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Nonverbal Communication Skills of Dentists, Patient Anxiety, and Patient Satisfaction with Treatment

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NONVERBAL COMMUNICATION SKILLS OF DENTISTS, PATIENT ANXIETY, AND PATIENT SATISFACTION WITH TREATMENT

by

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VITA

The author, Robert Moretti, is the son of James Moretti and Elva (Bonini) Moretti. He was born August 28, 1949, in Chicago, Illinois.

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He is co-author of the following articles:

Church, T., Moretti, R., & Ayer, W. Issues and concerns in the development of the dentist-patient relationship. New Dentist, 1980, 10, 20-24.

Goode, D., Meltzer, H., Moretti, R., Kupfer, D., & McPartland, R. The relationship between wrist-monitored motor activity and serum CPK activity in psychiatric inpatients. British Journal of Psychiatry, 1979, 135, 62-66.

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INTRODUCTION AND REVIEW OF LITERATURE

The value of a good relationship between health-care practitioner and patient would seem to have obvious benefits to both parties. At the very least, the ease and comfort of both participants would seem likely to be enhanced when their relationship is a positive one. However, modern investigators have demonstrated that a positive doctor-patient relationship can have even more far-reaching effects.

Several studies have demonstrated that patient failure to keep appointments and lack of patient cooperation are related to a poor doctor-patient relationship. For example, Alpert (1964) found that the patients who were most likely to fail to keep their appointments in an outpatient referral clinic tended to be those patients who felt that they had no doctor with whom they could talk. Other studies have shown that the cooperation of alcoholic patients with the prescribed treatment regimen was related to the communicated affect of physicians toward alcoholics in general (Milmoe, Rosenthal, Blane, Chafetz, & Wolf, 1967), and that in a pediatric setting, lack of patient cooperation was related to the doctor's lack of sensitivity to the mother's expectations (Francis, Korsch, & Morris, 1969). Summarizing several such studies, DiMatteo (1979)

asserted that the existing evidence indicated that the patient's willingness to accept and follow the prescribed treatment regimen might be increased if the physician is sensitive to the patient's needs as a person, communicates caring, and develops rapport with the patient. This is perhaps especially true when the treatment regimen is difficult or painful (Bowden & Burstein, 1974).

A good doctor-patient relationship appears to be important within dentistry as well as medicine. Gouchman (1977) found that visits to the dentist's office and patient compliance with clinical advice were affected by the relationship between patient and provider, including aspects of impersonality and lack of communication. Other writers have supported these findings (DiOrio, Madsen, Stratemann, & Stovall, 1971; Hornsby, Deneen, & Heid, 1975).

The healing process itself can also apparently be influenced by means of the increased patient compliance that occurs within the context of a good relationship between doctor and patient (Davis, 1968); that is, patients have been reported to get well sooner, to require less medication, to complain of fewer postoperative problems, and to obtain earlier discharge from the hospital (Egbert, Battit, Welch, & Bartlett, 1964; Johnson & Leventhal, 1974; Melamed, 1977).

Conversely, when patients are dissatisfied with a health-care practioner's interpersonal style, they tend

to shop around for a doctor with whom they feel they can communicate (Kasteler, Kane, Olsen, & Thetford, 1976). In one study of dentists, 49 percent of those surveyed acknowledged their having lost patients because of poor interpersonal relationships (Collette, 1969). At an extreme, patients may even choose to consult nonmedical healers for their physical problems if they can thereby obtain more understanding (Cobb, 1954).

Doctors also benefit from positive relationships with their patients because of the decreased likelihood of malpractice litigation. Those patients who take issue with the outcome of the technical treatment tend to file malpractice claims only if they are also dissatisfied with the social-emotional component of their doctor's treatment (Blum, 1957, 1960; Mechanic, 1968; Vaccarino, 1977).

Hornung and Massagli (1979) explained many of the above-described phenomena by suggesting that patients have two goals in seeking health care. The first goal is to receive competent care in the form of an accurate diagnosis and appropriate treatment. The second goal is to receive relief from the emotional disturbance and anxiety associated with the fear of being ill or in pain, a goal that would seem to focus attention on the interpersonal skills of the practitioner. Research findings have strongly supported the existence of these two goals, but have indicated that patients place as much or more emphasis on

the importance of the interpersonal aspect as they do on the technical aspect. Indeed, few patients ever terminate association with their physicians because they feel the physicians are incompetent, so long as the interpersonal relationship is good (Gray & Cartwright, 1963; Vuori, Aaku, Aine, Erkko, & Johannson, 1972). Perceptions of competence and role performance appear to be considerably less important to patients than perceptions of caring and accessibility as correlates of patients' intentions to return to a practitioner (DiMatteo, Prince, & Taranta, 1979). In a large stratified sample of urban families concerning satisfaction with medical care, the greatest criticism of a majority of respondents (64 percent) was about the nature of the physician-patient relationship they experienced (Koos, 1955). Similarly, Friedson (1961) reported that a majority of survey respondents felt that good medical care requires an interest in the patient as a person, while Doyle and Ware (1977) found that physician conduct toward the patient was the strongest influence on satisfaction with medical care. Another study found a strong correlation between patients' evaluations of doctors' medical treatment (what was done) and their evaluations of the practitioners' affective behavior toward them (Ben-Sira, 1976), suggesting the possibility that patients may evaluate technical competence on the basis of the quality of the doctor-patient relationship. Of course, the opposite may actually be true (i.e.,

the interpersonal relationship may be evaluated on the basis of the doctor's technical competence), given the correlational design of the study. However, if one assumes that few patients are capable of judging the technical skills of their doctor, then the former interpretation seems more likely. Such an assumption is supported by a more recent investigation. It was found that the correlation between patients' satisfaction with the technical component of doctors' behavior and their satisfaction with the affective component increased with decreasing levels of patient education (Ben-Sira, 1980). One might interpret this as indicating that as patients lack the knowledge to evaluate the technical skill of doctors, they tend to evaluate them on their interpersonal skills. Increased anxiety can apparently have the same effect, for the study also found that increasing levels of patient anxiety increased the correlation between patients' evaluations of doctors' technical skills and interpersonal skills.

Similar patterns of findings have been found within dentistry. Kreisberg and Treiman (1962) analyzed the content of responses to open-ended questions asking about aspects of dentists most and least liked. Respondents were 1,862 adults in a National Opinion Research Center survey. The public's chief concerns were with the personalities of dentists, their skill in minimizing pain, and the patients' fears of what may happen. McKeithen's

(1966) content-analyses of responses to open-ended items asking for descriptors of the best and worst imaginable dentist found that 59% mentioned an aspect of the dentist's personality as the most important feature of the ideal dentist; 58% mentioned ability, and 41% mentioned ability to reduce fear. In a study of patients treated at a dental school clinic, patients were asked to indicate the one thing they liked best about their treatment. The two most frequently mentioned aspects were the degree of concern and courtesy, and the quality of treatment (Kress, Ferraro, & Stiff, 1973). Finally, in a study of over 750 patients treated at another dental school, high dental anxiety scores significantly correlated with patient dissatisfaction (Weinstein, Smith, & Bartlett, 1973). Taken together, the above studies indicate that dental patients place as much or more emphasis on the interpersonal aspects of treatment as they do on the technical aspects, and that anxiety plays an important role in satisfaction with treatment. The paramount importance of the interpersonal relationship becomes even more apparent when one considers that dental patients, perhaps even more than medical patients, may rarely be knowledgeable enough to evaluate technical ability in their doctors (Church, Moretti, & Ayer, 1980), since dental procedures are minute and may reveal their quality of worksmanship only some time after they are performed. There is very little evidence that

patients can accurately report the technical procedures that occur during a dental visit in any but the most general terms (Lengkeek, Maas-DeWaal, Van Groenestijn, Mileman, & Swallow, 1979).

If good interpersonal relating is indeed important to increased compliance with treatment, regular visits to one's health-care practitioner, decreased malpractice litigation, and increased patient satisfaction, then it would seem important to be able to specify more clearly what behaviors are involved. As DiMatteo (1979) has pointed out,

> The inability to identify, empirically, predictors of rapport is paralleled by weak theoretical speculation of its components. Chafetz (1970), Kaufman (1970), and Headlee (1973) have proposed that rapport requires good manners, respect and compassion. . . . The components that these authors suggest are far from simply defined. Moreover, they are far from simply enacted. How does one define "good manners," for example? What behaviors insure the communication of "respect" and "compassion" and "reassurance"? These are complex aspects of human social interaction not necessarily understood by intuition alone. . . . Clarion calls for physicians to develop "pleasing bedside manner" and to "understand" and "empathize with" their patients, constitute unproductive rhetoric. (p. 21)

Several studies have attempted to uncover the correlates of good doctor-patient rapport by examining measures of intellectual ability and performance. These studies have met with little success. Both Medical College Admission Test scores and premedical grade point averages were found to be poor predictors of interpersonal success in physicians (Flom, 1971; Gough, Hall, & Harris, 1963, 1964;

Richards, Taylor, & Price, 1962). However, these measures did not prove to be negative predictors, suggesting perhaps that technical competence probably does not need to be sacrificed in order to gain interpersonal effectiveness (DiMatteo & Taranta, 1979). Self-report personality tests were also used in some of these same studies (Flom, 1971; Gough et al., 1964) and were found to predict to some extent the interpersonal effectiveness of students and interns. The results of these studies were weak and inconclusive.

