



Original experimental

Effects of validating communication on recall during a pain-task in healthy participants



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HIGHLIGHTS

- Validating/invalidating communication has an effect on memory recall.
- This effect is not due to decreases in interference (affect and catastrophizing).
- Instead, communication moderates the effects of pain catastrophizing on recall.

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ABSTRACT

Background: Increasing recall of instructions and advice in a pain consultation is important, since it is a prerequisite for adherence to treatment recommendations. However, interference due to pain-related distress may result in poor recall. Whereas there are some indications that recall can be increased by empathic communication that reduces interference, this interesting possibility remains largely untested experimentally.

The current experiment aimed at studying effects of empathic communication, and more specifically validation, on recall during a pain test and possible mediators and moderators of this effect.

Method: Participants received either validating ($N = 25$) or invalidating responses ($N = 25$) from the experimenter during a pain provoking task, followed by self-report measures of interference (affect, situational pain catastrophizing) and recall (accurate and false memories of words).

Results: As expected, the validated group exhibited higher accurate recall and less false memories following the pain test as compared to the invalidated group. This was partly due to the effect of interference being counteracted by moderating the relationship between pain catastrophizing and recall.

Conclusion: These novel results suggest that validating communication can counteract interference due to pain catastrophizing on recall, at least in a controlled experimental setting.

Implications: Good communication by health professionals is of utmost importance for adherence to pain management. The current results expand our knowledge on the effects of pain communication by establishing and explaining a clear link between empathic communication and recall, highlighting the role of pain catastrophizing.

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1. Introduction

Difficulties with recall are common among people with pain [1]. Since recall and forgetting is linked to treatment adherence as well as non-adherence [2], this problem can have far reaching consequences. In other words, communicating efficiently is important so that patients can recall information, which in turn is a prerequisite for treatment adherence [3].

A novel approach to do this has been tested in the area of bad news consultations. Two experimental studies show that an empathic communication style [4,5] increased recall of a video vignette as compared to non-empathic communication, when delivering bad news. The authors concluded that this is likely due to empathic communication counteracting interference from distress that bad news itself bring about.

People in pain also experience potential interference of recall. For instance they are often distressed [6]. Also, ruminations in the form of catastrophizing [7] seem to adversely affect recall [8] and can thus be seen as a form of interference. If the same principles apply for pain as with bad news consultation, empathic

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communication can affect recall by counteracting interference due to distress and pain catastrophizing [9].

Defining empathic communication is more difficult than it may seem at first glance. There are many definitions of empathy, which in turn predicts different outcomes [10]. It is therefore important to operationalize empathy in a way that is fitting for the pain field. The definition of empathy used in the studies on bad news consultation [4,5] is akin to emotional reassurance, which in turn is a predictor for detrimental outcomes for pain patients [11], and is thus an untenable operationalization of empathy for the pain field. The pain literature offers an alternative suggestion in using validation [12–14] for this purpose instead. Validation is defined as the ability to convey that the recipient's experience is understandable, legitimate and normal [13,15,16], and thus adheres to a definition of empathy that in turn predicts favourable clinical outcomes [10].

The purpose of this study is to conduct an experiment that tests whether validation [15] has an effect on recall as compared to invalidation [15] on people subjected to a task that causes acute pain and whether this effect is due to interference being counteracted. As can be seen in the models in Fig. 1, this can be achieved two ways. Either the effect of communication is mediated by changes in interference, or communication moderates the effects that interference has on recall.

2. Methods

2.1. Participants

52 participants completed the experiment, two of which were excluded from analyses leaving a final sample of 50 participants of working age, mostly consisting of university students, see Table 1 for a more thorough walkthrough of the demographic properties of the participants. We included people of working age (18–65), fluent in Swedish, without hearing impairment and with no prior affiliations with the experimenter. Participants were randomly and blindly assigned to one of two conditions, ensuring that the groups were balanced with respect to the occurrence of a pain problem. A pain problem was defined as a recurring pain problem in head, abdomen, back, neck or shoulders that has meant a significant hindrance in an important area of life during the last six months. The trials were conducted in the psychological laboratory of Örebro University. The protocol of this study was examined and approved by the regional ethics committee.

