

Glenn E. Davis*, MS, Walter Carl Hartwig, PhD, Richard B. Riemer, DO, Chandra Char, PhD, Adam McTighe, PsyD, MBA and David Kremelberg, PhD

Assessing patient experience of the tenets of osteopathic medicine

<https://doi.org/10.1515/jom-2023-0038>

Received February 14, 2023; accepted April 10, 2023;
published online May 16, 2023

Abstract

Context: Previous studies document that both osteopathic physicians and third-party observers identify an approach to the patient that is consistent with the philosophy and tenets of osteopathic medicine, often without investigating whether patients identify or are satisfied with it. Osteopathic physicians and the medical education community understand the distinctiveness of an osteopathic approach to the patient. Understanding the outcomes of an osteopathic approach to patient care includes confirming whether patients experience the tenets of osteopathic medicine in physician visits and, if so, how it relates to their experience of physician empathy and satisfaction with the visit.

Objectives: The objectives of this study were to assess patient experience of the tenets of osteopathic medicine, physician empathy, and satisfaction with the visit and to compare the results for patients who saw DOs with those who saw MD physicians.

Methods: More than 2000 patients at four outpatient clinic facilities were surveyed after a clinical visit on 22 prompts regarding their experiences of physician behaviors, physician empathy, and their own satisfaction with the encounter. Adult patients who were treated by an osteopathic or allopathic physician for a nonemergency encounter and who were not pregnant were included in

the analysis. Survey results for 1,330 patient–physician encounters were analyzed utilizing linear regression models comparing constructs representing patient experiences of the tenets of osteopathic medicine (Tenets), physician empathy (Physician Empathy), satisfaction (Satisfaction) with the encounter, as well as additional demographic and encounter variables.

Results: Approximately 23.8% of patients approached during the study period completed a survey (n=2,793), and among those, 54.7% of patients who consented to the study and who saw a physician provider (n=1,330/2,431) were included. Significant ($p \leq 0.01$), positive associations among patient experiences of Satisfaction with the visit and Physician Empathy were observed among those who saw both DO and MD physicians. Patients experienced the Tenets during encounters with both DO and MD physicians, but linear regression showed that their experience of the Tenets was significantly ($p \leq 0.01$) and positively explained by their experience of Physician Empathy ($\beta = 0.332$, $p = 0.00$, $se = 0.052$) and Satisfaction with the visit ($\beta = 0.209$, $p = 0.01$, $se = 0.081$) only when the physician was a DO.

Conclusions: Patients identified physician behaviors consistent with the Tenets and positively associated their experiences of Physician Empathy and Satisfaction with the visit regardless of physician training background. Patient experience of the Tenets significantly explained their experiences of Physician Empathy and Satisfaction after visits with a DO but not after visits with an MD.

Keywords: allopathic; osteopathic; patient care; patient satisfaction; physician empathy; tenets.

*Corresponding author: Glenn E. Davis, MS, Department of Academic Affairs, Touro University College of Osteopathic Medicine, 1310 Club Drive, Vallejo, CA 94592, USA, E-mail: gdavis@touro.edu

Walter Carl Hartwig, PhD, Department of Academic Affairs, Touro University College of Osteopathic Medicine, Vallejo, CA, USA

Richard B. Riemer, DO, Senior Associate Dean, Touro University College of Osteopathic Medicine, Vallejo, CA, USA

Chandra Char, PhD, Medical Center, Georgetown University, Washington, DC, USA

Adam McTighe, PsyD, MBA, Mind Restoration, LLC, Atlanta, GA, USA

David Kremelberg, PhD, DK Statistical Consulting, Houston, TX, USA

Throughout the last 20-year growth period of the profession, osteopathic physicians have sought to define and measure the difference between an osteopathic approach and an allopathic approach to patient care. In a large, national, 2002 survey of osteopathic physicians (n=928), the majority (74.9%, 695/928) agreed that the defining difference is application of the osteopathic philosophy, with tenets of body unity, self-regulation, interrelationship

of structure and function, and treatment incorporating these tenets, combined with ‘manipulative treatment, a caring doctor–patient relationship and a hands-on style’ [1].

A subsequent study entailed third-party observers scoring recorded patient encounters (n=54 distributed across 11 osteopathic and 7 allopathic physicians). The study concluded that osteopathic physicians may communicate to patients differently than allopathic physicians do, particularly with regard to the patient’s overall well-being (56.0 % of 32 patient visits to osteopathic physicians vs. 32.0 % of 22 patient visits to allopathic physicians), and recommended that future studies should explore whether the characteristics that correlated better to osteopathic physicians also correlate to patient outcomes and satisfaction [2].

