

RESEARCH ARTICLE

Are Surgeons' Tendencies to Avoid Discomfort Associated with Attitudes and Beliefs Toward Patient Psychosocial Factors?

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Received: 15 March 2021

Accepted: 02 February 2022

Abstract

Background: Orthopedic surgeons are sometimes hesitant to assess and address psychosocial factors. Surgeon-specific modifiable factors may contribute to surgeon attitudes and beliefs regarding the mental and social aspects of illness. A better understanding of these factors could help inform interventions to support surgeons and improve patient outcomes. We aimed to investigate whether orthopedic surgeons' self-reported compassion, perceived stress, and experiential avoidance are independently associated with various surgeon attitudes and beliefs regarding psychosocial aspects of health.

Methods: This is a cross-sectional study of 165 members of the Science of Variation Group (SOVG). Surgeons completed measures of compassion, stress, experiential avoidance, and demographics. They answered questions addressing attitudes and beliefs regarding psychosocial aspects of care, which were condensed to the following 6 dimensions through factor analysis: (1) confidence, (2) perceived resource availability, (3) blame towards patients, (4) fear of offending patients, (5) professional role resistance, and (6) fear of negative patient reactions. We performed 6 multivariable hierarchical regression analyses to determine whether self-reported compassion, perceived stress, and experiential avoidance were associated with aspects of surgeons' attitudes and beliefs regarding psychosocial care.

Results: After accounting for the influence of relevant covariates, experiential avoidance explained 2.9-6.6% of the variance (*P-values* .002 to .031) in all aspects of surgeon attitudes and beliefs regarding psychosocial care, except for perceived resource availability. Perceived stress and compassion toward others were not associated with any outcome variable.

Conclusion: Targeting orthopedic surgeons' tendency to avoid discomfort (i.e., experiential avoidance) via supportive/educational programs may decrease barriers and increase their abilities to address psychosocial factors, resulting in improved patient outcomes.

Level of evidence: III

Keywords: Experiential avoidance, Mental health, Psychosocial, Surgeons' attitudes

Introduction

Clinical and empirical evidence suggests a robust association among mental health concerns, maladaptive coping, pain intensity, and self-

reported functional limitations among orthopedic patients (1-4). Widespread adoption of biopsychosocial paradigms can facilitate the appropriate integration of

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THE ONLINE VERSION OF THIS ARTICLE
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psychosocial factors into clinical care, but such models are not routine in orthopedic surgery practices (5,6).

There are various barriers to addressing psychosocial factors in orthopedic practice. On one hand, patients may expect their surgeons to only discuss pathophysiology and biomedical treatment options and may resist conversations about psychosocial factors (7). On the other hand, surgeons may be uncomfortable discussing psychosocial factors with their patients and lack the communication strategies to do so effectively (8). Other surgeon factors may facilitate psychosocial care. For example, surgeons with more positive attitudes and beliefs regarding psychosocial care (e.g., confidence, perceived availability of resources) may be more likely to assess psychosocial factors and make appropriate referrals (8). Importantly these attitudes and beliefs are modifiable through alternative care strategies and psychoeducational interventions (9). Identifying modifiable psychological factors that contribute to surgeon attitudes and beliefs regarding psychosocial care will help inform interventions to support surgeons and ultimately improve the outcome of patients who need psychosocial care.

Evidence from other fields suggests that individual differences in compassion, perceived stress, and experiential avoidance (i.e., the tendency to avoid discomfort) may be associated with medical providers' attitudes and beliefs regarding psychosocial care (10). Compassion, or sensitivity toward the suffering of others and the desire to alleviate it, is associated with increased helping behaviors and reduced mental health stigma among healthcare providers (11-13). High perceived stress, or feelings that the demands of a situation outweigh abilities to cope, impairs attention, performance, and quality of patient care (14, 15). While experiential avoidance is understudied among physicians, evidence suggests that psychologists with high experiential avoidance sidestep implementing gold-standard treatments with long-term benefits when these treatments result in short term discomfort (9,16). No study to date has examined the relationship between compassion, perceived stress, and experiential avoidance as modifiable factors and various aspects of surgeons' attitudes and beliefs toward addressing psychosocial factors in an overarching model.

In this study, we examined associations among orthopedic surgeon self-reported compassion, perceived stress, and experiential avoidance with the following surgeon attitudes regarding psychosocial care: 1) confidence, 2) perceived resource availability, 3) blame towards patients for psychosocial complications, 4) fear of offending patients, 5) professional role resistance (e.g., unwillingness to address psychosocial factors), and 6) fear of negative patient reactions (e.g., complaints, anger). We hypothesized that surgeons' compassion, stress, and experiential avoidance would explain unique variance in surgeon attitudes regarding psychosocial care above and beyond the effects of theoretically relevant covariates (i.e., years of orthopedic surgery experience, existence of psychological care services in the settings surgeons work, surgeons' reception of psychosocial care education in residency curriculum, and number of patient encounters

per week (17-19)).

