RESEARCH

Knowledge sharing among medical teachers: the interplay between personality and the theory of planned behavior

Hatam Faraji Dehsorkhi[1] and Ali Asghar Hayat[2*]

Abstract

Introduction Knowledge sharing is critical to the quality of medical education and healthcare services. However, medical teachers encounter multiple barriers, such as content dispersion and a lack of shared knowledge management. Using structural equation modeling (SEM), this study aimed to (1) assess the predictive power of the Theory of Planned Behavior (TPB) in explaining knowledge-sharing intention and behavior among medical teachers and (2) examine the moderating effect of the Big Five personality traits on the relationship between knowledge-sharing intention and behavior.

Methods This cross-sectional correlational study involved a sample of 237 medical teachers from Shiraz University of Medical Sciences, Iran, who completed two validated and reliable questionnaires: a researcher-developed TPB questionnaire and a personality questionnaire developed by Rammstedt and John (2007). Data were collected in 2024 and analyzed using partial least squares structural equation modeling (PLS-SEM).

Results Structural equation modeling analysis, conducted using SmartPLS 3, revealed that knowledge-sharing intention was significantly influenced by perceived behavioral control ($\beta = 0.37$, $p < 0.001$), attitude ($\beta = 0.24$, $p < 0.001$), and subjective norms ($\beta = 0.28$, $p < 0.001$). Additionally, knowledge-sharing behavior was significantly predicted by knowledge-sharing intention ($\beta = 0.20$, $p < 0.001$) and perceived behavioral control ($\beta = 0.12$, $p < 0.01$). Among the Big Five personality traits, only conscientiousness significantly moderated the knowledge-sharing intention–behavior relationship ($\beta = 0.41$, $p < 0.001$).

Conclusion By integrating the Five-Factor Model of personality into TPB, this study demonstrated that TPB is a suitable framework for predicting knowledge-sharing behavior among medical teachers. Furthermore, it revealed that personality traits, particularly conscientiousness, may mediate the relationship between knowledge-sharing intention and behavior. These findings have practical implications for medical administrators in designing effective systems and interventions to enhance knowledge sharing among academics.

Keywords Knowledge sharing, Theory of Planned Behavior (TPB), Personality traits, Medical education

*Correspondence:
Ali Asghar Hayat
Ali.hayat63@gmail.com
[1] Faculty of Literature and Humanities, Kerman University, Kerman, Iran
[2] Clinical Education Research Center, Department of Medical Education, Faculty of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

Introduction

Knowledge is a strategic asset of universities [1], but it holds value only when shared [2–4]. In the fast-paced and ever-evolving field of medicine, where vast amounts of knowledge are continuously generated, knowledge sharing (KS) is of paramount importance [5, 6]. It ensures faculty members can access and utilize state-of-the-art

knowledge to provide high-quality medical education and healthcare services.

Despite its critical role in the success of higher education institutions (HEIs), many academicians perceive knowledge as a form of power [7] and are thus reluctant to share it [7–12]. This issue is even more pronounced in medical settings, where faculty members engage in education and healthcare [13]. Empirical research also suggests that most faculty members are not inclined to actively participate in knowledge-sharing behavior (KSB) [14–16]. The problem is particularly severe in developing countries such as Iran, where KS is hindered by weak technological infrastructure and an inadequate organizational culture. In this regard, a qualitative study conducted in an Iranian medical setting identified multiple KS barriers, including the"lack of shared knowledge management,""dispersion of content,"and"lack of compliance with needs"[13]. This may explain why studies indicate that the KS status of Iranian academics is not"acceptable"[11].

Unlike the vast body of KS literature in HEIs that primarily focuses on non-behavioral perspectives [17], this study adopts a behavioral approach to examine KS among medical teachers, using the theory of planned behavior (TPB) as its primary theoretical framework. TPB is well-suited for studying KSB [18] since KSB is considered an intentional behavior [16, 18–22]. Accordingly, at the core of TPB, intention plays a crucial role in influencing knowledge-sharing practices [16, 20, 23]. This implies that if faculty members do not intend to share knowledge, they cannot be compelled to do so [22, 24]. This is particularly relevant in highly professional organizations such as medical schools, where academic autonomy prevents the enforcement of knowledge-sharing practices.

Several empirical studies have examined KS in HEIs using the TPB. However, KS in higher education remains an under-researched area [10, 21, 25–27], particularly in developing countries such as Iran, and all existing KS studies have been conducted in non-medical contexts. Therefore, this study aligns with scholars'calls for further research on KS in HEIs [27]. Additionally, prior research findings are inconsistent, highlighting a gap in the relationship between KS intention (KSI) and KSB, suggesting that other factors may influence this relationship. One possible explanation for the intention-behavior gap is the presence of moderating variables, such as personality traits, which may enhance behavior prediction [28]. However, no study to date has investigated the moderating role of personality in the intention-behavior relationship within the KS domain among medical teachers. As a result, little is known about the cognitive mechanisms linking personality traits to KSB. Therefore, this study employs the TPB as its primary theoretical

framework to examine the relationship between medical teachers'personality traits, KSI, and KSB.

This study contributes twofold to the growing body of KS literature in HEIs. First, by integrating TPB with personality traits, it aims to explore the dynamics of KS at the individual level. Given that the fundamental mission of HEIs is knowledge creation, dissemination, and application [9, 29], any effort to enhance understanding of the KS process and its development is highly valuable. Second, this study provides insights for HEI administrators and policymakers by identifying individual-level factors that influence KSB, enabling the design of more effective systems and interventions to promote KS.

Conceptual framework
KS and relevance of the TPB
KS is a fundamental component of the knowledge management process [30–32]. It is defined as a set of discretionary, voluntary, or intentional behaviors [16, 18, 19, 22, 33] that involve the mutual exchange of experience, expertise, and information [10, 33, 34]. Given this definition, TPB is the most suitable and applicable framework for studying KS [35], focusing on partially volitional behaviors.

Developed by Ajzen [36], TPB posits that all human behaviors originate from an underlying intention and perceived behavioral control (PBC). Intention, in turn, is shaped by three primary determinants: attitude toward the behavior, subjective norms (SN), and PBC [37].

Attitude, a key determinant of intention, is "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" [37]. Numerous empirical studies have explored the role of academics'KS attitudes, consistently identifying it as the strongest and most reliable predictor of KSI [17, 18, 23, 38–43]. However, a few studies have reported a weak [16] or moderate [21] relationship between KS attitude and KSI, highlighting inconsistencies that warrant further investigation.

Based on this discussion, the first hypothesis is formulated as follows:

> H1. Medical teachers' KS attitude positively affects their KSI.