2.2. Materials

2.2.1. Pain test

For the pain test, participants' task was to hold a bucket filled sand (1.6 kg for women; 2.4 kg for men) with a straight arm for as long as they can, while listening to a distressing sound. This procedure was repeated four times (i.e., four trials) with short breaks in between. This pain provoking task has successfully been used in previous experimental protocols [17] and proved to work as a painful task for the purpose of this experiment (see Table 2 for pain ratings).

2.2.2. Video recorder

Each session was video recorded, using a Panasonic AG-AC90AEJ, mounted on a tripod.

2.2.3. Measurements

2.2.3.1. Main dependent variable (delayed recall). Following the pain tests, participants were presented with a prerecorded list of 10 words via a loudspeaker next to the participant, for a translation of the word lists, please see the online supplement. This was followed by a 15 s long distracting signal, after which participants

were prompted to recall as many words as possible (immediate recall). Upon completion of the pain test, with an approximate delay of seven minutes since the fourth word list, participants were, without any prior instructions, prompted to recall (delayed recall) as many of the words from all the word lists as possible (40 words in total). The main dependent variables are (1) the total number of words accurately recalled and (2) the total number of words falsely recalled during delayed recall.

In total we administered four different prerecorded word lists, one for each test trial, consisting of 10 words each. Each word list consisted of two words that were pain related (such as burning, throbbing), two words that were related to activity (such as training, lifting), two words that were related to passivity (such as pause, resting), two words that were emotionally positive (such as happiness, pleasure) and two words that were unrelated to the other categories (such as computer, always). Prior to the experiment, the word lists were tested on a small independent sample of students ($N=20$), to ensure equivalence of the different lists.

2.2.3.2. Pretest.

2.2.3.2.1. PCS trait. The pain catastrophizing scale [7] is a 13 item numerical scale ranging from 0 to 52. The pain catastrophizing scale measures the tendency to catastrophize about pain and has shown good validity in predicting various important variables such as pain [7], distress [18] and disability [19]. The scale averages 21.99 in a clinical sample and 16.56 in nonclinical samples [20]. Cronbach's $\alpha = .865$ in the current sample.

2.2.3.2.2. PANAS trait. The positive and negative affect scale [21] is a 20 item numerical scale, divided into two independent subscales, positive affect and negative affect. The scores of the two subscales ranges from 0 to 40. In the dispositional version of the scale participants are prompted to rate how much of an affect they generally experience. Examples of positive items include "Happiness" and "Curiosity", while examples of negative affect entails items such as "Hostile" and "Sad". In this sample Cronbach's $\alpha = .907$ and .769 for the positive and negative subscales respectively.

2.2.3.3. Experimental assessments.

2.2.3.3.1. Pain rating. For state pain ratings we used a single-item 0–10 numerical scale with verbal anchors at the end-points (not at all; extremely).

2.2.3.3.2. PANAS situational. For the post-pain tests a modified version of the positive and negative affect scale, was administered. This prompted participants to report the level of affect they were experiencing during the latest pain trial. The purpose of this measurement was to measure situational affect throughout the experiment. 10 items were presented on a five point numerical scale with verbal anchors (very little or none at all; a little; moderately; quite a bit; very much) at each possible step of the scale. Cronbach's α varied between .768 and .909 and, .618 and .833, for the positive and negative subscale respectively.

2.2.3.3.3. Situational pain catastrophizing. Situational pain catastrophizing was measured with three items from the Pain catastrophizing scale, "I keep thinking of other painful events.", "I can't seem to keep it out of my mind.", and "I keep thinking about how much it hurts." The items were picked with several considerations in mind. First, we wanted items that had a high level of internal consistency as well as a good correspondence with the PCS scale, which is why we selected items from the same subscale of the PCS. Second, we wanted items that were likely to be related to interference, making rumination the logical subscale. Third, we aimed for items that were credible in the specific experimental context. Items were rated on a numerical scale from 0 to 10 with verbal anchors at endpoints (not at all; extremely much). Throughout the experiment α varied between .606 and .824.

