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ORIGINAL RESEARCH

General Medicine

Attitudes toward risk among emergency physicians and advanced practice clinicians in Massachusetts

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Objective: Risk aversion is a personality trait influential to decision making in medicine. Little is known about how emergency department (ED) clinicians differ in their attitudes toward risk taking.

Methods: We conducted a cross-sectional survey of practicing ED clinicians (physicians and advanced practice clinicians [APCs]) in Massachusetts using the following 4 existing validated scales: the Risk-Taking Scale (RTS), Stress from Uncertainty Scale (SUS), the Fear of Malpractice Scale (FMS), and the Need for (Cognitive) Closure Scale (NCC). We used Cronbach's α to assess the reliability of each scale and performed multivariable linear regressions to analyze the association between the score for each scale and clinician characteristics.

Results: Of 1458 ED clinicians recruited for participation, 1116 (76.5%) responded from 93% of acute care hospitals in Massachusetts. Each of the 4 scales demonstrated high internal consistency reliability with Cronbach's αs ranging from 0.76 to 0.92. The 4 scales also were moderately correlated with one another (0.08 to 0.54; all $P < 0.05$). The multivariable results demonstrated differences between physicians and APCs, with physicians showing a greater tolerance for risk or uncertainty (NCC difference, −3.58 [95% confidence interval, CI, −5.26 to −1.90]; SUS difference, −3.14 [95% CI: −4.99 to −1.29]) and a higher concern about malpractice (FMS difference, 1.14 [95% CI, 0.11–2.17]). Differences were also observed based on clinician age (a proxy for years of experience), with greater age associated with greater tolerance of risk or uncertainty (age older than 50 years compared with age 35 years and younger; NCC difference, −2.84 [95% CI, −4.69 to −1.00]; SUS difference, −4.71 [95% CI, −6,74 to −2.68]) and less concern about malpractice (FMS difference, −3.19 [95% CI, −4.31 to −2.06]). There were no appreciable differences based on sex, and there were no consistent associations between scale scores and the practice and payment characteristics assessed.

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Conclusion: We found that risk attitudes of ED clinicians were associated with type of training (physician vs APC) and age (experience). These differences suggest one possible explanation for the observed differences in decision making.

KEYWORDS
emergency department, personality traits, risk tolerance

1 | INTRODUCTION

1.1 | Background and importance

Substantial variation exists in the rates at which emergency department (ED) clinicians choose to order certain tests, perform key procedures, or admit patients to the hospital even within the same ED for patients presenting with the same condition, suggesting that there might be opportunities to improve decision making.[1] The admission decision is but 1 of many types of decisions made every day; this decision is one of the most impactful in medicine and has important implications for healthcare spending.[2] A better understanding of the drivers of decision making beyond the clinical presentation of the patient may help unravel some of the root causes of variation in rates of admission, testing, and other clinical decisions in the ED, which can then be harnessed to influence decisions at the point of care. In the high-risk ED environment, it is likely that both extrinsic challenges related to the ED environment (eg, unpredictable patient presentations, high decision density, diagnostic uncertainty) and intrinsic personality traits of ED clinicians influence the intensity of workups and potentially lead to suboptimal decision making.[3,4]

Risk aversion is a fundamental intrinsic personality trait that likely influences decision making in medicine. This is perhaps especially so in the ED, where clinicians face time-sensitive and critical decisions in caring for undifferentiated patients with potentially serious causes of their symptoms. ED clinicians may decide to perform an additional test or admit a marginal patient because of concern over a bad outcome or medical malpractice claim outweighs the perceived costs of an additional test or admission.[5] When such decisions occur during the course of treating many patients, this behavior could result in substantially higher costs that do not result in net benefit to patients and could even lead to harm such as nosocomial infection. Furthermore, little is known about the extent to which ED clinicians' attitudes toward risk are related to innate clinician characteristics (eg, sex, gender, age, race, or training as physician vs advanced practice clinician [APC, physician's assistant, or nurse practitioner]) or external practice characteristics (eg, method of reimbursement, percentage of night shifts) that might vary over time. Understanding these relationships is essential for informing interventions designed to minimize the extent to which these attitudes toward risk lead to suboptimal decision making.

1.2 | Goals of this investigation

Attitudes toward risk among ED clinicians has been studied only to a limited degree, with prior studies focusing on small samples of physicians without examining the relationship to clinician characteristics.[6–9] In this study, we use survey data on 4 common scales of risk tolerance and a related concept—tolerance of uncertainty—to describe attitudes toward risk in ED physicians and APCs across the state of Massachusetts. We then assess the extent to which these attitudes are associated with key innate clinician characteristics and selected external aspects of the practice environment.

2 | METHODS

2.1 | Study population

Our survey targeted all currently practicing ED attending physicians and ED-based APCs across acute care hospitals in Massachusetts. With assistance from the Massachusetts College of Emergency Physicians, we identified and asked directors of 55 of 58 acute care hospital EDs (combining those where groups staffed more than 1 ED with the same group of clinicians). We were unable to contact directors of 3 of the 58 hospital EDs, and 1 other hospital opted not to participate.

