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Associations between thin slice ratings of affect and rapport and perceived patient-centeredness in primary care: Comparison of audio and video recordings

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Abstract

Objective—To investigate associations between ratings of "thin slices" from recorded clinic visits and perceived patient-centeredness; to compare ratings from video recordings (sound and images) versus audio recordings (sound only).

Methods—We analyzed 133 video-recorded primary care visits and patient perceptions of patient-centeredness. Observers rated thirty-second thin slices on variables assessing patient affect, physician affect, and patient-physician rapport. Video and audio ratings were collected independently.

Results—In multivariable analyses, ratings of physician positive affect (but not patient positive affect) were significantly positively associated with perceived patient-centeredness using both video and audio thin slices. Patient-physician rapport was significantly positively associated with perceived patient-centeredness using audio, but not video thin slices. Ratings from video and audio thin slices were highly correlated and had similar underlying factor structures.

Conclusion—Physician (but not patient) positive affect is significantly associated with perceptions of patient-centeredness and can be measured reliably using either video or audio thin slices. Additional studies are needed to determine whether ratings of patient-physician rapport are associated with perceived patient-centeredness.

Practice Implications—Observer ratings of physician positive affect have a meaningful positive association with patients' perceptions of patient-centeredness. Patients appear to be highly attuned to physician positive affect during patient-physician interactions.

Keywords

affect; rapport; physician-patient relations; video recording; audio recording; patient-centered care; thin slices; primary care

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Declaration: We confirm that all personal identifiers have been removed or disguised so that the persons described are not identifiable and cannot be identified through the details of the story.

1. Introduction

Health communication researchers often investigate associations between patient-physician communication during clinic visits and patients' post-visit perceptions of care (e.g., quality of care, agreement with treatment decisions). Calls for more patient-centered care,[1, 2] efforts to link communication to outcomes,[3] and policies linking hospital reimbursement to patient experience[4] have reaffirmed the importance of this research. Direct observation of clinical interactions, typically via video or audio recordings of clinic visits, is critical for identifying aspects of patient-physician communication that influence patients' post-visit perceptions and so plays a major role in both health communication research and clinical training.[5, 6] Analyzing recordings can be resource intensive, but recording allows researchers to capture paralinguistic and nonverbal aspects of communication, such as affect (i.e., patients' and physicians' displayed emotions)[7, 8] and rapport (i.e., harmony between patients and physicians).[9]

One approach for reducing the resources needed to analyze recordings of clinical interactions is to analyze short excerpts or “thin slices” from an interaction to approximate analysis of the whole visit. Research shows that observer judgments from thin slices correlate well with ratings of entire interactions across a wide range of real-world and experimental settings.[10, 11] While health communication researchers have used thin slices to analyze both affect[12, 13] and verbal communication,[14, 15] to our knowledge no studies have examined associations between thin slice ratings of real patient-physician interactions and patients' perceptions of patient-centeredness. Patient-centeredness is a core value in medicine[2, 16] and is typically assessed with patient ratings of physician behaviors such as eliciting the patient's illness experience, treating the patient as a whole person, finding common ground, and developing a therapeutic relationship.[17] Patient-centeredness has been associated with subsequent improvements in patient symptom burden and emotional health[18, 19] as well as with less diagnostic testing.[20]

Another important knowledge gap in this area is how thin slice ratings based on *video* recordings (recordings containing both images and sound) compare to thin slice ratings based on *audio* recordings (recordings containing only sound). Video recordings capture more data than audio recordings, but video recordings are more challenging to collect, raise additional privacy concerns, and are sometimes considered to be more intrusive than audio recordings.[21]

To address these questions, we used data from a prior study that included video recordings of primary care visits and patient perceptions of patient-centered care. We identified 30-second thin slices from these visits and analyzed observer ratings of patient affect, physician affect, and rapport for both video and audio thin slices. Our study tested the following hypotheses:

> Hypothesis 1a. Observer ratings of physician and patient positive affect from video thin slices (i.e. recordings containing both images and sound) will be positively associated with patient post-visit perceptions of patient-centeredness.

Hypothesis 1b. Observer ratings of physician and patient positive affect from audio thin slices (i.e. recordings containing only sound) will be positively associated with patient post-visit perceptions of patient-centeredness.

Hypothesis 2a. Observer ratings of patient-physician rapport from video thin slices will be positively associated with patient post-visit perceptions of patient-centeredness.

Hypothesis 2b. Observer ratings of patient-physician rapport from audio thin slices will be positively associated with patient post-visit perceptions of patient-centeredness.

Hypotheses 1a and 1b were based on results of two meta-analyses that found observer ratings of physician positive affect (based on whole visits) were positively associated with patient satisfaction.[7, 8] Hypotheses 2a and 2b were based on a prior study that found observer ratings of rapport (based on video thin slices) between medical students and standardized patients were positively associated with observer ratings of patient satisfaction.[9]

The results of this study will advance health communication research in two important ways. First, if thin slice ratings of actual clinic visits are associated with post-visit perceptions of patient-centeredness, then researchers may more confidently analyze thin slices (rather than whole visits) for future studies in this area. Second, findings may help researchers to choose between collecting either video or audio recordings for studies that can be conducted using either approach.

