

The Power of Invalidating Communication: Receiving Invalidating Feedback Predicts Threat-Related Emotional, Physiological and Social Responses.

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Acknowledgements

With many thanks to Laura Scott for her assistance in the lab, Kate De Brunner for carrying out data coding, to Professor Alan Fruzzetti and his team for sharing their expertise on validation/invalidation techniques and to the participants in this study.

Abstract

Previous studies have found that communicating acceptance and understanding ('validation') enhances the recipient's psychological and physiological wellbeing compared with receiving non-understanding feedback ('invalidation'). Yet, such studies have not established whether it is validation or *absence of* invalidation that is beneficial. This study examined the social, physiological and emotional effects of validating and invalidating feedback in more detail, by employing a control group. Ninety healthy volunteers were randomly allocated to receive validating, invalidating or no feedback during a series of stressor tasks. Self-report ratings, psychophysiological measurements and social engagement behaviors were recorded. Whilst there were no significant differences between validated and control participants, invalidated participants showed increased physiological and psychological arousal on several measures and reduced social engagement behaviors compared with the other two groups. The relevance of these findings for understanding adverse effects of invalidation during clinical interactions is discussed.

Keywords: Invalidation, Validation, Polyvagal theory, Perceived Safety, Negative Affect, Communication, Social Feedback.

The beneficial effects of positive human social interactions for mental and physical health have been well established (Beckes & Coan, 2011; Christenfeld & Gerin, 2000). Research has shown that being part of, and identifying with, a social group (Haslam, Holme & Haslam, 2008), receiving and giving social support (Brown, Nesse, Vinokur, & Smith, 2003; Coan, Schaefer & Davidson, 2006), and having predominantly positive interactions with others (Gottman & Notarius, 2000; Heaphy & Dutton, 2008; Seeman, 2000) has been associated with higher levels of well-being. Understanding the factors driving positive social interactions is therefore of great importance. The ability to empathize and to give or receive compassion have been identified as facilitators of positive interactions (Bylund, & Makoul, 2005) whereas being ignored, excluded, rejected (Williams & Zadro, 2001) or overly criticized (Gilbert & Miles, 2000) during social interactions have been found to have detrimental effects on wellbeing.

One simple but important aspect of social interactions, that of feeling understood, has largely been overlooked in previous research. Indeed the effects of feeling understood, and comprehensive ways to *communicate* such understanding have only recently started to be explored. This relational process is known as ‘validation’ (Fruzzetti & Worrall, 2010; Linehan, 1993; Lynch, Chapman, Rosenthal, Kuo & Linehan, 2006). Where validating responses communicate acceptance and understanding of an individual’s disclosure, invalidating responses are the opposite, failing to communicate understanding or acceptance, and instead communicating that the other’s thoughts, experiences, feelings, desires or actions are ‘illegitimate, invalid, incomprehensible, or otherwise wrong’ (p.124, Fruzzetti & Worrall, 2010).

The validation/invalidation construct is central to understanding therapeutic communication in several ways. First, it highlights an element of patient care that has sometimes been neglected. There are many reports of patients with medically unexplained symptoms for example, who report feeling that they are not understood by their healthcare

providers (Åsbring & Närvänen, 2002; Kenny, 2004; Lillrank, 2003). Second, validation/invalidation can be a useful approach when existing communication strategies are ineffective. For example, whereas empathy describes understanding the recipient, it arguably neglects the element of *communicating* this understanding to the recipient, focusing on transmission rather than receipt. Thus empathy is 'necessary...' but 'not sufficient' for therapeutic validation to take place (p.360, Linehan, 1997). Moreover, positive attempts to show compassion or to reassure may be *experienced* as invalidating, leaving the patient feeling that their problem has not been listened to or taken seriously (Linton et al., 2011). Understanding how a feeling of invalidation is elicited therefore, can shed light on instances where *unintentional invalidation* takes place during well-intentioned therapeutic interactions. Last, the advantage of focusing on the validation/invalidation concept for understanding communication is its clear definition and available guidelines for how to deliver different levels of validating (and invalidating) feedback (as defined in the Validating and Invalidating Behavior Coding Scheme, VIBCS, Fruzzetti, 2010).