The first study suggests that the osteopathic physicians in the study believe that their approach is characterized in part by adherence to osteopathic tenets; the second study suggests that for the physicians in the study, an osteopathic approach entails an osteopathic communication style. However, these studies did not confirm patient experiences of their findings, nor did they develop a method to measure patient experience of behaviors consistent with the tenets of osteopathic medicine, independently of the identity and training history of the provider.

A series of studies have related the tenets of osteopathic medicine to patient outcomes, without the opportunity to include patient self-reported experiences [3–5]. In sequential cross-sectional studies, one researcher demonstrated that patients (n=313 total) had a more favorable perception of physician empathy if that physician was a DO [6] (mean, 41.2; 95 % CI, 39.1–43.3 for DOs vs. 38.0; 95 % CI, 36.5–39.5 for MDs; $p=0.02$) and that patients (n=79) treated for lower back pain with osteopathic manipulative treatment (OMT) had better outcomes for pain intensity (mean numerical rating score, 5.6; 95 % CI, 5.1–6.1 vs. 6.1; 95 % CI, 5.9–6.3; $p=0.04$) and opioid use (multivariate odds ratio, 0.52; 95 % CI, 0.28–0.98; $p=0.04$) than those treated by DOs who did not utilize OMT (n=49) and those treated by MDs (n=318) [7]. Similar results in a subsequent study supported the efficacy of OMT for reducing pain intensity vs. a patient-centered approach for patients treated by osteopathic physicians (n=88, $p=0.01$; mean, 11.3; 95 % CI 10.1–12.6 vs. mean, 14.0; 95 % CI 13.3–14.7) [8].

These studies advanced important specific findings about the outcome differences in patients in those study populations who were treated by a DO vs. by an MD, and the outcomes of patients who were treated utilizing OMT. The studies indicated that a survey of the patient experience of an osteopathic approach would be useful. Patient experience of osteopathic healthcare has been studied via a quantitative survey to patients along with qualitative semi-structured interviews of 11 patients

[9]. In this case, the scope of practice was limited to manual therapy and patients experiencing chronic lower back pain. Survey results indicated that osteopathic assessment was thorough, educational, and included advice, along with multiple therapies suggested. Patients felt that osteopathic medicine was patient-centered and personally tailored [9]. A 2019 meta-analysis (n=16 publications) of patient experience, satisfaction, perception, and expectation of OMT found mostly positive responses with respect to patient expectation and satisfaction in the nine quantitative studies, one of which included direct comparisons to nonosteopathic encounters (n=60, preference for osteopathic treatment=38.3 %, allopathic treatment=8.3 %, no preference=53.3 %, $p<0.001$) [10]. Patient perceptions of OMT in the seven qualitative studies were summarized as patient-centered, holistic, and thorough, with responses also highlighting the positive aspect of the clinician–patient partnership [10].

The value of an osteopathic approach has often been advocated [11] and studied from the perspective of practitioners, third parties, and inferences based on the provider being an osteopathic physician [1–3]. The literature advocating the application of osteopathic principles is extensive (e.g., Refs. [12–14]); however, studies measuring patient outcomes generally exclude patient-reported experiences of an osteopathic approach, are grounded in OMT alone, derive from broader patient satisfaction surveys, and/or are limited by a small sample size.

The primary goal of this study was to investigate how patient experiences of satisfaction and physician empathy correlate to their experience of the tenets of osteopathic medicine:

- (1) The body is a unit; the person is a unity of body, mind, and spirit.
- (2) The body is capable of self-regulation, self-healing, and health maintenance.
- (3) Structure and function are reciprocally interrelated.
- (4) Rational treatment is based upon an understanding of the basic principles of body unity, self-regulation, and the interrelationship of structure and function.

Does experiencing these tenets in a physician visit leave patients feeling more satisfied or that they were treated more empathetically? Do patients experience the tenets in visits with an allopathic physician, or only with an osteopathic physician? This study utilized a survey instrument designed specifically for that information and includes enough cases to alleviate potential sampling bias. Understanding how patients describe their treatment experience may lead to a better understanding of the role that being treated osteopathically can play in patient experiences of physician empathy and satisfaction with their visit.

Methods

Institutional review board evaluation and approval and study funding

The Touro University California Institutional Review Board (IRB) reviewed and approved the project (# M-1616), and the Solano County Clinics signed an authorization agreement to proceed under its auspices. The project was reviewed by the Touro University Nevada IRB, which then signed an authorization agreement on behalf of the clinic in Henderson, Nevada, to proceed under the auspices of the IRB at Touro University California. The study was funded by the American Osteopathic Association (Grant #211630707).