2.2 | Survey process

For ease of administration and follow-up, we organized the hospitals into 6 groups and sequentially distributed the survey to clinicians from 1 group of hospitals at a time, with each survey period lasting 3 weeks. We also recruited 6 emergency physicians from some of the larger hospital networks to serve as survey coordinators across their networks. Before survey distribution, each site director or network coordinator sent a notification to their staff about the survey. Emails containing a link to the survey were initially sent on Tuesday and Friday in the first week and then 3 times each in weeks 2 and 3 (Monday, Wednesday, Friday) to those who had still not completed the survey. Those who completed the survey were given a $50 Amazon gift card. Reminders were sent during the survey period to each group either by one of our investigators (P.B.S.), the individual site director, or the network coordinator.

The survey period began on January 7, 2020, and was completed on September 20, 2020. Because of the statewide surge of COVID-19, survey enrollment was temporarily suspended from March 12, 2020, to May 12, 2020.

2.3 | Survey instrument

We constructed our survey instrument from the following existing scales with demonstrated reliability and validity: the Risk-Taking Scale (RTS), Stress From Uncertainty Scale (SUS), Fear of Malpractice Scale (FMS), and the Need for (Cognitive) Closure (NFC) Scale, all scored on a 6-point Likert scale ranging from strongly disagree to strongly agree. The RTS is adapted from the Jackson Personality Inventory (JPI), an assessment of personality widely used in business and industrial settings and for psychological research.[10–13] The risk-taking subscale of the JPI asks respondents to rate their agreement with 6 statements about general risk-taking behavior (unrelated to medical care; eg, "I enjoy taking risks"). Research demonstrates that high scores on this scale predicted more ordering of head computed tomography scans in pediatric patients presenting to the ED, greater use of cardiac biomarkers and higher admission rates from the ED for patients presenting with chest pain, and increased use of imaging for patients presenting to the ED with abdominal pain.[7–9,14] Moreover, the JPI subscales have been validated with behaviors in a wide range of situations and occupations, and the JPI has been shown to be a stable personality measure over time. The overall RTS score is the sum of each participant's response to the 6 items (after reverse coding of 3 items), with higher scores indicating greater risk taking.

The SUS is a 13-item scale that measures a similar construct as the RTS but is specific to the medical setting; it quantifies a clinician's discomfort when confronted by diagnostic uncertainty (eg, "The uncertainty of patient care often troubles me"). Unlike the RTS, the SUS pertains specifically to uncertainty in medical decision making and identifies a clinician's level of comfort with an inability to pinpoint a specific diagnosis. This scale assesses a key aspect of the ED clinician's daily responsibility, which is to make management decisions under varying degrees of uncertainty. Research demonstrates that scores on this scale are associated with burnout and depression among pediatric residents—conditions known to impact clinical care—as well as therapeutic inertia among neurologists treating patients with multiple sclerosis.[15,16] After reverse coding 2 items, responses were summed to create an overall score; higher scores indicate greater stress associated with uncertainty.

The FMS addresses the clinician's concerns related to medical malpractice rather than general risk aversion or uncertainty. The 6-item scale includes statements about how malpractice fear influences a clinician's practice of medicine (eg, "I feel pressured in my day-to-day practice by the threat of malpractice litigation"). Validity for this scale is established by research demonstrating that high scores predict decreased likelihood of discharging low-risk patients presenting with chest pain and an increased likelihood of admitting such patients to the hospital.[6] An overall FMS score was created by summing responses to all items; higher scores indicate greater concern about malpractice.

The Bottom Line

Risk aversion among emergency department (ED) clinicians could obviously influence decision making. This survey-based study among 1116 Massachusetts ED clinicians (77% response rate) showed that physicians, particularly if older, had greater tolerance for risk than advanced clinicians.

Finally, the NFC is a related construct that measures one's need for a concrete answer, which may or may not be correct, so that one can come to a conclusion and terminate cognitive processing (eg, "When I am confronted with a problem, I'm dying to reach a solution very quickly").[17] We used an abridged 15-item version of the full NFC that was developed and validated by Roets et al.[18] Individuals differ in their inherent dispositional levels of NFC, which is manifested by "a preference for order and predictability, a need for decisiveness, discomfort with ambiguity, and closed-mindedness," each of which is captured by the NFC scale.[19] This scale has been widely used and validated in the psychological literature, and high scales have been shown to predict increased primacy effects in decision making (ie, over-reliance on the first information received) and other cognitive heuristics.[19,20] In the clinical context, research demonstrates that obstetricians/gynecologists who score high on the NFC report a decreased likelihood of asking screening questions during patients' well-women exams, including questions pertaining to mental health, alcohol consumption, cigarette smoking, sexual abuse, and other important conditions.[21] Responses to the NFC scale were summed to create an overall score; higher scores indicate a greater need for (cognitive) closure.

We also asked respondents to report their age, number of shifts worked per month, percentage of night shifts per month, years of practice, and method of reimbursement (categorized as salary only, salary plus bonus, productivity only, or other). The survey instrument is included in Appendix 1.