Recent research has shown that validation has great potential for increasing wellbeing by improving the quality of relationships (Fruzzetti & Worrall, 2010) and promoting healthy psychological functioning (Schimel et al. 2001). Recent experimental studies have highlighted that invalidation and validation are clearly important in shaping the recipient's emotions and physiological responses; receiving validating feedback, compared with invalidating feedback, has been found to decrease negative affect, decrease physiological arousal, increase patient satisfaction and increase pain tolerance in recipients (Linton, Boersma, Vangronsveld, & Fruzzetti, 2011; Shenk & Fruzzetti, 2011).

Although validation has been shown to be useful, by directly comparing the effects of validating and invalidating feedback in research, it is impossible to establish whether it is validation, or lack of invalidation, which promotes the regulation of negative emotional and

physiological states. In fact, existing studies frame their findings as indicating the positives of validation, when without a control group as a reference, their findings could instead be due to the comparatively negative effects of invalidation (and no effect of validation). This study, by employing a control condition, will be the first to disentangle whether it is validation, or invalidation (or indeed both), which carry more weight in determining changes in emotional and physiological responding.

Moreover, although previous studies have included physiological measures to examine validation/invalidation, we extend this research by drawing upon Porges' polyvagal theory (1995, 2001, 2007) to examine the effects of validation/invalidation on psychophysiology, perceptions of social safety and social behavior concomitantly. We propose that validation may function to signal social safety- thereby more fully engaging the parasympathetic nervous system (PNS) and increasing social engagement behaviors (e.g., reciprocal eye contact and facial affect expressivity), whilst invalidation is perceived as threatening and thus facilitates activation of the sympathetic nervous system (SNS) resulting in social functioning deficits (e.g., reduced eye gaze, reduced facial affect expressivity). Shenk and Fruzzetti's (2011) psychophysiological experiment provides some support for this hypothesis, however, to our knowledge, no research to date has used a multi-faceted approach to examine the effects of validation/invalidation on physiological arousal, observed social behaviors, self-reported mood and perceived safety levels.

We hypothesize that:

1. During repeated exposure to a stressor task, invalidating feedback will increase sympathetic and decrease parasympathetic arousal compared with controls over the tasks. Invalidated individuals will report increased negative mood over the tasks, lower perceived safety levels and increased unwillingness to take part in the study again compared with controls. In contrast validation will have the opposite effect.

2. During the interactions where participants receive feedback from the experimenter, invalidated participants will display less non-verbal social engagement behaviors (less reciprocal eye gaze, less positive affect expressivity) than validated participants.

Method

Participants

Ninety participants (65 females and 25 males) were recruited through the University of Exeter notice boards, email mailing lists and local social networking groups. Potential participants were excluded from the study if they reported: 1) current drug or medication use, 2) current medical condition(s), 3) previous or current occurrence(s) of psychological disorder, 4) history of chronic pain, 5) moderate or high levels of anxiety and/ or depression (scoring above 10 on the Hospital Anxiety and Depression Scale, Zigmond & Snaith, 1983) and/ or: 6) aged over 35 (this was to ensure the participant- researcher interaction was appropriately age matched). The composition of the final sample (average age 21.57 years) was 63.3 % British, 5.6% European (non-British), 27.7% from other ethnic groups and 3.3% not specified.

Procedure

After consent, participants completed the online demographics survey and the Difficulties in Emotion Regulation Scale (DERS, Gratz & Roemer, 2004). Electrodes for psychophysiological measures were attached to the participant, and a five minute baseline period was recorded. Participants then filled out the Positive and Negative Affect Schedule (PANAS, Tellegen, Watson & Clark, 1988) before completing a mental arithmetic stressor task which was designed to be impossible to complete within the time available (based on Shenk, 2007). Participants in the control condition then completed an online feedback form to describe their feelings about the arithmetic task, whilst those in the validating (V) or invalidating (IV) condition were asked to describe their feelings about the task to the experimenter. The

experimenter responded for approximately two minutes with either validating or invalidating feedback.

Feedback was selected by the experimenter from a small collection of prepared statements. Validating feedback included normalizing feedback: ‘lots of people have said that they felt that way’, or matched disclosures: ‘I felt exactly the same way when I did the task’. In contrast, invalidating feedback included pathologizing statements: ‘I’m not sure why you are stressed; nobody else has said that they felt that way’, or insisting feedback: ‘you shouldn’t be as stressed/frustrated as this’. These statements were compiled using the Validating and Invalidating Behavior Coding Scheme (VIBCS, Fruzzetti, 2010) and were based on the statements that were successfully used by Shenk and Fruzzetti (2011) to manipulate validation/invalidation.

