

Surgeons' personality, characteristics and presence of meaning in life

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ABSTRACT

Background: Surgeons work long shifts and are frequently on call. Pressure to make quick and accurate decisions along with the responsibility of performing complex procedures contribute to surgeons' high stress-levels, anxiety and altered empathy level. We aimed to study surgeons' personality and meaning in life at two different centres.

Methods: General surgeons completed 47 questions. Visual analogous scale-items with controlled internal consistency (Cronbach alpha) coefficients varying from .77 to .85 were used from the following scales: Global Measure of Perceived Stress; Hostility Questionnaire; Jefferson Scale of Physician Empathy; Meaning in Life Questionnaire-SF; Rosenberg Self-Esteem Scale; Spielberger State Anxiety Scale and Quality of Work life Scale. Multiple linear regression analyses, parametric or non-parametric tests were employed when considered adequate.

Results: Fifty-four participants were recruited from 3 different levels of training. Gender differences in Anxiety, Physician Empathy and presence of meaning in life (MIL-P) were revealed. Junior trainees differed from senior trainees and consultants as regards MIL-P, Anxiety, Stress and work-related factors. The surgeons' self-rated self-esteem was work-related. Surgeons' Quality of Work Life was best predicted by Physician Empathy but also their self-rated Self-Esteem contributed significantly to the prediction. Surgeons' MIL-P was significantly predicted by Physician Empathy and State Anxiety.

Conclusion: Surgeons' current personality attributes might not apply to all of them. Female surgeons were more empathetic and felt more presence of meaning in life than male surgeons, and men were less anxious than female surgeons. Junior trainees experienced less anxiety than senior trainees but were more stressed than consultants. The most significant predictors of surgeons' personality were their experience of presence of meaning in life along with their level of empathy.

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Background

The nature of the majority of surgical specialties is accompanied by long-hour shifts, high patient volume, and a wide range of surgical procedures. General and emergency surgical trainees work long shifts and are frequently on call.

Pressure to make quick and accurate decisions along with the responsibility of performing complex procedures are regularly imminent, contributing to the high stress levels associated with surgical specialties. It has been reported that surgeons' burnout, anxiety and depression were high, especially during the pandemic.^{1,2} Surgeons' highest

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stressful issues consist of complex or rarely performed cases and poor assistance; 40% of surgeons had witnessed an intraoperative complication that was clearly related to surgeon's stress.³

Lately, surgeon's personality has been in focus of interest. Surgeons scored significantly higher on conscientiousness, agreeableness, openness, and neuroticism (i.e., tendency towards negative emotions such as anger, anxiety and depression) than non-surgeons.⁴ Empathy is commonly regarded as the key attribute for doctors. Emotional empathy (also called affective) involves mirroring the experience of another's emotions, that is, "walking in someone's shoes". Cognitive empathy (also called clinical) serves as a way of guiding empathic communication. While emotional empathy, which is linked to physician burnout, may risk inexactness and intermixture in clinical judgment across patient groups, cognitive empathy can also enhance the experience of meaning of the surgeon's work.⁵

There is a growing interest in the role of meaning in life (MIL) in medical settings as MIL is a vital component in human physical and mental health. Explicitly, it was claimed that people function best when they perceive a sense of MIL and hold a unique mission to strive for throughout their lives. Further, ethical challenges are critical components in surgery as well as in life itself, and surgeons must manage these challenges. This means accepting their individual and professional shortcomings, being anxious, being imperfect, as well as being humble.⁶

In our study we selected items from scales comprising self-rated characteristics of surgeons' perceived stress, self-esteem, empathy, anxiety, hostility, and presence of meaning in life (MIL-P) or search for meaning in life (MIL-S) We also scrutinized if or how surgeons' gender and level of training impacted these personality attributes. Correspondingly, we studied how work-related factors are linked to their characteristics such as self-esteem, as it has been claimed that a particular surgical personality exists.

The following research questions were answered:

- Do surgeons display gender differences in their personality attributes?
- Which attributes predict surgeons' stress experience?
- Do characteristics and work-related attributes differ across training groups?
- Which factors impact surgeon's self-esteem?
- Which attributes predict surgeon's quality of work-life?
- Which characteristics predict surgeon's meaning in life?