2. Methods

2.1. Data sources

Data were video recordings and questionnaires from a parent study of patient-physician communication conducted at an urban primary care clinic serving a predominately low-income, black patient population.[22, 23] Patients (n =133) were established adult patients who had an appointment scheduled with a participating physician. Patients were recruited without regard to their medical condition. Physicians (n = 17) were family medicine residents. All 133 visits were video recorded. Immediately prior to their visit, patients completed questionnaires that included demographics and the Medical Outcome Study 20-item health survey (SF-20).[24] The SF-20 includes 5 Likert-type items asking patients to rate their general health and one item asking patients to rate their average bodily pain during the past 4 weeks. Immediately after their visit, patients completed the 14-item patient perception of patient-centeredness measure, which is based on Stewart et al.'s model of patient centeredness and asks patients the degree to which the physician elicited their illness experience, reached common ground, and treated them as a whole person.[17, 25] Patients also answered 1 additional item asking how satisfied they were with the interaction. Table 1 shows the complete questionnaire. These 15 items were added together to generate a single patient-centeredness score (α = 0.90).[17, 18]

Thin slices were selected using a two-step approach as part of a prior analysis conducted to study associations between ratings of affect and rapport and discussions about pain.[12] First, research assistants systematically reviewed and coded video recordings to identify the precise timing and duration of all discussions about pain, to the nearest second. Second, they systematically selected two or three 30-second excerpts from each of the visits to serve as thin slices. Slices were sampled to show either a discussion about pain or no discussion about pain. Three slices were selected from the 85 visits that included substantive discussions about pain: one from the first two minutes of the visit, one from the middle of the visit, and one from the final two minutes of the visit. Two slices were selected from the 48 visits that included minimal or no discussions about pain: one from the first two minutes and one from the final two minutes (Only two slices were selected from these visits to conserve resources.). This approach, the full details of which have been previously published,[12] yielded a total of 351 thin slices. This study was approved by institutional review boards at Wayne State University, Karmanos Cancer Institute, and the University of Michigan.

2.2 Thin slice ratings

Research assistants unaware of study hypotheses rated each thin slice on variables related to patient affect, physician affect, and patient-physician rapport. Raters first analyzed the video thin slices. Raters underwent separate training and practice sessions for patient affect, physician affect, and rapport. Each rater watched the 351 slices in a different random order. Raters were instructed to watch each slice only once before rating it and to make ratings quickly based on first impressions. Four raters independently rated each variable related to patient and physician affect; three raters independently rated each slice on variables related to rapport.

Variables assessing patient and physician affect were selected by reviewing prior research on affect both generally and in the context of clinical interactions.[13, 26, 27] Raters assessed patients and physicians on the following 6-point unipolar scales: warm/friendly, tense/anxious, engaged/attentive, disagreeable/antagonistic, upset/distressed (patients only), sad/depressed (patients only), hesitant/uncomfortable (physicians only) and rushed/hurried (physicians only).

Variables assessing patient-physician rapport were adapted from a prior study of observer-rated rapport that used 9-point unipolar rating scales.[9] Rapport is a positive, dyadic concept that comprises positive affect (liking), mutual attention, and coordination.[28] Raters assessed rapport on the following 9-point scales: overall rapport, liking, attention, coordination, and mutual trust.

After rating video thin slices, raters repeated the whole rating process for audio thin slices. The rating process, including training, was identical for video and audio thin slices, except that computer monitors were thoroughly covered to ensure that ratings were based only on aural cues. There was also a gap of several months between the rating of video thin slices and audio thin slices to minimize chances that raters would remember specific slices.

2.3. Statistical analysis

For each rating variable, we calculated mean, standard deviation, intraclass correlation coefficient (ICC) of individual ratings, and effective reliability of mean ratings using the Spearman-Brown **coefficient**.[29] Effective reliability reflects the additional reliability gained from using multiple raters and has been used in prior studies.[30] Results for each variable generated from ratings of video thin slices were compared to results for the corresponding variable generated from ratings of audio thin slices. Pearson product moment correlations were also calculated for each pair of video- and audio-based rating variables.

To reduce the number of total variables for analysis, we performed exploratory factor analysis (iterated principal factor method) and examined scree plots, factor loadings, and eigenvalues to identify natural groupings within the three sets of rating variables (i.e., patient affect, physician affect, and rapport).[31] We then generated composite variables based on factor loadings. Summary statistics and creation of composite variables were carried out separately for ratings of video and audio thin slices.

To test our hypotheses, we performed a series of separate regressions with patients' perceived patient-centeredness as the dependent variable and each composite variable as the independent variable. To translate thin slice ratings into visit-level measures that could be analyzed as independent variables, we modeled visit-level estimates for each composite variable using mixed-effects models that accounted for both the clustered nature of our data (i.e., thin slices within visits and visits within physicians) and the presence or absence of pain-related discussion in each slice. We controlled for the presence of pain-related discussions because sampling of thin slices in the parent study was based on the presence or absence of pain-related discussions. This approach produces best linear unbiased estimates of group-level measures and accounts for random variation in slice-level ratings better than averages of raw data.[32] For each regression, we first evaluated bivariate associations between each composite variable and patient-centeredness controlling only for the clustering of visits within physicians. We then performed multivariable analyses controlling for patient demographics, baseline general health, and pain severity (pain severity had been found to correlate with which had been found to correlate with affect ratings in prior analyses[12]). We performed separate analyses for video and audio thin slices and calculated standardized regression coefficients to facilitate comparison across models.

We tested regression assumptions by inspecting residual plots. Approximately one percent of slices contained no patient-physician interaction and could not be rated; we did not impute these missing data. As a sensitivity analysis, we repeated our analysis of Hypotheses 1 and 2 using used a 3-level mixed effects model with thin slice ratings as the dependent variable, perceived patient-centeredness as the independent variable, and both patient and physician as random effects.[33] This approach reverses the dependent and independent variables but allows for estimation of associations between slice-level variables and perceived patient-centeredness without producing visit-level estimates for affect and rapport. Analyses were performed using Stata 13.1.