Materials and Methods

Participants and Procedures

This is a cross-sectional survey study. Participants were 165 members of the Science of Variation Group (SOVG) [Table 1]. SOVG is an international collaboration of orthopedic surgeons from across the globe, mainly from academic settings in the United States and Europe, interested in researching variations in the definition, interpretation, categorization, and treatment of disease. Participants completed self-report questionnaires electronically using a web-based survey platform (SurveyMonkey, Palo Alto, CA, USA). Recruitment occurred between August and September 2020. Our institutional review board approved this study and waived the need for informed consent.

Measures

Surgeons Attitudes and Beliefs Regarding Psychosocial Care (9).

Currently, there is no validated measure of surgeons' attitudes and beliefs regarding psychosocial care. Thus, we developed a 25-item scale to measure these attitudes and beliefs by adapting items from two sources. First, we used 10 items from a published measure of orthopedic surgeons' confidence and perceived resource availability for addressing patient psychosocial factors (9) (e.g., "I feel confident in making appropriate referrals for orthopedic trauma patients with psychosocial problems," "I feel the mental health services at the hospital can meet the needs of orthopedic trauma patients"). These 10 items were adapted from a validated scale assessing providers' attitudes and beliefs about managing psychosocial concerns associated with domestic violence. Second, we similarly adapted an additional 15 items from the same domestic violence scale (20). These additional items measured blame toward patients for having psychosocial complications (e.g., "Patients often do something to bring about psychosocial complications"), professional role resistance/fears of offending the patient by discussing the psychosocial factors (e.g., "I am afraid of offending the patient if I ask about their psychosocial problems"), and fear of negative patients reactions after addressing the psychosocial factors (e.g., "If I ask orthopedic patients about psychosocial issues, they will get very angry"). All 25 item responses are rated on a 5-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"), with higher scores indicating higher levels of confidence and perceived resource availability for managing psychosocial factors, as well as higher levels of blaming the patient, role resistance/fears of offending the patient, and fear of negative patient reactions.

We performed an exploratory factor analyses (EFA) of these 25 items in order to develop separate dimensions that could be interpreted as different underlying dimensions of surgeons' attitudes and beliefs regarding psychosocial care. This is important because examining each of the 25 items related to surgeons' attitudes and beliefs separately could lead to statistical power constraints (21). We omitted 3 items from our original

Table 1. Surgeon and practice characteristics (n = 165)

Characteristic		N (%)
Gender	Male	152(92.1%)
	Female	12(7.3%)
	Not answered	1(.6%)
Location of practice	Europe	75(45.5%)
	North America	64(38.8%)
	South America / Latin America	19(11.5%)
	Asia	4(2.4%)
	Australia	2(1.2%)
	Middle east	1(.6%)
	Type of workplace	Academic Institution
	Both	43(26.1%)
	Private Practice	27(16.4%)
	Neither	15(9.1%)
Engagement in Research and/or Teaching	Both	130(78.8%)
	Teaching	20(12.1%)
	Neither	11(6.7%)
	Research	4(2.4%)
Specialization	Hand and Upper Extremity	76(46.1%)
	Orthopedic Trauma	55(33.3%)
	Shoulder and Elbow other	10(6.1%)
	7(4.2%)	
	Surgical Sports Medicine	4(2.4%)
	Total Joint Reconstruction (arthroplasty)	4(2.4%)
	Pediatric Orthopedics	4(2.4%)
	Foot and ankle surgery	3(1.8%)
	Orthopedic Oncologist	1(.6%)
	Spine surgery	1(.6%)
Marital status	Married	143 (86.7%)
	In a domestic partnership	12 (7.3%)
	Divorced	5 (3.0%)
Household income	Single (never married)	5 (3.0%)
	\$10,001 - \$20,000	1(.6%)
	\$20,001k - \$50,000	5(3.0%)
	\$50,001 - \$100,000	4(2.4%)
	\$100,001 - \$200,000	15(9.1%)

Table 1. Continued

	\$200,001 - \$300,000	30(18.2%)
	\$200,001 - \$300,000	19(11.5%)
	\$300,001 - \$400,000	19(11.5%)
	\$400,001 - \$500,000	15(9.1%)
	\$500,001 - \$750,000	26(15.8%)
	> \$750,000	31(18.8%)

pool of 25 because they did not contribute meaningful information (e.g., low factor loadings- see Table 2), and then condensed the 22 items into 6 distinct factors representing different aspects of surgeons' attitudes and beliefs regarding psychosocial care. We named these 6 factors related to addressing psychosocial factors: 1) surgeon confidence (6 items), 2) perceived resource availability (4 items), 3) blame towards patients (3 items), 4) fear of offending patients (3 items), 5) professional role resistance (3 items), 6) and fear of negative patients' reactions (3 items) [Table 2]. The scores for each factor were calculated as the sum of items on that factor and used as dependent variables in subsequent analyses [Table 3].