SN, another crucial determinant of intention, is defined as "the perceived social pressure to perform or not to perform the behavior" [37]. Several empirical studies have demonstrated that academics' SN positively and significantly influence their intention to share knowledge [17, 23, 38, 40, 42, 43]. However, other studies have found no significant correlation between SN and KSI among academics [18, 39, 41, 43]. For instance, Fauzi et al. (2019) reported an insignificant effect of SN on

KSI, which might be attributed to the small sample size of 45 academics [43]. Given these inconsistencies, further investigation is warranted. Thus, the second hypothesis is formulated as follows:

> H2. Medical teachers' SN regarding KS affects their KSI.

PBC, another key component of TPB, is defined as "people's perception of the ease or difficulty of performing the behavior of interest" [37]. This construct is hypothesized to influence both intention and actual behavior within TPB. Prior research has shown that PBC significantly predicts academics' KSI [17, 18, 23, 39, 40, 42–46] and KSB [17, 21, 38, 39, 45]. However, findings on the relationship between PBC and KSI remain inconclusive. For example, Hosen, Chong, and Lau [38] found no significant relationship between PBC and academics' KSI [38]. Additionally, most previous studies have overlooked the direct relationship between PBC and academics' KSB, necessitating further examination. Based on these considerations, the following hypotheses are proposed:

> H3. Medical teachers' PBC over KS affects their KSI.
> H4. Medical teachers' PBC over KS positively affects their KSB.

In TPB, intention is the primary driving force behind behavior [36, 47]. Intentions are "indications of how hard people are willing to try, of how much effort they are planning to exert, to perform a behavior" [37]. Previous research has consistently demonstrated that academics' KSI significantly predicts their KSB [17, 21, 38–40, 45, 48]. Accordingly, the final hypothesis is formulated as follows:

> H5. Medical teachers' KSI positively affects their KSB.

In addition to the inconsistencies and inconclusive findings discussed above, several other limitations exist in the studies above. First, these studies have primarily been conducted in four countries—Malaysia [49], Hong Kong [50], the UAE [2], and the UK [16]—with Malaysia being the most frequently studied. This geographical concentration limits the generalizability of findings to culturally distinct contexts such as Iran. Second, only a few studies have attempted to examine the full TPB model among academics [49]. Moreover, many previous studies have overlooked the KSB construct [18, 21, 23, 45] or failed to investigate the PBC-KSB relationship [21, 40]. Third, across all studies, the relationship between academics' KSI and KSB is imperfect, raising the question of why some individuals act upon their intentions while others do not. As previously discussed, this suggests the presence of additional external variables influencing the relationship. Given these gaps, the present study examines the full TPB model among Iranian medical teachers.

Personality as a moderator of the KSI-KSB relationship

One significant conclusion derived from TPB studies is that academics differ in their KSB; while some follow through on their KSI, others do not. This variation can be explained by individual characteristics such as personality [10, 51–53], which plays a crucial role in KSB [10, 33]. Although a few empirical studies have established a relationship between personality traits and KSB [54, 55], the mechanisms through which personality influences behavior remain unclear [56], necessitating further investigation.

We postulate that medical teachers' ability to follow through with their KSI depends on their personality traits. Specifically, they should exhibit open-mindedness, comfort, emotional positivity, and confidence in this follow-through. Some studies have applied personality frameworks to examine the moderating role of personality within the TPB. However, these studies have primarily focused on behaviors such as exercise [56, 57], consumption [58], purchasing [59], and smoking [60]. To date, no study has explored the moderating role of personality in the KSI-KSB relationship among medical teachers.

Moreover, as de Bruijn et al. [61] noted, these studies have concentrated mainly on conscientiousness, while other personality traits could also serve as potential moderators of the intention-behavior relationship. For example, highly neurotic individuals, who tend to be anxious and impulsive, are less likely to act on their intentions [61]. Additionally, the results of these studies are inconsistent. While some suggest that personality does not moderate the intention-behavior relationship [57–59], others argue that traits such as extraversion and conscientiousness [28], conscientiousness alone [28, 56, 60], or neuroticism [61] serve as moderators, with other dimensions like openness to experience and agreeableness showing no moderating effect. Conscientiousness appears to be the most potent moderator of the intention-behavior relationship. In a systematic review of the moderators of the intention-behavior relationship in the physical activity domain, Rhodes and Dickau [28] concluded that conscientiousness is the strongest personality trait influencing this relationship, followed by extraversion. These personality traits appear to strengthen the intention-behavior relationship.

The present study considers all dimensions of the Big Five Factor model (FFM), one of the most robust and frequently used personality models [33, 54], as moderators of the KSI-KSB relationship among medical teachers.

Based on the above discussion, the following hypotheses are proposed:

> H6. Conscientiousness moderates the KSI-KSB relationship among medical teachers.
> H7. Extraversion moderates the KSI-KSB relationship among medical teachers.
> H8. Neuroticism moderates the KSI-KSB relationship among medical teachers.
> H9. Openness to experience moderates the KSI-KSB relationship among medical teachers.
> H10. Agreeableness moderates the KSI-KSB relationship among medical teachers.

The research hypotheses are illustrated in Fig. 1 below.

Research methodology

This study employs a cross-sectional correlational research design to test the proposed research hypotheses.

Participants

The target population consisted of 811 faculty members from Shiraz Medical University who participated in medical education fellowship programs. These programs, designed as professional development and empowerment initiatives, cater to early-career medical teachers and are conducted twice a year for one month. The training covers various topics, including teaching methods, curriculum development, learning assessment, and academic scholarship.

To determine the required sample size, we followed the guidelines provided by Hair et al. [62]. Given that our model includes four independent variables (attitude, SN, PBC, and intention) and 25 indicators, a minimum sample size of 158 was required to achieve an 80% statistical power for detecting R^2 values of at least 0.10 in any endogenous variable at a 1% significance level. However, to account for potential sample loss, we distributed 250 questionnaires, of which 237 were returned and deemed usable for data analysis.

Measurements

Two questionnaires were employed to collect data.

1. *Researcher-Developed TBP Questionnaire.* Pre-validated items were adapted and customized to measure KS attitude [41, 63], SN about KS [63, 64], PBC over KS [35, 63], KSI [26, 63], and KSB [6, 40, 65]. In designing the questionnaire, we followed Ajzen's key recommendation to enhance internal consistency—ensuring that items measuring a specific behavior are phrased with an appropriate level of specificity. Accordingly, we incorporated "knowledge or experience from the medical education fellowship" in every item instead of the more general terms "knowledge" or "experience."

   All TPB-related items, except for the KSB scale, were measured using a five-point Likert scale ranging from *1 = strongly disagree* to *5 = strongly agree*. The KSB items were assessed using a five-point Likert scale ranging from *1 = very rarely* to *5 = very frequently*.