Participants were then asked to complete the PANAS again, and, in order to examine the cumulative effects of repeated exposure to validation and invalidation during a stressor task, the process was repeated twice more; hence participants completed another two arithmetic tasks, received feedback (or filled in the feedback form, if controls), and completed the PANAS. Lastly, participants completed an online questionnaire, lasting approximately five minutes, to measure: 1) perceived experimenter validation levels, 2) perceived safety levels, and: 3) willingness to take part again. Participants were then debriefed and offered £10 for their participation.

Social engagement behavior coding. In order to examine differences in observed social engagement behaviors between the validated and invalidated participants, the experiments were recorded and a random selection of forty two of the participant video recordings from the study were coded for non-verbal social engagement behaviors. Because the control condition did not receive feedback from the experimenter, only 23 validated and 19 invalidated participants were included in this analysis (34 female and 8 male participants). A researcher, blind to the experimental manipulation and participant condition, coded the video excerpts at three time

points (Feedback1, 2 and 3) using the non-verbal social engagement coding scheme outlined below. To ensure that the researcher remained blind to the study manipulation, only the participant, and not the experimenter, was displayed on the screen, and audio content was muted.

Self-Report Measures

Emotion regulation. The Difficulties in Emotion Regulation Scale (DERS, Gratz & Roemer, 2004) was administered to measure self-reported level of emotion regulation skills. This scale has high internal consistency ($\alpha = .93$) and high test-retest reliability (Gratz & Roemer, 2004).

Perceived validation. A five-item scale was compiled to examine whether participants had perceived the experimenter feedback as it was intended (i.e. as validating or invalidating). The scale was found to have high levels of internal consistency ($\alpha = .95$). Participants were asked to rate the following items on a five point scale from 1, '*strongly disagree*' to 5, '*strongly agree*': 'The experimenter made me feel that my responses were understood'; 'The experimenter accepted my responses'; 'The experimenter made me feel that my responses were legitimate'; 'The experimenter made me feel that my responses were valid'; 'The experimenter made me feel that my responses were normal'.

Perceived safety and willingness to take part. Participants were asked to rate the following item: 'how safe and secure did you feel during the task?' on a four point scale from 1 '*extremely unsafe and insecure*' to 4 '*extremely safe and secure*'. Participants were also asked to indicate whether they would be interested in taking part in the study again as part of a planned future study.

Positive and negative mood. The Positive and Negative Affect Schedule (PANAS, Tellegen, Watson & Clark, 1988) was used to measure self-reported intensity of negative and positive affective state. The PANAS- NA comprises ten negative affect words and the PANAS-

PA ten positive affect words, and has a high level of internal consistency ($\alpha = .85$ for PANAS-NA, $\alpha = .89$ for PANAS-PA) and adequate construct validity (Crawford & Henry, 2004).

The Non-verbal Social Engagement Coding Scheme

Eight non-verbal behaviors were coded; eye gaze, smiling, frowning, and laughing (from 1 'not at all' to 5 'frequently'), 'head towards' behaviors (from 1 'head straight ahead' to 5 'head towards the experimenter'), 'head away' behaviors (from 1 'head straight ahead' to 5 'head away from the experimenter'), 'head up' behaviours (from 1 'head straight ahead' to 5 'head towards the ceiling') and 'head down' behaviors (from 1 'head straight ahead' to 5 'head towards the floor'). This coding scale was formed by adapting the scales developed by Todd, Bodenhausen, Richeson, and Galinsky (2011) and Ramanathan and McGill (2007).

A mean score comprising smiling, laughing, frowning (reverse-scored) and head towards behaviors at all three time points was calculated as a measure of social engagement. A mean score of looking away, turning the head away, down and up behaviors at all three time-points was calculated as a measure of disengagement behaviors.

Psychophysiological Data Recording and Pre-processing

Psychophysiological data was recorded using the Biopac data acquisition system, Inc. MP150 CE. Data sections for seven time points (> 60 seconds' duration) were extracted using AcqKnowledge software (version, 4.1.1 Biopac Systems Inc., 2010) for each participant for all psychophysiological measures: baseline, arithmetic task 1, experimenter feedback 1, arithmetic task 2, experimenter feedback 2, arithmetic task 3, and experimenter feedback 3.

Heart rate and heart rate variability. Heart rate (HR) was used as an index of sympathetic activation and parasympathetic deactivation, whereas high frequency heart rate variability (HF HRV) was used to measure parasympathetic activation of the autonomic nervous system. Two circular 3.5 cm disposable electrodes were attached; one below the participant's right collar bone and one to the participant's left side, underneath the ribcage.