The actual amount of time spent with a patient has been hypothesized to be a critical variable in the interpersonal relationship between doctor and patient. Results from studies of physicians have been mixed in this regard, with some indicating that the amount of time spent is crucial (Gray & Cartwright, 1953; Kasteler et al., 1976; Vuori et al., 1972), and others reporting that it is not (DiMatteo, Prince, & Taranta, 1979; Reader, Pratt, & Mudd, 1957). No such studies have been conducted with dentists.

For many years, observers have suggested that the important elements in the interpersonal relationship between doctor and patient lie in the realm of nonverbal behavior--the understanding of patients' nonverbal communications and the communication of caring and understanding to patients through nonverbal channels (Hippocrates, 1923 ed.; Osler, 1899). Although modern writers in medical

psychology have sometimes referred specifically to the importance of nonverbal communication (Adler, 1979; Blondis & Jackson, 1977; Korsch, Gozzi, & Francis, 1968), little attempt has been made to apply knowledge accruing from advances in the field (Friedman, 1979).

The potentially critical role of nonverbal behavior in communication between health-care practitioners and patients can be more readily appreciated when one examines the research comparing the relative importance of nonverbal communication and verbal communication. Both Argyle (1975) and Mehrabian (1971) found that when there is a contradiction between verbal and nonverbal messages, individuals are more likely to believe the nonverbal message. As examples of this bias in practice, several studies have found that untrained observers as well as experienced psychotherapists assign greater weight to feelings communicated nonverbally than to feelings communicated verbally (Haase & Tepper, 1972; Mehrabian, 1970; Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979; Tepper & Haase, 1978).

The concept of empathy can be helpful in understanding the role of nonverbal communication skills. Truax and Carkhuff (1967), defining empathy in the context of psychotherapy, stated "Accurate empathy involves both the therapist's sensitivity to current feelings and his verbal facility to communicate this understanding in a language attuned to the client's current feeling" (p. 46). Later

in their development of this construct, the authors expanded their definition to include the nonverbal components of communication. Similarly, McGowen and Schmidt (1962) defined empathy as the ability to understand the nonverbal communication of others and to communicate this understanding to them. These definitions of empathy aid one in the recognition that there are likely to be two important nonverbal processes in the doctor-patient relationship; that is, verbal sensitivity and nonverbal expressiveness. The role of each of these nonverbal processes in health care is discussed below.

DiMatteo (1979) suggested that the doctor's sensitivity to nonverbal communication permits the recognition of cues of dissatisfaction and negative affect in the body language of patients, enabling the physician to become aware of the patient's distress and deal with it. Nonverbal sensitivity of the doctor is important because patients are unlikely to express verbally their dissatisfaction with medical or interpersonal treatment; instead, the dissatisfaction is likely to be transmitted primarily through nonverbal channels (Bugental, Kaswan, & Love, 1970; Weitz, 1972). Friedman (1979) has listed several reasons for this: 1. Patients are likely to experience a number of emotions which are often expressed more clearly through nonverbal behavior; 2. Patients are unlikely to have had much experience hiding or controlling their emo-

tions in a medical setting; 3. Patients may be hesitant to communicate feelings that are embarrassing to them, and the communication ends up coming through nondeliberate channels; 4. The treatment itself may disrupt verbal communication. This last factor, it should be noted, is particularly applicable to dental treatment since the procedures are performed within the mouth, which effectively blocks verbal communication at times.

Nonverbal expressiveness of the practitioner has been under-emphasized. Friedman (1979) noted that "The importance of practitioner nonverbal expressiveness . . . is perhaps not so obvious: ignorance of this factor may be one of the most serious deficiencies of the practice of modern medicine" (p. 85). However, researchers working in the area of counseling and psychotherapy have been able to specify some of the particular nonverbal behaviors comprising the ability to express warmth, empathy, and caring. For example, behaviors such as head nods, smiles, eye contact, and forward lean while sitting by a counselor have been found to be related to clients' perceptions of the attractiveness and warmth of the counselor (LaCrosse, 1975; Sherer & Rogers, 1980), while closed arm positions tend to communicate coldness and rejection (Smith-Hanen, 1977).

Nonverbal expressiveness would seem to be as important to physicians and dentists as it is to psycho-

therapists. According to Friedman (1979), there are several possible reasons. First of all, individuals playing the role of the "good" patient may be hesitant to question a busy, high-status professional; patients may instead prefer to rely on the nonverbal messages of the practitioner. Secondly, patients are especially likely to attend to nonverbal cues of the doctor because of their position of weakness. There is evidence that individuals who are in a subordinate position will closely monitor the nonverbal cues of their bosses, perhaps to assess their mood and ascertain which actions are having positive and negative effects (Exline, 1972; Henley, 1977). Finally, patients may be searching for additional, unspoken information about their condition.

The research of Friedman and his colleagues (Friedman, Prince, Riggio, & DiMatteo, 1980) has to some extent supported the idea that nonverbal expressiveness is important to the health-care practitioner; these authors found a correlation of .52 between physician nonverbal expressiveness and physician popularity, as expressed in the size of physicians' practices.

In an interesting series of studies (DiMatteo & Taranta, 1979; Friedman, DiMatteo, & Taranta, in press), both the nonverbal sensitivity and the nonverbal expressiveness of family practice resident physicians was assessed and related to patient satisfaction with treatment. Non-

verbal sensitivity was measured with the Profile of Nonverbal Sensitivity (Rosenthal et al., 1979), while nonverbal expressiveness was measured by audiotaping and videotaping the physicians as they tried to inject various emotions into verbally neutral sentences. Judges reviewed the tapes and tried to identify the emotions being expressed. Patient satifaction in these studies was assessed by having patients rate their physicians on such variables as caring, sensitivity, listening, whether they felt they could call the doctor if necessary, and whether they wanted to continue seeing the doctor. Results indicated that those physicians who were skilled in understanding the meaning in body movements and postures (as measured by a particular combination of subscales of the Profile of Nonverbal Sensitivity) were rated as being more caring and more sensitive by their patients (r = .35). Physicians' skill at decoding facial expression and voice tone cues correlated minimally and nonsignificantly with patient satisfaction. In addition, the ability of the physicians to express emotions through nonverbal channels was found to be significantly related to patient satisfaction. This was especially true for physicians who had good abilities to nonverbally express positive emotions.

Although several studies of patient satisfaction with dental treatment have been performed, the roles of nonverbal sensitivity and nonverbal expressiveness have

not been explored. Interestingly, dental patients for the most part seem rather satisfied with dental treatment, as indicated by the skewed distributions on the several measures of patient satisfaction that have been used (Bolender, Swoope, & Smith, 1969; Davies & Ware, 1981; Estabrook, Zapka, & Lubin, 1980; Koslowsky, Bailit, & Valluzzo, 1974; Smith, 1976; Weinstein et al., 1973). Dimensions of patient satisfaction that have been assessed include patients' opinions of ease of access, convenience, cost, technical competence, and personality of the practitioner. In the studies that used specific questionnaire items relating to the dentist's personality, there appears to be a moderate to high correlation between satisfaction with the practitioner's personality and satisfaction with other aspects of dental treatment, including technical competence (Davies & Ware,1981; Koslowsky et al., 1974). In only one study was the actual technical quality of the dental work assessed: patient satisfaction with denture treatment in a dental school clinic proved to be quite high, but was unrelated to the actual quality of the dentures provided (Smith, 1976). Anxiety of the patient was shown in at least two studies to correlate negatively with patient satisfaction. This relationship held true for a general measure of disturbance (Bolender et al., 1976) as well as anxiety that was more specifically dentally-related (Weinstein et al., 1973). One study

reported a lack of relationship between patient anxiety (as measured by the Minnesota Multiphasic Personality Inventory) and patient satisfaction (Smith, 1976). It should be noted that in all of these studies patient satisfaction was assessed one week to several months after treatment.

The dental patient satisfaction studies reviewed above bear similarities to those conducted within medicine in that patients tend to blur the line between technical competence and interpersonal skills of the practitioner, in the suggestion that anxiety plays a role in patient satisfaction or lack of satisfaction, and in the finding that technical competence may be unrelated to patient satisfaction.

What, then, might be the roles played by nonverbal sensitivity and nonverbal expressiveness of the dentist in dental treatment? There are no findings that would suggest that they are any different than the roles they play in medicine. One might argue that perhaps facial cues would be more important to dentist nonverbal sensitivity than body cues, since dental treatment is focused in the head area. There also is general agreement among researchers in nonverbal communication that the face provides the most specific and detailed information about states and emotions (Ekman & Friesen, 1975; Ekman, Friesen, & Ellsworth, 1972; Izard, 1977; Vine, 1970). However, because people are more aware of facial expres-

sions, it is easier for them to inhibit or otherwise consciously change them. By contrast, body movements are outside our awareness to a greater degree, and hence are less subject to censorship. When an individual is attempting to disguise what is being felt, the body therefore provides more accurate cues than the face (Ekman & Friesen, 1969, 1974). Consequently, it is not altogether surprising that skill in reading body cues proved to be the important predictor of patient satisfaction in the DiMatteo and Taranta (1979) study of physicians. The evidence would seem to suggest that skill in reading body cues would also be important to dentists in spite of the ways in which dental treatment differs from most medical treatment.