Compassion Toward Others

The 5-item The Santa Clara Brief Compassion Scale (SCBCS) (22) measures compassion toward strangers and humankind at large (e.g., "I often have tender feelings toward people (strangers) when they seem to be in need.") using a 7-point Likert-type scale (1 = "not at all true of me;" 7 = "very true of me"). Higher sum scores represent higher levels of compassion toward others.

Perceived Stress

The 4-item Perceived Stress Scale (PSS-4) (23) assesses a person's feelings and thoughts related to their stress over the past month (e.g., "In the last month, how often have you felt that you were unable to control the important things in your life?") using a 5-point Likert-type scale (0 = "never;" 4 = "very often"). Higher scores represent greater perceived stress.

Experiential Avoidance

The 15-item Brief Experiential Avoidance Questionnaire (BEAQ) (24) was used to measure experiential avoidance (e.g., "I rarely do something if there is a chance that it will upset me") using a 6-point Likert-type scale (1 = "strongly disagree;" 6 = "strongly agree"). Higher sum scores represent greater levels of experiential avoidance.

Statistical Analysis

We used SPSS version 26 to conduct the analyses. We used descriptive statistics and bivariate correlations to describe our data. Next, we conducted six hierarchical linear regression analyses with the 6 dimensions of surgeons' attitudes and beliefs regarding psychosocial factors as outcome variables. In step one of each regression model, we included all of the 4 hypothesized theoretically relevant covariates (i.e., years of orthopedic

Table 2. EFA factor loadings matrix

	1	2	3	4	5	6
1.I have time to ask about psychosocial complications in practice	0.49					
2.I have strategies to encourage orthopedic trauma patients to seek help for psychosocial problems	0.85					
3.I have strategies to help orthopedic trauma patients change their psychosocial situation	0.88					
4.I feel confident in making appropriate referrals for orthopedic trauma patients with psychosocial problems	0.58					
5.I have access to information to guide the management of psychosocial issues related to recovery	0.61					
6.I have ways to ask patients about their psychosocial problems that will encourage them to take action	0.70					
7.I have access to personnel to assist in the management of psychosocial issues related to recovery		0.47				
8.I feel support personnel at my hospital can help manage psychosocial issues related to recovery		0.74				
9.I have access to mental health services should my patients need referrals		0.82				
10.I feel the mental health services at the hospital can meet the needs of orthopedic trauma patients		0.79				
11. Patients report psychosocial issues for secondary gains.					0.61	
12. Patients choose to have psychosocial issues.					0.73	
13. Patients often do something to bring about psychosocial complications.					0.72	
14.I am afraid of offending the patient if I ask about their psychosocial problems.			0.51			
15. Asking patients about psychosocial complications is an invasion of their privacy			0.75			
16. It is demeaning to patients to question them about their psychosocial issues.			0.79			
17. It is not my place to interfere with how a patient chooses to resolve her psychosocial issues.						0.62
18. I think that investigating the underlying cause of a patient's psychosocial complications is not part of medical care.						0.71
19. If patients do not reveal psychosocial problems to me, then they feel it is none of my business.						0.42
20. If I ask orthopedic patients about psychosocial issues, they will get very angry.					0.73	
21. When challenged, patients with psychosocial problems frequently direct their anger toward health care providers.					0.68	
22. I am reluctant to ask patients about their psychosocial problems of concern that they will get upset and give me bad ratings or complain about me.					0.56	

*Each factor (column) represent a dimension of attitudes and beliefs toward patient psychosocial factors: (1) confidence, (2) perceived resource availability, (3) fear of offending patients, (4) blame towards patients, (5) fear of negative patient reactions (e.g., complaints, anger), and (6) professional role resistance (i.e., unwillingness to address psychosocial factors). The following items from the original set of 25 items were omitted as they did not contribute meaningful information: 1. The patient lack of acknowledgment and acceptance of the fact that healing is a lengthy process, 2. I feel there are ways of asking about psychosocial complications of my patients without placing myself at risk for complaints, 3. Patient's psychosocial complications are a function of their personality which is not changeable

surgery experience, existence of psychological care services in the setting, surgeons' reception of psychosocial care education, and number of patient encounters per week). In step 2, we simultaneously entered the 3 a priori hypothesized predictors (i.e., compassion, perceived stress, and experiential avoidance). We reported squared semi-partial correlations (sr^2) as measures of effect size for each individual predictor. An a priori power analysis showed a sample size of 135 participants is required to achieve 80% power for a hierarchical multiple regression model with a small-medium effect size of 0.085, 3 predictors, 4 confounders, and P of .05.