Methods

Participants

Surgeons in the National Health Service (NHS) in the UK from two London hospitals took part in this study. Participants consisted of general surgeons comprising junior surgical trainees (JT), in the early years of their surgical training also known as core training level, as well as specialist registrars, who are in their higher surgical training (ST), as well as

consultants (CONS). The data was collected from October 2021 to June 2022. The response rate was 96%.

Questionnaire

A total of 47 anonymous questionnaires comprising age and 8 categorical variables, that is, gender, level of training, surgical specialty, supervision, relaxation, extra working hours (yes/no), work type (TW), (full/part) and extra work besides main job (EW; yes/no) were studied. Items from seven validated inventories with self-ratings in form of a line from 0 to 60 mm constituted visual analogue scales (VAS) indicating how many mm the surgeon agreed or disagreed with each item. The items were controlled for internal consistency in a cluster with Cronbach alpha. Items were deleted until a minimum correlation coefficient of 0.70 between items in each cluster of questions was retrieved. The applied scales with Cronbach alpha coefficient are shown in [Table 1](#).⁷⁻¹⁴

Statistics

By means of IBM, SPSS software, version 26 the results were computed. For seven scales, reliability was tested for internal consistency by Cronbach alpha. Items were deleted from the retrieved amount of scale questions until the Cronbach alpha increased over >.70 and the criterium for a valid internal consistency was completed. Furthermore, ANOVA with Tukey, independent t-tests (2-tailed), multiple linear regression analyses, Kolmogorov–Smirnov 2-sample test (K–S), Kruskal–Wallis analysis of variance (K–W: H), Median test (X^2), Pearson or Spearman correlations as well as Mann–Whitney U-tests were applied when considered appropriate.

Results

Altogether 54 (96% response rate) surgeons completed the questionnaires. Twenty-five were JT, 17 were ST and 12 were CONS. Out of these surgeons, men differed significantly from women only in three standardized scales measuring their characteristics. Male surgeons were less anxious than female surgeons. Female surgeons were more empathetic as well as felt more MIL-P than male surgeons. The surgeons' gender did not reveal anything as regards hostility (BPHQ), perceived stress (GPSS) and self-esteem (RSE). Consequently, gender significances in Spielberger State Anxiety Scale (SSAS), Jefferson Scale of Physician Empathy (PE), and MIL-P were found ([Table 2](#)).

Pearson correlation test revealed that GPSS and RSE were highly correlated ($r = .842$, $p < .001$) as opposed to BPHQ. The high correlation between GPSS and RSE indicated that linear regression analyses had to be performed separately with each of GPSS and RSE as dependent variable to be predicted by own independent variables in this study.

Consequently, we checked the ability of four measures MIL-P, BPHQ, WL and extra work besides job (EW) to explain the percentages of variance of the dependent variable total GPSS. After checking for violations of assumptions, the total variance explained by the significant model included an adjusted R square of 65%, ($F [4,47] = 24.71$, $p < .001$). Of

Table 1 – Participants' questionnaires included psychological scale items with internal reliability coefficients.

SCALE CONSTRUCTOR (YEAR)	Name Of Scale	Scale Measures	N Of N Items	Cronbach Alpha ^a
Buss& Perry (1992)	Hostility Questionnaire (BPHQ),	Verbal Anger and Hostility	10 out of 12	.788
Cohen et al. (1983)	A Global Measure of Perceived Stress (GPSS)	Perceived Stress	4 out of 5	.767
Marteau and Bekker (1992)	Spielberger State Anxiety Scale (SSAS) Short-Form	State Anxiety	6 out of 6	.857
Hojat et al. (2001)	Jefferson Scale of Physician Empathy (PE)	Physician Empathy as a cognitive construct	2 out of 6	.782
Niosh. From the General Social Survey Section D (2010)	Quality of Worklife Scale (WL)	Work-Life	2 out of 7	.768
Steger et al. (2006)	Meaning in Life Questionnaire - Short-Form (MLQ-SF)	Searching Meaning in Life (MIL-S)	6 out of 7; 3 items for subscale S	.778
Steger et al. (2006)	Meaning in Life Questionnaire - Short-Form (MLQ-SF)	Feeling Presence of Meaning in Life (MIL-P)	3 items for the subscale P	.796.
Rosenberg (1979)	Rosenberg Self-Esteem Scale (RSE)	Self-Esteem	7 out of 10	.854

^a Cronbach alpha = Controlling for internal reliability between items in a cluster.