3. Results

Table 2 shows participant demographics for the 133 patients and 17 physicians in our sample. Ninety-eight percent of patients were black; 88% of physicians were international medical graduates and most reported their race/ethnicity as either Asian (35%) or Indian/Pakistani (47%). Ratings of patient-centeredness had a strongly negative skew (mean 53.2, median 56, interquartile range 50 – 59), a typical pattern for post-visit self-reports of patient experience.[34]

Table 3 shows the ICC and estimated reliability for ratings of video and audio thin slices. ICC for most variables was between 0.30 and 0.45; reliability for most variables was between 0.65 and 0.7. (0.7 is a common threshold for acceptable reliability.[35]) These results are similar to those of other thin slice studies examining real clinical interactions.[13, 36] Compared to ratings of audio thin slices, ICC and reliability for ratings of video thin slices were slightly higher for all variables except for 3 of the 6 variables measuring patient affect. Ratings of tense/anxious affect for both patient and physician were outliers and had substantially lower reliability than other variables. Table 4 shows mean ratings and correlations between variables derived from video and audio thin slices. Mean ratings for video and audio thin slices were similar. Correlations between each video-based rating and the corresponding audio-based rating were large (mean $r = 0.64$, range 0.42 – 0.81) and were greater than 0.5 for all variables except for patient tense/anxious affect and physician tense/anxious affect.

Detailed factor analysis results, shown in Table 5, were similar for both audio and video thin slice ratings. In both cases, factor analysis for patient and physician affect yielded two-factor solutions, so a total of five composite variables (two for patient affect, two for physician affect, and one for rapport) were generated using the resulting factor loadings. The 5 composite variables based on video thin slices were highly correlated with the corresponding composite variable based on audio thin slices ($r = 0.76$ for patient positive affect, 0.72 for patient negative affect, 0.73 for physician positive affect, 0.67 for physician negative affect, 0.63 for rapport). The first patient factor, which we called “patient negative affect,” primarily comprised the variables tense/anxious and upset/distressed” (Spearman-Brown coefficient = 0.89); the second patient factor, which we called “patient positive affect,” primarily comprised the variables warm/friendly and engaged/attentive (Spearman-Brown = 0.84). The first physician factor, which we called “physician negative affect,” primarily comprised the variables tense/anxious and hesitant/uncomfortable (Spearman-Brown = 0.86); the second physician factor, which we called “physician positive affect,” primarily comprised the variables warm/friendly and engaged/attentive (Spearman-Brown = 0.72). For both audio and video thin slices, all five variables related to rapport loaded onto a single factor (Cronbach's alpha = 0.98), so we called the resulting composite variable “rapport.” Spearman-Brown coefficient is less biased than alpha for 2-item scales.[37] Based on factor analysis results, we generated standardized composite variables using the regression scoring method.[38]

Table 6 shows the results of our regression analyses. Hypotheses 1a and 1b (i.e., ratings of physician and patient positive affect from a) video and b) audio thin slices will be positively

associated with patient post-visit perceptions of patient-centeredness) were both supported for *physician* positive affect. In adjusted analyses, the regression coefficients associated with physician positive affect were statistically significant for both video thin slices (β = 0.21, 95%CI 0.06, 0.35, $P = 0.006$) and audio thin slices (β = 0.15, 95%CI 0.01, 0.29, $P = 0.04$). The standardized coefficient of 0.21 for video thin slices indicates a small-to-moderate effect size and the coefficient of 0.15 for audio thin slices indicates a small effect size.[39] In contrast, neither Hypothesis 1a nor Hypothesis 1b was supported for *patient* positive affect.

Hypotheses 2a and 2b (i.e., ratings of patient-physician rapport from a) video and b) audio thin slices will be positively associated with patient post-visit perceptions of patient-centeredness) received mixed support (Table 6). After adjusting for covariates, ratings of rapport from video thin slices were not significantly associated with perceived patient-centeredness (β = 0.07, 95%CI -0.08, 0.21, $P = 0.37$). However, ratings of rapport from audio thin slices were significantly associated with perceived patient-centeredness in the expected direction (β = 0.15, 95%CI 0.01, 0.29, $P = 0.035$).

Although we did not advance specific hypotheses related to patient negative affect or physician negative affect, for completeness we explored whether these composite variables were associated with patient post-visit ratings of perceived patient-centeredness (Table 6). Physician negative affect was not significantly associated with perceived patient-centeredness for either video or audio thin slices. In adjusted analyses, greater patient negative affect was associated with lower ratings of perceived patient-centeredness for video thin slices (β = -0.15, 95%CI -0.30, 0.00, $P = 0.045$) but not for audio thin slices (β = -0.11, 95%CI -0.26, 0.04, $P = 0.15$). However, the association between patient negative affect and perceived patient-centeredness was not significant in the sensitivity analysis conducted using slice-level variables. Detailed results of the sensitivity analysis, which were otherwise similar to results from the primary analysis, are available from the corresponding author.