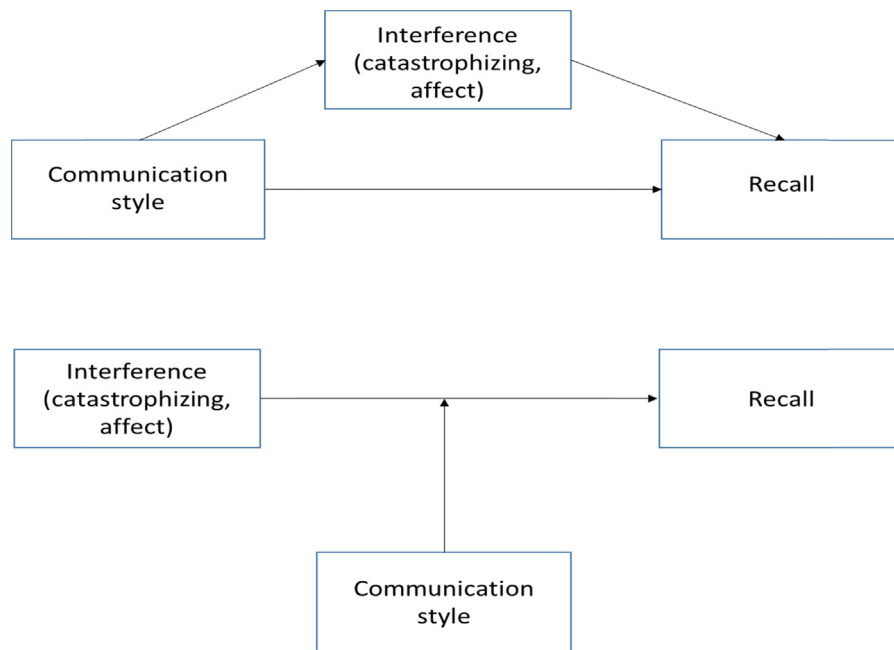


Fig. 1. Theoretical model illustrating the hypothesized influences of communication style on recall. The above figure outline that communication style can be mediated by interference. The lower section of the figure illustrates that communication can moderate the effect of interference on recall.

Table 1

Descriptive characteristics of participant pre-test values (*M* (sd), %).

Participant characteristics	Validation group	Invalidation group	<i>t</i> -Value/ χ^2 , (<i>p</i> -value)
<i>N</i>	25	25	
Age	24.5 (1.03)	24.16 (1.00)	.236 (.434)
Gender	54% female	44% female	.494 (.482)
Recurring pain	73%	80%	.461 (.417)
Students	92%	96%	1.336 (.513)
Pain catastrophizing	11.73 (7.83)	15.6 (6.48)	−1.919 (.061)
Positive affect	24.12 (6.31)	21.64 (6.33)	1.398 (.168)
Negative affect	10.6 (5.37)	9.43 (.94)	.677 (.502)

Table 2

Descriptive statistics of experimental variables, presented in group means.

Ratings	Group	Time point 1	Time point 2	Time point 3	Time point 4	<i>F</i> value (df): time, condition, interaction
Pain catastrophizing	Validation	11.00 (5.02)	10.12 (6.07)	10.64 (6.63)	9.48 (7.01)	.545 (2.21)
	Invalidation	9.00 (5.97)	10.36 (5.89)	10.56 (6.55)	10.96 (7.06)	.492 (1)
Positive affect	Validation	17.28 (6.91)	16.72 (7.68)	15.08 (8.41)	14.20 (8.26)	4.579 (2.215)* $\eta^2 = .09^{**}$
	Invalidation	17.56 (7.06)	13.88 (8.03)	13.36 (8.24)	10.96 (7.65)	12.346* (2.38) $\eta^2 = .205$
Negative affect	Validation	7.68 (4.86)	6.48 (4.65)	6.60 (5.61)	6.32 (6.16)	.772 (1)
	Invalidation	6.88 (3.71)	6.28 (3.55)	6.40 (4.79)	7.04 (5.44)	.794 (2.4)
Pain	Validation	3.88 (2.20)	4.63 (2.48)	5.20 (2.77)	5.04 (2.86)	1.122 (1.70)
	Invalidation	3.91 (2.16)	4.96 (2.24)	5.17 (2.50)	5.30 (2.54)	.305 (1)
Immediate accurate recall	Validation	4.12 (1.17)	4.56 (1.36)	5.04 (1.24)	5.04 (1.24)	.298 (1.7)
	Invalidation	3.96 (1.27)	5.08 (1.27)	5.32 (1.52)	5.40 (1.38)	16.932* (2.3) $\eta^2 = .261$
						.002 (1)
						.337 (2.3)
						13.01* (2.77) $\eta^2 = .231$
						.035 (1)
						.675 (2.77)

Note. Standard deviations are parenthesized.