Informed consent and participant compensation

A tablet was utilized to gather survey data electronically. The instrument began with an informed consent statement. The survey terminated if the patient did not consent and continued only if the patient consented. The results of informed consent were recorded and communicated to investigators by the Qualtrics™ survey software. The respondents were not compensated, and the project coordinators received no incentive to obtain a specific number of responses.

Study population

The study population consisted of patients who presented during the study period at three different outpatient clinic locations affiliated with Touro University College of Osteopathic Medicine (TUCOM) in the county hospital system of Solano County, California, from June 2017 through April 2018, and at a fourth outpatient clinic location sponsored by Touro University Nevada in Henderson, Nevada, from April 2018 until July 2018. Inclusion criteria were that the patient be at least 18 years of age, not pregnant, and that their visit be with a physician provider. Those seeing a pediatrician, a nonphysician provider, or with emergent conditions were automatically excluded. Physician providers at the sites included a mix of both DO and MD physicians ($n > 40$ overall).

Survey design

The survey (Appendix A) utilized in this study was derived from the relevant literature on the key domains that would manifest patient experience of osteopathic medicine: (1) Licciardone et al. [3], who focused on OMT with patient-centered statements of two of the osteopathic tenets and widely utilized satisfaction statements; (2) Carey et al. [2], who focused on osteopathic distinction with physician-centered statements of all osteopathic tenets; (3) the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey [15], which distributes and manages the largest national patient satisfaction questionnaire; (4) the Press-Ganey 10-question supplemental patient satisfaction survey, which is brief, widely utilized, and cross-linked to each of the previously mentioned instruments; (5) Glaser et al. [16], who validated a patient perception of physician empathy instrument; and (6) Hojat et al. [17], who achieved a brief satisfaction survey with high validity and reliability.

The initial draft of the survey listed statement prompts according to the three constructs of investigation: (a) osteopathic tenets, (b) physician empathy, and (c) patient satisfaction. Following the Fry Readability Scale guidelines [18], the statement prompts were edited to improve readability by the potential respondents: core to the Fry guidelines are the necessity to choose common, everyday words, utilize an active voice, write in the first person, and keep sentences short and to the point. Statement prompts were circulated to TUCOM osteopathic physician faculty to assess face validity (i.e., do the questions measure what was intended?) and construct validity (i.e., do these prompts closely represent the constructs they are designed to measure?). The current instrument utilized in the study consists of 22 statement prompts and six respondent demographic questions including informed consent. Outcome data were analyzed to determine if responses were consistent within the prompts by examining internal reliability utilizing Cronbach's alpha [19].

Statistical analysis

Demographic results were summarized (DK, GD). Cronbach's alpha was calculated to assess whether the internal reliability of the survey items that comprise the constructs 'Patient Experience of Tenets of Osteopathic Medicine (Tenets)', 'Patient Experiences of Physician Empathy (Physician Empathy)', and 'Satisfaction with the Visit (Satisfaction)' met the standard minimum of 0.80 (DK, GD). Additional data demonstrating survey validity through confirmatory factor analysis exist but have not been published (DK, GD). Relationships among the variables were assessed through a correlation study utilizing Spearman's rho. p values of the correlations were adjusted utilizing the Sidak method to reduce the likelihood of type-1 error due to multiple comparisons. Linear regression models of Satisfaction, Physician Empathy, and Tenets were calculated with all variables input in a single step due to the exploratory nature of the study (DK, GD). Statistical significance at the 99.0 % level ($p \leq 0.01$) was assessed for each model as well as each predictor variable. p values for covariates ≤ 0.01 in the regressions were adjusted utilizing the Holm method during post-estimation to reduce the likelihood of type-1 error due to multiple comparisons (DK, GD). Adjusted r^2 was studied to derive the percent of variance in the outcome variable that is explained by the linear relationship with the predictor variables in each model (GD). Beta coefficients of the significant ($p < 0.01$) predictor variables in each model were studied to observe the relative magnitude of change in the outcome variable associated with each significant predictor variable (GD). Outcomes of the analysis for patients who saw a DO were compared to those for patients who saw an MD (GD). All analyses were conducted in Stata 15™.

Results

A total of 2,793 patient survey responses were collected, representing an approximate overall response rate of 23.8 %. There were 2,431 responses in which the patient consented to participate in the study and named a provider. Among these, 54.7 % (1,330/2,431) pertained to visits with physicians and were included in the present study. Another 45.2 %

Table 1: Respondent characteristics.