2.4 | Statistical analysis

Scale scores were treated as normally distributed continuous variables, and we present scale means and standard deviations (SDs). We used mean imputation for responses with 1 missing item per scale; the rest were listwise deleted. We assessed skewness as a measure of distribution asymmetry. We used chi-square tests for proportions, *t* tests for normally distributed variables, and the Mann-Whitney *U* test for nonparametric comparisons. We used Cronbach's α to assess the reliability of each of our 4 scales. We used 1-way analysis of variance and estimated correlation coefficients using Pearson's R. We used multivariable linear regressions to analyze the association between the overall

TABLE 1 Survey participant characteristics

	Overall, n = 1116	Physician (MD/DO), n = 782	APP (NP/PA), n = 338	*P* Value
Age, years	43.34 ± 10.6	45.5 ± 10.0	38.3 ± 10.15	<0.001
Male sex[a]	604 (54.5)	500 (64.9)	104 (30.8)	<0.001
Race				<0.001
White	954 (85.5)	642 (82.6)	312 (92.3)	
Black	23 (2.1)	18 (2.3)	5 (1.5)	
Asian	102 (9.1)	88 (11.2)	14 (3.9)	
Other	37 (3.3)	30 (3.9)	7 (2.1)	
Years in practice	12.7 ± 9.7	14.2 ± 10.1	9.2 ± 7.7	<0.001
Shifts per month	12 (10–15)	12(9–14)	14(12–16)	<0.001
Percentage of night shifts	10 (2–25)	10 (5–25)	9.5 (0–25)	0.003
Salary type				<0.001
Salary	368 (33.0)	178 (22.9)	190 (56.2)	
Salary plus bonus	606 (54.3)	484 (62.3)	122 (36.1)	
Productivity	93 (8.3)	93 (12.0)	0	
Other	48 (4.3)	22 (2.8)	26 (7.7)	

Data are provided as mean ± standard deviation, n (%), or median (interquartile range).
[a]Data missing on 7 physicians and 1 APP.

score for each scale and the clinician characteristics. Data were analyzed using RStudio 1.3 (RStudio Public-benefit corporation) for Mac operating system (Apple Inc.). We considered a *P* value of < 0.05 to signify statistical significance.

Institutional review board approval was granted by the Beth Israel Deaconess Medical Center and Harvard Medical School Committees on the Use of Human Subjects.

3 | RESULTS

Of 1458 ED clinicians recruited for participation, 1116 responded (76.5% overall response rate; 77.2% for physicians, 75.8% for APPs). Responses were obtained from clinicians from 93% of all hospitals in Massachusetts. Item non-response was low, ranging from 0% to 0.62% across all scales. The mean age was 43.4 years, 54.3% were men, and years in practice ranged from 0 (first year in practice) to 44 (mean 12.7) (Table 1).

3.1 | Unadjusted survey results

Each of the scales included a broad range of responses (Figure 1). Each of the 4 scales demonstrated high overall reliability, with Cronbach's αs ranging from 0.76 (RTS) to 0.92 (SUS). The 4 scales also were moderately correlated with one another with correlations ranging from 0.08 to 0.54 (all $P < 0.05$; see Appendix 2), with the highest correlation among the scales that assessed risk taking and uncertainty in the medical domain (SUS and FMS; $r = 0.54$).

Responses on all 4 scales differed according to physician demographic characteristics (Table 2). Men reported higher risk taking, indicating greater general risk tolerance (RTS male score of 19.9 ± 4.8 vs the female score of 19.0 ± 5.0; $P = 0.003$), lower stress under uncertainty (SUS male score of 40.5 ± 11.6 vs the female score of 43.0 ± 11.9; $P < 0.001$), and lower need for cognitive closure (NCC male score of 51.1 ± 10.2 vs the female score of 52.8 ± 11.0; $P = 0.05$). Compared with participants aged younger than 35 years, those aged older than 50 years had lower stress under uncertainty (SUS age > 50 score of 39.0 ± 11.8 vs the age < 35 years score of 44.9 ± 10.1; $P < 0.0001$), lower need for cognitive closure (NCC score 49.3 ± 10.5 vs 53.6 ± 10.2; $P < 0.001$), and lower fear of malpractice (FMS score of 19.7 ± 6.6 vs 22.5 ± 5.6; $P < 0.001$). Compared with APPs, physicians had overall higher risk tolerance (RTS physician score of 19.8 ± 5.1 vs APP 18.9 ± 4.6; $P = 0.004$), lower stress under uncertainty (SUS score 40.1 ± 12.0 vs 45.3 ± 10.3; $P < 0.001$), and lower need for cognitive closure (NCC score 50.4 ± 10.6 vs 54.7 ± 9.8; $P < 0.001$). Scores on the scales, however, generally did not vary according to extrinsic characteristics related to the current practice environment.

3.2 | Adjusted results

The multivariable results evaluating the association between each scale and the clinician and practice characteristics were largely consistent with the unadjusted results, with the exception that differences based on clinician sex were no longer significant. Physicians and APPs differed with respect to need for cognitive closure (NCC score difference, −3.58 [95% confidence interval, CI, −1.90 to −5.26]), stress