Continuous electrocardiograph readings (ECG) were measured at a sampling rate of 1 kHz with a low pass filter of 35 Hz and a high pass filter of 0.5 Hz. The data was transformed using a template correlation to remove large artefacts, and R peaks were identified on the ECG waves. Remaining artefacts from noisy, missing or ectopic beats were interpolated from the adjacent R-peaks. The interpolation procedure was used for less than 5% of the ECG data. Mean HR and mean HF HRV (frequencies between 0.15 Hz and 0.4 Hz) were then extracted for each data section. Established guidelines (Berntson et al., 1997) were followed to extract HF HRV, which was calculated using a Fourier transformation on a time series of R- peaks.

Skin conductance level. Skin conductance level (SCL) was used as a measure of sympathetic arousal. A skin resistance transducer (TSD203) composed of two Ag-AgCl non polarizable electrodes was applied to the middle phalanx of the first and ring finger of the participant's non dominant hand. SCL was sampled at a rate of 500 Hz with a low pass filter of 1.0 Hz. Mean SCL, Maximum SCL values and minimum SCL values were then extracted, and the following equation (recommended by Lykken, Rose, Luther, & Maley, 1966) was applied to each data section for each participant to give a mean SCL corrected for individual differences: $\text{Corrected SCL} = (\text{SCL mean} - \text{SCL min}) / (\text{SCL max} - \text{SCL min})$

Pre-ejection period. Pre-ejection period (PEP) is a measure of sympathetic activity calculated from both the impedance cardiography (ICG) and ECG waves. Two EL506 strip electrodes were attached to the participant's neck (one below the hairline and the second 3 cm beneath it) and two strips were attached to the back (one at the height of the xiphi- sternal junction and the other 3 cm below this). ICG was continuously sampled at a rate of 1 kHz with a low pass filter of 10 Hz. High frequency noise (> 35 Hz) and low frequency noise (< 0.5 Hz) were removed using a band pass filter and a template correlation was carried out to remove any large artefacts. C points (dZ/dt peaks) were then labelled, and noisy, missing or ectopic C points were removed from further analysis, along with the corresponding R peaks. If > 5% of any data section was missing, the data section was removed from further analysis.

The abbreviated PEP (PEPr) was used for this study, as this provides a more reliable fiducial onset point for ventricular depolarization (See Berntson, Lozano, Chen, & Cacioppo, 2004; Kupper, Willemsen, Boomsma & De Geus, 2006). Because reliable identification of the point at which the aortic valve opens (the B point) can be problematic, Lozano et al.'s (2007) method for a derivative based estimate of the B point was used. The R to B interval (RB) was calculated from the R to C interval (RZ) as follows: $RB = 1.233RZ - 0.0032RZ^2 - 31.59$.

Statistical Analysis

After checking the normality of the distributions of our variables, mean disengagement behaviors, mean engagement behaviors, negative affect, positive affect, and HF HRV were log transformed to correct for data skew. Multilevel modelling was used for analysis of negative and positive affect and psychophysiological data, due to the hierarchical nature of these repeated measurement data series. The software package Mlwin version 2.24 (Mlwin, Centre for Multilevel Modelling, Bristol) was used, and models were fitted using maximum likelihood estimation, employing an iterative generalized least squares (IGLS) estimation. A two level model was employed, where measurement occasion or 'time' (level one) was clustered within participant (level two). Random intercept models allowed intercepts to vary across both levels; time and participant. A random slope parameter was added to the variable 'time' in order to fit each participant's trajectory more accurately, in all cases significantly improving the model fit. The quadratic function, $time^2$, was also added to all models at level one, to explore the nonlinear progression of each outcome measure over time.

'Condition' was entered as a categorical dummy variable (validation 'V', control 'C' and invalidation 'IV'). In order to compare all three conditions over time, each model was run twice; first with the dummy variable 'invalidation' as the reference category and then with 'validation' as the reference category. Two fixed interaction terms were also entered into the

saturated models and included in the final model if they were significant predictors; 'Condition by time' and 'Condition by time²'.

To determine a model of best fit, several models for each measure were implemented, and the final model was selected based on the significant reduction in the -2 Log Likelihood Ratio (-2LL). The covariates gender, age, and difficulties in emotion regulation skill (DERS score) were entered in a stepwise manner as potential predictors in all models, and were included in the analysis if they explained a significant amount of variance. As a result, DERS score was included in the negative affect model as a fixed covariate at level two ($\chi^2(1) = 9.39, p=.002$) and Age was included as a fixed covariate at level two in the PEPr model ($\chi^2(1) = 9.13, p=.010$). One extreme outlier (participant 53 $M = 24.37, SE = 2.26$) was excluded from PEPr analysis.