Results

Descriptive Statistics and Bivariate Correlations

Surgeons were primarily men (97%) and middle aged (Mage = 51 years; SD = 10.1; Table 1). Bivariate correlations between study variables revealed associations between existence of psychological care services and greater perceived resource availability, as well as lower fear of offending patients and fear of negative patient reactions [Table 4]. Greater number of years of orthopedic surgery experience was associated with greater surgeon confidence and greater blame towards patients. Reception of psychosocial care education was associated

Table 3. Descriptive statistics of study variables

	Mean/%	SD
1. Existence of Psychological Care Services	14%	
2. Years of Orthopedic Surgery Experience	18.63	9.79
3. Reception of Psychosocial Care Education	17%	
4. Number of Patient Encounters Per Week	70.76	45.52
5. Perceived Stress	4.38	1.91
6. Compassion	23.4	6.61
7. Experiential Avoidance	39.89	10.3
8. Surgeon Confidence	19.39	4.17
9. Perceived Resource Availability	13.53	3.46
10. Blame Toward Patients	7.57	2
11. Fear of Offending Patients	6.39	2.12
12. Role Resistance	6.64	1.92
13. Fear of Negative Patients Reactions	7.39	2.13

with greater surgeon confidence and perceived resource availability. Lastly, number of patient encounters per week was associated with greater fear of negative patient reactions. Among hypothesized predictors, higher experiential avoidance was associated with lower scores

on the surgeon confidence subscale and higher scores on blame towards patients, fear of offending patients, professional role resistance, and fear of negative patient reactions subscales. Greater stress was associated with greater fear of negative patient reactions. Compassion was not associated with any of the dimensions.

Regression Analyses

Table 5 depicts results of the regression analyses. Greater experiential avoidance was associated with lower surgeon confidence, above and beyond the effects of perceived stress and compassion, as well as all covariates (the unique variance explained per $sr^2 = 6.4\%$). As a whole, this model explained 12% of the variance in surgeon confidence, $F(7, 148) = 4.06, P = .008$. Greater experiential avoidance was also associated with greater blame towards patients for their psychosocial complications, controlling for all covariates ($sr^2 = 4\%$). As a whole, this model explained 10% of the variance in surgeon's blaming their patients for psychosocial complications, $F(7, 148) = 4.58, P = .004$. Greater experiential avoidance was also associated with greater fear of offending patients ($sr^2 = 5.8\%$). As a whole, this model explained 7% of the variance in surgeons' fear of offending patients, $F(7, 148) = 3.78, P = .01$. Greater experiential avoidance was also associated with greater professional role resistance in the model including all covariates ($sr^2 = 3\%$). As a whole, this model explained 2.9% of the variance in surgeons' role resistance for addressing psychosocial factors, $F(7, 148) = 2.43, P = 0.1$. Greater experiential avoidance was associated with greater fear of negative patient

Table 4. Bivariate correlations between all study variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Existence of Psychological Care Services	1	0.01	0.13	.22**	0.06	0.06	-0.03	-.18*	-.37**	0.04	.16*	0.13	.21**
2. Years of Orthopedic Surgery Experience		1	0.05	-0.14	-0.02	0.01	0.04	.16*	0.14	.19*	-0.07	-0.09	0.01
3. Reception of Psychosocial Care Education			1	0.02	0.05	-0.04	0.01	-.17*	-.15*	-0.08	0.02	0.01	0.08
4. Number of Patient Encounters Per Week				1	0.04	0.03	-0.08	-0.02	-0.15	0.08	0.10	0.03	.18*
5. Perceived Stress					1	0.01	.27**	-0.02	-0.05	0.12	0.14	0.07	.21**
6. Compassion						1	-.22**	0.08	-0.07	-0.11	0.05	-0.08	0.11
7. Experiential Avoidance							1	-.23**	0.02	.25**	.23**	.18*	.24**
8. Surgeon Confidence								1	.59**	0.11	-.30**	-.32**	-.26**
9. Perceived Resource Availability									1	0.11	-.18*	-0.10	-.21**
10. Blame Toward Patients										1	.25**	.17*	.31**
11. Fear of Offending Patients											1	.46**	.54**
12. Role Resistance												1	.35**
13. Fear of Negative Patients Reactions													1

Note: * indicates $p < 0.05$, and ** indicated $p < 0.01$.