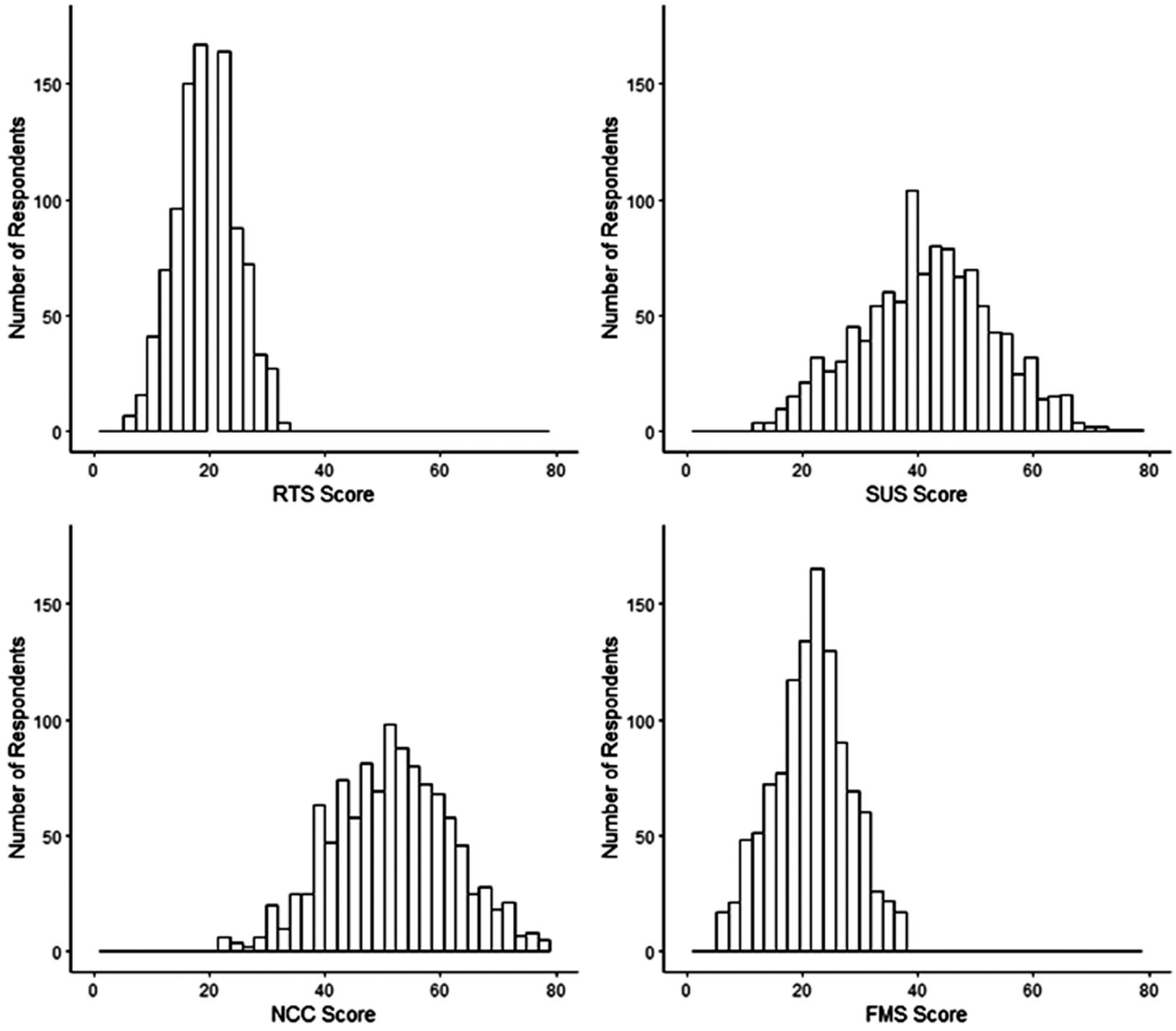

FIGURE 1 Distribution of survey responses for each scale. FMS, Fear of Malpractice Scale; NCC, Need for (Cognitive) Closure Scale; RTS, Risk-Taking Scale; SUS, Stress From Uncertainty Scale

under uncertainty (SUS score difference, −3.14 [95% CI, −1.29 to −4.99]), and fear of malpractice (FMS score difference, 1.14 [95% CI, 0.11–2.17]); however, these groups were similar with respect to overall risk taking (RTS score difference, 0.51 [95% CI, −0.31 to 1.33]). Furthermore, as in the unadjusted analyses, older age was associated with greater tolerance of risk or uncertainty and a lower fear of malpractice and need for cognitive closure compared with respondents aged 35 years or younger (Table 3). There were no appreciable differences in risk tolerance or tolerance of uncertainty scores based on sex or race.

Finally, there were no consistent associations between scale score and the practice and payment characteristics we included. There were statistically significant associations seen between FMS and the number of shifts per month (0.16; 95% CI, 0.06–0.26) and salary plus bonus method of reimbursement and SUS (1.86; 95% CI, 0.24–3.48) and FMS (1.05; 95% CI, 0.15–1.95) (Table 3).

3.3 | Limitations

Our study is limited to emergency physicians and APCs practicing in Massachusetts EDs, which limits the generalizability of our findings to other states. In particular, our sample includes a large majority of White physicians and APCs. Furthermore, although our high survey response rate is a key strength, it is still possible that our results were affected by non-response bias. Given that we did not have data on clinician characteristics for non-responders other than type of training and hospital, we were not able to perform analyses to assess for differences in characteristics between responders and non-responders. Furthermore, we are limited by multiple comparisons and as such our findings should be considered hypothesis generating. Finally, although our study demonstrates high reliability of these particular scales within an ED practice setting, a setting where these scales had not been widely studied,

TABLE 2 Mean scores for risk tolerance scales by key clinician characteristics[a]