Demographic category	N	%
Patient age		
<18	0	0.0
18–30	108	8.1
31–40	144	10.8
41–50	195	14.6
51–60	298	22.4
61–70	316	23.7
71–80	186	13.9
>80	71	5.3
No answer	12	0.9
Gender		
Female	924	69.4
Male	388	29.1
Other	5	0.3
No answer	13	0.9
Survey language		
English	1,312	98.6
Spanish	18	1.3
Visit history with this provider		
First visit	253	19.0
Second	158	11.8
Third or more	907	68.1
No answer	12	0.9
Reason for visit		
Regular checkup	472	35.4
Follow-up	501	37.6
New problem	241	18.1
Other	109	8.1
No answer	7	0.5

pertained to visits with unknown or mid-level providers (1,101/2,431) and were excluded.

Most respondents in the study sample were aged 41 to 70 (809/1,330, 60.7%), were female (924/1,330, 69.4%) vs. male (338/1,330, 29.1%) or Other [5/1,330, 0.3%], utilized the English language version of the survey (1,312/1,330, 98.6%) vs. the Spanish language version (18/1,330, 1.3%), were seeing their doctor for the third time or more (907/1,330, 68.1%), and were coming in for a regular checkup or follow-up from another visit (973/1,330, 73.2%) (Table 1). Cronbach's alpha coefficients, measuring internal reliability of the scales, were as follows: Tenets ($\alpha=0.80$) and Physician Empathy ($\alpha=0.81$), and Satisfaction ($\alpha=0.85$). The standard/conventional value indicating acceptable internal reliability is at least 0.8 [20].

Table 2: Summary statistics. Counts, means, and standard deviations by provider type.

Construct ^a	Variable	DO ^e	MD ^f
Empathy (12)	n ^b	1,257	63
	mean ^c	9.8	8.9
	SD ^d	2.6	2.9
Tenets (13)	n	1,259	63
	Mean	7.8	7.2
	SD	2.9	3.2
Satisfaction (6)	n	1,244	63
	Mean	5.0	4.4
	SD	1.6	1.9

^aConstruct being assessed (maximum possible). ^bnumber of observations. ^caverage. ^dstandard deviation. ^eResults for patients who saw a DO provider. ^fResults for patients who saw an MD provider. SD, standard deviation.

A maximum score of 12 was possible for the construct of Physician Empathy. The average response among patients who saw a DO provider ($n=1,257$) was 9.8 with a standard deviation of 2.6, whereas among those who saw an MD provider ($n=63$), it was 8.9 with a standard deviation of 2.9. A maximum score of 13 was possible for the construct of Tenets. The average response among patients who saw a DO provider ($n=1,259$) was 7.8 with a standard deviation of 2.9, whereas among those who saw an MD provider ($n=63$), it was 7.2 with a standard deviation of 3.2. A maximum score of 6 was possible for the construct of Satisfaction. The average response among patients who saw a DO provider ($n=1,244$) was 5.0 with a standard deviation of 1.6, whereas among those who saw an MD provider ($n=63$), it was 4.4 with a standard deviation of 1.9 (Table 2).

Significant correlations were observed between Physician Empathy and Tenets ($\rho=0.3$, $p=0.00$), between Physician Empathy and Satisfaction ($\rho=0.6$, $p=0.00$), and between Physician Empathy and visit history ($\rho=0.1$, $p=0.01$) among patients who saw a DO provider ($n=1,206$), and between Physician Empathy and Satisfaction ($\rho=0.8$, $p=0.00$) among patients who saw an MD provider ($n=62$). Significant correlations were observed between Tenets and Satisfaction ($\rho=0.8$, $p=0.00$) among patients who saw a DO provider, and between Tenets and reason for visit ($\rho=-0.4$, $p=0.00$) among patients who saw an MD provider. Significant correlations were observed between Satisfaction and visit history ($\rho=0.1$, $p=0.00$) between age and visit history ($\rho=0.2$, $p=0.00$), and between age and visit reason ($\rho=-0.1$, $p=0.00$) and between visit history and visit reason ($\rho=0.2$, $p=0.00$) among patients who saw a DO provider. All p values of the correlations were adjusted utilizing the Sidak method to reduce the likelihood of type 1 errors due to multiple comparisons (Table 3).