2. *Personality Scale.* To measure the FFM personality traits, we used the 10-item scale developed and validated by Rammstedt and John (2007) [66]. This concise scale is particularly suitable when partici-
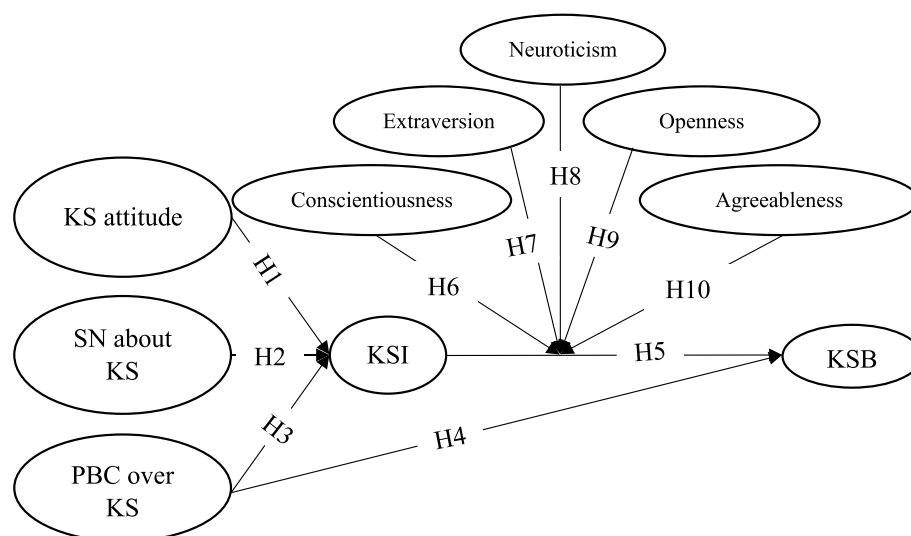

Fig. 1 Proposed research model

pants have limited time, making it ideal for medical teachers. Each personality trait was assessed with two items, one reverse-scored. Responses were recorded using a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

The survey comprised 35 items and was estimated to take 15–20 min to complete. Table 1 provides a detailed description of the constructs, their theoretical and operational definitions, the number of items used to measure them, and the corresponding sources.

Multiple techniques, including quantitative content validity and construct validity assessments, were employed to ensure the scales'validity and reliability.

For quantitative content validity, we calculated the Item Content Validity Index (I-CVI) for individual items and the aggregate mean I-CVI for each construct. A panel of 10 experts evaluated the 25 items of the TPB questionnaire based on three criteria: relevance, clarity, and simplicity. As shown in Table 2, the aggregate mean CVI exceeded 0.79 for all requirements—relevance (0.88), clarity (0.92), and simplicity (0.86)—confirming the questionnaire's content validity.

The results of construct validity are presented in the results section (see Tables 4, 5, and 6). Overall, all scales were demonstrated to be both valid and reliable.

Pilot study
Before administering the survey, a pretest was conducted with a panel of seven experts to evaluate the measurement tools regarding wording, comprehensibility, readability, and relevance. Based on their feedback, minor modifications were made to enhance clarity and precision.

Additionally, the questionnaire was pilot-tested with 35 medical teachers. The reliability analysis confirmed that all measures had acceptable Cronbach's alpha (α) values, indicating good internal consistency.

Procedure
Before distributing the survey, phone calls were made to assess medical teachers'willingness to participate. After obtaining consent, a web-based survey was emailed to them in 2024. To improve response rates, follow-up calls were made on days 6 and 12, reminding participants to complete the survey. Of 250 distributed questionnaires, 237 valid responses were received, resulting in an 87% response rate.

Data analysis
Partial Least Squares Structural Equation Modeling (PLS-SEM) was chosen for data analysis due to its exploratory nature and focus on theory development. PLS-SEM is particularly suitable for testing complex models with relatively small sample sizes [68].

The analysis followed a two-stage process [69], which is explained in detail in the following sections.

Table 1 Theoretical and operational definition of constructs

Construct	Theoretical definition	Operational definition	No. of final items	Source of items
KS attitude	a favorable inclination towards executing KS [43]	The degree to which a medical teacher has a positive or negative assessment of KS	5	Jolaee et al. [41] Bock et al. [63]
SN about KS	perception and expectation of others surrounding a person to execute KS[43]	The degree to which a medical teacher perceives that significant others expect them to execute KS	2	Bock et al. [63] Phung et al. [64]
PBC over KS	a person's ability and control over KS[43]	The degree to which a medical teacher feels they can execute KS	2	Chennamaneni et al.[35] Bock et al. [63]
KSI	Readiness of someone to engage in knowledge-sharing activity [21]	The degree to which a medical teacher is willing to engage in KS	5	Fullwood et al. [26] Bock et al. [63]
KSB	(actual) transfer of knowledge between and among individuals [7]	The degree to which a medical teacher performs KS	5	Skaik & Othman [40] Akhavan et al. [65] Durand et al. [6]
personality	feelings, sense of self, world views, thoughts, and behavior patterns [66]	The degree to which a medical teacher actively interacts with others (extraversion), maintains a harmonious relationship with others (agreeableness), follows social norms (conscientiousness), has negative emotions (neuroticism), and holds an open attitude to newness (openness to experience)	10	Rammstedt & John [67]

Table 2 I-CVI and S-CVI of the measures by 10 experts

Construct	Item	I-CVI For Simplicity	I-CVI For Relevance	I-CVI For Clarity
Attitude	A1	0.80	0.80	1
	A2	0.80	1	1
	A3	0.80	0.80	0.90
	A4	1	0.90	1
	A5	1	1	1
	A6	0.80	0.80	1
	A7	0.90	0.80	0.80
KSI	In1	0.80	0.90	1
	In2	0.90	0.90	0.80
	In3	0.80	0.80	1
	In4	0.90	0.80	1
	In5	0.90	0.80	1
	In6	0.80	0.80	1
	In7	0.90	0.80	0.90
KSB	Ks1	0.80	1	0.90
	Ks2	1	0.90	0.90
	Ks3	1	0.90	1
	Ks4	0.80	1	1
	Ks5	1	0.90	1
SN	Sn1	0.80	0.80	0.80
	Sn2	0.90	1	1
	Sn3	0.90	1	0.90
PBC	Pb1	0.80	0.80	0.80
	Pb2	0.80	0.90	1
	Pb3	0.80	1	1
Scale-level Content Validity Index	S-CVI = 0.86		S-CVI = 0.88	0.92

Results

Demographics of respondents

As shown in Table 3, the study included 237 participants, of whom 59.5% were male. Most respondents (46%) were between 41 and 45, and 60.33% held a Ph.D. Regarding work experience, the most significant proportion (40.5%) reported having 6 to 10 years of professional experience.

Assessment of measurement models

The first analysis stage involved assessing the reliability and validity of the measurement models. An initial evaluation revealed that six out of the 25 items in the TPB questionnaire had factor loadings below the acceptable threshold of 0.7, consequently removing them from the model. Following this refinement, the revised model was reassessed.