Finally, because Hypotheses 1a and 1b were both confirmed for physician positive affect, we performed additional exploratory analyses to investigate whether the ratings based on video thin slices (which capture both sound and images) resulted in significantly better prediction of perceived patient-centeredness than did the ratings based on audio thin slices (which captured only sound). For this analysis, we started with the multivariable regression model used to test Hypotheses 1b (i.e., association between ratings of physician positive affect from audio thin slices and perceived patient-centeredness) and then added a new independent variable indicating the additional information conveyed by video thin slices compared to audio thin slices. This new variable was generated by subtracting the composite variable for physician positive affect based on audio thin slices from the composite variable for physician positive affect based on video thin slices. We examined the regression coefficient associated with this new variable to determine whether the additional information captured from video thin slices significantly improved the model of perceived patient-centeredness compared to using only audio thin slices. We found that the additional information from video thin slices did improve model fit but that this improvement was not quite statistically significant ($P = 0.07$). Detailed results are available from the corresponding author.

4. Discussion and Conclusion

4.1. Discussion

In this study, we examined the extent to which observer ratings of affect and rapport during clinical interactions were associated with patient perceptions of patient-centeredness. Our findings supported Hypotheses 1a and 1b for physician positive affect (i.e., ratings of physician positive affect were positively associated with ratings of perceived patient-centeredness) but not for patient positive affect. Two prior meta-analyses found positive associations between observer-rated physician positive affect (based on whole visits) and post-visit patient satisfaction.[7, 8] Our study extends this literature by showing an association between physician positive affect and patient perceptions of patient centeredness. Taken together, these results suggest that the association between physician positive affect and post-visit self-reports of patient experience may be a general phenomenon that is at least partly independent of the specific aspects of experience (e.g. satisfaction, trust, patient-centeredness) being assessed. This interpretation is consistent with the observation that positive affect is conveyed largely via paralinguistic and nonverbal behaviors rather than verbal communication.[40, 41] The effect size we observed was small-to-moderate. However, physician affect colors every patient-physician interaction, and statistically small effects for common phenomena can translate into substantial practical impacts over time.[42] Small effect sizes can also generate large societal effects[43]; for example, the growing push to link reimbursement to patient experience ratings[4] and the attendant need to rank physicians based on these ratings means that relatively modest changes in patient ratings are likely to translate into important differences from the perspective of payers, administrators, and policymakers.

We also found that the associations between observer ratings of physician positive affect and patient perceptions of patient-centeredness can be reliably assessed based on 30-second thin slices of real clinic visits. This finding has important implications for researchers, because analyzing thin slices requires considerably less time and resources than analyzing whole visits. Our findings, as well as prior studies showing that analyses based on thin slices are highly correlated with analyses based on whole visits,[10, 11, 14, 15] should reassure communication researchers that using thin slices is a valid approach for investigating associations between patient-physician communication during clinic visits and patients' post-visit perceptions of care.

Finally, our study adds to the sparse literature that compares ratings of video recordings (recordings containing both images and sound) to ratings of audio recordings (recordings containing only sound). Researchers' decisions to collect either audio recordings or video recordings are often determined by their research questions and planned analyses. However, many research topics, including studies of affect and patient-physician rapport, can feasibly be studied using either video or audio recordings. Choosing between video and audio recordings in these cases is a critically important decision for communication researchers, but very little research has been done to evaluate the practical tradeoffs of this choice and to determine when the additional effort needed to capture video recordings is likely to result in different or better results compared to using audio recordings. For the variables measured in

our study, ratings from video and audio thin slices are highly correlated, have similar underlying factor structures, and were both sufficient to detect small-to-moderate associations between physician positive affect and ratings of perceived patient-centeredness. Therefore, at least in this instance, thin slices ratings from audio and video recordings produce similar results.

Findings related to Hypotheses 2a and 2b (i.e., that ratings of patient-physician rapport would be positively associated with perceived patient-centeredness) were mixed. Ratings of rapport were significantly positively associated with perceived patient-centeredness only for ratings based on audio thin slices. Unlike video recordings, audio recordings cannot show nonverbal interactions (e.g., body language), which play a key role in observer assessments of rapport.[28] Therefore, one possible interpretation of these findings is that observer ratings of rapport based on audio recordings tend to overestimate rapport because these ratings do not take into account mismatches between speech and body language, which would lead to lower ratings. This interpretation is consistent with our finding that the correlation between the video- and audio-based composite variables for rapport ($r = 0.63$) was lower than the correlation between the video- and audio-based composite variables for affect (range 0.67 – 0.73).

In our exploratory analyses, we found scant evidence to suggest that ratings of either patient or physician negative affect was significantly associated with patient perceptions of patient-centeredness. Our null findings for physician negative affect are consistent with a meta-analysis that found no association between ratings of physician negative affect (based on whole visits) and patient satisfaction.[7] Higher ratings of patient negative affect were associated with lower ratings of perceived patient-centeredness, but this association was only significant for ratings based on video thin slices and was not confirmed in our sensitivity analysis. Additional research is thus needed to clarify and confirm this finding.

This study has several limitations. Our findings were derived from a single clinic that provides care for a predominantly black, low-income patient population. However, prior studies in other clinical settings have also found associations between observer ratings of physician positive affect and patient post-visit perceptions,[7, 8] suggesting that this finding, at least, does generalize to other populations. While there was a gap of several months between rating of video thin slices and audio thin slices, we cannot rule out the possibility that raters remembered specific thin slices, so that ratings of audio thin slices were not based on truly independent first impressions.