	RTS	SUS	NCC	FMS
Clinician type				
Physician	19.8 ± 5.1	40.1 ± 12.0	50.4 ± 10.5	21.5 ± 6.7
APC	19.0 ± 4.7	45.2 ± 10.3	54.6 ± 9.8	21.3 ± 5.9
	$P = 0.01$	$P < 0.001$	$P < 0.001$	$P = 0.563$
Sex				
Male	19.9 ± 4.9	40.5 ± 11.6	51.0 ± 10.0	21.7 ± 6.4
Female	19.1 ± 5.1	42.9 ± 11.9	52.4 ± 11.0	21.2 ± 6.5
	$P = 0.005$	$P < 0.001$	$P = 0.027$	$P = 0.176$
Age (quartiles)				
<35 years	19.3 ± 4.7	44.9 ± 10.0	53.7 ± 10.2	22.5 ± 5.6
36–41 years	18.9 ± 5.1	42.9 ± 11.6	52.4 ± 10.2	22.5 ± 6.5
42–50 years	20.2 ± 5.2	39.1 ± 12.5	51.1 ± 10.6	21.0 ± 6.8
>50 years	19.9 ± 4.9	39.0 ± 11.7	49.3 ± 10.4	19.7 ± 6.6
	$P = 0.018$	$P < 0.001$	$P < 0.001$	$P < 0.001$
Race				
White	19.4 ± 5.0	41.9 ± 11.7	51.7 ± 10.5	21.4 ± 6.4
Black	18.7 ± 5.6	39.0 ± 10.7	49.0 ± 8.7	17.9 ± 5.7
Asian	20.8 ± 4.5	40.6 ± 11.6	52.5 ± 10.9	23.0 ± 6.2
Other	19.3 ± 4.4	39.6 ± 12.9	50.9 ± 10.0	20.6 ± 6.6
	$P = 0.045$	$P = 0.372$	$P = 0.489$	$P = 0.003$

Data are provided as mean ± standard deviation. APC, advanced practice clinician; FMS, Fear of Malpractice Scale; NCC, Need for (Cognitive) Closure Scale; RTS, Risk-Taking Scale; SUS, Stress From Uncertainty Scale.

[a]A total of 1045 participants provided complete survey responses.

TABLE 3 Multivariable analysis of association between survey scores and participant characteristics (n = 1045)

	RTS β Estimate (95% CI)	NCC β Estimate (95% CI)	SUS β Estimate (95% CI)	FMS β Estimate (95% CI)
MD/DO versus APC, APC reference	0.51 (−0.31 to 1.33)	−3.58*** (−5.26 to −1.90)	−3.14*** (−4.99 to 1.29)	1.14* (0.11 to 2.17)
Male versus female, male reference	0.57 (−0.08 to 1.23)	−0.08 (−1.42 to 1.26)	−1.34 (−2.81 to 0.14)	0.28 (−0.54 to 1.09)
Age, quartiles, <35 years reference				
Age, 36–41 years	−0.59 (−1.46 to 0.29)	−0.26 (−2.06 to 1.54)	−1.43 (−3.41 to 0.54)	−0.48 (−1.57 to 0.62)
Age, 42–50 years	0.80 (−0.10 to 1.69)	−1.37 (−3.22 to 0.48)	−4.93*** (−6.97 to 2.90)	−2.06*** (−3.19 to 0.94)
Age, >51 years	0.51 (−0.38 to 1.41)	−2.84** (−4.69 to 1.00)	−4.71*** (−6.74 to 2.68)	−3.19*** (−4.31 to 2.06)
Race, White reference				
Black	−0.75 (−2.87 to 1.37)	−1.94 (−6.31 to 2.43)	−2.52 (−7.33 to 2.29)	−3.41* (−6.07 to 0.75)
Asian	1.26* (0.20 to 2.33)	1.67 (−0.53 to 3.87)	−0.71 (−3.13 to 1.71)	1.27 (−0.07 to 2.61)
Other	0.10 (−1.75 to 1.95)	−1.07 (−4.88 to 2.74)	−2.99 (−7.18 to 1.20)	−1.81 (−4.13 to 0.50)
Shifts, no. per month	0.02 (−0.06 to 0.10)	0.08 (−0.09 to 0.24)	0.13 (−0.05 to 0.32)	0.16** (0.06 to 0.26)
Night, percentage of total shifts	0.00 (−0.01 to 0.01)	0.01 (−0.01 to 0.03)	−0.01 (−0.03 to 0.01)	−0.01 (−0.02 to 0.01)
Reimbursement method, salary reference				
Salary plus bonus	−0.31 (−1.03 to 0.40)	0.98 (−0.50 to 2.45)	1.86* (0.24 to 3.48)	1.05* (0.15 to 1.95)
Productivity	0.23 (−1.00 to 1.45)	−0.53 (−3.05 to 2.00)	1.91 (−0.86 to 4.69)	0.33 (−1.20 to 1.87)
Other	−0.08 (−1.63 to 1.47)	0.17 (−3.03 to 3.37)	−1.57 (−5.09 to 1.95)	0.22 (−1.73 to 2.16)

APC, advanced practice clinician; CI, confidence interval; FMS, Fear of Malpractice Scale; NCC, Need for (Cognitive) Closure Scale; RTS, Risk-Taking Scale; SUS, Stress From Uncertainty Scale.

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

future work is necessary to demonstrate the extent to which risk attitudes are associated with practice behaviors.