As presented in Table 4, key reliability and validity indicators—including composite reliability, Cronbach's alpha, average variance extracted (AVE), and factor loadings—all exceed the established minimum acceptable values, confirming the robustness of the measurement model.

Table 3 Respondents' demographic profile

Characteristics		Frequency	Percentage
Gender	Male	141	59.5
	Female	96	40.5
Age	30–35	3	1.26
	36–40	51	21.5
	41–45	109	46
	46–50	46	19.4
	51–55	23	9.7
	Above 55	1	0.42
	Missing	4	1.68
Level of education	M.A	2	0.84
	PhD	143	60.33
	MD	92	38.8
Working experiences	1–5	23	9.7
	6–10	96	40.5
	11–15	64	27
	16–20	49	20.6
	Above 20	5	2.10

Table 4 Reliability and convergent validity of the measures

Constructs	Convergent validity		Internal consistency		
	Factor loading (≥ 0.7)	AVE (≥ 0.5)	Composite reliability (≥ 0.7)	Cronbach's α (≥ 0.7)	rho_A
KS attitude	0.72 to 0.87	0.65	0.90	0.87	0.91
SN about KS	0.85 to 0.91	0.77	0.87	0.71	0.74
PBC over KS	0.85 to 0.89	0.75	0.86	0.68	0.70
KSI	0.73 to 0.84	0.62	0.89	0.85	0.85
KSB	0.74 to 0.86	0.65	0.90	0.86	0.86
Openness	0.83 to 0.92	0.78	0.87	0.73	0.84
Extraversion	0.88 to 0.89	0.80	0.89	0.75	0.75
Agreeableness	0.77 to 0.93	0.73	0.84	0.67	0.82
Neuroticism	0.90 to 0.91	0.84	0.90	0.79	0.79
Conscientiousness	0.87 to 0.89	0.78	0.87	0.72	0.72

As presented in Table 5, the Fornell-Larcker criterion confirms discriminant validity, as the square root of the average variance extracted (AVE) for each construct exceeds the corresponding inter-construct correlations.

Additionally, Table 5 provides descriptive statistics (mean and standard deviation) and the correlation matrix of the study variables. The findings indicate significant positive correlations between PBC ($r = 0.56$, $p < 0.01$), attitude ($r = 0.42$, $p < 0.01$), and SN ($r = 0.48$, $p < 0.01$) with KSI. Moreover, KSI ($r = 0.63$, $p < 0.01$) and PBC ($r = 0.49$, $p < 0.01$) were positively correlated with KSB.

Regarding personality traits, conscientiousness exhibited a positive and significant correlation with all components of the TPB ($p < 0.01$). Furthermore, openness to experience was positively associated with attitude ($r = 0.35$, $p < 0.01$) and PBC ($r = 0.16$, $p < 0.01$), while extraversion correlated positively with attitude ($r = 0.13$, $p < 0.05$). Additionally, agreeableness was positively associated with SN ($r = 0.21$, $p < 0.01$). Conversely, neuroticism demonstrated a significant negative relationship with KSB ($r = -0.14$, $p < 0.01$).

As shown in Table 6, the Heterotrait-Monotrait Ratio (HTMT) values are below 0.90, indicating no issues with discriminant validity among the constructs. Therefore, the HTMT criterion for discriminant validity is satisfied in this study.

Therefore, evaluating validity and reliability indicators confirms that the measurement models used in this study are both valid and reliable.

Assessment of the structural model
The second stage of SEM involves assessing the structural model. Before analyzing the structural model results, VIF was examined to check for collinearity between predictor variables. The first step involved assessing collinearity between KS attitude, SN about KS, and PBC over KS, as these serve as predictors of KSI. The second step involved evaluating the collinearity between KSI, PBC over KS, and the five dimensions of personality, which act as predictors of KSB. The VIF values ranged from 1.15 to 2.10, all below the threshold of 5, indicating that collinearity is not an issue.

The second step in the structural model assessment involves checking the relationships. As shown in Table 7, the bootstrapping results revealed that KS attitude significantly and positively influences KSI ($\beta = 0.245$, $\rho < 0.001$), SN about KS has a significant and positive direct effect on KSI ($\beta = 0.280$, $\rho < 0.001$), and PBC over KS significantly and positively influences KSI ($\beta = 0.375$, $\rho < 0.001$), providing support for hypotheses H1, H2, and H3. PBC over KS was the strongest predictor, followed by SN about KS and KS attitude. Furthermore, the results showed that KSI significantly and positively affects KSB ($\beta = 0.202$, $\rho < 0.001$), and PBC over KS also significantly and positively affects KSB ($\beta = 0.121$, $\rho < 0.01$), supporting hypotheses H4 and H5 (Fig 2).

The third step requires assessing the model's explanatory power by examining the R^2 values of the endogenous variables. The examination of R^2 revealed that the TPB explains 44% of the variance in KSI. Given the relatively small number of exogenous variables in the model, this value can be considered satisfactory. Additionally, the moderating effect of the five personality traits was tested using the product indicator approach. All predictor and moderator indicators were standardized before forming interaction terms to minimize multicollinearity. The strength of the moderating effects was assessed using Cohen's f^2 (Cohen, 1988). The results revealed that conscientiousness ($\beta = 0.418$, $t = 7.79$) significantly moderates the KSI-KSB relationship (H6). When added to the

Table 5 Correlation and discriminant validity of the measures (Fornell-Larcker Criterion)

	Mean	SD	Attitude	Intention	KSB	PBC	SN	Conscientiousness	Openness	Extraversion	Agreeableness	Neuroticism
Attitude	2.87	0.96	**0.80**									
Intention	2.90	0.89	0.42	**0.79**								
KSB	3.02	0.91	0.43	0.63	**0.80**							
PBC	2.93	1.14	0.34	0.56	0.49	**0.87**						
SN	3.10	1.20	0.24	0.48	0.28	0.38	**0.88**					
Conscientiousness	3.20	1.14	0.27	0.36	0.34	0.38	0.23	**0.88**				
Openness	2.96	0.90	0.35	0.09	0.07	0.16	0.05	0.21	**0.88**			
Extraversion	2.97	0.97	0.13	0.10	0.05	0.03	0.09	0.06	0.19	**0.89**		
Agreeableness	2.89	1.10	0.07	0.12	0.06	0.11	0.21	0.18	0.33	0.09	**0.85**	
Neuroticism	2.31	1.18	−0.02	−0.08	−0.14	−0.07	0.03	−0.14	−0.12	−0.17	−0.11	**0.91**

Table 6 HTMT discriminant validity

	Attitude	Intention	KSB	PBC	SN
Attitude					
Intention	0.46				
KSB	0.46	0.73			
PBC	0.41	0.72	0.63		
SN	0.29	0.60	0.36	0.54	