With respect to nonverbal expressiveness, there is again no evidence to suggest that it plays less of a role in dental treatment than it apparently does in medical treatment.

The present investigation is designed to investigate the relationship of nonverbal sensitivity and nonverbal expressiveness of dentists to the satisfaction of their patients with dental treatment. The study also aims to investigate the relationship of patient anxiety to patient satisfaction. The first three hypotheses to be tested, then, are:

1. Nonverbal sensitivity of dentists, as determined by a measure of their skill in reading body cues, predicts dental patient satisfaction with treatment. That is, the greater the nonverbal sensitivity of the dentist, the greater the satisfaction of the patient.
2. Nonverbal expressiveness of dentists predicts dental patient satisfaction with treatment. The greater the nonverbal expressiveness, the greater the patient satisfaction.
3. Pre-treatment levels of dentally-related anxiety in patients predict satisfaction with treatment. The greater the anxiety, the less the satisfaction.

There are reasons to believe that there might be some interactions between the predictors described above, which leads to the following further hypotheses.

4. Dentist nonverbal sensitivity and dentist nonverbal expressiveness interact in their prediction of patient satisfaction. That is high levels of nonverbal expressiveness are expected to enhance the predictive power of nonverbal sensitivity.

If one recalls that definitions of empathy (McGowen & Schmidt, 1962; Truax & Carkhuff, 1967) emphasize the need to understand and the need to express one's understanding, then it seems reasonable to hypothesize that the dentist who uses considerable nonverbal expressiveness does a better job of communicating understanding (gained via nonverbal

sensitivity) to patients than does the dentist who possesses low nonverbal expressiveness.

5. Patient anxiety levels before treatment interact with the nonverbal sensitivity of dentists in the prediction of patient satisfaction. That is, it is anticipated that patients who are anxious are also more appreciative of the noverbally sensitive dentist.
6. Patient anxiety also interacts with nonverbal expressiveness of dentists. That is, the anxious patient is also expected to be more appreciative of the nonverbally expressive dentist.

A final hypothesis is not related to the predictor variables discussed in the hypotheses above. This hypothesis concerns the relationship between patient satsifaction and the actual technical quality of the treatment provided:

7. Technical quality of the dentistry provided is hypothesized to be unrelated to patient satisfaction with treatment.

An exploratory analysis of data was also planned in the present study. This analysis was designed to investigate whether there are aspects of nonverbal sensitivity that might predict patient satisfaction in dentistry better than does skill in reading body cues.

METHOD

Setting

The study was conducted in the Dental Auxiliary Utilization Clinic (DAU) of a large midwestern dental school. Within the DAU clinic, senior dental students learn to work with dental assistants, performing treatment within semi-private cubicles that are completely walled off on three sides. The type of work typically performed in the DAU clinic is basic restorative dentistry (i.e., fillings and crowns). Because the DAU affords a somewhat private treatment site, and because students work there with dental assistants, the DAU is the clinic within the dental school that most closely approximates the private practice situation.

Dentists

Fourth year dental students served as dentists for the purposes of this study. The student-dentists were recruited during their one-week clinical rotations through the DAU clinic. Recruiting was performed either in person or by letter. Of approximately 80 student-dentists asked to participate, 59 agreed. Of these 59, 42 student-dentists were selected for final inclusion in the study, based upon their having met the criterion of having treated at least

three different patients in the DAU clinic who provided useable data. Six of the student-dentists in the study sample were female, and 36 were male. Ages ranged from 24 to 39, with a mean of 26.095 (SD = 2.861).

Dental Assistants

Six certified dental assistants were available to work with students in the DAU clinic. All were females, with ages ranging between 23 and 64. The mean age was 49.833 (SD = 18.627).

Patients

Patients being treated in the DAU clinic by a cooperating student-dentist were asked to participate in the study, provided they were at least 16 years of age. Two hundred and fourteen of the 220 patients who were asked agreed to participate. One hundred ninety-four patients successfully completed participation. Of the 20 patients who failed to complete participation successfully, 15 neglected to complete the study measures and 5 incorrectly completed the study measures. The sample of 194 patients was further reduced by eliminating the patients of student-dentists who were not selected for the final study sample. For the selected sample of student-dentists who had seen three or more different patients, the first three patients seen by each were included in the study, yielding a final sample of 126 patients. Fifty-four

of the patients were male, and 72 were female. The ages of the patients were not recorded for the study. However, statistics from the dental school indicated that of all patients who had registered for treatment in the last year and who were at least 16 years old, the mean age was 40.466 (SD = 17.538).

Instruments

Nonverbal sensitivity. The Profile of Nonverbal Sensitivity (PONS), which is a 45-minute videotape in which an actress presents 220 two-second segments of nonverbal behavior, was used to assess nonverbal sensitivity of the dentists. Eleven nonverbal channels are isolated in the PONS. These include the face, the body, the entire figure, and two pure auditory channels that use different techniques to disguise the words spoken, but preserve other aspects of paralanguage, such as tone of voice, pitch, and affect. The remaining channels combine one physical channel with one auditory channel.

The actress in the PONS portrays 20 different affective or emotional situations, ranging from relatively subtle emotions (e.g., motherly love) to more dramatic affects (e.g., threatening someone). A list of the 20 emotional situations appears in Table 1. Each of the 20 emotional situations appears 11 times, once in each of the 11 channels. The scenes are randomly ordered. Individuals being tested with the PONS watch and/or listen to each

Table 1

Emotional Situations Portrayed in the PONS

Helping a customer.
Talking about one's wedding.
Ordering food in a restaurant.
Leaving on a trip.
Expressing gratitude.
Expressing motherly love.
Expressing deep affection.
Admiring nature.
Trying to seduce someone.
Talking to a lost child.
Talking about the death of a friend.
Criticizing someone for being late.
Talking about one's divorce.
Nagging a child.
Returning faulty item to a store.
Expressing strong dislike.
Asking forgiveness.
Threatening someone.
Saying a prayer.
Expressing jealous anger.

2-second item and then try to identify or decode it by choosing one of two alternative descriptions. Internal consistency of the PONS is reported to be high (coefficient θ = .92), and retest reliability is moderate (r = .69). Construct validity of the PONS has been extensively researched, and the measure has fared well both in terms of criterion validity and discriminant validity (Rosenthal et al., 1979).

Hypotheses 1, 4, and 5 refer to the prediction of patient satisfaction from the skills of dentists in reading body cues. To investigate these hypotheses, a composite scale was created from a combination of selected PONS subscales. This composite scale, hereafter referred to as Body Channel, was derived by adding the scores on those PONS subscales that portray only the body, with or without voice (i.e., body scale, body + random-spliced voice, and body + content-filtered voice). Body Channel is identical to the variable reported to correlate positively with patient satisfaction in the DiMatteo and Taranta (1979) investigation. Scores may range from a low of one to a high of 60 on Body Channel.

Nonverbal expressiveness. The Affective Communication Test (ACT) was used to assess nonverbal expressiveness of the dentists. This instrument is a relatively new 13-item self-report measure that has been reported to have

good internal consistency (coefficient alpha = .77) and excellent test-retest stability (r = .90). Several studies have supported the ACT's construct validity (Friedman et al., 1980). Individuals taking the ACT are presented with a series of first-person statements and are asked to indicate the degree to which they feel each is true or not true of them on a 9-point scale. Items comprising the ACT appear in Table 2. Scores may potentially range from a low of one to a high of 117.

Anxiety. Patient anxiety with respect to dentistry was assessed via the Dental Anxiety Scale (DAS), a 4-item self report measure with good internal consistency (Kuder-Richardson 20 = .86) and test-retest reliability (r = .82). Validity studies reviewed by Corah and his colleagues (Corah, 1969; Corah, Gale, & Illig, 1978) have demonstrated that DAS scores predict patient anxiety during dental surgery (Auerbach, Kendall, Cuttler, & Levitt, 1976), and are significantly related to state anxiety scores from the State-Trait Anxiety Inventory as well as palmar sweat index scores in patients seen at a dental emergency clinic (Weisenberg, Kreindler, & Schachat, 1974). In addition, the DAS has been shown to reflect changes in dental anxiety in dental phobics who have undergone systematic desensitization therapy (Gale & Ayer, 1969). The complete DAS appears in Table 2. The instrument is scored by assigning

Table 2

ACT Items

1.	When I hear good dance music, I can hardly keep still.
2.	My laugh is soft and subdued.
3.	I can easily express emotion over the telephone.
4.	I often touch friends during conversations.
5.	I dislike being watched by a large group of people.
6.	I usually have a neutral facial expression.
7.	People tell me that I would make a good actor or actress.
8.	I like to remain unnoticed in a crowd.
9.	I am shy among strangers.
10.	I am able to give a seductive glance if I want to.
11.	I am terrible at pantomime as in games like charades.
12.	At small parties I am the center of attention.
13.	I show that I like someone by hugging or touching that person.