Table 3: Correlations. Spearman’s rho, p value for patients seeing DO and MD providers

		Empathy		Tenets		Satisfaction		Gender		Age		History ^a		Reason ^b	
		DO ^c	MD ^d	DO ^c	MD ^d	DO ^c	MD ^d	DO ^c	MD ^d	DO ^c	MD ^d	DO ^c	MD ^d	DO ^c	MD ^d
Empathy	rho	1.0	1.0												
Tenets	rho	0.3 ^e	0.3	1.0	1.0										
	p	0.00	0.15												
Satisfaction	rho	0.6 ^e	0.8 ^e	0.2 ^e	0.2	1.0	1.0								
	p	0.00	0.00	0.00	0.49										
Gender	rho	0.0	0.06	0.0	0.0	0.0	0.0	1.0	1.0						
	p	0.99	1.00	0.71	1.00	1.00	1.00								
Age	rho	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0				
	p	0.95	1.00	1.00	1.00	0.26	1.00	1.00	1.00						
History	rho	0.1 ^e	0.0	0.0	0.0	0.1 ^e	0.0	0.0	-0.1	0.2 ^e	0.1	1.0	1.0		
	p	0.01	1.00	0.33	1.00	0.00	1.00	0.96	0.99	0.00	0.98				
Reason	rho	0.0	0.0	0.0	-0.4 ^e	0.0	0.0	0.0	0.0	-0.1 ^e	0.1	0.2 ^e	0.0	1.0	1.0
	p	1.00	1.00	0.97	0.00	1.00	1.00	1.00	1.00	0.00	0.99	0.00	1.00		

rho=Spearman’s Rho correlation coefficient. p, probability, with Sidak correction for multiple comparisons, of observing this correlation due to random chance. ^eStatistically Significant (p≤0.01) after Sidak correction for multiple comparisons. ^aVisit History weighted as (1) first, (2) second, (3) third or more times patient indicated they had seen this doctor. ^bVisit Reason weighted as (1) regular checkup, (2) follow-up, (3) new problem, (4) other. ^cDO statistics based on 1,206 patient surveys. ^dMD statistics based on 62 patient surveys

Linear regression models of Satisfaction based on experience of Tenets, and Physician Empathy, as well as patient age, gender, and visit history, were compared between those who saw a DO physician (n=1,206) and those who saw an MD physician (n=62) (Table 4). The model was statistically significant for both those who saw a DO [F (12, 1,193)=195.14, p=0.00, root mean squared error=0.960], and those who saw an MD [F (9, 52)=17.79, p=0.00, root mean squared error=1.056], indicating that for both the DO and MD sample, the variance in Satisfaction was significantly explained by the linear relationship with experience of Tenets, Physician Empathy, patient age, gender, and visit history. Among patients who saw a DO, the model explained approximately 65.9 % of the variance in Satisfaction (adjusted r²=0.659), while among those who saw an MD, it explained approximately 71.2 % of the variance in Satisfaction (adjusted r²=0.712).

Further investigation of Holm adjusted p values showed that among patients who saw a DO physician, both Physician Empathy (p=0.00), and Tenets (p=0.01), as well as it being the third visit (p=0.00), were statistically significant. In contrast,

among those who saw an MD, only Physician Empathy was statistically significant (p=0.00). Among patients who saw a DO, every one unit increase in the experience of Tenets was associated with approximately a 0.026 unit increase in Satisfaction (β=0.026, standard error=0.010), and a one unit increase in experience of Physician Empathy was associated with approximately a 0.501 increase in Satisfaction (β=0.501, standard error=0.011), while the third visit or more was associated with approximately a 0.269 unit decrease in Satisfaction (β=-0.269, standard error=0.089). Among those who saw an MD, every one unit increase in Physician Empathy was associated with approximately a 0.541 unit increase in Satisfaction (β=0.541, standard error=0.049).

Linear regression models of Physician Empathy based on experience of Tenets, and Satisfaction, as well as patient age, gender, and visit history were significant both among those who saw a DO [F (12, 1,193)=202.06, p=0.00, root mean squared error=1.486], and those who saw an MD [F (9, 52) =16.18, p=0.00, root mean squared error=1.633] (Table 5). Among patients who saw a DO, the model explained approximately 66.6 % of the variance in Physician Empathy

Table 4: Linear regression. Patient satisfaction by physician empathy, experience of tenets, patient age, gender, and visit history

	Model probability	Model adj. r ² (root mse) ^a	Empathy p ^b	Empathy β (std error) ^c	Tenets p ^b	Tenets β (std error) ^c	Third visit p ^b	Third visit β (std error) ^c
DO provider (n=1,206, F (12, 1,193)=195.14)	0.00 ^d	r [2]=0.659 (0.960)	0.00 ^d	0.501 (0.011)	0.01 ^d	0.026 (0.010)	0.00 ^d	-0.269 (0.089)
MD provider (n=62, F (9, 52)=17.79)	0.00 ^d	r [2]=0.712 (1.056)	0.00 ^d	0.541 (0.049)	0.73		0.91	

^amodel root mean squared error. ^bprobability, with Holm correction for multiple comparisons, of linear relationship due to random chance. ^cvariable standard error. ^dStatistically significant (p≤0.01).