4 | DISCUSSION

In this study of attitudes toward risk and uncertainty across a broad population of ED physicians and APCs in hospitals throughout Massachusetts, we found a wide range of responses across each of the scales we examined, suggesting that there is substantial heterogeneity among clinicians with respect to their innate attitudes toward risk. We also found that clinician risk tolerance is associated with key clinician characteristics. We found notable differences between physicians and APCs with respect to tolerance of uncertainty (physicians tolerating greater uncertainty), but no substantial differences among physicians and APCs with respect to overall risk-taking behavior or fear of malpractice. Clinician age was also a significant predictor of tolerance of uncertainty and was associated with lower scores on the FMS. In contrast, there was no relationship with clinician sex after controlling for other characteristics. The few practice characteristics that we examined, including frequency of night shifts and method of pay, also were not consistently associated with risk attitudes.

The differences in tolerance of uncertainty between physicians and APCs—differences that remain after controlling for age and years of experience—raise interesting questions about the root causes and implications for practice. Prior studies within emergency medicine and primary care comparing APCs with physicians have largely focused on differences in patient complexity (APCs generally seeing lower complexity patients) or efficiency of practice (APCs potentially order fewer tests on lower complexity patients but more tests on higher complexity patients).[22–30] Nationally, ED visits involving physician assistants were shown to be associated with lower acuity, younger patient age, fewer tests and procedures, shorter length of stay, and fewer admissions, again reinforcing a lower complexity of patients cared for by APCs.[31] Although these differences in complexity are well established, there is to our knowledge no literature focusing on potential differences in attitudes toward risk between physicians and APCs. Because APCs generally focus on less complex patients, they may be less exposed to situations with greater uncertainty and thus be less comfortable with it. Alternatively, APCs in general undergo fewer years of training with less of a focus on pathophysiology and differential diagnosis, which also could contribute to differences in their comfort with risk and uncertainty. On the other hand, the collaborative nature of practice for many ED-based APPs may help mitigate APC's risk concerns and discomfort with uncertainty and potentially guard against excess testing. Because there are no substantial differences in RTS scores (which measures risk-taking behavior in general as opposed to the medical setting), it seems more likely that APPs are less comfortable with uncertainty not because their personalities are inherently less able to tolerate risk and uncertainty, but because their level of training and practice is either geared toward lower complexity cases or because they are supported by physicians when managing higher acuity or more complex cases.

That both APCs and physicians with more experience are more tolerant of uncertainty is consistent with real-world observations of practice in the ED setting, but until now largely unsupported by the literature. One small study measuring uncertainty and risk aversion in emergency physicians demonstrated a strong association between experience and tolerance of risk and uncertainty, with tolerance of uncertainty partially mediating the relationship between experience and risk aversion; this study was limited to physicians across only 3 EDs.[32] Based on our data, more experienced clinicians appear to be less fearful of the unknown, or perhaps additional years of experience and exposure to varying types of patient presentations for common and uncommon conditions leads to less uncertainty. It is interesting that the more experienced clinicians in our sample also were less fearful of malpractice. Thus, it does not appear to be the case that longer exposure to the malpractice environment with associated heightened cumulative incidence of being sued leads to an increased fear of malpractice. It is not entirely clear whether more experienced clinicians just feel overall more confident in their ability to avoid error and associated lawsuits or view malpractice as a potentially inevitable byproduct of practicing medicine.

In summary, in this cross-sectional survey of attending emergency physicians and APCs across Massachusetts, we found that risk attitudes were associated with key clinician characteristics—namely, type of training (physician vs APC) and age. These differences suggest 1 possible explanation for observed differences in decision making even for patients presenting with similar clinical conditions. The reliability of these scales and the association with key innate clinician characteristics now sets the stage for further studies evaluating the relationship between aversion to risk or uncertainty and decision making (particularly with respect to admission to the hospital or ordering certain tests) in the ED.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Peter B. Smulowitz, Ryan C. Burke, Victor Novack, Linda Isbell, and Bruce E. Landon contributed to the study concept and design. Peter B. Smulowitz and Ryan C. Burke contributed to acquisition of the data. Peter B. Smulowitz, Bruce E. Landon, Linda Isbell, and Victor Novack contributed to acquisition of funding. Daniel Ostrovsky, Victor Novack, Ryan C. Burke, and Linda Isbell contributed statistical expertise. Peter B. Smulowitz and Bruce E. Landon drafted the manuscript. Peter B. Smulowitz, Ryan C. Burke, Daniel Ostrovsky, Linda Isbell, Victor Novack, and Bruce E. Landon contributed to analysis and interpretation of the data and critical revision of the manuscript for important intellectual content.

REFERENCES

1. Smulowitz P, O'Malley A, Zaborski L, McWilliams J, Landon B. Variation in emergency department admission rates among Medicare patients: does the physician matter? *Health Aff Milwood*. 2021;40(2):251-257.

