Mimicking non-verbal emotional expressions and empathy development in simulated consultations: An experimental feasibility study

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Abstract

Objective: To explore the feasibility of applying an experimental design to study the relationship between non-verbal emotions and empathy development in simulated consultations.

Method: In video-recorded simulated consultations, twenty clinicians were randomly allocated to either an experimental group (instructed to mimic non-verbal emotions of a simulated patient, SP) or a control group (no such instruction). Baseline empathy scores were obtained before consultation, relational empathy was rated by SP after consultation. Multilevel logistic regression modelled the probability of mimicry occurrence, controlling for baseline empathy and clinical experience. ANCOVA compared group differences on relational empathy and consultation smoothness.

Results: Instructed mimicry lasted longer than spontaneous mimicry. Mimicry was marginally related to improved relational empathy. SP felt being treated more like a whole person during consultations with spontaneous mimicry. Clinicians who displayed spontaneous mimicry felt consultations went more smoothly.

Conclusion: The experimental approach improved our understanding of how non-verbal emotional mimicry contributed to relational empathy development during consultations. Further work should ascertain the potential of instructed mimicry to enhance empathy development.

Practice implications: Understanding how non-verbal emotional mimicry impacts on patients' perceived clinician empathy during consultations may inform training and intervention programme development.

Key words: mimicry, non-verbal emotion, empathy, experimental design

1. Introduction

During the last decade, healthcare communication researchers have been focusing on verbal expressions of emotional exchange and made significant contributions to the understanding of the relationship between emotional language and empathy during doctor-patient interaction [1, 2]. In contrast, how non-verbal expressions of emotion contribute to empathy establishment in applied settings seems not to be well researched. This is largely due to under-developed theories in non-verbal emotional expressions in realistic settings and limited methodological development in the field of healthcare communication.

Building on breakthroughs in neuroscience, in particular the discovery of a human mirror neuron system [3], recent theories of embodied cognition [4] illuminate new ways to study mechanisms of empathy development in healthcare settings. Theories of embodied emotion suggest that when individuals adopt emotion-specific postures or facial expressions, they experience associated emotions [5 – 6]. A traditional theoretical interpretation of this behaviour is the matched motor hypothesis, according to which behavioural mimicry is an automatic motor response that reflects a basal perception – behaviour link (also known as the chameleon effect [7]). Mimicry can be broadly defined as "doing what others are doing" [e.g., 8]. It consists of verbal and non-verbal behaviours that range from lexical repetitions over gestural and postural alignment to the imitation of facial expressions.

Behavioural mimicry is known to lead to improved inter-personal relationships, as shown in the chameleon effect [7, 9]. For example, imitating an interactive partner's gesture, posture or speech can enhance social bonds and improve empathizing with others' emotions in a social setting. Given this known social function of behavioural mimicry, it may be useful from a practical perspective to study behavioural mimicry in a healthcare communication context because of its potential to improve the doctor-patient relationship. Specifically,

instructing a clinician to mimic a patient's behaviour may increase the inter-personal (relational) empathy, and thus may improve the level of perceived empathy in the patient.

Applying the theoretical proposition of the embodied emotion [4] to doctor-patient interaction, a key prediction is that imitating the bodily expressions of the patient will help the doctor experience the patient's emotional state. Behavioural mimicry serves as an initial skill development, and experiencing patients' emotional state functions as developing affective empathy, which contributes to attitude formation. Consequently, when this emotional mimicry goes well, it leads to affective sharing and lays a strong foundation for relational empathy development [7, 10]. Therefore, we hope to enhance clinicians' consultation skills through instruction of behavioural mimicry, which in turn will help improve clinicians' baseline empathy as a personality trait for attitude development. As a result, the quality of the doctor-patient relationship is expected to be improved, which will be measured in the form of perceived relational empathy in the patient.

Other cognitive aspects, such as the capacity to take the other's perspective and one's own ability for healthy emotion regulation [11, 12], are also important and should be taken into account when conducting experiments on the effects of emotional mimicry on empathy development.