Table 5. Multiple Variable Regression Analyses for Six Dimensions of Surgeons Attitudes and Beliefs Toward Patient Psychosocial Factors

	R²	b	SE	t	p value	sr²
Surgeon Confidence						
Step 1	.06*					
Existence of Psychological Care Services		-1.925	.881	-2.185	.030	0.03
Years of Orthopedic Surgery Experience		.070	.034	2.092	.038	0.03
Reception of Psychosocial Care Education		.004	.007	.529	.598	0.03
Number of Patient Encounters Per Week		-2.065	.971	-2.127	.035	0.001
Step 2	.06**					
Perceived Stress		.140	.174	.802	.424	0.003
Experiential Avoidance		-.111	.033	-3.355	.002	0.07
Compassion		.036	.246	.146	.884	0.0001
Perceived Resource Availability						
Step 1	.16***					
Existence of Psychological Care Services		-3.480	.762	-4.565	.000	0.11
Years of Orthopedic Surgery Experience		.050	.026	1.880	.062	0.02
Reception of Psychosocial Care Education		-1.187	.692	-1.715	.088	0.02
Number of Patient Encounters Per Week		-.004	.006	-.649	.517	0.002
Step 2	.01					
Perceived Stress		-.050	.142	-.350	.727	0.001
Experiential Avoidance		-.006	.027	-.207	.837	0.0002
Compassion		-.037	.040	-.926	.356	0.004
Blame Toward Patients						
Step 1	.03					
Existence of Psychological Care Services		-.513	.423	-1.213	.227	0.001
Years of Orthopedic Surgery Experience		.039	.016	2.426	.016	0.04
Reception of Psychosocial Care Education		.005	.004	1.480	.141	0.01
Number of Patient Encounters Per Week		.224	.466	.481	.631	0.01
Step 2	.07**					
Perceived Stress		.071	.083	.857	.393	0.004
Experiential Avoidance		.041	.016	2.623	.012	0.04
Compassion		-.159	.117	-1.355	.177	0.01
Fear of Offending Patients						
Step 1	.02					
Existence of Psychological Care Services		-0.047	0.452	-0.104	0.917	0.03
Years of Orthopedic Surgery Experience		-0.021	0.017	-1.202	0.231	0.01
Reception of Psychosocial Care Education		0.003	0.004	0.726	0.469	0.0001
Number of Patient Encounters Per Week		1.021	0.498	2.049	0.042	0.003
Step 2	.05*					
Perceived Stress		0.028	0.09	0.311	0.756	0.001
Experiential Avoidance		0.053	0.017	3.121	0.003	0.06
Compassion		0.122	0.127	0.959	0.339	0.01

Table 5. Continued

Role Resistance						
Step 1	.01					
Existence of Psychological Care Services		-0.068	0.415	-0.164	0.87	0.02
Years of Orthopedic Surgery Experience		-0.021	0.016	-1.314	0.191	0.01
Reception of Psychosocial Care Education		0	0.003	-0.043	0.966	0.0001
Number of Patient Encounters Per Week		0.809	0.457	1.769	0.079	0.0001
Step 2	.02					
Perceived Stress		-0.011	0.083	-0.134	0.893	0.0001
Experiential Avoidance		0.034	0.016	2.181	0.031	0.03
Compassion		-0.108	0.118	-0.921	0.359	0.01
Fear of Negative Patients Reactions						
Step 1	.05*					
Existence of Psychological Care Services		0.247	0.451	0.548	0.584	0.03
Years of Orthopedic Surgery Experience		-0.001	0.017	-0.04	0.968	0.0001
Reception of Psychosocial Care Education		0.006	0.004	1.669	0.097	0.001
Number of Patient Encounters Per Week		1.136	0.496	2.289	0.023	0.02
Step 2	.08**					
Perceived Stress		0.106	0.087	1.21	0.228	0.01
Experiential Avoidance		0.057	0.017	3.434	0.002	0.07
Compassion		0.234	0.124	1.898	0.06	0.02

Note: * indicates $P < 0.05$, and ** indicated $P < 0.01$.

reactions ($sr^2 = 6.6\%$). As a whole, this model explained 13% of the variance in surgeons' fear of negative patient reactions after addressing psychosocial factors, $F(7, 148) = 6.09, P = .001$. None of the hypothesized predictors were associated with perceived resource availability. As a whole, this model explained 14% of the variance in perceived resource availability, $F(7, 148) = 4.75, P < .001$.