Table 3

Dental Anxiety Scale

Instructions: For each item below, circle the letter that best indicates your response.

1. If you had to go to the dentist tomorrow, how would you feel about it?
   (A) I would look forward to it as a reasonably enjoyable experience.
   (B) I wouldn't care one way or the other.
   (C) I would be a little uneasy about it.
   (D) I would be afraid that it would be unpleasant and painful.
   (E) I would be very frightened of what the dentist might do.

2. When you are waiting in the dentist's office for your turn in the chair, how do you feel?
   (A) Relaxed.
   (B) A little uneasy.
   (C) Tense.
   (D) Anxious.
   (E) So anxious that I sometimes break out in a sweat or almost feel physically sick.

3. When you are in the dentist's chair waiting while he gets his drill ready to begin working on your teeth, how do you feel?
   (A) Relaxed.
   (B) A little uneasy
   (C) Tense
   (D) Anxious.
   (E) So anxious that I sometimes break out in a sweat or almost feel physically sick.

4. You are in the dentist's chair to have your teeth cleaned. While you are waiting and the dentist is getting out the instruments which he will use to scrape your teeth around the gums, how do you feel?
   (A) Relaxed.
   (B) A little uneasy.
   (C) Tense.
   (D) Anxious.
   (E) So anxious that I sometimes break out in a sweat or almost feel physically sick.

points to the patient's choices, with one point for an (A) choice to 5 points for an (E) choice. The range of possible scores is from 4 to 20.

Technical quality of dental work. The technical quality of the dental work performed on patients was rated by one of two dental school instructors, in several different aspects, where appropriate, including: anesthesia, caries management, tooth preparation, pulp protection, quality of temporary restoration, and quality of final restoration. The instructors were blind to the actual purpose of the grading. Each aspect that was graded was scored on a 5-point scale. A description of one of the items in the scale and its anchor points is presented as an example in Table 4. In addition, to control for the difficulty level of the dental work performed, the type of treatment rendered to each patient was rated according to a difficulty scale by the instructor. A list of the types of dental work performed and the difficulty ratings assigned to them is given in Table 5.

Treatment satisfaction. Aspects of patient satisfaction were measured with a series of eight Likert-type statements developed for the present study. These items inquired about the patient's opinions regarding: the dentist's caring, warmth, and interest; the dental assistant's caring, warmth, and interest; the quality of

Table 4

Example of Technical Quality Grading: Anesthesia

Score	Description
1	Effective, with the following steps: (a) topical; (b) warm anesthetic solution; (c) aspiration; (d) slow rate of injection--20 seconds or more; (e) sufficient interval allowed before start of procedure--5-10 minutes.
2	Effective, with failure to follow one of the steps (see above).
3	Effective, with failure to follow two or more of the steps (see above).
4	Partial anesthesia.
5	Anesthesia not obtained--dentist's fault.

Table 5

Difficulty Ratings Assigned to Dental Work

Rating	Description
1	Easy, for example, Class I; removal of temporary restoration from excavated tooth and amalgam placement.
2	Class II on premolar, or Class III anterior (single surface of tooth).
3	Class II on molar, or Class III (2 surfaces of tooth).
4	Class IV, 4 surfaces of any tooth, or crown preparation.
5	Pin restoration, post placement with extensive replacement of tooth structure, bridge preparation, or vitality checks on tooth.

the dental work performed; and the patient's satisfaction with treatment. In this original group of items, the midpoint of each scale was anchored with the word "neutral." After reviewing data from a pilot group of 100 patients, it was apparent that patients tended to rate their student-dentists toward the extreme end, signifying high satisfaction. The anchor points for the items were therefore revised in an attempt to push patient ratings toward the middle and obtain greater variability in the data. The items contained in the Treatment Satisfaction Questionnaire in their final form, along with instructions, are presented in Table 6.

Procedure

Student-dentists were told that they were being asked to participate in a study of patient satisfaction with dentistry. It was explained to them that each of their patients would be asked to complete brief questionnaires at the beginning and end of each treatment session, and that these questionnaires would be confidential--that is, their results would not be available to the student-dentists. The student-dentists were told that their own participation would involve the taking of two measures of nonverbal communication skills, and that their test scores, to be treated as confidential, would be available to them after they finished their rotation through the DAU clinic.

Table 6

Treatment Satisfaction Questionnaire

PATIENT RATINGS OF TODAY'S TREATMENT

Please rate your dentist and dental assistant on the following scales, in this manner: Read each statement, and then circle the number below the statement that best describes your response. Your ratings should reflect today's treatment session only. These ratings are CONFIDENTIAL and will not be revealed in connection with your name. Your ratings will be used only for research, and will not be used to grade students.

THE DENTIST

With respect to my comfort, the dentist:

1	2	3	4	5	6	7	8	9
cared very much		cared quite a bit		cared somewhat		cared very little		cared not at all

The dentist was a:

1	2	3	4	5	6	7	8	9
very cold person		cold person		neither cold nor warm		warm person		very warm person

The dentist was interested in what I said:

1	2	3	4	5	6	7	8	9
very much		quite a bit		somewhat		very little		not at all

THE DENTAL ASSISTANT

With respect to my comfort, the dental assistant:

1	2	3	4	5	6	7	8	9
cared very much		cared quite a bit		cared somewhat		cared very little		cared not at all

The dental assistant was a:

1	2	3	4	5	6	7	8	9
very cold person		cold person		neither cold nor warm		warm person		very warm person

The dental assistant was interested in what I said:

1	2	3	4	5	6	7	8	9
very		quite a bit		somewhat		very little		not at all

Table 6.--Continued

Please rate the quality of the dental work you received today:

1	2	3	4	5	6	7	8	9
poor		acceptable		good		excellent		outstanding

Please rate the level of your satisfaction with today's treatment session:

1	2	3	4	5	6	7	8	9
extremely pleased		pleased		satisfied		somewhat unsatisfied		not satisfied

THANK YOU! PLEASE FOLD AND SEAL IN THE ENVELOPE

Each student-dentist who participated signed an informed consent document. A copy of the document appears in Appendix A.

The student-dentists were administered the PONS and ACT in a conference room near the clinic. Of the 42 student-dentists in the final study sample, 38 took the measures at the beginning of their DAU rotations; the remaining 4 took the study measures some time after completing their rotations. Testing was conducted in groups varying in size from one to seven. The standard instructions of the PONS (Rosenthal et al., 1979) and ACT (Friedman et al., 1980) were read to the participants before each measure was administered.

At the beginning of each dental treatment session, the patient was brought to a faculty office near the DAU clinic. Patients were told by the present investigator or a secretary that the clinic was conducting research on patient attitudes toward dentistry, and that their voluntary participation would require only that they fill out two brief questionnaires. One questionnaire was to be completed before the treatment session, and one after the treatment session. The patient's name, the student-dentist's name, and the dental assistant's name were logged into a record book, along with the time of day. However, patients themselves were assigned a code number and were told that they were not to put their names on the questionnaires.

Participating patients were handed a copy of the DAS bearing their code number and were asked to complete it. When finished they were to seal the DAS in an envelope which was provided, and were to deposit the envelope in a locked box in the office. Patients were then brought to their student-dentist's treatment cubicle in the DAU clinic. They were asked to return to the office after the treatment session.

Treatment sessions were conducted in a normal fashion. At the end of the treatment session, instructors filled out the rating forms for technical quality of the treatment. The patients returned to the faculty office after the treatment session, where they were administered the Treatment Satisfaction Questionnaire, bearing their code number. These forms were also sealed in envelopes and deposited in the locked box by the patients.

Some patients were seen for treatment more than once during their student's rotation through the DAU clinic. These patients were asked to complete the study measures each time they were treated, so as to provide some data on repeated visits. However, the data from the extra visits were not used in the tests of the main hypotheses.

RESULTS

Results were mixed. Hypotheses 1, 3, 5, and 7 were supported, while hypotheses 2, 4, and 6 were not confirmed. An important confounding variable emerged, that of the dental assistants; when its effect was controlled for, the success or failure of the original results in reaching statistical significance was unaltered.

Development of the Dependent Variable

In order to derive a score that could be used as the dependent variable, a reduction of the Treatment Satisfaction Questionnaire data was performed. Data from 343 patient visits, nearly three times as many patient visits as included in the actual study sample, were available for this analysis. The direction of scoring on items 1, 3, 4, 6, and 8 of the Treatment Satisfaction Questionnaire was reversed so that high scores on any item would be indicative of greater satisfaction. Means, standard deviations, and ranges for each item are presented in Table 7. Distributions on each of the items are negatively skewed, reflecting the tendency of patients to report high satisfaction. On item 1, the range of responses was considerably restricted.