2. Dummit LA. Medicare physician payments and spending. *Issue Brief George Wash Univ Natl Health Policy Forum 2005*. 2006;815:1-13.
3. Croskerry P, Sinclair D. Emergency medicine: a practice prone to error?. *CJEM*. 2001;3(4):271-276.
4. Saposnik G, Redelmeier D, Ruff C, Tobler P. Cognitive biases associated with medical decisions: a systematic review. *BMC Med Inform Decis Mak*. 2016;16(1):138.
5. Orman R. Long term health of patients vs. short term risk to doctors. https://home.hippoed.com/em/ercast. Accessed April 20, 2018.
6. Katz D, Williams G, Brown R. Emergency physicians' fear of malpractice in evaluating patients with possible acute cardiac ischemia. *Ann Emerg Med*;46(6):525-533.
7. Pines J, Hollander J, Isserman J. The association between physician risk tolerance and imaging use in abdominal pain. *Am J Emerg Med*. 2009;26(5):552-557.
8. Pines J, Isserman J, Szyld D, Dean A, McCusker C, Hollander J. The effect of physician risk tolerance and the presence of an observation unit on decision making for ED patients with chest pain. *Am J Emerg Med*;28(7):771-779.
9. Pearson S, Goldman L, Orav EJ. Triage decisions for emergency department patients with chest pain: do physicians' risk attitudes make the difference?. *J Gen Intern Med*. 1995;10(10):557-564.
10. Jackson D. *Jackson Personality Inventory, Revised Manual*. Port Huron, MI: Sigma Assessment Systems; 1994.
11. Paunonen S, Jackson D. The Jackson Personality Inventory and the five-factor model of personality. *J Res Personal*. 1996;30(1):42-59.
12. Smither J, London M, Richmond K. The relationship between leaders' personality and their reactions to and use of multisource feedback. *Group Organ Manag*. 2005;30(2):181-210.
13. Doster J, Wilcox S, Lambert PL. Stability and factor structure of the Jackson Personality Inventory-Revised. *Psychol Rep*. 2000;86(2):421-428.
14. Huang Y-S, Syue Y-J, Yen Y-L, Wu C-H, Ho Y-N, Cheng F-J. Physician risk tolerance and head computed tomography use for patients with isolated headaches. *J Emerg Med*. 2016;51(5):564-571. e1.
15. Simpkin AL, Khan A, West DC, et al. Stress from uncertainty and resilience among depressed and burned out residents: a cross-sectional study. *Acad Pediatr*. 2018;18(6):698-704.
16. Saposnik G, Sempere AP, Prefasi D, et al. Decision-making in multiple sclerosis: the role of aversion to ambiguity for therapeutic inertia among neurologists (DIScUTIR MS). *Front Neurol*. 2017;8:65.
17. Roets A, Raman E, Heytens S, Avonts D. Effects of dispositional need for closure and training on medical decision making. *Med Decis Mak Int J Soc Med Decis Mak*. 2014;34(2):144-146.
18. Roets A, Van Hiel A. Item selection and validation of a brief, 15-item version of the need for closure scale. *Personal Individ Differ*. 2011;50:90-94.
19. Webster D, Kruglanski A. Individual differences in need for cognitive closure. *J Pers Soc Psychol*. 1994;67(6):1049-1062.
20. Kruglanski A, Webster D. Motivated closing of the mind: "Seizing" and "Freezing. *Psychol Rev*. 1996;103(2):263-283.
21. Raglan G, Babush M, Farrow V, Kruglanski A, Schulkin J. Need to know: the need for cognitive closure impacts the clinical practice of obstetrician/gynecologists. *BMC Med Inform Decis Mak*. 2014;14(122):1-5.
22. Wiler JL, Rooks SP, Ginde AA. Update on midlevel provider utilization in U.S. emergency departments, 2006 to 2009. *Acad Emerg Med Off J Soc Acad Emerg Med*. 2012;19(8):986-989.
23. Ginde AA, Espinola JA, Sullivan AF, Blum FC, Camargo CA. Use of midlevel providers in US EDs, 1993 to 2005: implications for the workforce. *Am J Emerg Med*. 2010;28(1):90-94.
24. Mafi JN, Wee CC, Davis RB, Landon BE. Comparing use of low-value health care services among U.S. Advanced Practice Clinicians and Physicians. *Ann Intern Med*. 2016;165(4):237-244.
25. Mundinger MO, Kane RL, Lenz ER, et al. Primary care outcomes in patients treated by nurse practitioners or physicians: a randomized trial. *JAMA*. 2000;283(1):59-68.
26. Mehrotra A, Liu H, Adams JL, et al. Comparing costs and quality of care at retail clinics with that of other medical settings for 3 common illnesses. *Ann Intern Med*. 2009;151(5):321-328.
27. Horrocks S, Anderson E, Salisbury C. Systematic review of whether nurse practitioners working in primary care can provide equivalent care to doctors. *BMJ*. 2002;324(7341):819-823.
28. Rodriguez-Leor O, Cid-Alvarez B, Ojeda S, Martin-Moreiras J. Impact of the COVID-19 pandemic on interventional cardiology activity in Spain. *REC Interv Cardiol*. 2020;2:82-89.
29. Li J, Westbrook J, Callen J, Georgiou A, Braithwaite J. The impact of nurse practitioners on care delivery in the emergency department: a multiple perspectives qualitative study. *BMC Health Serv Res*. 2013;13:356.
30. Donelan K, DesRoches CM, Dittus RS, Buerhaus P. Perspectives of physicians and nurse practitioners on primary care practice. *N Engl J Med*. 2013;368(20):1898-1906.
31. Wu F, Darracq MA. Physician assistant utilization in U.S. emergency departments; 2010 to 2017. *Am J Emerg Med*. 2021;42:132-136.
32. Lawton R, Robinson O, Harrison R, Mason S, Conner M, Wilson B. Are more experienced clinicians better able to tolerate uncertainty and manage risks? A vignette study of doctors in three NHS emergency departments in England. *BMJ Qual Saf*. 2019;28(5):382-388.