4.2. Conclusion

Our findings show that physician positive affect (but not patient positive affect) is significantly positively associated with patient perceptions of patient-centeredness and also that this association can be measured reliably using thin slices. We found inconsistent evidence of a positive association between patient-physician rapport and perceived patient-centeredness. Additional studies using video and audio recordings are needed to clarify whether ratings of patient-physician rapport are associated with perceived patient-centeredness. In our study, rating from video thin slices and audio thin slices were highly correlated with each other and had similar underlying factor structures. Our study highlights

the need for more research comparing analyses based on video versus audio recordings that can inform communication researchers who are weighing the practical tradeoffs of collecting video versus audio recordings.

4.3. Practice implications

Thin slice analysis provides a valid approach for investigating associations between ratings of physician and patient affect during clinic visits and subsequent measures of patient experience. With modern technology, making and analyzing thin slices is also substantially more cost-effective than analyzing entire interactions. The association between physician positive affect and subsequent self-reports of patient experience (e.g., perceived patient-centeredness, patient satisfaction) has been replicated in different clinical settings and can be demonstrated using thin slice ratings. The robust nature of this association across studies suggests that patients are highly attuned to physician positive affect during patient-physician interactions, and that physician positive affect likely has a meaningful effect on patient self-reports of post-visit perceptions even when patients are asked to rate constructs (such as patient-centeredness) that do not directly pertain to physician affect.

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References

1. McCormack LA, Treiman K, Rupert D, Williams-Piehota P, Nadler E, Arora NK, et al. Measuring patient-centered communication in cancer care: A literature review and the development of a systematic approach. Soc Sci Med. 2011; 72:1085–95. [PubMed: 21376443]
2. Epstein RM, Fiscella K, Lesser CS, Stange KC. Why The Nation Needs A Policy Push On Patient-Centered Health Care. Health Affair. 2010; 29:1489–95.
3. Street RL Jr. How clinician-patient communication contributes to health improvement: modeling pathways from talk to outcome. Patient Educ Couns. 2013; 92:286–91. [PubMed: 23746769]
4. Chatterjee P, Tsai TC, Jha AK. Delivering value by focusing on patient experience. The American journal of managed care. 2015; 21:735–7. [PubMed: 26633097]
5. Bell, RA., Kravitz, RL. Direct Observation and Coding of Physician-Patient Interactions. In: Whaley, BB., editor. Research Methods in Health Communication: Principles and Application. New York: Routledge; 2014. p. 141-68.
6. Henry SG, Holmboe ES, Frankel RM. Evidence-based competencies for improving communication skills in graduate medical education: a review with suggestions for implementation. Med Teach. 2013; 35:395–403. [PubMed: 23444891]
7. Henry SG, Fuhrel-Forbis A, Rogers MA, Eggly S. Association between nonverbal communication during clinical interactions and outcomes: a systematic review and meta-analysis. Patient Educ Couns. 2012; 86:297–315. [PubMed: 21824738]
8. Venetis MK, Robinson JD, Turkiewicz KL, Allen M. An evidence base for patient-centered cancer care: a meta-analysis of studies of observed communication between cancer specialists and their patients. Patient Educ Couns. 2009; 77:379–83. [PubMed: 19836920]
9. Hall JA, Roter DL, Blanch DC, Frankel RM. Observer-rated rapport in interactions between medical students and standardized patients. Patient Educ Couns. 2009; 76:323–7. [PubMed: 19545973]