Discussion

Orthopedic surgeons can play a pivotal role in promoting evidence-based biopsychosocial models of care. However, prior research suggests that surgeons' attitudes and beliefs regarding assessing and addressing patients' psychosocial concerns make them reluctant to take on this role. Identifying modifiable surgeon factors associated with attitudes and beliefs regarding psychosocial care can aid in identifying surgeons who can benefit from supportive/educational interventions and ultimately, improve patient outcomes (25).

Our hypothesis that surgeon compassion, stress, and experiential avoidance are associated with attitudes regarding patient psychosocial care was partially supported. Results showed that, after controlling for theoretically relevant covariates, experiential avoidance was the sole psychosocial factor associated with negative attitudes and beliefs toward addressing psychosocial factors including low surgeon confidence, blame towards

patients, fear of offending patients, professional role resistance, and fear of negative patient reactions (explaining 2.9-6.6% of the unique variance). Our findings are consistent with previous research suggesting that higher experiential avoidance predicts lower levels of action consistent with one's values in a given moment (25). It is likely that many orthopedic surgeons value holistic patient care involving medical, emotional, and social support. However, surgeons with greater experiential avoidance may have greater difficulty acting in accordance with this value when facing negative emotions and thoughts associated with patients' psychosocial concerns. Conversely, surgeons with low levels of experiential avoidance, may be more willing to navigate the discomfort and uncertainty of addressing patients' psychosocial concerns to optimize outcomes.

Contrary to expectations, compassion and perceived stress were not associated with any of the dimensions of surgeons' attitudes and beliefs regarding psychosocial factors. However, given our sample's similar rates of compassion as compared to other medical providers, it is possible that factors such as lack of knowledge about or even disbelief in the biopsychosocial model could explain surgeons' negative attitudes and beliefs toward psychosocial care regardless of their level of compassion (32, 33, 26). For example, a highly compassionate surgeon who primarily believes in the biomedical model of care

might express his compassion by providing optimal biomedical, but not psychosocial, care. The null findings for perceived stress may be related to the fact that surgeons in our sample endorsed lower levels (the resultant restricted variability of) perceived stress on average ($M=4.38$) compared to the general population (23). Perhaps orthopedic surgeons in our sample, who were predominantly in academic settings with over 18 years of experience on average, perceived a greater ability to meet the high demands of their profession compared to surgeons on average. Future research needs to examine these relationships among other surgeon samples.

The small to medium observed effect sizes for experiential avoidance across models (range of $sr^2= .03$ to $.07$)(34) could be due to the smaller range of scores on experiential avoidance in the current study sample, compared to the patient samples, which impacts its influence on surgeons' attitudes and beliefs (24,28). Alternatively, based on our clinical expertise estimates and given the complex nature of behavioral science data experiential avoidance may have a relatively small, but still clinically relevant role in explaining the variance in surgeons' attitudes and beliefs, along with other potential distal (e.g., care system support) and proximal (e.g., mental health literacy) determinants (9,32, 35, 36, 37). Notably, the unique effects of experiential avoidance were evident above and beyond the variance accounted for by a series of theoretically relevant surgeon covariates, which increase confidence in the findings.

Clinically, addressing experiential avoidance among surgeons who report high levels of such tendencies could help reduce their negative attitudes and beliefs toward addressing psychosocial factors. The resultant surgeons' involvement with these factors improves the psychosocial care of patients. Such efforts to enhance care quality, in conjunction with the institutional efforts to support the biopsychosocial model of care, can facilitate the integration of psychosocial care in orthopedic settings with direct patient benefits (9).

Several limitations of this study are worth noting. First, the current study sample consisted of a group of international orthopedic surgeons involved in a web-based collaborative and mostly involved in academic settings, which limits the generalizability of our findings. For example, our previous study has shown that SOVG surgeons are typically effective at recognizing and discussing psychosocial factors (although they are less adept at screening or referring patients), which may differentiate them from non-academic surgeons with distinct viewpoints on psychosocial factors (8). Second, due to the cross-sectional nature of our study, the directionality of findings cannot be inferred. Third, given our study relied solely on self-report questionnaires, future studies may benefit from accessing electronic medical records to capture objective patient outcomes related to psychosocial care (e.g., referrals). Forth, we extended past work on a new measure of surgeon confidence and attitudes about patient psychosocial care, by condensing the items into 6 theoretically plausible dimensions (9). This inventory of surgeons' attitudes and

beliefs is a valuable resource for any educational, research, or policy change initiative focused on improving surgeons' involvement with psychosocial factors. Further research is needed to elaborate on the validity and reliability of these dimensions, across orthopedic surgeon populations. Finally, given the enormous impact of trauma symptoms as a prominent component of psychosocial problems among orthopedic patients, future research should look into specific factors that may impede surgeons' discussions of various aspects of trauma and the provision of appropriate referral for traumatized patients (33).