Table 7 Path coefficients for hypothesis testing

	Path	Beta	t	*P*. value	Decision
H1	attitude → KSI	0.245	4.30	< 0.01	Supported
H2	SN → KSI	0.280	5.68	< 0.01	Supported
H3	PBC → KSI	0.375	6.56	< 0.01	Supported
H4	KSI → KSB	0.202	2.74	< 0.01	Supported
H5	PBC → KSB	0.121	3.48	< 0.01	Supported
H6	KSI * Conscientiousness → KSB	0.418	7.79	< 0.01	Supported
H7	KSI * Extraversion → KSB	0.016	0.09	≥ 0.05	Not supported
H8	KSI * Neuroticism → KSB	−0.019	0.11	≥ 0.05	Not supported
H9	KSI * Openness → KSB	−0.031	0.34	≥ 0.05	Not supported
H10	KSI * Agreeableness → KSB	0.081	0.85	≥ 0.05	Not supported

model, conscientiousness increased the R^2 of KSB to 0.61, representing a significant improvement in the variance explained. The f^2 value for conscientiousness was 0.33, indicating a medium effect size. Therefore, H6 was supported, showing that high conscientiousness strengthens the TPB model by enhancing the KSI-KSB relationship. However, the other personality traits (extraversion, neuroticism, openness to experience, and agreeableness) were found to be non-significant moderators. As a result, hypotheses H7, H8, H9, and H10 were not supported.

The fourth step involves evaluating the model's predictive power by checking the Q^2 values. The blindfolding algorithm with an omission distance of seven yielded Q^2 values of 0.26 and 0.37 for KSI and KSB, respectively, indicating the model's predictive relevance.

Finally, the goodness of fit index (GoF), which assesses the overall fit of structural equation models, was calculated using the following formula:

$$GoF = \sqrt{average AVE * \text{average } R2} = \sqrt{average(0.65 + 0.77 + 0.75 + 0.62 + 0.65 + 0.78) * \text{average}(0.45 + 0.61)} = 0.61$$

Three GoF values—0.01, 0.25, and 0.36—are considered small, medium, and large, respectively. In this study, the GoF value was 0.611, which is considered significant.

Discussion

This study aimed to predict KSB among Iranian medical teachers by integrating the FFM into the TPB. The findings confirmed the first hypothesis, aligning with TPB and previous research in higher education institutions (HEIs) [16–18, 20, 21, 23, 38–44]. This suggests that medical teachers'attitudes toward KS significantly influence their KSI. In other words, if they perceive KS as beneficial—enhancing their reputation, strengthening social ties with colleagues, creating academic opportunities, or improving teaching and scholarly work—they are more likely to engage in it [12, 26, 70, 71]. According to Al-Kurdi et al. [25], academics who do not fear losing their knowledge superiority tend to have a positive mindset toward KS and actively participate in KS activities [25].

The results also supported the second hypothesis, which is consistent with TPB and most prior studies [17, 23, 38, 40, 42, 43] but contradicts a few [18, 39, 41]. This indicates that social expectations and approval influence medical teachers' willingness to engage in KS. If they perceive KS as an encouraged and expected practice among key stakeholders—such as top management, students, colleagues, and other higher education figures—their intention to share knowledge will likely increase. Although academicians typically enjoy a high degree of autonomy, the nature of academia inherently values KS, and knowledge hoarding is often seen as detrimental, potentially damaging one's reputation and violating professional ethics [38, 43]. Therefore, academics tend to prioritize and respect KS expectations set by significant others [21].

The data supported the third hypothesis, aligning with TPB and several past studies [17, 18, 23, 39, 40, 42, 43, 46] but contradicting findings by Hosen, Chong, and Lau [38]. According to TPB, the ease of engaging in KS plays a crucial role. However, KS is often the most challenging among knowledge management components. Medical teachers must believe they can effectively share knowledge, a perception shaped by internal factors such as time availability [11, 43], KS self-efficacy [11], and conceptual and communication skills [18], as well as external factors like organizational support [38, 46] and infrastructure [46]. Consequently, even medical teachers with positive KS attitudes and supportive SN may hesitate to share

knowledge if organizational conditions are unfavorable, time is limited, or they lack confidence in their KS abilities.
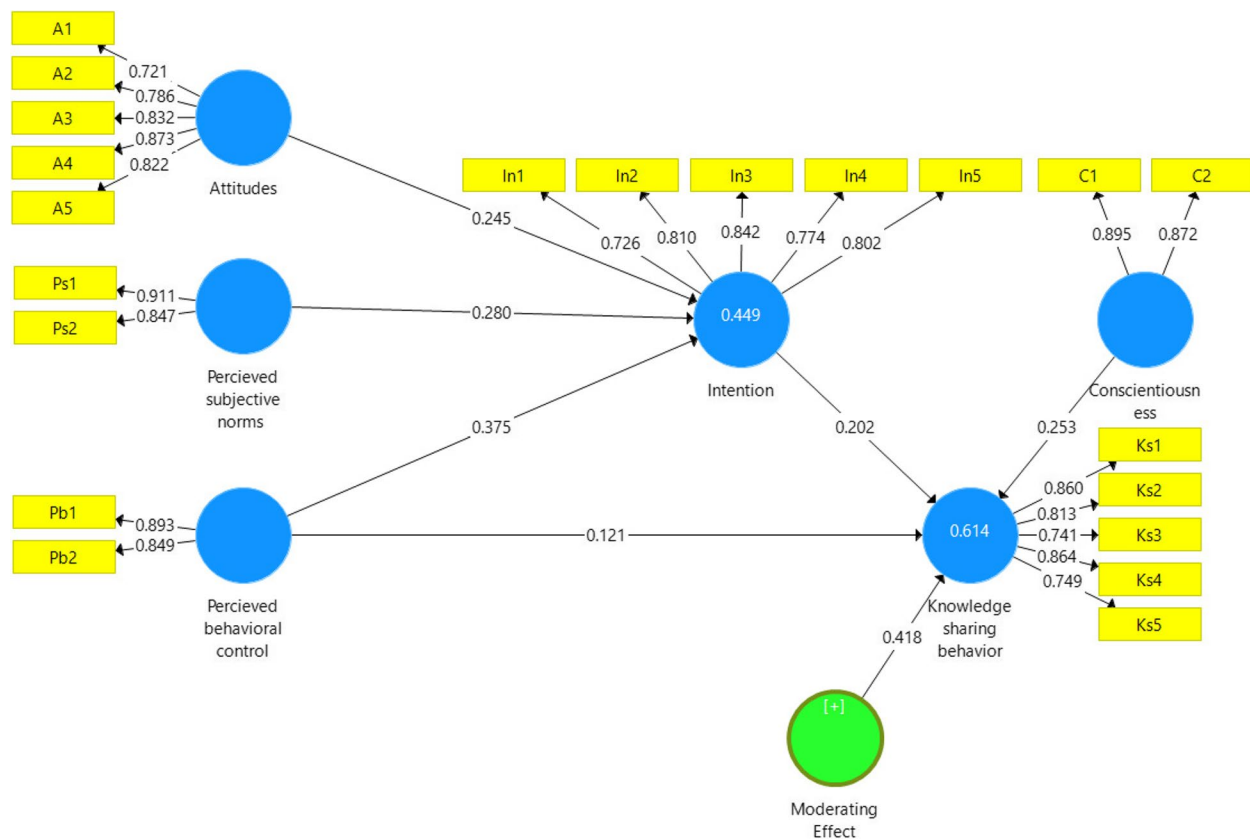
Fig. 2 PLS model output