Although there is currently a renewed debate about whether and how facial feedback influences emotions [13], the available literature on facial expression mimicry indicates similar effects of spontaneous and instructed mimicry [14, 15]. Given the perceived lack of studies on how non-verbal expressions of emotion contribute to empathy establishment in applied settings, our study aims to explore the feasibility of this instructional approach. Specifically, it aims to generate experimental evidence on how mimicking simulated patients' non-verbal emotional expressions contributes to the development of relational empathy as perceived by the patient. Research questions are: (i) Can non-verbal emotional expressions be mimicked by clinicians in simulated consultations? (ii) Does non-verbal

emotional mimicry improve relational empathy during simulated consultations? (iii) Is an experimental design to study the relationship between non-verbal emotion and empathy development feasible?

2. Methods

2.1. Participants and design

We adopted an experimental design to study empathy development during simulated consultations. Our key manipulation was to instruct half of our participating clinicians to actively mimic the patient's behaviours. Twenty staff members with clinical experience (Table 1) and one simulated patient (SP) within the School of Medicine at University of St Andrews were recruited as staff and patient participants, respectively. Staff were randomly allocated to either the experimental (*n*=10, instructed to mimic non-verbal emotional expressions of the SP) or the control group (*n*=10, no such instruction). Based on the differences on the relational empathy (with means and standard deviation) and with clinician baseline empathy as covariate, we anticipated a larger relational empathy in the experimental group than the control group. We then performed a power analysis for a power lever of 80%, given α of .05 and assuming a large effect size of 0.80. According to G-Power3 [16], 21 participants would be needed for each group to detect the directional effect of instructed mimicry. This estimate exceeds our actual sample size (10 for each group) and indicates insufficient statistical power to detect a relatively large effect. However, the focus of the study was to explore the feasibility of the experimental approach, we will discuss the results in light of the sample size limitation.

2.2. Procedure

The SP was provided with a scripted scenario (irritable bowel syndrome), trained to display five non-verbal emotional expressions (Appendix 1) during simulated consultations, and blind to the experimental condition. Before consultation, staff completed a questionnaire for their baseline empathy using the Interpersonal Reactivity Index (IRI) [17], along with their demographic and clinical experiences. While controlling for gender, age, clinical experience and baseline empathy scores, staff were randomly allocated to one of two instruction groups. They were either instructed or not instructed to mimic non-verbal SP emotional expressions during consultation and both groups were video recorded. After each of the twenty individual consultations, the SP rated the level of empathy received from the staff by using the Consultation and Relational Empathy (CARE) measure [18]. This validated and standardized tool is frequently used to measure the quality of the doctor-patient relationship during clinical consultations. Consultation smoothness was rated by both staff and SP on a 7-point Likert scale (1 = not smooth at all, 7 = extremely smooth). Staff in the experimental condition also reported retrospectively, for each observed mimicry event, their emotional state while watching the recording of their consultation.

After inspection of sample videos, a behavioural coding scheme (Appendix 2) was developed specifically for the study by the principal investigator (YZ). Mimicry behaviour was defined as intentionally (in the experimental group) or unintentionally (in the control group) imitating the SP's non-verbal emotional expressions (including facial, gesture and postures). If the SP's other non-verbal emotional behaviours were mimicked (than the five instructed behaviours), the code 'mimic other' was assigned. All mimicry behaviours (in the experimental condition only) were entered with an associated affective state, collected from interviews rather than video observations. We coded both the frequency and the duration of the mimicry behaviour. The consultations were coded by a single research assistant through

applying the coding scheme onto the Noldus™ Observer XT 10.0 system [19]. The principal investigator subsequently performed inter-coder reliability checks on the research assistant with by re-coding four randomly selected clips. Coders were not blind to the experimental condition as the affective state of mimicry was entered for the experimental condition only. Both intra-coder (*Kappa* = 0.76, *CI* (0.65, 0.87) and inter-coder (*Kappa* = 0.78, *CI* (0.69, 0.87) reliabilities were satisfactory according to Cohen's Kappa [20].