10. Ambady N, Bernieri FJ, Richeson JA. Toward a histology of social behavior: Judgmental accuracy from thin slices of the behavioral stream. Advances in Experimental Social Psychology, Vol 32. 2000; 32:201–71.
11. Ambady N, Rosenthal R. Thin Slices of Expressive Behavior as Predictors of Interpersonal Consequences - a Metaanalysis. Psychol Bull. 1992; 111:256–74.
12. Henry SG, Eggly S. The effect of discussing pain on patient-physician communication in a low-income, black, primary care patient population. J Pain. 2013; 14:759–66. [PubMed: 23623573]
13. Ambady N, LaPlante D, Nguyen T, Rosenthal R, Chaumeton N, Levinson W. Surgeons' tone of voice: A clue to malpractice history. Surgery. 2002; 132:5–9. [PubMed: 12110787]
14. Carcone AI, Naar S, Eggly S, Foster T, Albrecht TL, Brogan KE. Comparing thin slices of verbal communication behavior of varying number and duration. Patient Educ Couns. 2015; 98:150–5. [PubMed: 25441095]
15. Roter DL, Hall JA, Blanch-Hartigan D, Larson S, Frankel RM. Slicing it thin: New methods for brief sampling analysis using RIAS-coded medical dialogue. Patient Educ Couns. 2011; 82:410–9. [PubMed: 21239135]
16. Levinson W, Lesser CS, Epstein RM. Developing physician communication skills for patient-centered care. Health Affair. 2010; 29:1310–8.
17. Stewart, M., Brown, JB., Weston, WW., McWhinney, IR., McWilliam, CL., Freeman, TR. Patient-centered medicine: Transforming the clinical method. 3rd. London: Radcliffe Publishing; 2014.
18. Stewart M, Brown JB, Donner A, McWhinney IR, Oates J, Weston WW, et al. The impact of patient-centered care on outcomes. J Fam Practice. 2000; 49:796–804.
19. Little P, Everitt H, Williamson I, Warner G, Moore M, Gould C, et al. Observational study of effect of patient centredness and positive approach on outcomes of general practice consultations. BMJ. 2001; 323:908–11. [PubMed: 11668137]
20. Epstein RM, Franks P, Shields CG, Meldrum SC, Miller KN, Campbell TL, et al. Patient-centered communication and diagnostic testing. Ann Fam Med. 2005; 3:415–21. [PubMed: 16189057]
21. Rushmer R, Themessel-Huber M, Coyle J, Humphris G, Dowell J, Williams B. Is the routine recording of primary care consultations possible … and desirable? Lessons for researchers from a consultation with multiple stakeholders. Patient Educ Couns. 2011; 82:247–53. [PubMed: 20547028]
22. Penner LA, Dovidio JF, Edmondson D, Dailey RK, Markova T, Albrecht TL, et al. The Experience of Discrimination and Black-White Health Disparities in Medical Care. Journal of Black Psychology. 2009; 35:180–203.
23. Penner LA, Dovidio JF, West TV, Gaertner SL, Albrecht TL, Dailey RK, et al. Aversive Racism and Medical Interactions with Black Patients: A Field Study. J Exp Soc Psychol. 2010; 46:436–40. [PubMed: 20228874]
24. Stewart AL, Hays RD, Ware JE. The MOS Short-Form General Health Survey: Reliability and validity in a patient population. Med Care. 1988; 26:724–32. [PubMed: 3393032]
25. Hudon C, Fortin M, Haggerty JL, Lambert M, Poitras ME. Measuring patients' perceptions of patient-centered care: a systematic review of tools for family medicine. Ann Fam Med. 2011; 9:155–64. [PubMed: 21403143]
26. Russell JA. A Circumplex Model of Affect. J Pers Soc Psychol. 1980; 39:1161–78.
27. Haskard K, DiMatteo MR, Heritage J. Affective and instrumental communication in primary care interactions: Predicting the satisfaction of nursing staff and patients. Health Commun. 2009; 24:21–32. [PubMed: 19204855]
28. Bernieri, FJ. The Expression of Rapport. In: Manusov, V., editor. The Sourcebook of Nonverbal Measures. Mahwah, NJ: Laurence Erlbaum Associates; 2005. p. 347-60.
29. Rosenthal, R. Conducting judgment studies: Some methodological issues. In: Harrigan, JA.Rosenthal, R., Scherer, KR., editors. The New Handbook of Methods in Nonverbal Behavior Research. Oxford: Oxford University Press; 2005. p. 199-234.
30. Fiscella K, Franks P, Srinivasan M, Kravitz RL, Epstein R. Ratings of physician communication by real and standardized patients. Ann Fam Med. 2007; 5:151–8. [PubMed: 17389540]
31. Fabrigar LR, Wegener DT, MacCallum RC, Strahan EJ. Evaluating the use of exploratory factor analysis in psychological research. Psychol Methods. 1999; 4:272–99.

32. Hayward RA, Heisler M, Adams J, Dudley RA, Hofer TP. Overestimating outcome rates: statistical estimation when reliability is suboptimal. Health Serv Res. 2007; 42:1718–38. [PubMed: 17610445]
33. Snijders, T., Bosker, R. Multilevel Analysis. 2nd. Washington DC: SAGE Publications; 2012.
34. Rolfe A, Cash-Gibson L, Car J, Sheikh A, McKinstry B. Interventions for improving patients' trust in doctors and groups of doctors. Cochrane database of systematic reviews. 2014:CD004134. [PubMed: 24590693]
35. Streiner, DL., Norman, GR. Health measurement scales : a practical guide to their development and use. 3rd. Oxford; New York: Oxford University Press; 2003.
36. Ambady N, Koo J, Rosenthal R, Winograd CH. Physical therapists' nonverbal communication predicts geriatric patients' health outcomes. Psychol Aging. 2002; 17:443–52. [PubMed: 12243386]
37. Eisinga R, Grotenhuis M, Pelzer B. The reliability of a two-item scale: Pearson, Cronbach, or Spearman-Brown? International journal of public health. 2013; 58:637–42. [PubMed: 23089674]
38. DiStefano C, Zhu M, Midrila D. Understanding and using factor scores: Considerations for the applied researcher. Practical Assessment, Research, & Evaluation. 2009; 14:1–11.
39. Cohen, J. Statistical Power Analysis for the Behavioral Sciences. 2nd. Hillsdale, N.J.: Lawrence Erlbaum Associates; 1988.
40. Juslin, PN., Scherer, KR. Vocal expression of affect. In: Harrigan, JA.Rosenthal, R., Scherer, KR., editors. The New Handbook of Nonverbal Behavior Research. 1st. New York: Oxford University Press; 2006. p. 65-135.
41. Burgoon, JK. Nonverbal signals. In: Knapp, ML., Miller, GR., editors. Handbook of interpersonal communication. 2nd. Thousand Oaks, Calif: Sage Publications; 1994. p. 334-90.
42. Penner LA, Dovidio JF, Gonzalez R, Albrecht TL, Chapman R, Foster T, et al. The Effects of Oncologist Implicit Racial Bias in Racially Discordant Oncology Interactions. J Clin Oncol. 2016; 34:2874–80. [PubMed: 27325865]
43. Greenwald AG, Banaji MR, Nosek BA. Statistically small effects of the Implicit Association Test can have societally large effects. J Pers Soc Psychol. 2015; 108:553–61. [PubMed: 25402677]