* $p < .05$. η^2 = partial eta squared. Time point 1 represent results prior to application of the independent variable.

** Confidence interval (95%) = .0–.24.

2.3. Independent variable: (in)validating communication

For a detailed description of validation see [13]. Validation and invalidation has successfully been used in previous experimental protocols [16,17]. In this experiment the experimenter would validate or invalidate the participants' expressed experience of the

trials. Common topics for this were the bodily sensation of pain, the stress of being in an experiment and the wish to perform well. A common response from a participant was that they felt a lot of pain and that this caused disappointment in that they did not hold the bucket long enough, according to their own expectations. A validating response to this could be "That's a really common response.

Many people feel surprised over the level of pain that the task brings about. When something looks easier than it is, it is often hard to live up to one's own expectations." An invalidating response to this statement could be "That's strange. Nobody else describes their experience this way. No wonder you're disappointed."

2.4. Procedure

After completing screening and pretest, participants were randomized to either validating or invalidating communication and thus eligible to book an experiment. Sessions with the validation procedure took place on different days from sessions involving the invalidation procedure so that the experimenter could commit to the communication style more easily. Days with validation and invalidation were intermixed with each procedure taking place every other day.

Upon arrival, participants were greeted and informed in a neutral way as to not affect the experiment. Upon start, the experimenter demonstrated the pain task, then stated "This test consists of holding this bucket with a straight arm for as long as you can. When you cannot hold it any longer, put the bucket down. I will be in the adjacent room and time the duration. Then I will ask you to complete a questionnaire about your experience. Following that, you will hear instructions for yet another test in the speaker right above the desk you are sitting at. We will then have a short break that will allow your muscles to recover, during which I will ask you a couple of questions. We will repeat this test a couple of times today."

The participant would then engage in the pain task (four trials) (see Section 2.2). Following the pain tests participants rated the experimental tests (see Section 2.2.3), followed by an immediate recall test (see Section 2.2.3) and finally a short validating or invalidating conversation (around 3 min) with the experimenter. About 7 min after having completed the pain task, participants were prompted to a free recall task (see online supplement). See Fig. 2 for a graphic representation of the timeline.

2.5. Statistical analysis

All variables used as dependent variables were visually examined for normality. All violations were within the acceptable boundaries specified by Hayes [22] for use in mediation and moderation analyses. The procedure used in ANOVA was also considered to be robust for violations of normality [23]. For repeated measurements a Greenhouse Geisser correction was used to compensate for violations of the sphericity assumption. For the correlation table we used Pearson correlations.

We used two GLM MANOVA repeated measures of the post-pain measurements, with the four experimental time-points as within subject variable and communication style as between subject variable. The first MANOVA consisted of the dependent variables conceptualized as interference (situational pain catastrophizing, situational positive/negative affect). The second MANOVA consisted of the pain and recall immediately following the pain tests (see Table 2).

Delayed recall and false memories were analyzed with a MANCOVA with communication style entered as a factor. Baseline values of Pain catastrophizing and Positive and Negative affect were entered as covariates in the MANCOVA.

Mediation analysis was conducted using interference variables (situational catastrophizing, positive/negative affect) as mediators with the baseline values for the mediator entered as a covariate and the last measurement of the experiment as the mediator. In the mediation analysis communication style was used as independent variable and delayed recall/false memories as the dependent variable.

Moderation analysis was conducted with the interference variable (situational catastrophizing, situational positive/negative affect) as independent variable, delayed recall and false memories as dependent variables, and communication style as moderator.

All analyses were conducted with SPSS 23. Analyses of mediation and moderation was conducted with the plugin program PROCESS [24] for SPSS.

For each of the analyses trait measures (Pain Catastrophizing Scale, PANAS) were entered as covariates and included or rejected on the basis of their contributions to the model. Every analysis was conducted on the originally assigned groups (validation $N=25$, invalidation $N=25$).

3. Results

3.1. Participants

A total of 50 participants finished the experiment and were eligible for inclusion in the analysis. The characteristics of the sample are provided in Table 1. The participants were a young sample of predominantly students that for the most part had some form of recurring pain problem. Males and females were nearly equally distributed across groups. In general, scores were low on pain catastrophizing as compared to a normal student sample [20,7] and average on negative affect and positive affect, as compared with healthy individuals [21]. One participant provided unusable ratings for the state situational interval and was thus only included in the pre–posttest analysis.