Table 2 – Participants' age and gender-related issues when associated with psychological scales.

Variable	Alpha	Label	N	Mean: df = 1	SD	Md	Md ¹ X ²	P=
Age (Range 25–54 Years)		Years	54	33.3	6.2	33.0		
Age across gender		F	17	34.4	6.7	33.0	.888	n.s.
		M	31	32.7	5.9	33.0		
Buss-Perry Hostility scale (BPHQ) across gender	.788	F	19	248.05	72.9	220	.791	n.s.
		M	34	265.21	93.8	224		
Global measure of perceived stress (GPSS) across gender	.767	F	20	137.35	29.7	125	1.604	n.s.
		M	34	128.79	34.0			
Physicians' Empathy Scale (PE) across gender	.782	F	20	99.40	18.4	92	6.432	.011
		M	34	81.74	25.1			
Presence Of Meaning In Life - Short-Form (MIL-P) across gender	.715	F	20	138.35	34.7	125	5.744	.017
		M	34	119.29	35.8			
Rosenberg Self-Esteem Scale (RSE) across gender	.854	F	19	309.89	73.1	305	1.367	n.s.
		M	34	300.79	71.8			
Searching For Meaning in Life - Short-Form (MIL-S) across gender	.778	Yes	24	81.85	44.1	90	.005	n.s.
		No	29	98.09	45.6			
Spielberger State Anxiety Inventory (SSAS) across gender	.857	F	20	274.20	77.4	240	8.772	.003
		M	34	222.41	54.5			
Work Life scale (WL) across gender	.768	F	20	101.90	21.0	100	1.819	n.s.
		M	34	91.94	21.8			

Note. ¹Median test provides X² = significant or n.s.

the variance of GPSS, MIL-P explained 22% (beta .555, $p < .001$), BPHQ explained 10% (beta .324, $p < .001$), EW predicted 8% (beta .293, $p = .001$) and lastly WL predicted 7% (beta .293, $p = .003$) of the total variance. Multicollinearity was not at hand. Accordingly, MIL-P was the best predictor of GPSS.

Table 3 shows work-related factors in combination with other measures. Searching for meaning in life (MIL-S) was thought to be a predictor of the dependent total sum of self-rated RSE but this was not the case.

In contrast, MIL-P together with quality of WL, EW and type of work (WT) explained the percentages of variance of

total RSE. After checking for violations of assumptions, the total variance explained by the significant model gave an adjusted R square of 42.4%, $F(4,47) = 8.63$, $p < .001$. Of total RSE, EW explained 9% of the variance (beta .317, $p = .008$), MLQ-SF-P described 8% (beta .324, $p = .017$), WL predicted 6% (beta .305, $p = .028$) and likewise WT predicted 6% (beta .261, $p = .032$) of the total variance. Multicollinearity was not at hand. Based on this result, the surgeons' self-esteem seems to be significantly explained mostly by work-related predictors.

By Spearman's rho it was revealed that quality of WL correlated with PE ($r_s = .576$, $p < .001$) and with RSE ($r_s = .553$, p

Table 3 – Participants' results in work-related issues relative to psychological scales.

Variable	Alpha	Label	N	Mean	SD	Median	K–W* H	Df	P=
Empathy across worktype	.782	Full	51	86.51	23.8	92	5.977	1	.014
		Part	2	117.50	3.5	305			
Self-esteem across worktype	.854	Full	51	300.02	70.39	305	4.225	1	.040
		Part	2	407.00	18.38	100			
Quality of work-life across worktype	.768	Full	51	94.24	21.7	100	4.243	1	.039
		Part	2	119.0	1.4	90			
MIL-S across extra work besides main job	.778	Yes	24	76.88	42.1	90	3.846	1	.050
		No	29	103.55	45.3				

Note. *Kruskal–Wallis. H = non-parametric variance analysis based on medians.