2.3. Data analysis

Frequency and duration of mimicry, along with the clinician's affective state and the frequency of cognitive empathy (Appendix 3) were calculated. A 2-level logistic regression [21] modelled the probability of *mimicry* behaviour occurrence (i.e. outcome variable, 1=present, 0=absent), considering factors in both the utterance level (level 1) and the consultation level (level 2), where level 1 was nested within level 2. Explanatory factors in level 1 were: mimicry location relative to the start of the consultation and mimicry duration. Level 2 variables were clinician age, gender, clinical experience (continuously coded), baseline empathy (IRI total score), experimental condition (1=yes, 0=no), cognitive empathy, relational empathy (CARE total score), and smoothness of the consultation (separately rated by both patient and clinicians, uncorrelated, Pearson $r = 0.2419$, $p > 0.05$). Analyses were conducted in STATA/IC™ 13.0 for Windows using the *xtmelogit* procedure, following three steps: (i) variance composition at each level was explored in a null model with random intercept; (ii) predictive variables were entered at level 1 followed by level 2, with variables indicating a significant effect at the 5% level (two-sided) being retained for the next model; (iii) model improvements were checked. In addition, analysis of covariance (ANCOVA) explored differences between the two groups regarding relational empathy (CARE total and selected items) and smoothness of the consultation, controlling for covariate effects (baseline empathy).

2.4. Ethical approval

This study was funded by the Carnegie Trust (RIG 70156). It was independently reviewed and approved by the University of St. Andrews Teaching and Research Ethics Committee (UTRECT approval number: MD11398) on 12th March 2015.

3. Results

3.1. Group characteristics before consultation

As shown in Table 1, the key group characteristics before consultation were not significantly different between the two groups regarding clinician gender (50% male in each group), average age (41.05 years; t (18) = 0.277, $p > 0.05$), clinical experiences (2.80 years; t (18) = 0.849, $p > 0.05$) and baseline empathy scores (66.15, t (18) = 0.369, $p > 0.05$), which indicated that these two groups were comparable before our experiment.

[Insert Table 1 about here]

3.2. Frequency and duration of mimicry

As shown in Table 2, the total number of mimicry displays was similar in both groups (instructed mimicry: n = 185; spontaneous mimicry: n = 168) while the average duration of instructed mimicry lasted much longer (5.32 seconds, SD = 2.88) compared to spontaneous mimicry (2.38 seconds, SD = 2.29), t (18) = 1.41 $p < 0.05$. Only 8.65% of instructed mimicry occurrences were associated with self-reported affect. Importantly, there was a high level of spontaneous mimicry in the control group and by far the most frequent mimicking behaviour was gesture-based.

[Insert Table 2 about here]

3.3. Prediction of mimicry

A number of findings emerged from the two-level logistic regression analyses in prediction of mimicry occurrences (Table 3): (i) 45% of the variance (confidence interval *CI*:

0.10, 2.11) of the observed mimicry behaviour was explained by level 2 variables relating to clinicians (e.g., clinical experience and baseline empathy). (ii) The experimental condition increased the occurrence of mimicry behaviour (odds ratio *OR* = 3.17 (*CI*: 1.57, 6.40), p = 0.001). (iii) Mimicry was almost significantly related to improved relational empathy (*OR* = 1.07 (*CI*: 0.99, 1.14), p = 0.067).

[Insert Table 3 about here]

3.4. Difference in empathy and smoothness

Controlling for clinician's baseline empathy, ANCOVA analyses revealed that (i) the SP felt being treated more like a whole person when interacting with the clinicians in the control group (i.e., during spontaneous mimicry) (F (1,17) = 4.637, $p < 0.05$). (ii) The clinicians who displayed spontaneous mimicry felt that the consultation went more smoothly, compared to those instructed to mimic (F (1,17) = 4.872, $p < 0.05$), whereas the patient did not feel the difference regarding the consultation smoothness (F (1,17) = 0.517, $p > 0.05$). There was no correlation between patient-rated and clinician-rated consultation smoothness (r = 0.242, n = 20, $p > 0.05$). The total CARE score measuring the overall consultation and relational empathy was not significantly different between the two groups (F (1,17) = 1.036, $p > 0.05$).