Surgeons' tendencies to avoid discomfort (i.e., experiential avoidance) are associated with different indices of surgeons' negative attitudes and beliefs regarding psychosocial care. Our findings outline a promising path for future intervention studies, which may benefit from improving tolerance for discomfort to promote effective psychosocial care, with direct benefits for orthopedic patients with psychosocial factors. A vast literature demonstrates that interventions that enhance mindfulness and nonjudgmental acceptance of uncomfortable thoughts and emotions, increase tolerance of discomfort and promote values-consistent behaviors, even when such behaviors elicit distress (e.g., discussing a patient's concerns about depression and suicidal ideation) (34-37). Such interventions, in tandem with comprehensive institutional efforts to support biopsychosocial models of care, pose the potential to meaningfully enhance patient outcomes.

Ethics approval: Our institutional review board approved this study and waived the need for informed consent.

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References

1. Helmerhorst GTT, Vranceanu A-M, Vrahas M, Smith M, Ring D. Risk factors for continued opioid use one to two months after surgery for musculoskeletal trauma. *J Bone Joint Surg Am.* 2014; 96(6):495-9.
2. Trief PM, Grant W, Fredrickson B. A prospective study of psychological predictors of lumbar surgery outcome. *Spine (Phila Pa 1976).* 2000; 25(20):2616-21.
3. Vranceanu A-M, Bachoura A, Weening A, Vrahas M, Smith RM, Ring D. Psychological factors predict disability and pain intensity after skeletal trauma. *J Bone Joint Surg Am.* 2014; 96(3):e20.
4. Vranceanu A-M, Barsky A, Ring D. Psychosocial aspects of disabling musculoskeletal pain. *J Bone Joint Surg Am.* 2009; 91(8):2014-8.
5. Ayers DC, Franklin PD, Ring DC. The role of emotional health in functional outcomes after orthopaedic surgery: extending the biopsychosocial model to orthopaedics: AOA critical issues. *J Bone Joint Surg Am.* 2013; 95(21):e165.
6. Zale EL, Ring D, Vranceanu A-M. The Future of Orthopaedic Care: Promoting Psychosocial Resiliency in Orthopaedic Surgical Practices. *J Bone Joint Surg Am.* 2018; 100(13):e89.
7. Verbeek J, Sengers M-J, Riemens L, Haafkens J. Patient expectations of treatment for back pain: a systematic review of qualitative and quantitative studies. *Spine (Phila Pa 1976).* 2004; 29(20):2309-18.
8. Vranceanu AM, Beks RB, Guitton TG, Janssen SJ, Ring D. How do Orthopaedic Surgeons Address Psychological Aspects of Illness? *Arch Bone Jt Surg.* 2017; 5(1):2-9.
9. Wegener ST, Carroll EA, Gary JL, McKinley TO, O'Toole RV, Sietsema DL, et al. Trauma Collaborative Care Intervention: Effect on Surgeon Confidence in Managing Psychosocial Complications after Orthopaedic Trauma. *J Orthop Trauma.* 2017; 31(8):427-33.
10. Hayes SC, Strosahl K, Wilson KG, Bissett RT, Pistorello J, Toarmino D, et al. Measuring experiential avoidance: A preliminary test of a working model. *Psychol Rec.* 2004; 54(4):553-78.
11. Gilbert P. The Evolution and Social Dynamics of Compassion. *Social and Personality Psychology Compass.* 2015; 9(6):239-54.
12. Pegrum J, Pearce O. A stressful job: are surgeons psychopaths? *Bulletin.* 2015; 97(8):331-4.
13. Skinta MD, Lezama M, Wells G, Dilley JW. Acceptance and Compassion-Based Group Therapy to Reduce HIV Stigma. *Cognitive and Behavioral Practice.* 2015; 22(4):481-90.
14. Balch CM, Freischlag JA, Shanafelt TD. Stress and burnout among surgeons: understanding and managing the syndrome and avoiding the adverse consequences. *Arch Surg.* 2009; 144(4):371-6.
15. Williams ES, Rondeau KV, Xiao Q, Francescutti LH. Heavy physician workloads: impact on physician attitudes and outcomes. *Health Serv Manage Res.* 2007; 20(4):261-9.
16. Scherr SR, Herbert JD, Forman EM. The role of therapist experiential avoidance in predicting therapist preference for exposure treatment for OCD. *Journal of Contextual Behavioral Science.* 2015; 4(1):21-9.
17. Fennell KM, Bamford L, Olver I, Wilson CJ. Good training, systems and funding, not good luck: what hematologists and oncologists believe would make it easier for them to refer their cancer patients to psychosocial care. *Transl Behav Med.* 2019; 9(1):139-46.
18. Williams TM, Smith GP. Does training change practice? A survey of clinicians and managers one year after training in trauma-informed care. *The Journal of Mental Health Training, Education and Practice.* 2017; 12(3):188-98.
19. Slover JD, Karia RJ, Hauer C, Gelber Z, Band PA, Graham J. Feasibility of integrating standardized patient-reported outcomes in orthopedic care. *Am J Manag Care.* 2015; 21(8):e494-500.
20. Maiuro RD, Vitaliano PP, Sugg NK, Thompson DC, Rivara FP, Thompson RS. Development of a health care provider survey for domestic violence: psychometric properties. *Am J Prev Med.* 2000; 19(4):245-52.
21. Rehman US, Janssen E, Newhouse S, Heiman J, Holtzworth-Munroe A, Fallis E, et al. Marital satisfaction and communication behaviors during sexual and nonsexual conflict discussions in newlywed couples: a pilot study. *J Sex Marital Ther.* 2011; 37(2):94-103.
22. Hwang JY, Plante T, Lackey K. The Development of the Santa Clara Brief Compassion Scale: An Abbreviation of Sprecher and Fehr's Compassionate Love Scale. *Pastoral Psychology.* 2008; 56:421-8.
23. Warttig SL, Forshaw MJ, South J, White AK. New, normative, English-sample data for the Short Form Perceived Stress Scale (PSS-4). *J Health Psychol.* 2013; 18(12):1617-28.
24. Gámez W, Chmielewski M, Kotov R, Ruggero C, Suzuki N, Watson D. The brief experiential avoidance questionnaire: development and initial validation. *Psychol Assess.* 2014; 26(1):35-45.
25. Levin ME, Krafft J, Pierce B, Potts S. When is experiential avoidance harmful in the moment? Examining global experiential avoidance as a moderator. *Journal of Behavior Therapy and Experimental Psychiatry.* 2018; 61:158-63.
26. Dy CJ, Brogan DM, Rolf L, Ray WZ, Wolfe SW, James AS. Variability in surgeon approaches to emotional recovery and expectation setting after adult traumatic brachial plexus injury. *Journal of hand surgery global online.* 2021; 3(1):30-5.
27. Cohen J, Cohen P, West SG, Aiken LS. *Applied multiple regression/correlation analysis for the behavioral sciences.* Routledge; 2013.
28. Cornell JA, Berger RD. Factors that influence the value of the coefficient of determination in simple linear