Table 5: Linear regression. Physician empathy by, experience of tenets, patient satisfaction, patient age, gender, and visit history

	Model probability	Model adj. r^2 (root mse) ^a	Tenets p^b	Tenets β (std error) ^c	Satisfaction p^b	Satisfaction β (std error) ^c
DO provider (n=1,206, F (12, 1,193)=202.06)	0.00 ^d	r [2]=0.666 (1.486)	0.00 ^d	0.099 (0.015)	0.00 ^d	1.200 (0.028)
MD provider (n=62, F (9, 52)=16.18)	0.00 ^d	r [2]=0.691 (1.633)	0.37		0.00 ^d	1.293 (0.117)

^amodel root mean squared error. ^bprobability, with Holm correction for multiple comparisons, of linear relationship due to random chance. ^cvariable standard error. ^dStatistically significant ($p \leq 0.01$).

(adjusted $r^2=0.666$), whereas among those who saw an MD, it explained approximately 69.1 % of the variance in Physician Empathy (adjusted $r^2=0.691$).

Further investigation showed that among patients who saw a DO physician, both experience of Tenets ($p \leq 0.01$) and Satisfaction ($p \leq 0.01$), as well as being a female patient ($p \leq 0.01$), were statistically significant. Following Holm adjustment, only Tenets ($p=0.00$) and Satisfaction ($p=0.00$) were assessed as significant, whereas being a female patient ($p=0.05$) was not. In contrast, among those who saw an MD, only Satisfaction was statistically significant ($p=0.00$) following Holm adjustment. Among patients who saw a DO, each one unit increase in the experience of Tenets was associated with approximately a 0.09 unit increase in experience of Physician Empathy ($\beta=0.099$, standard error=0.015), and a one unit increase in Satisfaction was associated with approximately a 1.20 unit increase ($\beta=1.200$, standard error=0.028) in experience of Physician Empathy. Among those who saw an MD, every one unit increase in Satisfaction was associated with approximately a 1.29 ($\beta=1.293$, standard error=0.117) increase in Physician Empathy.

Linear regression models of experience of Tenets based on experience of Physician Empathy, and Satisfaction, as well as patient age, gender, and visit history, were statistically significant among patients who saw a DO [F (12, 1,193) =19.38, $p=0.00$, root mean squared error=2.722], but not among those who saw an MD [F (9, 52)=1.04, $p=0.42$, root mean squared error=3.194] (Table 6). Among patients who saw a DO, the model explained approximately 15.4 % (adjusted $r^2=0.154$) of the variance in experience of Tenets.

Further investigation of Holm adjusted p values showed that among patients who saw a DO physician, both Satisfaction ($p=0.01$) and Physician Empathy ($p=0.00$), as well as being a female patient ($p=0.00$), were statistically significant. Among patients who saw a DO, every one unit increase in the experience of Physician Empathy was associated with approximately a 0.33 unit increase in experience of Tenets ($\beta=0.332$, standard error=0.052), a one unit increase in experience of Satisfaction was associated with approximately a 0.20 unit increase in experience of Tenets ($\beta=0.209$, standard error=0.081), whereas being a female patient was associated with a 0.51 unit decline in Experience of Tenets ($\beta=-0.51$, standard error 0.171). Variance in patient experience of Tenets from MDs was not statistically significantly explained by the linear relationship to Physician Empathy ($p=0.374$, standard error=0.269), Satisfaction ($p=0.73$, standard error=0.418), or other measured variables.

Discussion

Does treating patients osteopathically affect their experiences of physician empathy and satisfaction with their visit? To address this question and to advance upon the scope of prior studies, we acquired data directly from patients rather than from providers, on experiences of each of the four tenets, physician empathy, and satisfaction, and then directly compared responses from patients who saw a DO with those who saw an MD.

Table 6: Linear regression. Experience of tenets by physician empathy, patient satisfaction, patient age, gender, and visit history

	Model probability	Model adj. r^2 (root mse) ^a	Empathy p^b	Empathy β (std error) ^c	Satisfaction p^b	Satisfaction β (std error) ^c	Female p^b	Female β (std error) ^c
DO provider (n=1,206, F (12, 1,193)=19.38)	0.00 ^d	r [2]=0.154 (2.722)	0.00 ^d	0.332 (0.052)	0.01 ^d	0.209 (0.081)	0.00 ^d	-0.513 (0.171)
MD provider (n=62, F (9, 52)=1.04)	0.42		0.37		0.73		0.84	

^amodel root mean squared error. ^bprobability, with Holm correction for multiple comparisons, of linear relationship due to random chance. ^cvariable standard error. ^dStatistically significant ($p \leq 0.01$).