[Insert Table 4 about here]

4. Discussion and Conclusion

4.1. Discussion

This experimental study asked whether non-verbal emotional expressions can be mimicked by clinicians in simulated consultations. We found a high level of spontaneous mimicry, as well as similar frequencies of mimicry behaviour in response to the SP's non-verbal emotional expressions, in both experimental and control groups. This novel finding affirms our lead question and suggests that non-verbal emotional expressions are mimicked

by clinicians in simulated consultations either intentionally or unintentionally, consistent with the literature on the chameleon effect [7, 9] and previous comparisons of instructed versus spontaneous mimicry in autistic spectrum participants [14, 15]. However, our study reported much longer durations for instructed than spontaneous mimicry, probably reflecting the effort required to remember to mimic. This extra effort even amounted to experiences of unease by some clinicians in our study who felt their normal flow of consultation was disrupted, due to having to remember to mimic and being aware of what they were doing. Our ANCOVA results confirmed that clinicians instructed to mimic felt the consultation went less smoothly, compared to those in the control condition. This finding contrasts with previous work where, despite deliberate efforts to carry out mimicry, both mimickers and mimickees rated the interactions more smoothly compared to interactions without mimicry [8]. As the majority of studies on mimicry involved facial expressions that were not frequently observed in our study, the relationships between (a) what behaviour was mimicked, (b) the degree of effort taken to mimic, and (c) its effect on consultation smoothness need further exploration. Furthermore, our logistic regression showed that 45% of variance in observed mimicry was explained by clinician-level factors such as experience and baseline empathy as a personality trait. Thus the distribution of other potentially relevant mimicker level variables in the two groups, such as autism traits, which were shown to impact on how mimickers benefited from instructed mimicry in recognizing mimickee's emotions [22], also need to be explored further in future studies.

Our coding of emotional mimicry was based on observable expressive behaviours (e.g., gestures, facial expressions and bodily postures), reflecting the classical view of emotional mimicry (i.e. the matched motor hypothesis [7]). More recent social-contextual views argue that mimicry serves a social function and depends on the context in which emotions are expressed [23, 24]. Emotional mimicry is thus the imitation of an emotional intention, rather

than the movement of facial muscles. Emotional mimicry will therefore occur only if the emotional signal and the relationship are perceived as affiliative [25]. In support of this social-contextual view of emotional mimicry, many clinicians in our study felt uncomfortable being instructed to mimic.

A second main question was whether non-verbal emotional mimicry improves relational empathy during simulated consultations. Our multilevel logistic regression showed that mimicking patients' non-verbal emotional expressions marginally improved the perception of relational empathy on the part of a simulated patient ($p = 0.067$). As this study focused on exploration of the feasibility of an experimental approach, our sample size was not sufficiently powered to detect a small- to medium-sized effect, due to economic constraints. However, the general direction of the observed relationship is encouraging and consistent with previous findings on mimicry as a social glue [9]. Empirical studies have consistently demonstrated that our genuine human tendency to imitate an interaction partner's gestures, posture and speech, serves an important social functions in fostering social bonds, helping to understand and empathize with others' emotions, both in social [8, 26, 27] and clinical settings [28, 29]. Our study in a simulated clinical setting provides additional evidence for the bi-directional nature of emotional mimicry that was found in live interactions [8] in that both mimickers and mimickees became emotionally attuned. It should be noted, however, that in Stel and Vonk's study [8] facial expressions were mimicked while in our study the majority of mimicry was on gestures and only the patient's relational empathy (rather than the affective empathy) was measured.

Secondly, it was the spontaneously occurring (uninstructed) mimicry that was related to the patient feeling being treated more like a whole person, and that was also related to clinicians' perception of the interaction as proceeding more smoothly. This finding is

somewhat different from the literature on facial expression mimicry which instead suggests similar effects of spontaneous and instructed mimicry [14, 15]. One explanation for our finding is that the mechanisms of gesture-driven and facial emotional mimicry might differ. This is already evident from the fact that gesture-based mimicry was the most frequent behavioural category by far (see Table 2), thus suggesting differential saliency of the two behavioural categories. Therefore, the present work implies an important theoretical distinction that needs further study.