Data from the Treatment Satisfaction Questionnaire

Table 7

Descriptive Statistics of Treatment Satisfaction Questionnaire Items (n = 343)

Item	Mean	SD	Actual Range
1. Dentist's concern with comfort	8.670	0.812	5-9
2. Warmth of dentist	8.048	1.412	1-9
3. Dentist's interest in what patient said	8.356	1.120	1-9
4. Assistent's concern with comfort	8.388	1.263	1-9
5. Warmth of assistant	7.940	1.456	1-9
6. Assistant's interest in what patient said	7.971	1.620	1-9
7. Opinion of dental work quality	7.748	1.387	1-9
8. Satisfaction with treatment	7.818	1.951	1-9

were subjected to an alpha-type factor analysis (Kaiser & Caffrey, 1965) with Varimax rotation, in order to define factors that would have maximum generalizability. The correlation matrix of the treatment Satisfaction Questionnaire items is given in Table 8. All the correlations are positive, and most are of moderate size. Squared multiple correlations, which were used as the initial communality estimates in the factor analysis, are given on the main diagonal of the correlation matrix. With factors having eigenvalues less than one being rejected, two factors were extracted. The final factor solution after Varimax rotation is presented in Table 9, along with the final communality estimates after twelve iterations.

Items 1, 2, 3, 7, and 8 load highest on factor 1. Taken together, these items appear to comprise a dimension that refers to satisfaction with the interpersonal qualities of dentists and the quality of the work they perform. The sum of scores on items 1, 2, 3, 7, and 8 is hereafter referred to as Patient Satisfaction, and is used as the dependent variable in the present study. Patient Satisfaction scores for the 126 patients in the study sample range from 27 to 45. As can be seen from Table 10, the distribution of these scores is negatively skewed (skewness = -1.157).

Items 4, 5, and 6 of the Treatment Satisfaction Questionnaire load highest on factor 2, although item 5 is ambiguous in its loadings. Taken together, these items

Table 8

Correlation Matrix of Treatment Satisfaction Questionnaire Items

Item	1	2	3	4	5	6	7	8
1	.314	.343	.401	.382	.163	.231	.311	.231
2		.520	.337	.239	.569	.149	.350	.296
3			.447	.400	.249	.518	.424	.261
4				.599	.571	.688	.319	.367
5					.621	.531	.317	.320
6						.620	.334	.294
7							.329	.436
8								.263

Table 9

Varimax Rotated Factors Extracted from Treatment Satisfaction Questionnaire Data

	Item	Factor 1	Factor 2	Final Communality Estimate
1.	Dentist's concern with comfort	.481	.166	.258
2.	Warmth of dentist	.640	.137	.429
3.	Dentist's interest in what patient said	.512	.318	.364
4.	Assistant's concern with comfort	.357	.751	.692
5.	Warmth of assistant	.416	.465	.390
6.	Assistant's interest in what patient said	.181	.938	.913
7.	Opinion of dental work quality	.622	.209	.431
8.	Satisfaction with treatment	.457	.243	.268

Table 10

Distribution of Patient Satisfaction Scores in Study Sample

Score	% of Scores
44-45	34.1
42-43	22.2
40-41	13.5
38-39	13.5
36-37	4.8
34-35	5.6
32-33	3.2
30-31	2.4
28-29	0.0
27	0.8
Mean	41.254
SD	3.968

refer to satisfaction with qualities of dental assistants. Factor 2 is not used in the present study.

Independent Variables

Scores on the DAS range from 4 to 17 for patients in the study sample, with a mean of 7.837 (SD = 3.017). Table 11 indicates that these scores are positively skewed (skewness = 0.937).

The scores of student-dentists on the ACT range from 33 to 101, with a mean of 74.548 (SD = 15.793). The distribution of these scores is only slightly negatively skewed.

Total scores of the student-dentists on the PONS are approximately symmetrically distributed. Mean scores for the total PONS and each of its subscales are listed in Table 12. The mean score of the student-dentists on the composite Body Channel is 46.881 (SD = 3.184). Body Channel is distributed with a slight negative skew.

Tests of Hypotheses

A simultaneous multiple regression analysis was used to test hypotheses 1, 2, 3, 4, 5, and 6. Body Channel scores, ACT scores, and DAS scores represented the predictor variables in hypotheses 1, 2, and 3, respectively. Products of Body Channel and ACT scores, Body Channel and DAS scores, and ACT and DAS scores represented the predictors in hypotheses 4, 5, and 6, respectively.

Table 11

Distribution of Dental Anxiety Scale Scores

Score	% of Scores
4-5	27.0
6-7	23.8
8-9	24.6
10-11	12.7
12-13	6.3
14-15	3.2
16-17	2.4
Mean	7.873
SD	3.017

Table 12

Mean Scores on PONS and Subscales of PONS

Scale	Mean	SD
Content-filtered voice	12.738	2.079
Random-spliced voice	13.357	1.695
Face only	16.905	1.329
Body only	15.762	1.651
Full figure	17.310	1.359
Face + random-spliced voice	18.833	1.026
Figure + random-spliced voice	17.333	1.213
Figure + content-filtered voice	17.929	1.427
Face + content-filtered voice	16.786	0.993
Body + random-spliced voice	15.929	1.492
Body + content-filtered voice	15.190	1.714
Total	177.857	8.327

Patient Satisfaction scores were regressed on all these predictors simultaneously. Since each student-dentist had three patients, the Body Channel scores and ACT scores of the student-dentists were entered once for each of their respective patients. An alternative approach would have been to calculate mean Patient Satisfaction scores and mean DAS scores for each student-dentist's group of three patients, and to use these mean scores in the regression analysis. This latter approach was rejected because of the potential loss in information involved in using mean scores.

The correlation matrix of ACT, DAS, Body Channel, and Patient Satisfaction scores appears in Table 13. There is no evidence of strong multicollinearity. Results of the multiple regression appear in Table 14. Overall multiple correlation of the predictors with Patient Satisfaction is .536, accounting for nearly 29 percent of the variance. The overall regression is significant[1] ($F(6,119) = 7.984$)

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[1]Although the discussions of multiple regressions of Patient Satisfaction on various predictors refer to levels of statistical significance, strictly speaking such statistical inferences may be untenable because of the marked skews in distributions of the dependent variable (Patient Satisfaction) and one of the independent variables (DAS). However, the multiple regression's qualities as a data-descriptive device are unaltered by such violations in the assumption of normally distributed variables. Logarithmic and antilog transformations of the Patient Satisfaction and DAS scores, respectively, were conducted in an attempt to normalize their distributions. A new multiple regression analysis using these transformed scores was performed, and the results were not appreciably different from the original analysis presented in the main body of the present paper. All variables found to be statistically

Table 13

Correlations Among ACT, DAS, Body Channel, and Patient Satisfaction

Variable	ACT	DAS	Body Channel	Patient Satisfaction
ACT	1.000	.013	.204	.149
DAS		1.000	-.083	-.413
Body Channel			1.000	.161
Patient Satisfaction				1.000

Table 14

Multiple Regression Summary: Patient Satisfaction Regressed on ACT, DAS, and Body Channel

		Analysis of Variance	df	SS	F	p
Multiple R	.536					
R square	.287	Regression	6	564.805	7.984	<.001
Standard error	3.434	Residual	119	1,403.068		

Variable	B	Standardized Beta	Standard Error B	F(1,119)	p
ACT	-0.534	-2.127	0.370	2.081	n.s.
DAS	-6.110	-4.647	1.585	14.875	<.001
Body channel	-1.673	-1.343	0.685	5.961	<.005
ACT x DAS	0.962	0.063	0.007	0.018	n.s.
Body channel x DAS	0.118	4.191	0.036	10.889	<.025
Body channel x ACT	0.120	2.473	0.008	2.301	n.s.
(Constant)	121.484				

with a p of less than .001.

Body Channel scores and DAS scores each contribute significantly to the prediction of Patient Satisfaction, supporting Hypotheses 1 and 3. The product of Body Channel and DAS scores also contributes significantly to the prediction of Patient Satisfaction, supporting Hypothesis 5. Scores on the ACT, both alone and in two-way combinations with Body Channel scores and DAS scores, failed to significantly predict Patient Satisfaction. Hypotheses 2, 4, and 6 are therefore not supported.

An adequate test of Hypothesis 7 required that patients and student-dentists that had heretofore been excluded from analysis be pooled with those in the study sample. The enlargement of the sample proved to be necessary because a considerable amount of data with respect to the grading of technical quality was missing in the selected study sample. The loss of data did not appear to be systematic.

Not all of the student-dentists whose patient visits were graded for technical quality ended up being graded on the same aspects of dentistry. This was because different treatments were rendered to different patients, and grading was therefore not always appropriate

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significant in the original analysis were also significant in the analysis using transformed data; a rank ordering of the standardized beta weights remained unchanged from the original analysis.

in every aspect. For example, if a patient visit was graded for the quality of a temporary restoration, a grade for the quality of a permanent restoration would be inappropriate. Therefore, a mean rating of technical quality was determined for each patient visit by adding the scores for each aspect of dentistry that had been graded and dividing by the number of aspects graded. A review of the technical quality grades indicated that the vast majority of patient visits had been graded in five of the six possible aspects.