3.2. Manipulation check

Two certified clinical psychologists that completed an advanced course in DBT rated a randomized and blinded sample (20% of the participants) of the interactions and categorized it as either validating or invalidating. The ratings were 100% concordant with assigned group as well as with each other.

3.3. Is there a direct effect of communication style on recall after the experiment?

3.3.1. Delayed free recall

There were significant and large differences between the two groups in accurate memories ($F(1, 48)=10.60$, $p<.05$; Cohens $d=.99$) and false memories ($F(1, 48)=12.75$, $p<.05$; Cohens $d=1.62$) during the delayed free recall test. As illustrated in Fig. 3, the validation group ($N=25$) accurately recalled a mean of 8.64 items ($SD=2.56$, $CI=7.72-9.83$) from the list of 40 words, while the invalidation group ($N=25$) recalled a mean of 6.22 items ($SD=2.65$, $CI=5.08-7.23$). The validation group ($N=25$) had a mean of .60 ($SD=.82$, $CI=.07-1.14$) false memories, whereas the invalidation group ($N=25$) had a mean of 1.92 ($SD=1.51$, $CI=1.32-2.439$) false memories on average.

3.4. Is there an indirect effect of communication style on recall through situational pain catastrophizing and affect?

For an overview of the relationship between all the measured variables across different timepoints, please consult the online supplement Table 4. The development of situational pain catastrophizing shows a significant interaction between time and experimental condition ($F(2,22)=4.579$, $p<.05$, $\eta^2=.09$). Situational pain catastrophizing for validation ($N=25$) had a downward trend while for invalidation ($N=25$) it increased across trials. This suggests that situational pain catastrophizing developed differently over time, depending on communication style. As can be seen in Table 2, positive affect, negative affect, pain and, immediate recall

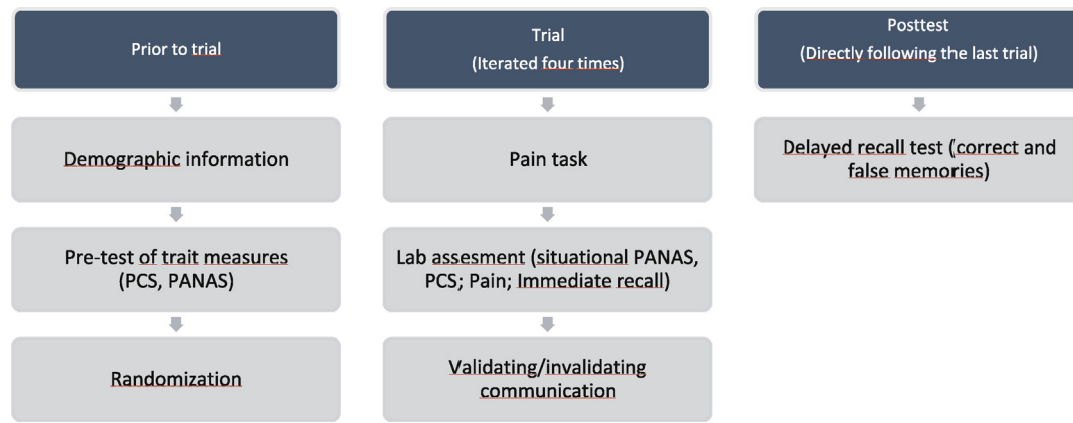


Fig. 2. Graphic representation of the sequence in the experiment.