Where participants engaged in conversation with the experimenter during the feedback task, interference occurred to the ICG electrodes located on the neck. Therefore there was missing PEPr data, particularly during the participant reflection periods from the validation group. Thus the analysis was carried out to compare all three conditions across only three time points excluding reflection periods (arithmetic 1, arithmetic 2 and arithmetic 3). Data sections where ≥ 60 seconds of reliable data could not be extracted were excluded from these models. As a result 261 data sections of a possible 356 were included in the model.

Results

Self-Report Data

Perceived validation. A one way ANOVA indicated significant differences in perceived validation scores between the V ($M = 4.75, SE = .069, n = 30$), IV ($M = 2.26, SE = .159, n = 30$), and C ($M = 4.18, SE = .170, n = 29$) conditions, $F(2, 86) = 88.77, p < .001$. Paired contrasts revealed significant differences in perceived validation between the V and C group, $F(1, 86) = 8.45, p = .005$, the V and IV group, $F(1, 86) = 162.16, p < .001$, and between the IV and

C group, $F(1, 86) = 94.46, p < .001$. This indicates that the validating or invalidating feedback received from the researcher was reliably perceived as such by participants.

Perceived safety. For perceived safety, a one way ANOVA revealed significant differences in scores across conditions, $F(2, 86) = 7.73, p = .001$. Paired contrasts indicated significant differences between the V and IV condition ($F(1, 86) = 12.72, p = .001$) and the C and IV condition ($F(1, 86) = 10.28, p = .002$) with significantly lower safety ratings for the IV condition compared with the other two conditions (V: $M = 3.83, SE = .112$, IV: $M = 3.27, SE = .110$, C: $M = 3.77, SE = .110$). No differences were found between the V and C conditions.

Unwillingness to take part again. A Chi-Square test revealed a significant relationship between experimental condition and unwillingness to take part, $\chi^2(2) = 10.80, p = .003$. Of the ten people who said they would not take part in the experiment again, 1 (10%) was in the V condition, 1 (10%) was in the C condition and 8 (80%) were in the IV condition.

Negative affect (NA). Although there were no significant findings for the positive affect data, there were significant results for negative affect (NA). Whilst the ‘condition by time²’ interaction ($\chi^2(2) = 3.00, ns$) and the ‘condition by time’ interaction ($\chi^2(2) = 0.58, ns$) were not significant and so were removed from the model, the main effect of condition was significant ($\chi^2(2) = 10.21, p = .006$). After rerunning the model with ‘validation’ as the reference dummy category, there was no significant difference between the V and C group’s NA scores. Participants who were invalidated showed higher levels of NA over the tasks compared with the validated group, but there were no significant differences between IV and C group, as shown in Figure 1. Table 1 displays the beta coefficients for these models.

Table 1. Beta Coefficients for the Negative Affect Models

Model	Predictor	β	SE	Z score*	95% Confidence Interval	
					Lower	Upper
1	Intercept	-0.07	0.05	-1.46	-0.17	0.03
	Time	-0.01	0.02	-0.64	-0.06	0.03
	Time ²	<.01	0.01	0.80	-0.01	0.01

	V	-0.06	0.02	-3.15	-0.10	-0.02
	C	-0.03	0.02	-1.70	-0.07	0.01
	DERS	0.08	0.02	3.21	0.03	0.12
2	Intercept	-0.14	0.05	-2.67	-0.24	-0.04
	Time	-0.01	0.02	-0.64	-0.06	0.03
	Time ²	<.01	0.01	0.80	-0.01	0.01
	IV	0.06	0.02	3.15	0.02	0.10
	C	0.03	0.02	1.50	-0.01	0.07
	DERS	0.08	0.02	3.21	0.03	0.12

-2LL (IGLS deviance) = -703.065 (268 of 270 cases). *Note.* *Z scores in bold indicate significant effects where $p \leq .05$. Model 1 = IV condition as the comparison group, Model 2 = V condition as the comparison group.