The correlation and linear regression results indicated that although patients in our study may have experienced the Tenets to some extent in visits with both DO and MD physicians, their experience of the tenets was significantly associated with experience of physician empathy and satisfaction with the visit only when the physician was a DO. Furthermore, positive beta coefficients indicated that their experience of the tenets from DO providers was related to increased experience of both physician empathy and satisfaction with the visit. We believe that these results imply that adherence to the Tenets, when the physician was a DO, may have led to better and more satisfying visits for the patients in our study. We are unsure why there was a significant but small and negative correlation between experience of Tenets and reason for visit among patients who saw an MD, nor why being a female patient was associated with an increased experience of Tenets, nor why while the third visit or more was associated with a decrease in satisfaction with the visit when the provider was a DO.

A previous study of osteopathic patient care recommended that future studies address patient satisfaction and outcomes in those encounters [1]. Our results indicate that patient satisfaction and experience of physician empathy increase in visits with a DO along with experiences of the Tenets. Unlike prior studies that relied on physician self-report or national patient surveys or registries [4–7], our study confirmed direct patient experience of the tenets, and an associated experience of physician empathy and satisfaction with the visit when the provider was a DO. The survey results also showed that patients experienced satisfaction and physician empathy, and positively associate those experiences, whether the provider was an MD or a DO.

Limitations

Patient experience of Tenets was assessed with 13 statement prompts, Physician Empathy with 6 statement prompts, and Satisfaction with 3 statement prompts. Therefore, one unit of Tenets represents approximately 7.6 % of the total available, whereas one unit of Physician Empathy and Satisfaction represent approximately 16.7 % and 33.3 %, respectively, of the totals available. As a result, the magnitude of beta coefficients should not be directly compared across domains. That is why we limited our discussion to the sign as indicating an increasing (positive) or decreasing (negative) association.

It is possible that by conducting multiple comparisons, some of the significant results we report occurred by chance. We believe that the likelihood that we detected significant results by random chance, i.e., that they are merely type-1

errors, is low due to the large sample size, our decision assesses significance and the 99 % level, the consistency of relationships detected in the various analyses, and our use of p values that are adjusted to reduce the likelihood of type-1 errors during multiple comparisons.

Data were collected at four sites in two states but in broadly similar primary care settings that did not include the full spectrum of physician-patient encounters, and we also excluded results from pediatric patients and those who may have been in distress. As such, the range of potential experiences was constrained. There may also be clustering effects in the data. There were no MD physicians in the Nevada clinic. Unfortunately, this meant that we could not investigate clustering effects by state, and therefore cannot rule out potential clustering by state as a limitation on the generalizability of the results.

The generalizability of the results is limited in other ways as well. The sample size was reduced from what it could have been due to only 23.8 % of candidates electing to complete the survey, and the exclusion of results where the patient was unable to provide the name of the physician. Moreover, the study design was cross-sectional, which eliminated evaluation of whether the same patients would answer the survey differently if they took it multiple times and after experiencing the tenets in varying amounts. Finally, we cannot rule out that reliability of the results and inferences may have been reduced by a social desirability bias in which the probability that patients responded favorably rose independently of their true feelings because they believed it was expected or that they intended to please the project coordinators.

Conclusions

Patients experienced satisfaction and physician empathy, and positively associated those experiences, when the provider was an MD or a DO. Patient experience of the Tenets from a trained provider, a DO, significantly explained and correlated with their experience of physician empathy and satisfaction with the visit compared to experience of the tenets from a nontrained provider, an MD. Patient experience of the tenets from MDs did not significantly explain the linear relationship with their experience of physician empathy, satisfaction, or other measured variables. Patient experience of the tenets from osteopathic physicians was indeed related to physician empathy, the patient being female, and satisfaction with the encounter.

Acknowledgments: We thank Project Manager Susan Elliott, Grant Manager Lou Van Der Ree, Project Manager Amity

Buchner, Project Manager Lisa Meeks, Dr. Michael Clearfield (then Dean of Touro University College of Osteopathic Medicine), Dr. John Dougherty (then Dean of Touro University Nevada College of Osteopathic Medicine), Dr. Stacey Pierce-Talsma (then Chair of Osteopathic Manipulative Medicine at Touro University College of Osteopathic Medicine), Dr. Tami Hendriksz (Dean of Touro University College of Osteopathic Medicine), and the staffs at each of the four research sites for their contributions and assistance on this project.

Research funding: This research project was funded by the American Osteopathic Association (Grant #211630707). Funding was distributed to support Project Managers for data collection, computer tablets for survey data input at clinic facilities, statistical consulting, and translation of the survey questionnaire into Spanish and Tagalog.

Author contributions: All authors provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; G.D. and W.H. drafted the article or revised it critically for important intellectual content; all authors gave final approval of the version of the article to be published; and all authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Competing interests: None reported.