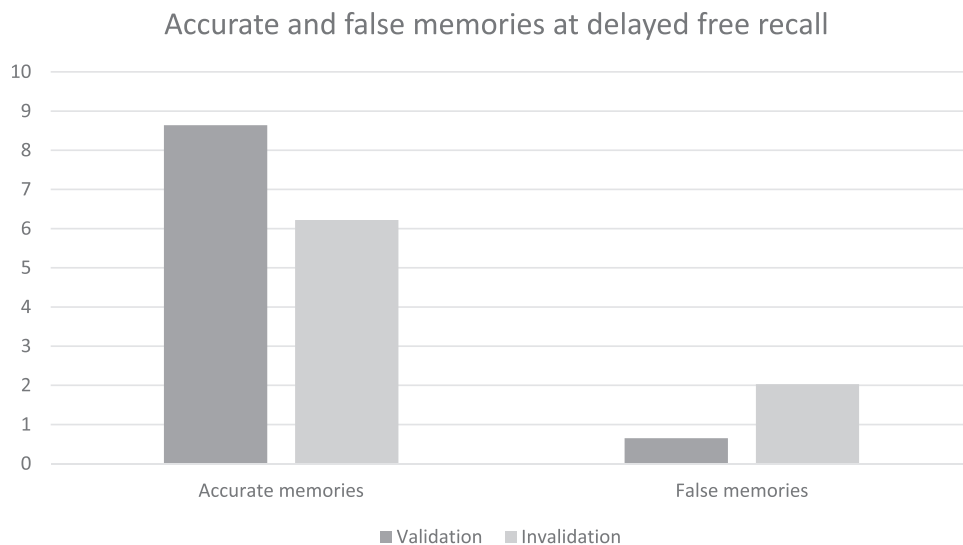


Fig. 3. Post-experimental difference of delayed free recall number of items (max 40).

do not reveal any significant interaction between time and experimental condition. For positive affect there is an independent effect of time, with level of positive affect declining over time for both groups. For pain and immediate recall there is an independent effect of time, with both variables increasing for both groups over time. For immediate recall this indicates a certain training-effect.

3.4.1. Mediation analysis

The independent variable, dependent variable and mediator are specified in Fig. 4. Since the Repeated Measures-ANOVA did not reveal any effects on positive or negative affect, these two variables were not analyzed as potential mediators. Analyses ($N = 50$) reveal significant ($p < .05$) effects on both situational pain catastrophizing, accurate, and false memories of mode of communication. There is however a lack of significant ($p > .05$) effect between situational pain catastrophizing and the memory measurements, suggesting that the independent variable affects both the mediator and the outcome variable independently of one another.

3.4.2. Is the effect of affect and pain catastrophizing on recall altered by communication style?

As shown in Table 3, there is a significant interaction between communication and situational pain catastrophizing on accurate memories. Analysis of conditional effects reveals that the effect of pain catastrophizing on accurate recall is significant for

participants in the invalidating condition alone ($B = -.19$, $p \leq .05$, $CI = (-.31, -.06)$).

4. Discussion

This extends the knowledge on how recall is affected by communication. Most previous research has focused on information [25], rather than communication style. The studies examining empathic communication for bad news consultation [4,5] use a procedure where recall is tested on video vignettes rather than interactions. In this experiment, we tested recall based on each participant's interaction. Not only did data reveal an effect on recall, but also the effect size is also large. These data suggests that people who were validated did not only recall more, but they also recalled more accurately. If these findings are compared to the smaller effects found in the studies described above, there may be important differences between the study designs explaining this, such as level of participation and how communication is operationalized.

Concerning level of participation, there may be a difference in how people recall after experiencing communication as opposed to watching vignettes of other people. In all likelihood, direct experience will create more vivid results. Another difference between the experiments is how communication is operationalized. The studies on bad news operationalize empathic communication as for instance supportive statements reassurance [5]. While this is likely

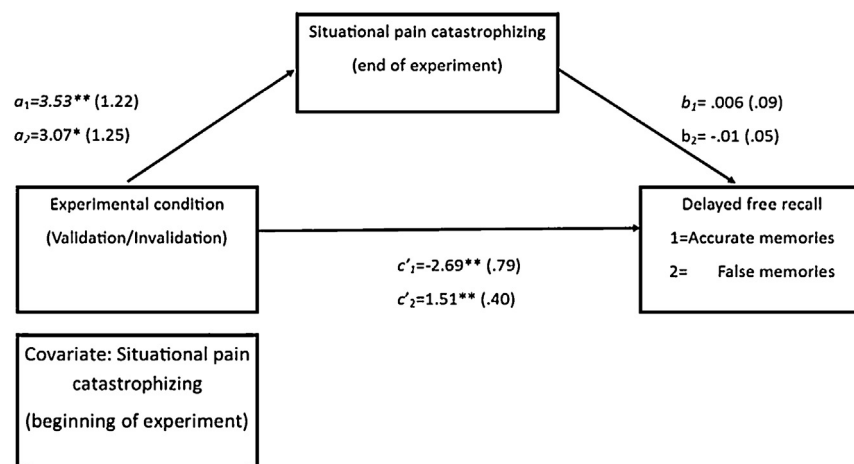


Fig. 4. Mediation model of direct and indirect effects of experimental condition on delayed recall. Values (unstandardized β) annotated with ₁ represents the effects on accurate memories. Values (unstandardized β (Se)) annotated with ₂ represents the effects on false memories. * $p < .05$, ** $p < .01$. $R^2 = .65$ and $.24$ for accurate memories, and $.66$ and $.27$ for false memories.