Figure 1. Change in log transformed negative affect (NA) score, mean heart rate (HR), skin conductance level (SCL) and pre-ejection period (PEPr) over time for each condition. (ATTACHED SEPARATELY)

Non-verbal Social Engagement Behaviors

Because the two social engagement measures were significantly correlated ($r = -.659$, $N = 42$, $p < .001$) a MANOVA was carried out to examine whether there were significant differences in engagement and disengagement behaviors between validated and invalidated participants, which was indeed the case, $F(2, 39) = 3.84$, $p = .03$, $\eta^2 = .165$. Univariate ANOVAs revealed that there were significant differences between groups in both disengagement behaviors ($F(1, 40) = 6.66$, $p = .014$, $\eta^2 = .143$) and engagement behaviors ($F(1, 40) = 5.97$, $p = .013$, $\eta^2 = .130$). After applying Bonferroni corrections for multiple tests, (p value cut off = .025), these findings were still significant. As expected, there were significantly more engagement behaviors in the V condition than the IV condition and significantly less disengagement behaviors in the V condition than the IV condition.

Psychophysiological Measures

Heart rate. For heart rate, the ‘Condition by time²’ interaction ($\chi^2(2) = 0.13$, *ns*) was not significant and thus was removed from the model. The ‘Condition by time’ interaction was significant ($\chi^2(2) = 8.88$, $p = .012$) suggesting that the difference in HR across conditions over time was linear. There was a significant difference between the control and IV group over time

(z score = -2.02, $p < .05$) and the V and IV group over time (z score = -2.89, $p < .05$). After rerunning the model with V as the comparison group, there were no significant differences in HR between the C and the V group over time. Whilst the IV group showed an increased HR over time compared with the other two groups, there were no significant differences in HR between the C and V group over time (see Figure 1 and Table 2).

HF HRV. For the HF HRV models there were no significant differences between the V, IV or C groups.

Table 2. Beta Coefficients for the Heart Rate Models

Model	Predictor	β	SE	Z score*	95% Confidence Interval	
					Lower	Upper
1	Intercept	9.41	2.29	4.12	4.94	13.89
	Time	-1.35	0.55	-2.44	-2.43	-0.26
	Time ²	0.19	0.07	2.51	0.04	0.33
	Validation	-1.96	3.15	-0.62	-8.13	4.21
	Control	-3.51	3.11	-1.13	-9.61	2.59
	V X Time	-0.85	0.29	-2.89	-1.42	-0.27
	C X Time	-0.57	0.28	-2.02	-1.13	-0.02
2	Intercept	7.46	2.36	3.16	2.83	12.08
	Time	-2.19	0.55	-3.99	-3.27	-1.12
	Time ²	0.19	0.07	2.51	0.04	0.33
	Invalidation	1.96	3.15	0.62	-4.21	8.13
	Control	-1.55	3.18	-0.49	-7.78	4.67
	IV X Time	0.848	0.293	2.89	0.27	1.42
	C X Time	0.28	0.30	0.94	-0.30	0.86

-2LL (IGLS deviance) = 2948.60 (470 of 540 cases). Note. *Z scores in bold indicate significant effects where $p \leq .05$. Model 1 = IV condition as the comparison group, Model 2 = V condition as the comparison group.

Pre-ejection period (PEPr). The ‘condition by time²’ interaction ($\chi^2(2) = 4.61, ns$) was not significant and so was removed from the model, whilst the ‘condition by time’ ($\chi^2(2) = 8.26, p = .016$) interaction was significant indicating that differences in PEPr over time across condition was linear. There was a significant difference between the C and IV group over time (z score = 2.16, $p < .05$) and the V and IV group over time (z score = 2.74, $p < .05$). After rerunning the model there were no significant differences between the C group and the V group over time. Whilst PEPr for the C and V group decreased and then recovered to baseline levels

over time, for the IV group PEP_r decreased without recovery over the tasks, indicating increased SNS arousal in response to repeated IV feedback (see Figure 1 and Table 3).

Skin Conductance Levels (SCL). For SCL, the ‘condition by time’ interaction ($\chi^2(2) = 5.10, ns$) and the ‘condition by time²’ ($\chi^2(2) = 4.60, ns$) interaction were not significant and so were removed from the model. Condition main effect was significant ($\chi^2(2) = 49.84, p = .007$). There was no significant difference between the V and IV group although there was a significant difference in SCL between the C and IV groups (z score = $-3.02, p < .05$). After rerunning the model there was a significant difference between the C and V condition. SCL was significantly lower for controls compared with both V and IV group (z score = $-2.26, p < .05$) which is not in line with our hypothesis (see Figure 1 and Table 4).