Table 1

Patient perception of patient-centeredness*

1.	To what extent was your main problem(s) discussed today?			
	Completely	Mostly	A little	Not at all
2.	Would you say that your doctor knows that this was one of your reasons for coming in today?			
	Yes	Probably	Unsure	No
3.	To what extent did the doctor understand the importance of your reason for coming in today?			
	Completely	Mostly	A little	Not at all
4.	How well do you think your doctor understood you today?			
	Very well	Well	Somewhat	Not at all
5.	How satisfied were you with the discussion of your problem?			
	Very satisfied	Satisfied Some	what satisfied	Not satisfied
6.	To what extent did the doctor explain this problem to you?			
	Completely	Mostly	A little	Not at all
7.	To what extent did you agree with the doctor's opinion about the problem?			
	Completely	Mostly	A little	Not at all
8.	How much opportunity did you have to ask your questions?			
	Very much	A fair amount	A little	Not at all
9.	To what extent did the doctor ask about your goals for treatment?			
	Completely	Mostly	A little	Not at all
10.	To what extent did the doctor explain treatment?			
	Very well	Well	Somewhat	Not at all
11.	To what extent did the doctor explore how manageable this (treatment) would be for you? He/she explored this:			
	Completely	Mostly	A little	Not at all
12.	To what extent did you and the doctor discuss your respective roles? (Who is responsible for making decisions and who is responsible for what aspects of your care?)			
	Completely	Mostly	A little	Not at all
13.	To what extent did the doctor encourage you to take the role you wanted in your own care?			
	Completely	Mostly	A little	Not at all
14.	How much would you say that this doctor cares about you as a person?			
	Very much	A fair amount	A little	Not at all
15.	Overall, how satisfied were you with today's visit with this doctor?			
	Completely	Mostly	A little	Not at all

* Questions 1-14 comprise the patient perception of patient centeredness measure developed by Stewart, Brown, Weston et al. (2014). Question 15 was added for the purposes of this study.

Table 2

Participant characteristics

Patients	**(*n* = 133)**	**Physicians**	**(*n* = 17)**
Male (%)	24.1	Male (%)	47.0
Mean Age [Years] (SD)	44.0 (14.1)	Mean Age [Years] (SD)	30.4 (3.4)
Black Race/Ethnicity (%)	98.5	Race/Ethnicity (%)	
Highest Education (%)		Indian / Pakistani	47.1
< High school diploma	29.0	Asian	35.3
High school diploma	54.2	White	11.8
College graduate	16.8	Black	5.9
Annual Income (%)		International medical graduate (%)	88.2
<$10,000	28.9		
$10,000 - $29,999	35.2		
>$30,000	35.9		
Pain Severity, mean (SD) *	3.8 (1.4)		
General health status (SD) **	14.9 (4.5)		
Perception of physician patient-centeredness (SD) †	53.2 (7.4)		

* range 1-6; higher = greater pain.

** range 5-25; higher = better health

† range 15-60; higher = more patient centered

Table 3

Comparison of inter-rater reliability for video and audio thin slice ratings*

	Video thin slices				Audio thin slices			
Variable	**ICC**	**95% CI**	**Reliability**	**95% CI**	**ICC**	**95% CI**	**Reliability**	**95% CI**
Patient Affect								
Warm/ Friendly	0.47	0.41, 0.52	0.78	0.74, 0.81	0.38	0.33, 0.44	0.71	0.66, 0.76
Tense/ Anxious	0.24	0.18, 0.29	0.55	0.47, 0.63	0.26	0.20, 0.32	0.58	0.50, 0.65
Engaged / Attentive	0.44	0.38, 0.50	0.76	0.71, 0.80	0.45	0.40, 0.51	0.77	0.72, 0.81
Disagreeable/ Antagonistic	0.48	0.42, 0.53	0.78	0.74, 0.82	0.36	0.30, 0.42	0.69	0.64, 0.74
Upset/ Distressed	0.42	0.37, 0.48	0.74	0.70, 0.79	0.46	0.40, 0.51	0.77	0.73, 0.81
Sad / Depressed	0.46	0.41, 0.52	0.77	0.73, 0.81	0.35	0.29, 0.41	0.68	0.62, 0.74
Physician Affect								
Warm/ Friendly	0.38	0.33, 0.44	0.71	0.66, 0.76	0.35	0.30, 0.41	0.69	0.63, 0.74
Tense/ Anxious	0.16	0.11, 0.22	0.44	0.33, 0.53	0.06	0.02, 0.11	0.21	0.06, 0.33
Engaged/ Attentive	0.38	0.32, 0.42	0.71	0.66, 0.76	0.37	0.31, 0.43	0.70	0.65, 0.75
Disagreeable / Antagonistic	0.35	0.29, 0.41	0.68	0.62, 0.73	0.32	0.26, 0.38	0.65	0.59, 0.71
Hesitant/ Uncomfortable	0.34	0.28, 0.40	0.67	0.61, 0.73	0.22	0.17, 0.28	0.54	0.45, 0.61
Rushed/ Hurried	0.34	0.29, 0.40	0.68	0.62, 0.73	0.18	0.13, 0.24	0.47	0.37, 0.56
Patient-Physician Rapport								
Rapport	0.42	0.35, 0.48	0.68	0.62, 0.74	0.34	0.28, 0.41	0.61	0.53, 0.68
Liking	0.42	0.35, 0.58	0.68	0.62, 0.74	0.36	0.30, 0.43	0.63	0.56, 0.69
Attention	0.42	0.35, 0.48	0.68	0.62, 0.73	0.28	0.22, 0.35	0.54	0.45, 0.62
Coordination	0.39	0.32, 0.46	0.66	0.59, 0.72	0.31	0.24, 0.38	0.57	0.49, 0.64
Trust	0.43	0.36, 0.49	0.69	0.63, 0.74	0.33	0.26, 0.39	0.59	0.51, 0.66

*ICC refers to a single rating; reliability refers to the mean across raters calculated using the Spearman-Brown formula.