The data confirmed the fourth hypothesis, aligning with TPB and previous studies [17, 21, 38, 39]. This finding indicates that PBC can directly influence and predict KSB. According to D'Souza, Agarwal, and Chavali [72], highly educated individuals tend to exhibit a stronger internal locus of control and greater confidence, believing they have control over their actions [72]. Given this, medical teachers with higher education levels are more likely to engage directly in KSB, as they perceive KS as manageable and within their control, even when holding intention constant.

The results supported the fifth hypothesis, consistent with TPB and prior research [17, 21, 38–40, 43, 48]. This suggests that willingness and motivation are essential prerequisites for KSB. Intention is a key motivational driver—more motivated medical teachers are more likely to engage in KS. Notably, intention, as the strongest predictor of KSB, not only determines the extent of knowledge shared but also influences its quality.

The analysis confirmed the sixth hypothesis, aligning with most previous studies [28, 60, 73] but contradicting others [57–59]. Highly conscientious individuals are goal-oriented and persistent, making them less likely to

abandon their intentions. Accordingly, medical teachers with high conscientiousness are more determined to follow through on their KSI than their less conscientious counterparts. Moreover, viewing KS as a professional duty, highly conscientious medical teachers actively strive to fulfill their intention to share knowledge with their peers.

Conversely, the analysis rejected the seventh hypothesis, indicating that extraversion does not moderate the KSI-KSB link among medical teachers. This finding aligns with several studies [57–59] but contradicts the study by Rhode et al. [73].

Similarly, the eighth hypothesis was not supported, suggesting that neuroticism does not moderate the KSI-KSB relationship. This result is consistent with prior studies [57–59] but contrasts with findings by de Bruijn et al. [61].

In addition, the ninth hypothesis was also not confirmed, indicating that openness to experience does not moderate the KSI-KSB relationship. This outcome aligns with previous studies [57–59].

Finally, the analysis did not support the tenth hypothesis, indicating that agreeableness does not moderate the KSI-KSB relationship. This finding aligns with previous studies [57–59].

Considering the findings for H7, H8, H9, and H10, medical teachers with strong motivation are inclined to participate in KSB regardless of their extraversion, neuroticism, openness to experience, or agreeableness levels.

Conclusion

Our study makes two key contributions to the existing body of KS research. Theoretically, the present study was an attempt to examine the role of individual-level factors in KSB among medical teachers by integrating the FFM into the TPB.

While previous studies have applied these two frameworks separately, our findings demonstrate that the TPB effectively explains and predicts KSI and KSB, addressing inconsistencies in prior research. Additionally, we identified conscientiousness as a significant moderator that strengthens the KSI-KSB relationship.

From a practical perspective, our study provides valuable insights for medical school administrators and policymakers in designing more effective KS policies and interventions. Specifically, our findings suggest that since KS attitudes significantly impact KSI, medical school administrators should implement training programs to foster positive attitudes toward KS. Research in training and development has shown that targeted training can enhance employees' knowledge, skills, and attitudes. Given that SN about KS significantly influences KSI, administrators should develop appraisal and reward systems that recognize and incentivize KS practices. Previous studies highlight that well-structured reward systems effectively encourage employees to engage in KSB [7].

Since PBC significantly affects KS, institutions should invest in technological infrastructure and resources—such as online discussion forums, IT systems, research collaborations, and seminars—to facilitate KS among medical teachers. A supportive organizational climate and adequate technological resources are essential for fostering KSB [52, 74]. Assigning manageable workloads is crucial, as excessive administrative tasks can hinder knowledge-sharing efforts [43].

Since conscientiousness was found to moderate the KSI-KSB relationship, medical universities should consider personality traits—particularly conscientiousness—when recruiting faculty members. Unlike attitudes or motivations, personality traits are relatively stable and less influenced by training or incentives. Therefore, incorporating conscientiousness as a selection criterion can enhance the likelihood of fostering a strong KS culture within academic institutions.

limitations

Although this study integrated the FFM into the TPB, a substantial portion of the variance in KSB remains unexplained, suggesting that individual level factors can't wholly account for KSB. So, future scholars can explore the role of group and organizational level variables in stimulating KSB among medical teachers. Second, the study relied on self-report measures, which may introduce social desirability bias or subjective misrepresentation. Future research should, thus, use other research methodologies like qualitative methodology to explore KSB. Third, since this study employed a cross-sectional design, it can't establish causal relationships between variables. Therefore, a longitudinal approach in future studies would help determine the directionality and stability of the relationships over time. Fourth, the relatively small sample size restricts the generalizability of findings to other higher education institutions (HEIs). Future research should, therefore, include more extensive and diverse samples across public and private universities to gain a more comprehensive understanding of KSB among academicians.

Declarations

Ethics approval and consent to participate
This study was approved by the Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.REC.1403.124). All participants provided informed consent, and anonymous questionnaires were used to ensure confidentiality. All procedures were conducted following relevant ethical guidelines and regulations.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

References
1. Usman SA, Kowalski KB, Andiappan VS, Parayitam S. Effect of knowledge sharing and interpersonal trust on psychological capital and emotional intelligence in higher-educational institutions in India: Gender as a moderator. FIIB Business Review. 2022;11(3):315–35.

2. Kaba A, Ramaiah CK. Investigating the use of ICT tools for knowledge sharing among faculty members in UAE. International Journal of Knowledge Management Studies. 2019;10(4):365–80.

3. Yigzaw ST, Jormanainen I, Tukiainen M. Knowledge sharing in the higher education environment of developing economies–The case of Eritrea. Afr J Inf Syst. 2021;13(3):6.

4. Li X, Roberts J, Yan Y, Tan H. Knowledge sharing in China–UK higher education alliances. Int Bus Rev. 2014;23(2):343–55.

5. Long Y, Cheng X, Chen J. Influence of study climate and trust on knowledge sharing and knowledge hiding among Chinese medical students. BMC Med Educ. 2024;24(1):1370.

6. Durand F, Bourgeault IL, Hebert RL, Fleury M-J. The role of gender, profession and informational role self-efficacy in physician–nurse knowledge sharing and decision-making. J Interprof Care. 2022;36(1):34–43.