We can therefore conclude that an experimental design to study the relationship between non-verbal emotion and empathy development is indeed feasible. It constitutes a useful novel approach to apply general social and psychological theories in relevant disciplines to study healthcare communication.

4.2 Strengths and limitations

The reported findings should be interpreted in the light of the following limitations. First, due to a limited sample size, especially with a multilevel analysis, type II errors are likely resulting from low statistical power. Secondly, only a single SP rated the relational empathy in all conditions. While this budget-induced design limitation raises the issue of generality, it also has advantages in that we can rule out idiosyncratic biases as a source of variance and can be assured of standardized and comparable communication signals across conditions. Thirdly, the instruction to mimic may have imposed an additional cognitive load on the clinicians who were already taxed with managing a complex diagnostic conversation. This overload may have contributed to the clinicians feeling uncomfortable. This outcome also casts doubts on the benefit of instructed mimicry for clinical practice and signals a need for further investigation of methods that induce a more natural mimicry behaviour.

Despite these limitations, this is the first known study to adopt an experimental approach to study relational empathy development in a simulated consultation by applying social cognitive theories on embodied emotion to healthcare communication research. Furthermore, this study adopted a two-level analysis to study emotional mimicry occurrence and its impact on relational empathy by investigating variables relating to both conversational and clinician levels. In particular, clinician baseline empathy as a personality trait, and their perspective taking abilities during consultation, were both controlled for when conducting the analyses. Therefore, our innovative methodology grounded in firm theoretical foundations, together with rigorous multilevel statistical analysis adopted in this study will encourage future healthcare communication researchers to continue to search for appropriate methodological and analytical methods to answer challenging and meaningful health questions.

A number of areas are suggested for the future directions for this work. First, as the clinicians' own feeling of being able to mimic patients' emotional behaviours was influenced by their own clinical experience and personality, such as their empathy trait, it will be beneficial to explore the distribution of other potentially relevant mimicker-level variables, such as autism traits, which were shown to impact on how mimickers benefited from instructed mimicry in recognizing mimickee's emotions [22]. Second, in spite of the indication that general mimicry can improve relational empathy, further work is needed to ascertain which type of mimicry (instructed or spontaneous) contributes more significantly to relational empathy development. Although the available literature on facial expression mimicry indicated similar effects of spontaneous and instructed mimicry [14, 15], further studies should identify the contexts within which mimicry is more or less appropriate in order to avoid the present result of discomfort from instructed mimicry. For example, some of the patients' behaviours might reflect their medical condition and should thus not be mimicked. Finally, it will be also beneficial to explore in more depth how the social-contextual view of

emotional mimicry fits into healthcare settings. Mimicry may be more about intentions in specific social contexts, rather than the mere imitation of observed movements.

4.3 Conclusion

It is feasible to study the relationship between non-verbal emotion and empathy development in the healthcare communication setting using an experimental approach. The experimental approach described here investigated the origin of the empathic general practitioners' (GP) behaviours and improved our understanding of how non-verbal emotional mimicry contributed to relational empathy development during consultations. Instructing clinicians to mimic may add cognitive load that leads to perceived discomfort in otherwise natural interactions. Further work is needed to ascertain the potential of instructed mimicry to enhance relational empathy development in clinical consultations.

4.4 Practice implications

Our initial findings suggest that the potential of mimicry to improve doctor-patient relations needs to be studied further. Understanding how non-verbal emotional mimicry impacts on patients' perceived clinician empathy during consultations may help inform training and intervention programme development in the clinical setting, for example by developing mimicry-centred skill programmes during GP education.

Conflict of interest

The authors have no conflict of interest that could inappropriately influence or be perceived to influence this manuscript.

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Authors' statement

We confirm all patient/personal identifiers have been removed or disguised so the patient/person(s) described are not identifiable and cannot be identified through the details of the story.

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The funder of the study (the Carnegie Trust) has no role in any of the following: study design; collection, analysis and interpretation of data; writing of the report; and in the decision to submit the article for publication.