- and nonlinear regression models. *Phytopathology*. 1987; 77(1):63-70.
29. Balkin RS, Lenz AS. Contemporary issues in reporting statistical, practical, and clinical significance in counseling research. *Journal of Counseling & Development*. 2021; 99(2):227-37.
30. Rubin A, Bellamy J. *Practitioner's guide to using research for evidence-based practice*. John Wiley & Sons; 2012.
31. Neter J, Kutner MH, Nachtsheim CJ, Wasserman W. *Applied linear statistical models*.
32. McCaffrey ESN, Chang S, Farrelly G, Rahman A, Cawthorpe D. Mental health literacy in primary care: Canadian Research and Education for the Advancement of Child Health (CanREACH). *Evid Based Med*. 2017; 22(4):123-31.
33. Vincent HK, Horodyski M, Vincent KR, Brisbane ST, Sadasivan KK. Psychological distress after orthopedic trauma: prevalence in patients and implications for rehabilitation. *PM&R*. 2015; 7(9):978-89.
34. Brown RA, Reed KMP, Bloom EL, Minami H, Strong DR, Lejuez CW, et al. Development and preliminary randomized controlled trial of a distress tolerance treatment for smokers with a history of early lapse. *Nicotine Tob Res*. 2013; 15(12):2005-15.
35. Hooper N, Villatte M, Neofotistou E, McHugh L. The effects of mindfulness versus thought suppression on implicit and explicit measures of experiential avoidance. *International Journal of Behavioral Consultation and Therapy*. 2010; 6(3):233.
36. Fortney L, Luchterhand C, Zakletskaia L, Zgierska A, Rakel D. Abbreviated mindfulness intervention for job satisfaction, quality of life, and compassion in primary care clinicians: a pilot study. *The Annals of Family Medicine*. 2013; 11(5):412-20.
37. Ofei-Dodoo S, Cleland-Leighton A, Nilsen K, Cloward JL, Casey E. Impact of a mindfulness-based, workplace group yoga intervention on burnout, self-care, and compassion in health care professionals: a pilot study. *Journal of occupational and environmental medicine*. 2020; 62(8):581-7.