Table 4

Correlation between video and audio thin slice ratings

	Video thin slices		Audio thin slices		Pearson correlation (*r*)**
Variable	**Mean***	**SD***	**Mean***	**SD***	
Patient Affect					
Warm/ Friendly	3.56	0.73	3.77	0.61	0.75
Tense/ Anxious	3.23	0.69	2.14	0.56	0.49
Engaged / Attentive	4.43	0.61	4.61	0.62	0.65
Disagreeable/ Antagonistic	1.50	0.65	1.37	0.41	0.81
Upset/ Distressed	2.98	0.88	2.35	0.86	0.72
Sad / Despressed	2.16	0.85	1.89	0.66	0.71
Physician Affect					
Warm/ Friendly	3.99	0.57	3.83	0.52	0.71
Tense/ Anxious	1.56	0.42	1.31	0.24	0.42
Engaged/ Attentive	4.85	0.60	4.89	0.50	0.64
Disagreeable / Antagonistic	1.34	0.52	1.30	0.41	0.75
Hesitant/ Uncomfortable	1.54	0.52	1.41	0.40	0.65
Rushed/ Hurried	1.33	0.46	1.33	0.34	0.61
Patient-Physician Rapport					
Rapport	6.10	1.22	6.16	1.27	0.63
Liking	5.98	1.13	5.89	1.18	0.65
Attention	6.81	1.11	6.93	1.08	0.53
Coordination	6.09	1.20	6.56	1.22	0.51
Trust	5.99	1.24	5.99	1.21	0.57

*Means and SDs reflect raw rating scores. Patient and physician affect variables were rated on a 6-point scale (1 = lowest, 6 = highest); rapport variables were rated on a 9-point scale (1 = lowest, 9 = highest).

**Refers to correlation between the ratings of video and audio thin slices on the same row.

Table 5

Factor analysis results for video and audio thin slice ratings*

	Video thin slices			Audio thin slices		
Rating variable	**Factor 1**	**Factor 2**	**Uniqueness**	**Factor 1**	**Factor 2**	**Uniqueness**
Patient affect						
Warm/ Friendly	-0.1815	0.9099	0.0973	-0.1106	0.9203	0.1242
Tense/ Anxious	0.8365	-0.0906	0.2410	0.7542	0.1125	0.2768
Engaged/ Attentive	0.1302	0.8579	0.2103	0.4134	0.7316	0.2465
Disagreeable/ Antagonistic	0.2943	-0.1026	0.6569	0.2853	-0.2031	0.5286
Upset/ Distressed	0.9685	-0.0288	0.0433	0.9347	-0.0578	0.1125
Sad/ Depressed	0.5224	-0.5810	0.2488	0.3957	-0.5315	0.3588
Physician affect						
Warm/ Friendly	-0.1253	0.7729	0.3690	-0.1710	0.7987	0.3119
Tense/ Anxious	0.6926	-0.0341	0.2726	0.5993	-0.0231	0.3655
Engage/ Attentive	0.0966	0.7689	0.3799	0.0969	0.7882	0.3453
Disagreeable/ Antagonistic	0.5695	0.0254	0.6223	0.6298	-0.0105	0.5382
Hesitant/ Uncomfortable	0.8778	-0.0141	0.2285	0.8042	-0.0635	0.3331
Rushed/ Hurried	0.1224	0.0158	0.6511	0.1800	0.1202	0.6999
Patient-physician rapport						
Rapport	0.9678		0.0633	0.9539		0.0901
Liking	0.9459		0.1053	0.9270		0.1406
Attention	0.9242		0.1459	0.9003		0.1895
Coordination	0.9332		0.1291	0.9090		0.1738
Trust	0.9331		0.1292	0.9522		0.0933

*Analysis used the iterated principal factor method. Ratings for affect variables reflect varimax rotation.

Table 6

Associations between composite variables and physician patient-centeredness for video and audio thin slices

	Video thin slices				Audio thin slices			
	Unadjusted*		Adjusted**		Unadjusted*		Adjusted**	
Composite variable	**Coefficient†**	**95% CI**	**Coefficient†**	**95% CI**	**Coefficient†**	**95% CI**	**Coefficient†**	**95% CI**
Patient positive affect	0.08	-0.09, 0.24	0.02	-0.13, 0.17	0.14	-0.02, 0.31	0.11	-0.04, 0.26
Patient negative affect	-0.20‡	-0.36, -0.04	-0.15‡	-0.30, 0.00	-0.18‡	-0.34, -0.02	-0.11	-0.26, 0.04
Physician positive affect	0.26‡	0.10, 0.41	0.21‡	0.06, 0.35	0.17‡	0.013, 0.34	0.15‡	0.01, 0.29
Physician negative affect	-0.04	-0.21, 0.12	0.07	-0.08, 0.22	0.04	-0.13, 0.20	0.06	-0.08, 0.20
Patient-physician rapport	0.15	-0.01, 0.32	0.07	-0.08, 0.21	0.20‡	0.04, 0.36	0.15‡	0.01, 0.29

*Unadjusted (bivariate) models account only for clustering of patients within physicians.

**Adjusted (multivariable) models are adjusted for patient age, sex, income, baseline general health, and pain severity, as well as for clustering of patients within physicians. Sensitivity analyses for Hypothesis 3 compared the adjusted coefficients for video thin slices against the adjusted coefficients for video thin slices.

†Standardized regression coefficients

‡$P < 0.05$