Ethical approval: The Touro University California Institutional Review Board (IRB) reviewed and approved the project (M-1616), and the Solano County Clinics signed an authorization agreement to proceed under its auspices. The project was reviewed by the Touro University Nevada IRB, which then signed an authorization agreement on behalf of the clinic in Henderson, NV, to proceed under the auspices of the IRB at Touro University California.

Informed consent: All patients provided informed consent electronically before being allowed to complete the survey.

References

1. Johnson SM, Kurtz ME. Perceptions of philosophic and practice differences between US osteopathic physicians and their allopathic counterparts. *Soc Sci Med* 2002;55:2141–8.
2. Carey TS, Motyka TM, Garrett JM, Keller RB. Do osteopathic physicians differ in patient interaction from allopathic physicians? An empirically derived approach. *J Am Osteopath Assoc* 2003;103:313–8.
3. Licciardone J, Gamber R, Cardarelli K. Patient satisfaction and clinical outcomes associated with osteopathic manipulative treatment. *J Am Osteopath Assoc* 2002;102:13–20.
4. Licciardone JC. A comparison of patient visits to osteopathic and allopathic general and family medicine physicians: results from the national ambulatory medical care survey, 2003–2004. *Osteopath Med Prim Care* 2007;1:2.
5. Licciardone JC, Herron KM. Characteristics, satisfaction, and perceptions of patients receiving ambulatory health care from osteopathic physicians: a comparative national survey. *J Am Osteopath Assoc* 2001;101:374–85.
6. Licciardone JC, Schmitt ME, Aryal S. Empathy in medicine osteopathic and allopathic physician interpersonal manner, empathy, and communication style and clinical status of their patients: a pain registry-based study. *J Am Osteopath Assoc* 2019;119:499–510.
7. Licciardone JC, Gatchel RJ. Osteopathic medical care with and without osteopathic manipulative treatment in patients with chronic low back pain: a pain registry-based study. *J Am Osteopath Assoc* 2020;120:64–73.
8. Licciardone JC, Aryal S. Patient-centered care or osteopathic manipulative treatment as mediators of clinical outcomes in patients with chronic low back pain. *J Osteopath Med* 2021;121:795–804.
9. Orrock PJ. The patient experience of osteopathic healthcare. *Man Ther* 2016;22:131–7.
10. Lam MT, Banihashem M, Lam HR, Wan AB, Chow E. Patient experience, satisfaction, perception and expectation of osteopathic manipulative treatment: a systematic review. *Int J Osteopath Med* 2019;32:28–43.
11. Clearfield M. A path to osteopathic distinction: the Touro California GROUPIE program. *J Am Osteopath Assoc* 2017;117:488–94.
12. Brown ZJ, Martin SP, Carman R Jr. Integrating osteopathic philosophy in cancer care. *J Am Osteopath Assoc* 2019;119:391–4.
13. Ciervo CA, Shubrook JH, Grundy P. Leveraging the principles of osteopathic medicine to improve diabetes outcomes within a new era of health care reform. *J Am Osteopath Assoc* 2015;115:eS8–19.
14. Kuchera ML. Applying osteopathic principles to formulate treatment for patients with chronic pain. *J Am Osteopath Assoc* 2007;107:ES28–38.
15. Centers for Medicare and Medicaid Services. Hospital consumer assessment of healthcare providers and systems: patients' perspectives of care survey—centers for medicare and medicaid services. Available from: <https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/HospitalHCAHPS> [Accessed 30 Apr 2016].
16. Glaser K, Markham FW, Adler HM, McManus PR, Hojat M. Relationship between scores on the Jefferson scale of physician empathy, patient perceptions of physician empathy, and humanistic approaches to patient care: a validity study. *Med Sci Mon Int Med J Exp Clin Res* 2007;13:291–4.
17. Hojat M, Louis DZ, Maxwell K, Markham FW, Wender RC, Gonnella JS. A brief instrument to measure patients' overall satisfaction with primary care physicians. *Fam Med* 2011;43:412–7.
18. Fry E. The fry graph readability formula; 2016. Available from: <https://readable.com/readability/fry-readability-graph/> [Accessed 18 Jun 2019].
19. Cohen J. *Statistical power analysis for the behavioral sciences*, 2 ed. Hillsdale, New Jersey: Lawrence Erlbaum Associates, Inc.; 1988.
20. Nulty DD. The adequacy of response rates to online and paper surveys: what can be done? *Assess Eval High Educ* 2008;33:301–14.

Supplementary Material: This article contains supplementary material (<https://doi.org/10.1515/jom-2023-0038>).