< .001). This led us to check the ability of the two measures to explain the percentages of variance of the dependent variable total WL. After checking for violations of assumptions, the total variance explained by the significant model comprised an adjusted R square of 37,7 %, $F(2,50) = 16,48$, $p < .001$. Of the variance of WL, PE explained 16% (beta .446, $p = .001$) and RSE predicted 7% (beta .265, $p = .018$). Multicollinearity was not at hand. Accordingly, surgeons' quality of work life was best predicted by PE but also their self-rated self-esteem played a significant role in the prediction.

It was found that MIL-P did not correlate with MIL-S ($r = -0.066$, n.s.). However, MIL-P differed between training groups when analysed with Median test ($= 6.036$; Bonferroni adjusted: $p = .045$). Junior trainees experienced less MIL-P than CONS. In contrast, PE did not differ across training groups (n.s.) but anxiety did: JT experienced less anxiety compared to ST (Table 4).

As regards correlations, MIL-P correlated with PE ($r = .721$) and SSAS ($r = .551$); furthermore, SSAS correlated with PE ($r = .427$) (Fig. 1; Fig. 2).

The correlations led us to think that MIL-P can serve as dependent variable in a linear regression analysis with PE and SSAS as predictors. After checking for violations of assumptions, the significant model explained of the total variance with an adjusted R square: 57,6 % ($F [2,51] = 37,01$, $p < .001$) To be exact, PE explained 29% (beta .594, $p < .001$) and SSAS predicted 7% (beta .298, $p = .004$) significantly of the variance in MIL-P. Multicollinearity was not at hand. PE was identified to be the best predictor of surgeon's experience of MIL-P but also SSAS was a significant predictor of MIL-P (Fig. 2). However, PE predicted four times more variance of total MIL-P than SSAS.

By ANOVA ($F [2,51] = 33,13$, $p < .001$) it was indicated that surgeons with low empathy and low MIL-P differed significantly from those with high level of empathy along with high level of MIL-P ($p < .001$) as well as medium level of empathy and medium level of MIL-P also differed from high level of both attributes ($p = .003$), Fig. 2.

Discussion

Our study focused on surgeons' personalities; surgeons were recruited from three different levels of training from two different hospitals in the UK. We asked the following questions about their personalities.

Do surgeons display gender differences in their personality attributes?

We wanted to explore if surgeons presented gender differences in personality attributes and we found that in some characteristics they do. We revealed that male surgeons were less anxious than female surgeons who were more empathetic and felt more MIL-P compared to male surgeons. Gender difference in SSAS was in agreement with findings of previous researchers¹⁵ whose female participants had significantly higher mean of SSAS than their male counterparts. Then again, women's higher level of empathy was explained by their greater capacity for social relationship compared to men, women often begin displaying more compassion to social stimuli and emotional signals and exhibit more care-oriented qualities already at an early age.¹⁶ Our result that women experienced more MIL-P is supported by previous findings that female participants reported higher levels of purpose in life than men.¹⁷

Which attributes predict surgeons' stress experience?

In contrast to findings from previous research¹⁸ that proved that female surgeons were significantly more stressed than men particularly during the pandemic, our research did not reveal any gender difference in stress. This can be explained by women's greater MIL-P because surgeons' perceived stress was currently mostly predicted by MIL-P which may sound like a paradox but is not. Explicitly, it was revealed that MIL-P relates to making sense of life events¹⁹, to anticipate and prepare for stressful events and therefore gives a greater sense of being in control over what happens. People who are short of sense of MIL, feel a lack of control and are more vulnerable to stressful life events than those with a robust sense of MIL.