7. Akosile A, Olatokun W. Factors influencing knowledge sharing among academics in Bowen University, Nigeria. J Librariansh Inf Sci. 2020;52(2):410–27.

8. Mutahar Y, Farea MM, Abdulrab M, Al-Mamary YH, Alfalah AA, Grada M. The contribution of trust to academic knowledge sharing among academics in the Malaysian research institutions. Cogent Bus Manag. 2022;9(1):2038762.

9. Ramayah T, Yeap JA, Ignatius J. Assessing knowledge sharing among academics: A validation of the knowledge sharing behavior scale (KSBS). Eval Rev. 2014;38(2):160–87.

10. Farrukh M, Sajid M, Zreen A, Khalid R. Knowledge sharing in higher education institutes: An empirical investigation of individual characteristics. J Appl Res Higher Educ. 2020;12(2):311–29.

11. Dokhtesmati M, Bousari RG. Knowledge sharing in Iranian academic institutions: meta analysis approach. Procedia Soc Behav Sci. 2013;73:383–7.

12. Annansingh F, Howell KE, Liu S, Baptista NM. Academics' perception of knowledge sharing in higher education. Int J Educ Manag. 2018;32(6):1001–15.

13. Ramazanzade K, Ayati M, Abedi F, Shokohifard H. Strategies for sharing pedagogical knowledge in clinical education in adapting to the impact of COVID-19. J Educ Health Promot. 2022;11(1):85.

14. Gagné M. A model of knowledge-sharing motivation. Human Resource Management: Published in Cooperation with the School of Business Administration, The University of Michigan and in alliance with the Society of Human Resources Management. 2009;48(4):571–89.

15. Riege A. Three-dozen knowledge-sharing barriers managers must consider. J Knowl Manag. 2005;9(3):18–35.

16. Fullwood R, Rowley J. An investigation of factors affecting knowledge sharing amongst UK academics. J Knowl Manag. 2017;21(5):1254–71.

17. Hosen M, Ogbeibu S, Lim WM, Ferraris A, Munim ZH, Chong Y-L. Knowledge sharing behavior among academics: Insights from theory of planned behavior, perceived trust and organizational climate. J Knowl Manag. 2023;27(6):1740–64.

18. Khan MN, Akhtar S. Developing and testing an inclusive model of academicians' knowledge sharing using the theory of planned behavior. PalArch's Journal of Archaeology of Egypt/Egyptology. 2023;20(2):375–99.

19. Mansor ZD, Mustaffa M, Salleh LM. Motivation and willingness to participate in knowledge sharing activities among academics in a public university. Procedia Economics and Finance. 2015;31:286–93.

20. Nguyen T-M, Nham TP, Froese FJ, Malik A. Motivation and knowledge sharing: a meta-analysis of main and moderating effects. J Knowl Manag. 2019;23(5):998–1016.

21. Al-Kurdi OF, El-Haddadeh R, Eldabi T. The role of organizational climate in managing knowledge sharing among academics in higher education. Int J Inf Manage. 2020;50:217–27.

22. Afshar Jalili Y, Ghaleh S. Knowledge sharing and the theory of planned behavior: a meta-analysis review. VINE J Inf Knowledge Manag Syst. 2021;51(2):236–58.

23. Shekh Zain R, Syed Abdul Mutalib SKM, Dzulkafli N, Noor Aziz AS, Rosli NA, Yusuf FH, et al., editors. Factors affecting knowledge sharing intention among academic staff. Proceedings of the Second International Conference on the Future of ASEAN (ICoFA) 2017-Volume 1: Business and Social Sciences; 2019: Springer.

24. Tan CN-L, Ramayah T. The role of motivators in improving knowledge-sharing among academics. Information Research: An International Electronic Journal. 2014;19(1):n1.

25. Al-Kurdi O, El-Haddadeh R, Eldabi T. Knowledge sharing in higher education institutions: a systematic review. J Enterp Inf Manag. 2018;31(2):226–46.

26. Fullwood R, Rowley J, Delbridge R. Knowledge sharing amongst academics in UK universities. J Knowl Manag. 2013;17(1):123–36.

27. Fan Z, Beh L-S. Knowledge sharing among academics in higher education: A systematic literature review and future agenda. Educ Res Rev. 2024;42:100573.

28. Rhodes RE, Dickau L. Moderators of the intention-behaviour relationship in the physical activity domain: a systematic review. Br J Sports Med. 2013;47(4):215–25.

29. Javaid J, Soroya S, Mahmood K. Impact of personal and organizational factors on knowledge sharing attitude of university teachers in Pakistan. Electron Libr. 2020;38(2):317–36.

30. Bock GW, Kim Y-G. Breaking the myths of rewards: An exploratory study of attitudes about knowledge sharing. Information Resources Management Journal (IRMJ). 2002;15(2):14–21.

31. Lo MF, Tian F. How academic leaders facilitate knowledge sharing: a case of universities in Hong Kong. Leadersh Org Dev J. 2020;41(6):777–98.

32. Yu T-K, Lu L-C, Liu T-F. Exploring factors that influence knowledge sharing behavior via weblogs. Comput Hum Behav. 2010;26(1):32–41.

33. Shaukat R, Ahmad S, Naveed MA, Ur RS. Impact of personality traits on knowledge sharing behavior of academicians: a case of University of Sargodha, Punjab, Pakistan. SAGE Open. 2023;13(1):21582440231160984.

34. Van Den Hooff B, De Ridder JA. Knowledge sharing in context: the influence of organizational commitment, communication climate and CMC use on knowledge sharing. J Knowl Manag. 2004;8(6):117–30.

35. Chennamaneni A, Teng JT, Raja M. A unified model of knowledge sharing behaviours: theoretical development and empirical test. Behav Inf Technol. 2012;31(11):1097–115.

36. Ajzen I. From intentions to actions: A theory of planned behavior. Action control: From cognition to behavior: Springer; 1985. p. 11–39.

37. Ajzen I. The theory of planned behavior. Organ Behav Hum Decis Process. 1991;50(2):179–211.

38. Hosen M, Chong Y-L, Lau L-S. Sharing knowledge through publishing research work in indexed journals: a vision of Malaysian private universities. Asia Pac Soc Sci Rev. 2020;20(4):5.

39. Abd-Mutalib H, Muhammad Jamil CZ, Mohamed R, Ismail SNA. The determinants of environmental knowledge sharing behaviour among accounting educators: a modified theory of planned behaviour. Int J Sustain High Educ. 2023;24(5):1105–35.

40. Skaik HA, Othman R. Determinants of knowledge sharing behaviour among academics in United Arab Emirates. Int J Knowl Syst Science (IJKSS). 2014;5(3):54–70.

41. Jolaee A, Md Nor K, Khani N, Md YR. Factors affecting knowledge sharing intention among academic staff. Int J Educ Manag. 2014;28(4):413–31.