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APPENDIX 1: SURVEY INSTRUMENT

Please indicate the extent to which you agree or disagree with each of the following statements (1 = strongly disagree, 2 = moderately disagree, 3 = slightly disagree, 4 = slightly agree, 5 = moderately agree, 6 = strongly agree):

Risk-Taking Scale

1. I enjoy taking risks.
2. I try to avoid situations that have uncertain outcomes.
3. Taking risks does not bother me if the gains involved are high.
4. I consider security an important element in every aspect of my life.

5. People have told me that I seem to enjoy taking chances.

6. I rarely, if ever, take risks when there is another alternative.

Need for Cognitive Closure Scale

7. I don't like situations that are uncertain.

8. I dislike questions which could be answered in many different ways.

9. I find that a well-ordered life with regular hours suits my temperament.

10. I feel uncomfortable when I don't understand the reason why an event occurred in my life.

11. I feel irritated when one person disagrees with what everyone else in a group believes.

12. I don't like to go into a situation without knowing what I can expect from it.

13. When I have made a decision, I feel relieved.

14. When I am confronted with a problem, I'm dying to reach a solution very quickly.

15. I would quickly become impatient and irritated if I would not find a solution to a problem immediately.

16. I don't like to be with people who are capable of unexpected actions.

17. I dislike it when a person's statement could mean many different things.

18. I find that establishing a consistent routine enables me to enjoy life more.

19. I enjoy having a clear and structured mode of life.

20. I do not usually consult many different opinions before forming my own view.

21. I dislike unpredictable situations.

22. (Additional item) In my day-to-day practice, I am fearful of making a mistake which results in harm to the patient.

Stress Under Uncertainty Scale

23. The uncertainty of patient care often troubles me.

24. Not being sure of what is best for a patient is one of the most stressful parts of being a healthcare clinician.

25. I am tolerant of the uncertainties present in patient care.

26. I find the uncertainty involved in patient care disconcerting.

27. I usually feel anxious when I am not sure of a diagnosis.

28. When I am uncertain of a diagnosis, I imagine all sorts of bad scenarios—patient dies, patient sues, etc.

29. I am frustrated when I do not know a patient's diagnosis.

30. I fear being held accountable for the limits of my knowledge.

31. Uncertainty in patient care makes me uneasy.

32. I worry about malpractice when I do not know a patient's diagnosis.

33. The vastness of the information that physicians are expected to know overwhelms me.

34. I frequently wish I had gone into a specialty or subspecialty that would minimize the uncertainties of patient care.

35. I am quite comfortable with the uncertainty in patient care

36. (Additional item) In my day-to-day practice, I am fearful of making a mistake which results in being sued.

Fear of Malpractice Scale

37. I have had to make significant changes in my practice pattern because of recent legal developments concerning medical delivery.

38. I am concerned that I will be involved in a malpractice case sometime in the next 10 years.

39. I feel pressured in my day-to-day practice by the threat of malpractice litigation.

40. I order some tests or consultations simply to avoid the appearance of malpractice.

41. Sometimes I ask for consultant opinions primarily to reduce my risk of being sued.

42. Relying on clinical judgment rather than on technology to make a diagnosis is becoming riskier from a medicolegal perspective.

Lastly, please complete the brief demographic and work-related questions below.

43. What is your age?

44. Are you Hispanic, Latino/a, or Spanish origin? Y/N

45. Which 1 or more of the following would you say is your race? [ ] White [ ] African-American [ ] Asian [ ] American-Indian/Alaska Native [ ] Pacific Islander [ ] Other–please specify.

46. What is your sex? Male/Female

47. Are you an: MD, DO, NP, PA?

48. Number of years of practice after graduating residency (or APC training)?

49. On average, how many shifts per month do you work?

50. On average, what percent of your total shifts are night shifts?

51. What is the method of reimbursement for you at your primary practice site: (a) salary, (b) salary plus incentive bonus, (c) pure productivity basis, (d) other (please define)?

APPENDIX 2: CORRELATION MATRIX DEMONSTRATING CORRELATIONS BETWEEN THE 4 RISK TOLERANCE SCALES

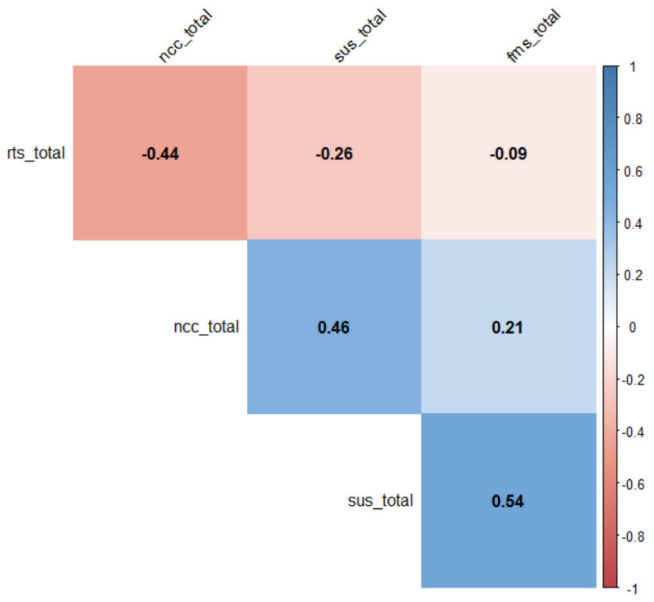

FIGURE 2