Table 3. Beta Coefficients for the PEP_r Models

Model	Predictor	β	SE	Z score*	95% Confidence Interval	
					Lower	Upper
1	Intercept	-1.24	4.10	-0.30	-9.27	6.80
	time	-1.01	1.19	-0.85	-3.33	1.32
	time ²	0.08	0.28	0.27	-0.48	0.63
	Validation	-0.86	1.79	-0.48	-4.36	2.65
	Control	0.02	1.80	0.01	-3.50	3.54
	V X time	1.54	0.56	2.74	0.44	2.64
	C X time	1.23	0.57	2.16	0.12	2.34
	Age	-0.03	0.18	-0.15	-0.38	0.33
2	Intercept	-2.09	4.29	-0.49	-10.51	6.32
	time	0.53	1.20	0.45	-1.82	2.89
	time ²	0.08	0.28	0.27	-0.48	0.63
	Invalidation	0.86	1.79	0.48	-2.65	4.36
	Control	0.88	1.76	0.50	-2.57	4.33
	IV X time	-1.54	0.56	-2.74	-2.64	-0.44
	C X time	-0.31	0.55	-0.57	-1.39	0.77
	Age	-0.03	0.18	-0.15	-0.38	0.33

-2LL (IGLS deviance) = 1021.857 (192 of 267 cases) Note. *Z scores in bold indicate significant effects where $p \leq .05$. Model 1 = IV condition as the comparison group, Model 2 = V condition as the comparison group.

Table 5. Beta Coefficients for the SCL Models

		95% Confidence Interval	
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Model	Predictor	β	SE	Z score*	Lower	Upper
1	Intercept	501.03	25.99	19.27	450.09	551.98
	time	31.15	12.17	2.56	7.31	55.00
	time ²	-2.39	1.61	-1.48	-5.55	0.77
	V	-19.69	25.52	-0.77	-69.70	30.32
	C	-77.95	25.78	-3.02	-128.47	-27.42
2	Intercept	481.34	26.00	18.51	430.38	532.31
	Time	31.15	12.17	2.56	7.31	55.00
	time ²	-2.39	1.61	-1.48	-5.55	0.77
	IV	19.69	25.52	0.77	-30.32	69.70
	C	-58.25	25.77	-2.26	-108.76	-7.75

-2LL (IGLS deviance) = 6593.341 (530 of 540 cases). *Note.* *Z scores in bold indicate significant effects where $p \leq .05$. Model 1 = IV condition as the comparison group, Model 2 = V condition as the comparison group.

Discussion

This study examined the effects of validating and invalidating feedback during a stressor task on physiological arousal, mood state, perceived safety levels, willingness to take part again and social engagement behaviors. In line with our hypothesis, invalidating feedback had adverse effects on participants' physiological, emotional and social responses during a series of arithmetic stressor tasks, compared with validating or no feedback. Participants who received invalidating feedback displayed significantly higher levels of physiological arousal over the tasks, indexed by shorter PEPr and increased HR (although HR changes can be SNS or PNS driven, given the PEPr findings, increased HR in this study is likely driven by increased SNS activity). Invalidated participants also showed: 1) significantly higher negative affect compared with validated participants, 2) significantly lower perceived safety ratings and decreased willingness to repeat the experiment, compared with the validation group and controls, and: 3) significantly less social engagement behaviour compared with validated participants.

One advantage of this study is that it implemented a control condition. This allowed us to determine whether it was predominantly validation, or invalidation, which influenced the level of negative emotional and physiological arousal displayed. Although there were no differences

between the validation and control groups on any of the outcome measures, there were significant differences between the invalidated condition and the other two groups on both physiological (HR and PEPr) and self-report measures (perceived safety, negative affect and unwillingness to take part). These results suggest that in healthy controls, it is lack of invalidating feedback, rather than the presence of validating feedback, that facilitates a reduction in negative emotional and physiological arousal during stressful tasks.

Whilst previous research concludes that it is the positive effects of validating feedback rather than the negative effects of invalidating feedback that are key, according to Baumeister, Bratslavsky, Finkenauer, and Vohs' theory (2001) invalidation may carry heavier costs than validation carries benefit. They propose that there is adaptive value for 'bad' events to have more power than 'good' events, to allow us to respond effectively to threat. Indeed, research suggests that 'bad' interactions do have more pervasive effects than 'good' interactions (Vinokur & van Ryn, 1993; Graziano, Brothen & Bersheid, 1980). Strong long-term effects of invalidating feedback have also been documented; pervasive emotional invalidation has been linked with social and emotional problems in childhood (e.g., Gottman, Katz, & Hooven, 1996), avoidant-insecure attachments (Cassidy, 1994), and chronic emotion inhibition in adulthood (Krause, Mendelson, & Lynch, 2003). Our findings are critically important in shifting the focus of validation research; we suggest that reducing invalidating feedback, rather than increasing validating feedback, may be the key to regulating mood and emotions, improving willingness to take part and allowing individuals to engage optimally in social interactions.