42. Goh SK, Sandhu MS. Knowledge sharing among Malaysian academics: Influence of affective commitment and trust. Electron J Knowl Manag. 2013;11(1):pp38-48-pp38-48.

43. Fauzi MA, Nya-Ling CT, Thurasamy R, Ojo AO, Shogar I. Muslim academics' knowledge sharing in Malaysian higher learning institutions. J Islamic Mark. 2019;10(2):378–93.

44. Fauzi MA, Nya-Ling CT, Thursamy R, Ojo AO. Knowledge sharing: Role of academics towards research productivity in higher learning institution. VINE J Inf Knowl Manag Syst. 2019;49(1):136–59.

45. Fauzi MA, Tan CNL, Thurasamy R, Ojo AO. Evaluating academics' knowledge sharing intentions in Malaysian public universities. Malays J Libr Inf Sci. 2019;24(1):123–43.

46. Sadiq Sohail M, Daud S. Knowledge sharing in higher education institutions: Perspectives from Malaysia. Vine. 2009;39(2):125–42.

47. Armitage CJ, Christian J. From attitudes to behaviour: Basic and applied research on the theory of planned behaviour. Current Psychology. 2003;22(3):187–95. https://doi.org/10.1007/s12144-003-1015-5.

48. Khalil O, Marouf L, Khalil N. Academics' Knowledge Sharing Intentions and Behaviours: The Influence of Espoused Culture, Social Norm, and Attitude. J Inf Knowl Manag. 2021;20(02):2150016.

49. Paiman N, Fauzi MA, Norizan N, Abdul Rashid A, Tan CN-L, Wider W, et al. Exploring personality traits in the knowledge-sharing behavior: the role of agreeableness and conscientiousness among Malaysian tertiary academics. J Applied Res Higher Educ. 2024;16(5):1884–911.

50. Ng PM, Wut TM, Lo MF. Enhancing knowledge sharing behaviour in building academics' career capital in higher education: the mediating role of innovative climate. Technol Knowl Learn. 2024;29(1):91–111.

51. Pei-Lee T, Chen CY, Chin WC, Siew YY. Do the big five personality factors affect knowledge sharing behaviour? a study of malaysian univeristies. Malays J Libr Inf Sci. 2011;16(1):47–62.

52. Thi Chung D, Thi Tram Anh P. Factors affecting knowledge sharing behaviour in public higher education institutions: An empirical study of Vietnam. Cogent Bus Manag. 2022;9(1):2155002.

53. Titi AA. Determinants of knowledge sharing in a public sector organization. J Knowl Manag. 2013;17(3):454–71.

54. Agyemang FG, Dzandu MD, Boateng H. Knowledge sharing among teachers: the role of the Big Five Personality traits. VINE Journal of Information and Knowledge Management Systems. 2016;46(1):64–84.

55. Jami Pour M, Taheri F. Personality traits and knowledge sharing behavior in social media: mediating role of trust and subjective well-being. On the Horizon. 2019;27(2):98–117.

56. Conner M, Rodgers W, Murray T. Conscientiousness and the intention–behavior relationship: Predicting exercise behavior. J Sport Exerc Psychol. 2007;29(4):518–33.

57. MacCann C, Todd J, Mullan BA, Roberts RD. Can personality bridge the intention-behavior gap to predict who will exercise? Am J Health Behav. 2015;39(1):140–7.

58. Monds LA, MacCann C, Mullan BA, Wong C, Todd J, Roberts RD. Can personality close the intention-behavior gap for healthy eating? An examination with the HEXACO personality traits. Psychol Health Med. 2016;21(7):845–55.

59. Charnsak Srisawatsakul, Gerald Quirchmayr, Borworn Papasratorn. Do Personality Traits Work as Moderator on the Intention to Purchase Mobile Applications Work? - A Pilot Study. 2nd Information and Communication Technology - EurAsia Conference (ICT-EurAsia). Bali, Indonesia.2014:56-65. https://doi.org/10.1007/978-3-642-55032-4_6.

60. Conner M, Grogan S, Fry G, Gough B, Higgins AR. Direct, mediated and moderated impacts of personality variables on smoking initiation in adolescents. Psychol Health. 2009;24(9):1085–104.

61. de Bruijn G-J, Brug J, Van Lenthe FJ. Neuroticism, conscientiousness and fruit consumption: Exploring mediator and moderator effects in the theory of planned behaviour. Psychol Health. 2009;24(9):1051–69.

62. Hair Jr JF, Hult GTM, Ringle CM, Sarstedt M, Danks NP, Ray S. Partial least squares structural equation modeling (PLS-SEM) using R: A workbook: Springer Nature; 2021.

63. Bock G-W, Zmud RW, Kim Y-G, Lee J-N. Behavioral intention formation in knowledge sharing: Examining the roles of extrinsic motivators, social-psychological forces, and organizational climate. MIS quarterly. 2005;29(1):87–111.

64. Phung VD, Hawryszkiewycz I, Chandran D, Ha BM. Promoting knowledge sharing amongst academics: A case study from Vietnam. J Inf Knowl Manag. 2019;18(03):1950032.

65. Akhavan P, Hosseini SM, Abbasi M, Manteghi M. Knowledge-sharing determinants, behaviors, and innovative work behaviors: An integrated theoretical view and empirical examination. Aslib J Inf Manag. 2015;67(5):562–91.

66. Jadin T, Gnambs T, Batinic B. Personality traits and knowledge sharing in online communities. Comput Hum Behav. 2013;29(1):210–6.

67. Rammstedt B, John OP. Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. J Res Pers. 2007;41(1):203–12.

68. Sarstedt M, Ringle CM, Hair JF. Partial least squares structural equation modeling. Handbook of market research: Springer; 2021. p. 587–632.

69. Henseler J, Fassott G. Testing moderating effects in PLS path models: An illustration of available procedures. Handbook of partial least squares: Concepts, methods and applications. 2010:713–35.

70. Zhang X, Gao S, Cheng Y, Meng F. Encouraging physicians' continuous knowledge-sharing in online health communities: A motivational perspective. Front Public Health. 2022;10:1036366.

71. Ramayah T, Yeap JA, Ignatius J. An empirical inquiry on knowledge sharing among academicians in higher learning institutions. Minerva. 2013;51:131–54.

72. D'souza KC, Agarwal UA, Chavali U. Demographic profiling of the locus of control of employees: Evidence from India. Manag Labour Stud. 2013;38(4):335–56.

73. Rhodes RE, Courneya KS, Jones LW. The theory of planned behavior and lower-order personality traits: Interaction effects in the exercise domain. Personality Individ Differ. 2005;38(2):251–65.

74. Kathiravelu SR, Mansor NNA, Ramayah T, Idris N. Why organisational culture drives knowledge sharing? Procedia Soc Behav Sci. 2014;129:119–26.

Publisher's Note