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Table 1. Participant group characteristics before consultation

Variables	Experiment Group (*n*=10)	Control Group (*n*=10)	Test for difference	*P* value
Gender (male %)	50%	50%	n/a	
Age (year)	41.90 (12.77)	40.20 (14.62)	t (18) = 0.277	> 0.05
Clinical experience (year)	2.90 (0.32)	2.70 (0.68)	t (18) = 0.849	> 0.05
IRI total score (empathy baseline)	65.20 (13.80)	67.10 (8.61)	t (18) = 0.369	> 0.05

- Continuous variables were presented with mean with standard deviation; categorical variables were presented with percentage.
- IRI (interpersonal reactivity index) to measure empathy as a baseline personality characteristic.

Table 2. Frequency and duration of mimicry

Variables	Experiment (*n*=10) (instructed mimicry)	Control (*n*=10) (spontaneous mimicry)
Frequency	185 Posture: 10 Facial: 21 Gesture: 151 Unknown: 3	168 Posture: 2 Facial: 4 Gesture: 162
Duration (seconds)	5.32 (*SD* = 2.88)	2.38 (*SD* = 2.29)
No. of mimicry associated with affect	16 (8.65%)	Unknown

Table

Table 3. Multilevel logistic regression lag 1 sequence models for *mimicry* outcome

	Null		Model 1			Model 2			Model 3			Model 4	
Fixed effects	*P*	*OR*	95% *CI*	*P*	*OR*	95% *CI*	*P*	*OR*	95% *CI*	*P*	*OR*	95% *CI*	*P*
Experiment		2.35	1.08, 5.15	0.031	3.23	1.30, 8.02	0.012	3.04	1.33, 6.94	0.008	3.17	1.57, 6.40	0.001
CARE (total)					1.10	1.00, 1.21	0.048	1.06	1.00, 1.13	0.049	1.07	0.99, 1.14	0.067
Smoothness (patient)					0.70	0.34, 1.41	>0.05						
Smoothness (clinician)					1.14	0.68, 1.91	>0.05						
Mimicry time								0.99	0.99, 1.00	>0.05			
Mimicry duration								0.99	0.98, 1.00	>0.05			
Clinician Gender (ref: male)											0.74	0.39, 1.42	>0.05
Age											0.98	0.96, 1.02	>0.05
Experience											0.83	0.44, 1.57	>0.05
IRI (baseline empathy)											0.97	0.94, 1.01	>0.05
Cognitive Empathy											1.12	0.92, 1.37	>0.05
Random effects (intercept)													
Level2 variance (clinician)	0.45 (0.10, 2.11)		0.30 (0.05, 1.79)			0.19 (0.02, 1.76)			0.26 (0.05, 1.53)			0.00	
LR[1] test	$\chi^2(1) = 4.16$, $p = 0.021$		$\chi2(1) = 2.77$, $p = 0.048$			$\chi2(1) = 1.22$, $p = 0.134$			$\chi2(1) = 2.60$, $p = 0.053$			$\chi2(1) = 0.004$, $p =$	1.000
Log likelihood	-172.91		-170.55			-168.14			-167.250			-162.558	
LR[2] test			$\chi2(1) = 4.72$, $p = 0.030$ (CMnull)			$\chi2(3) = 4.82$, $p = 0.186$ (*CM1)			$\chi2(3) = 6.59$, $p = 0.086$ (CM1)			$\chi2(6) = 15.98$, $p =$ (CM1)	0.014

*CM1= compared with Model 1
LR[1] test = likelihood ratio test comparing the mixed effects logistic model to a standard logistic model
LR[2] test = likelihood ratio test for model improvement

Table

Table 4. ANCOVA results after consultation

Outcome Variable	Condition		Fix factor: Condition			Covariate: IRI		
	Experiment (mean, SD)	Control (mean, SD)	***F* (1,17)**	***p***		***F* (1,17)**	***p***	
CARE (Item 4) (whole person)	3.10 (0.74)	3.90 (0.88)	4.637	0.046*	0.214	0.001	0.971	0.000
Clinician-rated smoothness	4.60 (0.84)	5.40 (0.70)	4.872	0.041*	0.223	0.688	0.418	0.039
Patient-rated smoothness	5.10 (0.99)	5.40 (0.84)	0.517	0.482	0.030	0.010	0.920	0.001
CARE (Total)	37.50 (8.20)	40.70 (5.72)	1.036	0.323	0.057	0.087	0.772	0.005