Moreover, this study extends upon previous work by using a multi-faceted approach to examine the effects of validation/invalidation on physiological arousal, observed social behaviors, self-reported mood and perceived safety levels. To our knowledge this is the first study to look at the effects of validating and invalidating feedback on observed social behaviours, finding a significant reduction in social engagement behaviours in the invalidated

condition compared with the validated condition. This provides support for Porges' theory (1995, 2007) which suggests that under conditions of perceived threat, our ability to engage socially is reduced, reducing the participant's ability to display such behaviors as reciprocal eye gaze and positive affect displays.

Although this study was carried out on healthy controls, the findings may have important implications for clinical interactions, particularly in highlighting the potential detrimental effect of invalidation on psychological and physiological wellbeing. This is relevant for many patient groups; for example those suffering from medically unexplained symptoms often report feeling misunderstood and frustrated during consultations (Greville-Harris, Karl, Hempel, Lynch & Dieppe 2014; Vangronsveld & Linton, 2012), perhaps because of the idiopathic nature of their symptoms which cannot be easily diagnosed or explained (Werner & Malterud, 2003). Idiopathic patients describe doctors as doubting their symptoms, not taking them seriously (Salmon, 2006) and report 'being met with skepticism and lack of comprehension' by their healthcare providers (p. 1409, Werner & Malterud, 2003).

Invalidation during clinical consultations can be unintentional, and still have detrimental effects. Consultants' reassurances that there is no underlying disease can leave patients feeling that their problem has not been listened to or taken seriously (Linton et al., 2011). Positive attempts to show compassion or reassure patients may be experienced as invalidating; efforts to normalize patients' symptoms or concerns without engaging with their worries may result in the patient expanding on symptoms in order to encourage the physician to listen and heed their concerns (Dowrick, Ring, Humphris & Salmon, 2004). We suggest that reducing invalidating feedback, rather than offering validating feedback per se, has clear potential for alleviating physiological and emotional arousal.

This research has several limitations. First, whilst this study measured state levels of perceived safety as a retrospective self-report rating, future studies could benefit from using more sophisticated repeated measures of perceived safety to look in detail at changes in

perceived safety levels over the tasks. In addition, whilst we have found a positive association between feeling understood and feeling safe, the causal direction of this effect could not be distinguished. Future studies designed to examine the possible mediation effects would be a valuable direction for future research, also allowing the potential mechanisms of Porges' (2007) polyvagal theory to be explored further.

There were also no significant differences in HF HRV across conditions as we had hypothesized, yet this may be due to the stressful nature of the task; although we predicted that validated participants would display higher HF HRV, all participants were subjected to a repeated stressor task. Although validated participants showed reduced sympathetic arousal, the repeated stressor may not have allowed them to feel completely 'socially safe'. Future research may benefit from exploring whether validation can increase PNS engagement under conditions where repeated stressor tasks are not used.

Furthermore, skin conductance findings were not in line with the hypotheses. Whilst the control condition showed lower skin conductance compared with the other two conditions, there were no significant differences in skin conductance level between the validated and invalidated group. This may be because the participants in the control condition did not take part in a social encounter whereas participants in the validating and invalidating condition did (be it positive or negative). Previous research has found that minimal social encounters (i.e. the introduction of participants to a new researcher) can lead to significant increases in skin conductance (Vrana & Rollock, 1998). This design limitation should be considered in future validation research.

Despite these limitations, our research suggests that reducing invalidation during social interactions does matter, in both shaping our physiological, emotional and social responses during stressful tasks, as well as our willingness to repeat the experience. This has potential application for many clinical interactions, particularly in the treatment of patients with idiopathic conditions, who notoriously do not feel understood or accepted (Werner & Malterud,

2003). Feeling misunderstood may, in itself, exacerbate the patient's levels of physiological and emotional distress, adversely impact willingness to adhere to treatment and, according to Porges' polyvagal theory (2007), impede the individual's ability to respond to and pick up on important social and environmental cues.

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