Table 3

Conditional effects of interference by communication style on post-experimental recall.

	R^2	F (df 6, 43)	MSE	β	t	LLCI	ULCI
Accurate memories	.33**	3.46	6.09				
Communication				-.30	-.23	-.25	1.85
PC				.26	1.58	-.02	.53
Communication $\times$ PC				-.22*	-2.15	-.40	-.05
Accurate memories	.25**	2.45	6.73				
Communication				-2.06	-1.77	-4.01	-.11
NA				.03	.16	-.31	.37
Communication $\times$ NA				-.08	-.60	-.31	.15
Accurate memories	.33**	3.51	6.06				
Communication				-4.00**	-2.99	-6.25	-1.75
PA				-.11	-.75	-.01	.30
Communication $\times$ PA				.14	1.55	-.01	.30
False memories	.36**	3.81	1.50				
Communication				2.20**	3.44	1.13	3.28
Catastrophizing				.12	1.44	-.02	.26
Communication $\times$ PC				-.08	-1.61	-.17	.00
False memories	.37**						
Communication				1.63**	2.83	.66	2.59
Negative affect				.01	.12	-.16	.18
Communication $\times$ NA				-.05	-.68.	-.17	.07
False memories	.38**	4.12	1.46				
Communication				.83	1.19	-.34	2.00
Positive affect				-.13	-.48	-.16	.09
Communication $\times$ PA				.05	-1.42	-.11	.01

Note. β = unstandardized beta coefficient, MSE = mean standard error, LLCI = lower limit confidence interval, ULCI = upper level confidence interval, PC = pain catastrophizing, NA = negative affect, PA = positive affect, CI = 95% bias corrected.

* $p < .05$.

** $p < .01$.

For all models pre-experimental values of Pain Catastrophizing scale and PANAS was entered as covariates. Validation $N = 25$, Invalidation $N = 25$.

adequate for breaking bad news, in the pain field it is called emotional reassurance, and is seen as harmful rather than helpful [26]. One reason is that some patients may experience reassurance as belittlement of their experiences [26] causing it to backfire [27]. Other studies shows that emotional reassurance has detrimental effects such as decreased rates of return to work and reduced adherence, possibly since it does not facilitate challenging what maintains the problem [11].

This experiment uses validation and invalidation to operationalize empathic communication. This allows for a combination of strong empathic support with an equally strong and compassionate challenge towards the dysfunctional patterns of behaviour that can maintain a pain problem [15]. This means circumventing the inherent flaws of affective reassurance, while maintaining a compassionate communication. Using validation also solves another

issue that is frequent when assessing communication behaviours, namely that the operationalization is often vague and difficult to interpret [28]. Validation can be behaviorally coded for level of adherence [29], giving increased opportunities to assess level of clinician adherence as well as the possibility to have a behaviorally driven education of communication.

Data reveals direct effects on both recall and potential interference of recall, but in counter to the second hypothesis, there was no mediating relationship. Instead, this experiment suggests that recall is better in the validating condition than the invalidating condition despite the potential interference, and that effects of interference are to some extent moderated by communication style. These are intriguing results that open up for interpretations.

The conditional effects of pain catastrophizing are significant only for those being invalidated and this gives mainly two possible

explanations. Either this is because invalidation drives the effects of pain catastrophizing on accurate recall, or because validation counteracts the effect that pain catastrophizing exerts on accurate recall. Since there is an established link between pain catastrophizing and recall among pain patients [30], and a study measuring perceived forgetfulness clearly indicate that a higher level of pain catastrophizing is associated with a higher level of perceived forgetfulness among pain patients [31]. In other words, this indicates that validation counteract the detrimental effects that pain catastrophizing has on recall.