The correlations between Patient Satisfaction and mean technical quality scores appear in Table 15. In a total sample of 150 patient visits made to 53 student-dentists, the correlation between the two variables is negligible (r = .022) and nonsignificant. To control for the level of difficulty of the dental work performed, the mean technical quality ratings were placed in ratio to the difficulty ratings that had also been assigned to the dental work. The correlation between Patient Satisfaction and this ratio is also negligible (r = .026) and nonsignificant.

Since no attempt was made to establish inter-rater reliability between the two dental school instructors doing the grading for technical quality, the relationship between Patient Satisfaction and mean technical quality was also examined separately for each instructor. The identity of the grading instructor could be determined for 81 of the

Table 15

Correlations Between Patient Satisfaction and Mean Technical Quality

Instructor	Patient Satisfaction vs. Mean Technical Quality	Patient Satisfaction vs. Mean Technical Quality, Controlled for Difficulty
Overall (n = 150)	.022	.026
Instructor A (n = 58)	.084	.048
Instructor B (n = 23)	-.338	.220

150 patient visits. As can be seen in Table 15, the bulk of the 81 patient visits was graded by instructor A, and the correlation between Patient Satisfaction and mean technical quality is .084 for these patients. Even when mean technical quality scores are controlled for difficulty level, this correlation remains zero-order (r = .048) and non-significant. For the 23 patient visits graded by instructor B, the correlation between Patient Satisfaction and mean technical quality scores is -.338 ($p > .10$). Had this figure reached significance, it would have indicated that high scores of Patient Satisfaction tend to be associated with high technical quality dental work (Patient Satisfaction and mean technical quality were scaled in opposite directions). When the mean technical quality scores given by instructor B are controlled for difficulty level, the correlation between Patient Satisfaction and mean technical quality reverses direction (r = .220), but remains nonsignificant. Taken together, these findings support Hypothesis 7.

Exploratory Analyses

Exploratory analyses were conducted on the study data to determine whether a different combination of PONS subscales might predict Patient Satisfaction more satisfactorily than had Body Channel scores. It should be noted that since the exploratory analyses to be reported were conducted on the original study data, they involve a capitalization on chance. That is, repeated statistical tests on the same

data increase the likelihood of a significant finding occurring by chance. This caveat should be borne in mind when considering the results presented below.

To accomplish the exploration, Patient Satisfaction scores were initially regressed simultaneously on all 11 subscales of the PONS. The correlation matrix for this regression appears in Table 16. While some degree of multicollinearity is present, it does not appear to be a serious problem. Results of the multiple regression appear in Table 17. As can be seen, the PONS subscales do not significantly predict the criterion, either singly or as a group. However, for the purposes of further exploration, the four subscales possessing the highest standardized beta weights (Body, Body + Content-Filtered Voice, Face + Random-Spliced voice, and Random-Spliced Voice) were combined to form a new composite scale, hereafter referred to as the Exploratory PONS Composite. This scale was then substituted for Body Channel in a reanalysis of the original multiple regression that had been used to test Hypotheses 1 through 6. The correlation matrix for the reanalysis is given in Table 18. Results of the new analysis appear in Table 19. The overall multiple correlation achieves statistical significance ($F(6,119) = 7.735$, $p < .001$), and the percent of variance accounted for (28.1%) is very similar to that of the original analysis (28.7%; see Table 14). However, the Exploratory PONS

Table 16

Correlations Among PONS Subscales and Patient Satisfaction

Variable	CF	RS	Face	Body	Figure	Face + RS	Figure + RS	Face + CF	Figure + CF	Body + RS	Body + CS	Patient Satis-faction
CF	1.000	.292	.321	.135	.207	.126	-.070	.031	.317	.458	.001	-.039
RS	.292	1.000	.239	.468	.077	.145	.035	-.025	.090	.153	.051	.136
Face	.321	.239	1.000	.339	.335	.270	.273	.239	.427	.287	.166	.121
Body	.135	.468	.339	1.000	.108	.331	.028	.071	.360	.178	.160	.181
Figure	.207	.077	.335	.108	1.000	.296	.141	.441	.284	.106	.057	.052
Face + RS	.126	.145	.270	.331	.296	1.000	.045	.106	.271	.274	-.091	.132
Fig. + RS	-.070	.035	.273	.028	.141	.045	1.000	.020	.305	.106	.131	.079
Face + CF	.031	-.025	.239	.071	.441	.106	.020	1.000	.277	.233	.038	.008
Fig. + CF	.317	.090	.427	.360	.284	.271	.305	.277	1.000	.460	.114	.046
Body + RS	.458	.153	.287	.178	.106	.274	.106	.233	.460	1.000	.090	.007
Body + CF	.001	.051	.166	.160	.057	-.091	.131	.038	.114	.090	1.000	.119
Patient Satisfaction	-.039	.136	.126	.181	.052	.132	.079	.008	.046	.007	.119	1.000

Table 17

Multiple Regression Summary: Patient Satisfaction Regressed on PONS Subscales

		Analysis of Variance	df	SS	F	p
Multiple R	.260					
R square	.068	Regression	11	133.493	0.754	n.s.
Standard error	4.011	Residual	114	1,834.380		

Variable	B	Standardized Beta	Standard Error B	F(1,114)	p
Content-filtered voice	-0.162	-0.085	0.222	0.535	n.s.
Random-spliced voice	0.199	0.085	0.255	0.606	n.s.
Face	0.183	0.061	0.337	0.295	n.s.
Body	0.237	0.099	0.284	0.698	n.s.
Figure	0.220	0.008	0.328	0.005	n.s.
Face + random-spliced voice	0.404	0.105	0.409	0.975	n.s.
Figure + random-spliced voice	0.150	0.046	0.335	0.201	n.s.
Face + content-filtered voice	-0.476	-0.012	0.433	0.012	n.s.
Figure + content-filtered voice	-0.104	-0.037	0.339	0.095	n.s.
Body + random-spliced voice	-0.672	-0.025	0.310	0.047	n.s.
Body + content-filtered voice	0.228	0.098	0.220	1.073	n.s.
(Constant)	23.504				

Table 18

Correlations Among ACT, DAS, Exploratory PONS Composite, and Patient Satisfaction

Variable	ACT	DAS	Exploratory PONS Composite	Patient Satisfaction
ACT	1.000	.013	.247	.149
DAS		1.000	-.034	-.413
Exploratory PONS Composite			1.000	.227
Patient Satisfaction				1.000

Table 19

Multiple Regression Summary: Patient Satisfaction Regressed on ACT, DAS, and Exploratory PONS Composite

		Analysis of Variance	df	SS	F	p
Multiple R	.530					
R square	.281	Regression	6	552.151	7.735	<.001
Standard error	3.449	Residual	119	1,415.722		

Variable	B	Standardized Beta	Standard Error B	F(1,119)	p
ACT	-0.503	-2.003	0.427	1.392	n.s.
DAS	-5.241	-3.986	1.658	9.994	<.005
Exploratory PONS composite	-1.061	-1.026	0.607	3.054	n.s.
ACT x DAS	-1.000	-0.066	0.007	0.018	n.s.
Exploratory PONS composite x DAS	0.759	3.659	0.029	7.062	<.01
Exploratory PONS composite x ACT	0.857	2.367	0.007	1.554	n.s.
Constant)	109.503				

Composite fails to attain statistical significance by itself, suggesting that it is not as good a predictor of Patient Satisfaction as Body Channel has been shown to be. The relatively powerful predictive effects of DAS scores, both by themselves and as a moderator of the Exploratory PONS Composite, are as apparent in the reanalysis as they were in the original.

Confounding Variables

The influences of two possible confounding variables on the results reported with respect to Hypotheses 1 through 6 and the exploratory analyses were examined. The first potential confounding variable examined was that of the sex of student-dentists and their patients. Using the overall group of 59 student-dentists (51 male, 8 female), which includes the 42 student-dentists in the study sample, mean Patient Satisfaction scores were calculated for the following groups: male student-dentist/male patient, male student-dentist/female patient, female student-dentist/male patient, female student-dentist/female patient. Results appear in Table 20, indicating the mean Patient Satisfaction scores for these groups are very similar. These data were subjected to an unweighted-means analysis of variance, the results of which appear in Table 21. Sex of patient and/or sex of student dentist

Table 20

Mean Patient Satisfaction Scores for Different Sex Dyads

	Male Student-Dentist	Female Student-Dentist
Male patient	41.026 (n=77)	40.833 (n=12)
Female patient	40.839 (n=86)	41.000 (n=19)

Table 21

Analysis of Variance: Sex of Patient by Sex of Student-Dentist

Source of Variance	SS	df	MS	F	p
Sex of patient	.002	1	.002	0.0001	n.s.
Sex of student-dentist	.005	1	.005	0.0003	n.s.
Interaction	.031	1	.031	0.0020	n.s.
Error		190	17.178		

clearly are unrelated to Patient Satisfaction, and therefore exert no confounding effects.