- CARE: The Consultation and Relational Empathy Measure
- CARE Item 4: Being interested in you (i.e. the simulated patient) as a whole person (1 = poor, 5 = excellent).
- Clinician-rated consultation smoothness: On a scale of 1-7 with 1 being not smooth at all and seven being extremely smooth, how smoothly do you feel the consultation went?
- Patient-rated consultation smoothness: Overall, on a scale of 1-7 with 1 being not smooth at all and 7 being extremely smooth, how smoothly do you feel the consultation went?
- Small effect size = 0.01; medium effect size =0.06; large effect size =0.14 *$p <$ 0.05.

Appendix 1 Five non-verbal emotional expressions by the simulated patient

Type	Nature of emotion	Topic elicited by clinician	Non-verbal behaviour	Verbal content	Consistency between verbal & nonverbal
Negative	Frustration (agitation)	Any diet makes it better or worse?	Shrugging shoulders with hand gestures (right hand shakes a bit then both palms up and open)	Barking at the wrong tree.	consistent
Negative	Fed up	Could I ask you about the pain? How did it all happen?	Crossing legs and sit back	Reluctantly responding, sigh (it's just a pain, difficult to describe, all consuming)	conflict
Negative	Overwhelming (cannot bear to think of the stress at work)	Issues at work, Take some time off?	Rolling eyeballs to side (look elsewhere), shaking head	The situation just got crazy at school	consistent
Negative	Upset, hopeless	Things at home, boys, so much to do	Big sigh, body sinking in, followed by silence	Difficult to get on top of things	consistent
Positive	Happy, relieved, being understood	Showing empathy and understanding on 'test'	Nodding head, opening gesture and whole body leaning forward	Yes, yes, absolutely	consistent

Appendix 2: Behavioural coding scheme for mimicking patients' non-verbal emotional behaviours

Subject	Behaviour	Notes
Simulated patient (SP)	Non-verbal[a]	Appendix 1
	Headmaster (nice guy) – pushes away Pain (can't concentrate) – sigh, hand to head Diet (barking) – palms up, shaking, shrugging shoulders Work (crazy) – looks elsewhere, hand in hair Test (yes, absolutely) – nodding, open posture	
Clinician	Non-verbal	
	Mimic (one of the five SP nonverbal emotional behaviours was mimicked) Modality: gesture, facial, body Affective state[b]: affected, superficial, unknown Mimic other (SP nonverbal emotional behaviours other than the five listed above was mimicked)	(from interview)
	Verbal[c] Cognitive empathy (Perspective taking statements, such as "I can understand this is difficult.")	Appendix 3

- Non-verbal[a]: details of the five SP non-verbal emotional expressions can be found in Appendix 1.
- Affective state[b]: clinicians' affective states (experimental condition only) corresponding to their mimicry behaviours are elicited from the interviews after the consultation and subsequently entered into the coding.
- Verbal[c]: typical examples of clinicians' verbal expressions of cognitive empathy are illustrated in Appendix 3.

Appendix 3 Ten typical examples of clinicians' cognitive empathy

No.	Clinicians' verbal expressions coded as 'perspective taking' (i.e. cognitive empathy)
1	It sounds like it's something that's causing you quite a lot of interference in your life.
2	The environment seems to be rather stressful at the moment.
3	It seems to me, from what you're telling me, that you're not coping brilliantly.
4	Obviously you're very, very distressed.
5	Must be hard for you, physical and psychological, must be very hard for you.
6	I get the impression that you're getting quite, well, you're getting quite distressed about this.
7	So obviously it's got to the stage where, you know, it's becoming a real problem for you, and I can see that.
8	I can imagine that trying to deal with S3 (secondary 3rd year) boys, well, that must be hard enough on a good day, never mind when you're feeling, feeling unwell.
9	It sounds absolutely miserable, I can, you know, obviously haven't had to deal with that myself, but it sounds utterly miserable.
10	Especially when you're doing your job where you're standing up in front of people, it's very distracting, you need to have your full attention.