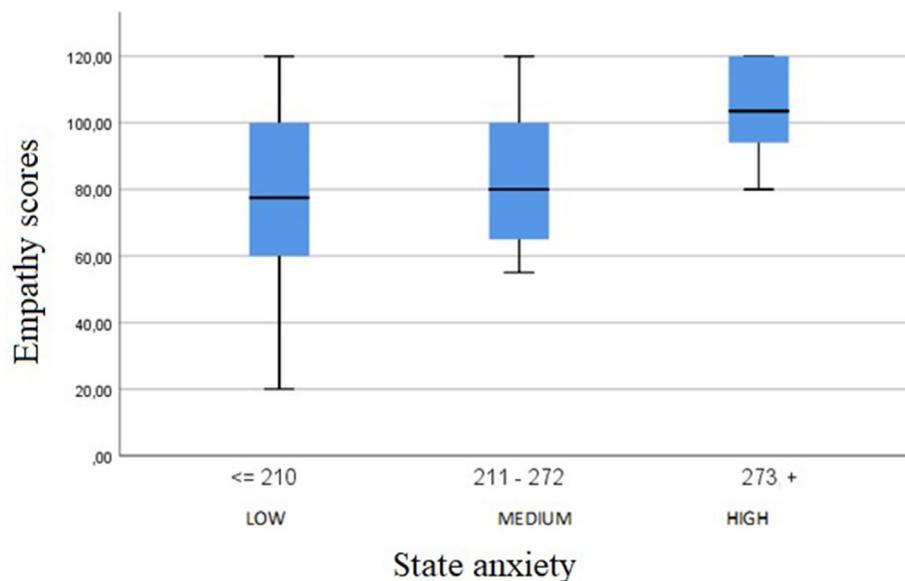
Do characteristics and work-related attributes differ across training groups?

Physician empathy did not differ across training groups. When analysing further, we discovered that JT experienced less anxiety than ST but more stress than CONS. JT had less workdays than CONS and felt less MIL-P than CONS. In a previous study about the prevalence of surgeons' performance anxiety (SPA) and its association with other attributes, there was an understanding that human factors are instrumental

Table 4 – Participants' significant results between trainees in psychological scales or in workload.

Variable	Trainees ¹	N	Mean	SD	Md	Median Test ² X ²	Df	P=
Presence of meaning in life across training groups	1) JT	25	116.52	29.7	125	6.036	2	.049
	2) ST	17	131.00	40.5		JT < CONS		
	3) CONS	12	140.25	39.5				
Anxiety across training groups	1) JT	25	220.84	63.3	240	6.442	2	.040
	2) ST	17	257.35	75.1		JT < ST		
	3) CONS	12	262.50	59.6				
Stress across training groups	1) JT	25	124.72	28.1	125	6.442 ³	2	.040
	2) ST	17	138.06	33.1		JT > CONS		
	3) CONS	12	138.42	39.2				
Workload across training groups	1) JT	25	1,92	.86	2	6.032 ⁴	(2,51)	.004
	2) ST	17	2,35	.61	2	JT < CONS		
	3) CONS	12	2,92	.98	3			

Note. ¹Trainees (JT) also known as house officers or those who are in the core surgical training and senior trainees who are in the higher surgical training pathway (ST), as well as consultants (CONS). ²Median test provides X²; ³Fisher's test p = .036; ⁴ANOVA.

**Fig. 1 – Empathy scores relative to state anxiety.**

for the outcome of a surgery.²⁰ Altogether 631 responses were collected from surgeons with a mean surgical experience of 15.3 years. A total of 52% of participants were consultants; 87% had experienced SPA themselves and 65% reported that SPA negatively affected surgical performance and finally 96% felt that SPA negatively impacted surgeons' wellbeing. SPA is a common and significant challenge among surgeons across all specialties at all levels of experience in the UK and is not associated with wellbeing.

Which factors impact surgeon's self-esteem?

The surgeons' self-esteem was work-related but also predicted by MIL-P. Working extra explained 9%, Quality of work-life 6%, Type of work 6% and MIL-P 8% of the total variance of self-esteem. In other words, the variance in self-esteem was predicted in sum 21% by work-related factors but also MIL-P predicted significantly surgeon's self-esteem. Healthy self-esteem

includes positive affect. Positive affect and MIL-P are recognized as protective factors against suicidal ideation while negative affect and MIL-S are risk factors.²¹ Namely, MIL-S occurs in individuals whose needs are not met. Accordingly, MIL-P and MIL-S correlated negatively (n.s.) in our study.

However, there are a lot of reasons for surgeons to continue in their work with high self-esteem. The surgeons who take their profession seriously and go on improving and using new treatments and interventions accomplish more and are more satisfied than those who do not.²²

Which attributes predict surgeon's quality of work-life?