The second potential confounding variable examined was that of patients having been treated with different dental assistants in attendance. Patient Satisfaction scores were grouped by dental assistants, and a one-way analysis of variance was performed on the six groups of data. The identity of the dental assistant could be determined for only 120 of the 126 patient visits in the study sample. Results appear in Table 22, indicating that the effect of dental assistants is significantly related ($F(5,114) = 2.571$, $p < .05$) to Patient Satisfaction, and therefore is a potential confound.

The regression of Patient Satisfaction on ACT, DAS, and Body Channel scores (used to test Hypotheses 1 through 6) was therefore reanalyzed. In this reanalysis, dental assistants were made into dummy variables which together served as a covariate. Results of the reanalysis appear in Table 23, representing a hierarchical decomposition of the variance with its attendant F tests (Cohen & Cohen, 1975). With dental assistants taken into account, the multiple correlation increases to .589, as compared with .536 in the original analysis (see Table 14). Of course, it should also be remembered that the sample in the reanalysis is slightly different from the original

Table 22

Analysis of Variance for Influence of Dental Assistants on Patient Satisfaction Scores

Source of Variance	SS	df	MS	F	p
Total	1,744.967	119	--	--	--
Between groups	176.853	5	35.371	2.571	<.05
Within groups	1,568.114	114	13.755	--	--

Table 23

Patient Satisfaction Regressed on ACT, DAS, and Body Channel

with Dental Assistants as Covariate

Multiple R	.589	Analysis of Variance	df	R^2	R^2 Increase	F	p
R square	.347	Covariate: Dental assistants	5	.099	.099	3.274	<.01
Standard error	3.325	Hypothesized predictors	6	.347	.248	6.843	<.001
		Residual	108				

Variable	B	Standardized Beta	Standard Error B	F(1,108)	p
ACT	-0.407	-1.659	0.378	1.159	n.s.
DAS	-5.108	-3.969	1.587	10.363	<.001
Body channel	-1.405	-1.155	0.702	4.003	<.025
ACT x DAS	-0.266	-0.179	0.007	0.141	n.s.
Body channel x DAS	0.102	3.706	0.036	8.185	<.001
Body channel x ACT	0.936	1.983	0.008	1.327	n.s.
(Constant)	109.462				

sample (120 out of the original 126 patient visits). The effect of the covariate is significant ($F(5,108) = 3.274$, $p < .01$), accounting for nearly 10% of the variance in Patient Satisfaction. However, even with this variance partialled out, the percentage of variance accounted for by the predictors in Hypotheses 1 through 6 is nearly 25%, and is still significant. A comparison of the standardized beta weights in Table 23 with those of the original analysis (Table 14) indicated that the essential results of the original analysis still hold true even when the confounding effect of dental assistants has been controlled for. That is, Body Channel scores, DAS scores, and product scores of Body Channel and DAS all still significantly predict Patient Satisfaction.

When the same type of covariate analysis is performed on the exploratory analysis (Patient Satisfaction regressed on ACT, DAS, and Exploratory PONS Composite; see Table 19), similar findings occur. That is, when the 10% of variance accounted for by dental assistants is removed, the exploratory predictors as a group (Table 24) still account for a significant portion of the variance in Patient Satisfaction (23%; $F(6,108) = 6.170$, $p < .001$). Among the individual predictors, DAS scores still significantly predict Patient Satisfaction, both alone and in combination with the Exploratory PONS Composite. No other predictors attain significance.

Table 24

Patient Satisfaction Regressed on ACT, DAS, and Exploratory PONS Composite with Dental Assistants as Covariate

Multiple R	.574	Analysis of Variance	df	R^2	R^2 Increase	F	p
R square	.329	Covariate: Dental assistants	5	.099	.099	3.187	<.025
Standard error	3.370	Hypothesized predictors	6	.329	.230	6.170	<.001
		Residual	108				

Variable	B	Standardized Beta	Standard Error B	F(1,108)	p
ACT	-0.288	-1.177	0.456	0.400	n.s.
DAS	-4.277	-3.324	1.672	6.548	<.025
Exploratory PONS composite	-0.773	-0.765	0.643	1.443	n.s.
ACT x DAS	-0.337	-0.226	0.007	0.204	n.s.
Exploratory PONS composite x DAS	0.631	3.117	0.029	4.831	<.05
Exploratory PONS composite x ACT	0.512	1.449	0.007	0.477	n.s.
(Constant)	92.472				

Other Findings

Some supplementary findings, which are only tangentially related to the main hypotheses and analyses of the present investigation are presented in this section.

Stability of Patient Satisfaction scores across visits. Twenty-nine patients made visits to the DAU clinic more than once, and were treated by the same student-dentist each time. Twenty-five of these patients also had the same dental assistant on both treatment visits. An examination of the correlations between Patient Satisfaction scores on Visit 1 and on Visit 2 provide some information concerning the stability of these scores across visits. In all cases but one, Visits 1 and 2 occurred within one week of each other. Table 25 presents the results of the correlations, for total Patient Satisfaction scores and for the individual items that comprise Patient Satisfaction. Items 1 and 2 are the most reliable across visits. Item 8 appears to be moderately reliable, while Items 3 and 7 are the least reliable. However, it should be noted that all these correlations are statistically significant with a probability of less than .01 or better, with the exception of Item 7, which is significant at the .05 level of probability. These reliabilities indicate that patients tend to maintain their opinions of the interpersonal qualities of dentists across visits, but are somewhat more variable across visits in their opinions of dental work quality. Finally, the total Patient Satisfac-

Table 25

Stability of Patient Satisfaction Over Visits

Item	Correlation Between Visit 1 and Visit 2 (n=25)	p
1. Dentist's concern with comfort	.961	<.001
2. Warmth of dentist	.953	<.001
3. Dentist's interest in what patient said	.527	<.01
7. Opinion of dental work quality	.393	<.05
8. Satisfaction with treatment	.706	<.001
Patient Satisfaction Total	.835	<.001

tion score appears to be quite stable across visits ($r(23) = .835$, $p < .001$; all tests two-tailed).

Patient Satisfaction and visit number. Many of the patients treated in the DAU clinic during the course of the study had been treated by the same student-dentist before coming to the clinic. A correlation was calculated between the Patient Satisfaction scores and the number of times each patient has been previously treated by the same student-dentist, in a sample of cases where this information could readily be determined from patient charts. For 65 of the patients who were included in the study sample, the correlation between Patient Satisfaction and number of previous visits is .204 ($p > .10$). When this sample is extended to include an additional 38 patients not included in the study sample, the correlation is reduced to .019. It therefore appears that there is no relationship between Patient Satisfaction and number of previous treatment visits.

Patient Satisfaction and length of visit. Treatment visits in a dental school clinic are scheduled for longer periods of time than in private practice. For a sample of 119 patient visits in which information was available (including patient visits not included in the study sample), the correlation between Patient Satisfaction and length of visit is -.242 ($p < .02$; two-tailed), indicating that the longer the treatment sessions are, the less satisfied patients tend to be.

DISCUSSION

Four of the seven hypotheses in the present study were supported. Hypothesis 1 states that nonverbal sensitivity of dentists, as measured by their skill in reading body cues, predicts patient satisfaction with treatment. This proved to be true, supporting the previous work of DiMatteo and Taranta (1979), and extending it from the realm of medicine to that of dentistry. However, the magnitude of the relationship between nonverbal sensitivity and patient satisfaction appears to be small. As a single correlate, nonverbal sensitivity accounted for only 2.6 percent of the variance in Patient Satisfaction scores. Still, the exploratory analysis failed to turn up a different combination of PONS subscales that could predict Patient Satisfaction scores better than Body Channel scores did. It therefore appears that skill in reading body movements and gestures is the core of nonverbal sensitivity for dentists, as it is for physicians. However, more research is needed in order to determine whether or not the magnitude of the effect of nonverbal sensitivity is large enough to be considered meaningful.

Pre-treatment levels of patient anxiety were strong predictors of patient satisfaction in the present study, supporting Hypothesis 3. The magnitude of the simple

relationship between anxiety and patient satisfaction was nearly twice as large in the present study (r = -.413) than that reported by Weinstein and his colleagues (Weinstein et al., 1973). It is important to note that both studies have used the DAS as their measure of anxiety, and that the DAS appears to be a measure of state anxiety (Weisenberg et al., 1974). The one study in the recent dental literature that did not show a relationship between anxiety and patient satisfaction (Bolender et al., 1969) used the Minnesota Multiphasic Personality Inventory, which yields more of a trait measure of anxiety. Moreover, this latter study also dichotomized patients as either high anxious or normal, rather than using the scores in a continuous fashion as correlates of patient satisfaction. The findings of the current study with respect to anxiety would seem to warrant an experimental investigation designed to determine whether pre-treatment reduction of anxiety increases subsequent patient satisfaction. The supplementary finding in the present investigation that length of the treatment session also correlated negatively and significantly with patient satisfaction may at some level also be related to anxiety. It seems reasonable to assume that if one feels anxious about a procedure, then the shorter the treatment time the better.