A noteworthy result is the difference in effect between immediate and delayed recall. While effects on delayed recall are large, the performances by validated and invalidated individuals on immediate recall are close to identical. This can have several explanations. In the immediate recall we employed a word list that is ten words long, which is close to the 7 ± 2 items that an average person can hold on to in working memory [32]. The distracting sound may also not have had the disrupting effect that we desired. Taken together this means that the immediate recall is likely to tap in to working memory as well as more long term recall. The delayed recall however, was conducted after participants had to engage in other activities, which is more distracting, in combination with the total pool of words being four times as big and thus untenable to hold on to in the working memory. This makes it likely that the delayed recall condition in this experiment is a more correct representation of being able to recall for instance health related information in an everyday life setting, than the immediate recall condition.

A surprising result is that this experiment does not replicate previous findings on the effects of validation on affect [16,17]. Instead, there are no significant differences between the two groups over time. This can be due to several reasons. First this result may be due to a lack of power. Possibly the validation and invalidation conditions, given the sample size and relatively large variance, may not have given large enough of an effect to detect differences on affect. Also, and related, our measure of affect may not have been sensitive enough to detect changes. Considering the procedures of validation and invalidation, validation tends to increase peoples willingness to disclose their inner experiences while invalidation tends to do the opposite. If so, future experiments could benefit from measuring affect via psychophysiological measurements rather than self-report.

A limitation to bear in mind concerns the external validity of the recall tests. There is a difference between remembering words from a list and comprehending a perhaps counterintuitive biopsychosocial rationale, often the case in clinical consultations for people with pain problems. There is also a difference between prospective memory and the retrospective memory that we measured here. Advice that is supposed to be translated into behavioural change is more of prospective than retrospective memory, and it is unclear to which extent this recall test extends to prospective memory. Further, while overlapping with word lists used in other studies, this experiment does not use word lists that are validated on clinical and normal samples [33,34]. This underscores the importance of corroborating these experimental findings in clinical contexts. However, a recent study from a clinical setting confirmed a similar pattern between recall, pain catastrophizing and distress in their effects on functional limitation [35].

Also, this experiment features slightly lower pain ratings on average than what can be seen in a clinical context of people seeking health care for acute pain [36], and the memory tests were administered between pain provoking tasks, to minimize interference between the task and the test. There is currently no data on whether slightly higher pain ratings or direct proximity to the pain stimulus may influence the results and impact of communication on general recall, but the possibility cannot be excluded.

While the experiment features mostly people who had a recurring pain problem and thus are at risk of developing chronicity, they also appear to be well functioning. Though we tried to recruit people with pain problems, the sample has low scores on pain catastrophizing and average on negative and positive affect. Also, the reader should also bear in mind that the size of the sample is relatively small. We cannot therefore exclude the possibility of a sampling bias.

A strength of this study is that it intermixes objective measurements with self-report. Both the independent variable and the main dependent variable are objective measurements that are less likely to be biased the same way that self-report measures are [37]. This study also manages to link results between self-report and objective measurements such as coded communication and recall, indicating a robustness of the results.

5. Conclusions

From these results we can conclude that validating and invalidating communication may counteract and exacerbate interference on recall caused by pain catastrophizing. This effect seems primarily due to moderation of the relationship between the interference and accurate and false recall, rather than to mediation through decreases of the interference itself.

6. Implications

For clinicians, these results are also informative. Our data suggest that validation could affect a crucial part of consultations: the possibility to recall health related information. The lack of difference in immediate recall implies that while a patient may be fully able to express understanding during consultation the person may still not recall it in the everyday context. Clinicians are also advised to pay attention to their communication when meeting patients that catastrophize, since these results indicate that validation/invalidation may moderate the link between this variable and recall. This means that catastrophizers, who are at elevated risk of developing chronic problems, also may be the patients that recall better due to empathic communication [38].

Future research should both try to corroborate these findings in clinical context as well as attempt to build more detailed models of mediation and moderation that can clarify the mechanisms of communication in health care.

Ethical issues

Information and consent was gathered at two time points for every participant, first digitally when conducting the pretest and then before the experimental procedure. This procedure was reviewed and approved by the regional ethics board in Uppsala.

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Conflicts of interest

No conflicts of interest declared.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.sjpain.2017.07.003>.

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