The quality of surgeon's work life was used as a dependent variable in a linear regression analysis with the predictors PE and RSE. Of the variance of Quality of Work Life, PE explained 16% and RSE predicted 7%. Physician Empathy explained best surgeons' experience of Quality of work life although also RSE

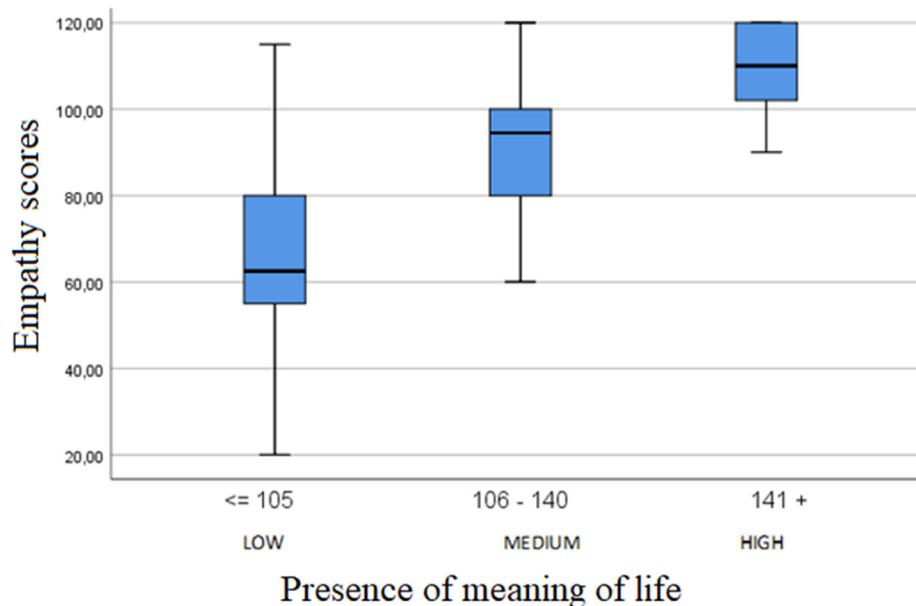


Fig. 2 – Empathy scores relative to presence of meaning in life.

played a significant role in the prediction of quality of work-life. Leading physician educators defined empathy as a form of un-emotional cognition. Others argue that physicians' emotional receptiveness or awareness greatly serves the cognitive or clinical goal of understanding patients' emotions. These arguments have important implications for teaching empathy.²³

Which characteristics explain surgeon's experience of presence of meaning in life?

To answer the question of what explains surgeon's MIL-P, we used MIL-P as dependent variable in a linear regression analysis with PE and SSAS as predictors. It was revealed that PE was a strong predictor of MIL-P and explained 29 % but also SSAS predicted significantly 7% of the variance in MIL-P. Empathy was identified to be the best predictor of surgeon's experience of MIL-P. This result is supported by 1620 respondents, out of which 358 were surgeons, who discovered that three qualities define a *great surgeon*. The main three qualities comprised dexterity (54% of respondents), meticulousness (18%), and empathy (18%).²⁴ Previously, surgeons' main qualities were claimed to be agreeableness, openness and conscientiousness (3, 24). These claims are not conflicting. Agreeableness and openness predict tolerance which is explained by empathic concern and conscientiousness is a synonym to meticulousness.²⁵ The importance of a surgeon's MIL-P is the new observation.

There was a limitation to completing the questionnaires from surgeons' side due to their busy work schedule. The main disadvantages of self-rating scales are conscious or unconscious tendencies falsifying responses (eg, tendencies to exaggerate or hide indicators); as well as positive response bias and social desirability effects. On the other hand, the primary advantages of self-reporting are that it is inexpensive

and can be relatively quickly collected from staff. Self-reports can be made in privacy and can be anonymised to protect sensitive information and thereby promote truthful responses.

As a future direction, the data can be replicated in multi-centered international settings to study surgeons' characteristics among participants from diverse geographic areas and different backgrounds.

Conclusion

The common characteristics we currently recorded and attributed to surgeon's personality may not apply to all of them. Our current result highlighted the importance of presence of meaning in life as a strong positive character contributing to surgeon's self-esteem as well as was predicted by physician empathy, manifesting surgeons' essential personality qualities.

Ethical approval

Study registration and approval from the Health Research Authority and Health and Care Research Wales (HCRW) and approval from local research departments were received before commencement of this study.

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Declaration of competing interest

The authors declare no conflict of interests.

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