Hypothesis 5, stating that pre-treatment anxiety

of patients interacts with nonverbal sensitivity of dentists, was also supported. Patient anxiety served as a moderator variable, such that high levels of anxiety were associated with patient satisfaction when the dentist's nonverbal sensitivity was also high. This interesting finding makes intuitive sense. The dentally-anxious patient may well be seeking some sort of reassurance when entering a treatment session. The dentist who is able to read the patient's body language and understand what the patient is feeling may have a greater likelihood of providing that reassurance.

Hypotheses 2, 4, and 6 were not supported. That is, nonverbal expressiveness of dentists did not predict patient satisfaction, either by itself or interacting with nonverbal sensitivity or anxiety. These results are rather puzzling, as well as surprising. It is possible that the failure of the present investigation to support the hypotheses concerning nonverbal expressiveness may be attributable to the measure used. Previous studies (i.e., Fretz, 1966; LaCrosse, 1975; Sherer & Rogers, 1980) have used actual behavioral measures of nonverbal expressiveness--for example, head nodding or smiling--or the judged ability to express emotion through tone of voice or facial cues (DiMatteo & Taranta, 1979). The present investigation used the ACT, a self-report measure of nonverbal expressiveness. Even though scores on the ACT have been shown to correlate

significantly with ratings of nonverbal expressiveness made by friends (Friedman et al., 1980), it seems probable that the instrument is a far less accurate measure of actual behavior than are simple behavioral frequency counts. Also, it is of interest to note that in the DiMatteo and Taranta study (1979), it was the ability of physicians to nonverbally express positive emotion that correlated with patient satisfaction; ability to nonverbally express other emotions was not related to patient satisfaction. Perhaps, then, it is only the ability to nonverbally express positive emotion that is of importance to the health-care practitioner. However, a very recent study (Hall, Roter, & Rand, 1981) found that negative, rather than positive, voice tone in physicians was related to patient satisfaction, as long as the actual words used had positive content. From these findings, researchers might conclude that the straightforward investigation of nonverbal expressiveness might not be sufficient; there may be special circumstances under which nonverbal and verbal expressiveness interact. In any case, the question still remains: If the ability of dentists to read patient body language is related to patient satisfaction, then how are dentists expressing this understanding so as to make patients aware of it?

Taken together, the predictors in Hypothesis 1 through 6 accounted for nearly 25 percent of the variance in Patient Satisfaction scores, even after the influence of

dental assistants was statistically removed. Cross-validation studies would be needed to determine if the 25 percent figure would remain stable. Shrinkage calculations, however, indicate that in a new sample, the predictors would still be likely to account for approximately 21 percent of the variance in Patient Satisfaction scores.[2]

Hypothesis 7, stating that there is no relationship between patient satisfaction and technical quality of dentistry, was also supported. To some extent, this finding was not surprising, considering that three of the five items comprising Patient Satisfaction scores referred to interpersonal qualities of the dentist. One might expect that patient ratings of interpersonal qualities of dentists would be unrelated to the technical quality of the dentistry. However, even when satisfaction is narrowly defined as the patient's opinion of the quality of the dental work itself (Item 7 on the Treatment Satisfaction Questionnaire), there is still no relationship of satisfaction to technical quality (r (148) = .030). The present study supports the notion that the interpersonal aspect of dental treatment is more important than the quality of the dental work in determining patient satisfaction.

The emergence of the dental assistants as a potentially confounding variable reinforces the impression

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[2]See Tatsuoka (1969) for the computational procedure used in calculating shrinkage estimates.

that interpersonal aspects of dentistry are very important, for the dental assistants are not the direct providers of the treatment, in spite of the fact that they accounted for nearly 10 percent of the variance in Patient Satisfaction scores. Further research will be needed to determine what qualities of dental assistants influence patient satisfaction with treatment. Until this determination has been made, research on patient satisfaction would do well to control for all individuals who come into contact with the patient, not just the health-care practitioner. The statistical control exerted through covariate analysis in the present study eliminated the influence of dental assistants as a confound, but genuine experimental control is to be preferred.

The distribution of Patient Satisfaction scores in the present study was similar to that found in several other studies of dental patient satisfaction--that is, negatively skewed (Bolender et al., 1969; Davies & Ware, 1981; Estabrook et al., 1980; Koslowsky et al., 1974; Smith, 1976; Weinstein et al., 1973). That such skewed distributions have been so consistently found with differing measuring instruments in private practice as well as clinic samples suggests that a characteristic of the population tendency is involved, rather than mere sampling error or failures in measurement scaling. It is possible that the tendency of dental patients to view treatment

favorably may simply reflect a response set influenced by social desirability. However, Davies and Ware (1981) found that an examination of parallel items inquiring about medical and dental care yielded statistically significant differences favoring the quality of dental care. It is difficult to explain why patients would be more influenced by social desirability when responding to questions about their dentists than they are when responding to questions about their physicians. In any case, future attempts to measure dental patient satisfaction need to address themselves to this issue of skewness in order that adequate statistical inferences can be made. .

While they do not solve the problem of skewness, items comprising the Patient Satisfaction score appear to be reasonably stable across visits, and unrelated to the number of prior visits the patient had had with the same dentist. These findings suggest that degree of satisfaction with treatment may develop very early in the relationship between dentist and patient, and that it may remain fairly stable over time. More studies are needed to confirm this impression.

Finally, with respect to future research, the design of the present study could be extended to consider the other side of the coin; that is, the nonverbal communication skills of the patient, and the anxiety of the doctor. Do nonverbally sensitive patients tend to produce dentists

or physicians who are more satisfied with their patients? Does the dentist or physician who is highly anxious tend to be especially appreciative of the nonverbally sensitive patient? Given the two-way nature of communication, these questions are perhaps more important to patient satisfaction than they may at first glance seem. For the level of satisfaction of the health-care practitioner may be detectable by many patients, and it may influence their feelings about the treatment they receive.

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APPENDIX A

SCHOOL OF DENTISTRY
DEPARTMENT OF PREVENTIVE DENTISTRY AND COMMUNITY HEALTH

INFORMED CONSENT

Dental student name: _____ Date: _____

Project title: PATIENT SATISFACTION WITH TREATMENT

PARTICIPANT INFORMATION

Aims of study: To increase our knowledge of what produces a satisfied dental patient.

Description of procedure: You will be asked to take 2 tests that measure certain aspects of your interpersonal style. Altogether, these tests will take about 1 hour of your time. All of your test results and questionnaire ratings will be treated as CONFIDENTIAL and will not be revealed in connection with your name.

Risks and discomforts: There are no risks and discomforts other than the time it takes to complete the tests and questionnaires.

Potential benefits: The results of your performance on the interpersonal tests will be provided to you, along with an opportunity to consult with the principal investigator about their meaning. This study will also potentially benefit future dental patients in terms of their satisfaction with treatment, and will potentially benefit dental professionals by indicating what produces patient satisfaction.

Financial risks: There are no financial costs to you.

Physical injury: It is understood that biomedical or behavioral research such as that in which you have agreed to participate, by its nature, involves risk or injury. In the event of physical injury resulting from these research procedures, emergency medical treatment will be provided at no cost, in accordance with the policy of (X) Medical Center. No additional free medical treatment or compensation will be provided except as required by Illinois law.

In the event you believe you have suffered any physical injury as the result of participation in the research program, please contact Dr. (X), Medical Center, telephone (X).

Confidentiality: I agree to allow my test results and ratings to be available to other authorized researchers for the purpose of evaluating the results of this study. I consent to the publication of any data which may result from these investigations for the purpose of advancing scientific knowledge, providing my name or any other identifying information (initials, social security number, etc.) is not used in conjunction with such publication. All precautions to maintain confidentiality of the data will be taken.

Voluntary and anonymous participation: I understand that my participation in this research is voluntary, and that I will not be asked to affix my name to any of the data that I provide. A code number will be used in place of my name. A master code sheet will pair my name with the code number. This master code sheet will be kept under lock and key. Only the principal investigators will have access to the master code sheet. The master code sheet will be destroyed at the end of the study.

CONSENT

I have fully explained to (name of participant)_____ the nature and purpose of the above-described procedure and the risks that are involved in its performance. I have answered and will answer all questions to the best of my ability. (signature: principal investigator)_____

I have been fully informed of the above-described procedure with its possible benefits and risks. I give permission for my participation in this study. I know that (name: principal investigator)_____ or his associates will be available to answer any questions I may have. If, at any time, I feel my questions have not been adequately answered, I may request to speak with a member of the Medical Center Review Board. I understand that I am free to withdraw this consent and discontinue participation in this project at any time without prejudice to my student standing. I have received a copy of this informed consent document.

_____
(signature: dental student

_____
(signature: witness to signature)

APPROVAL SHEET

The dissertation submitted by Robert J. Moretti has been read and approved by the following committee:

Dr. Thomas Petzel, Director
Professor of Psychology, Loyola

Dr. Emil Posavac
Professor of Psychology, Loyola

Dr. Daniel Barnes
Adjunct Professor of Psychology, Loyola

The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the Committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

10/23/81
Date

Thomas P. Petzel
Director's Signature