expressing either PBM, PFE, PTV or a neutral video. The study had no

significant findings when looking at the mediating relationship, neither was there a significant direct relationship between NBs and hypothetical pain intensity.

Both studies investigated the perception of isolated micro-NBs and explores how the NBs differ from each other. They show that the perception on micro-NBs is highly dependent on situational factors, and since micro-NBs are subtle it is important to reduce factors that can be distraction. This thesis is one of the first papers that tried to cover the knowledge-gap between on how isolated micro-NBs are perceived, but there are still many aspects of this to be explored. Further studies should focus on continuing examine how micro-NBs affect the respondent/ participant/ patient, and see if personality has a mediational role between NBs and pain.

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