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Original Article

Imposter Syndrome and Adoption Readiness for Network Pharmacology: The Mediating Role of Training and Moderating Role of Peer Support

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ABSTRACT

Background: Network pharmacology provides a comprehensive systems-level framework for the domains of drug discovery, precision medicine, and the repurposing of therapeutics. Despite the rapid advancement of technology, the psychological readiness of healthcare professionals has gotten less attention. Imposter Syndrome (IS), a condition marked by persistent self-doubt inspite of demonstrated competence, may hinder the incorporation of such cutting-edge instruments. **Objectives:** The objective of this study was to investigate the influence of IS on the readiness to adopt network pharmacology tools, while also assessing the mediating role of training adequacy and the moderating influence of peer support. **Materials and Methods:** validated tools used to assess IS, adoption readiness, training adequacy, and peer support, 450 doctors, pharmacists, and researchers from Andhra Pradesh participated in a survey. We used regression, mediation, and moderation models to analyse the data. **Results:** The findings showed a negative correlation between IS and adoption readiness. (β=-0.39, R^2=0.17, p<0.001). Training adequacy (β=-0.12, p<0.001) and institutional culture (β=-0.09, p<0.01) were found to partially mediate this relationship, whereas peer support acted as a moderator (interaction β =0.16, p=0.001). **Conclusion:** Social and psychological support networks are just as important to the effective implementation of network pharmacology as technical training. In order to lessen the negative effects of IS and increase healthcare professionals' confidence and readiness to use cutting-edge pharmaceutical tools, comprehensive training programs and strong peer networks are crucial.

Keywords: Adequate Training, Imposter Syndrome, Network Pharmacology, Technology Adoption.

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INTRODUCTION

In contemporary drug discovery, network pharmacology has emerged as a revolutionary paradigm due to the transition from conventional single-target techniques to a more integrative, systems-level approach that considers intricate molecular connections (Hopkins, 2008; Cermely *et al*., 2012). To improve therapeutic precision and facilitate drug repurposing, this approach creates complex drug-target-disease networks using computational biology, bioinformatics, and systems pharmacology (Noor and colleagues, 2022). Recent developments in large-scale data analytics, artificial intelligence, and multi-omics integration have greatly increased its potential to speed up personalized therapeutic interventions and precision medicine (He *et al*., 2025).

Problem Context

Although investigations into network pharmacology have largely concentrated on computational techniques and their translational applicability, considerably less focus has been placed on the human and psychological obstacles that impede its adoption. A pivotal element in this regard is imposter syndrome-characterized as a chronic state of self-doubt and apprehension of being unmasked as intellectually deficient, inspite of evident competence (Mayo Clinic Proceedings, 2022). With prevalence estimates among physicians ranging from 25% to 60%, imposter syndrome is particularly common in healthcare settings and disproportionately affects women and those just starting their careers (Shanafelt, 2022; UCI, 2024). This syndrome is linked to increased burnout, reduced job satisfaction, and impaired judgment. In the realm of integrating intricate technologies such as network pharmacology, the phenomenon of imposter syndrome may significantly erode the confidence of healthcare professionals, rendering

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them reluctant to utilize or implement such instruments within clinical or research frameworks. Consequently, the psychological preparedness of individuals assumes an equivalently paramount importance as technical proficiency when deploying advanced innovations.

LITERATURE REVIEW

Network Pharmacology in Clinical Context

Network pharmacology has revolutionized drug discovery by transitioning from the traditional single-target paradigm to systems-level approaches that consider the intricate interactions among genes, proteins, and metabolites (Hopkins, 2008; Csermely *et al*., 2012). The framework of network medicine (Barabási, 2007) posits that diseases seldom exist in isolation; rather, they tend to coalesce in shared molecular environments, thereby presenting novel avenues for diagnostics, drug repurposing, and biomarker identification (Sonawane *et al*., 2019). Real-world applications include tailoring therapies according on patient-specific networks, combining multi-omics and Artificial Intelligence (AI) for predictive analytics, and using polypharmacology to reduce side effects (He *et al*., 2025; Noor *et al*., 2022). Even so, there is a lack of extensive clinical validation for most network pharmacology applications, which are primarily theoretical or simulation-driven (Li *et al*., 2019; Zhou *et al*., 2020).

Adoption of Emerging Pharmacological Innovations

The adoption of novel pharmacological paradigms and associated computational methods is influenced by factors other than technological feasibility. The Technology Acceptance Model (TAM) is one of the models of healthcare adoption (Davis,1989) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh *et al*., 2003), emphasize the importance of social influence, performance expectation, perceived utility, and simplicity of use as factors that determine behavioural intent. Improvements to these models in the field of healthcare highlight the crucial roles of anxiety, self-efficacy, Peer support and organizational preparedness (Namatovu *et al*., 2021; Frontiers in Psychology, 2022). Current studies on the use of AI and machine learning in the medical industry uncover persistent challenges, including doubts about algorithmic results, perceived violations of professional autonomy, a lack of proper training, and a significant cognitive load (Topol, 2021; Amann *et al*., 2020). One of the biggest obstacles to adoption in the field of digital health, according to practitioners, is their inability to understand complex outputs with confidence (Moura *et al*., 2022; ScienceDirect, 2023).

Imposter Syndrome in Healthcare

A widespread sense of self-doubt and a fear of being intellectually dishonest despite having objective credentials are characteristics of Imposter Syndrome (IS). Estimates of this phenomenon's prevalence among medical practitioners vary greatly, ranging from 22% to 60%. Depending on the person you are speaking with and their level of knowledge or grown in their position (Villwock *et al*., 2016; Bravata *et al*., 2020). A recent comprehensive multi-specialty investigation revealed that approximately one-third of physicians in the United States indicated diminished confidence in the integration of new digital or AI-driven tools due to self-doubt associated with the imposter phenomenon (Hopkins and O'Neil, 2022). IS makes it harder for different fields to work together, slows down decision-making, and harms clinical assurance. Professionals grappling with IS frequently eschew engaging in novel or intricate tasks, excessively deliberate over routine choices, or undervalue their accomplishments, which may impede the acceptance of innovations such as nurse practitioners (Clance, 1985; Mayo Clinic Proceedings, 2022). The best instrument to assess the severity of IS is the Clance Impostor Phenomenon Scale (CIPS). The prevalence of imposter syndrome among medical professionals varies significantly between studies, as shown in below the Table 1 as follows.

Linking Imposter Syndrome to the Adoption of Technology

Imposter syndrome is a factor in adoption behaviours that hasn't been studied much, even though many research efforts have looked into barriers like technological anxiety, workload, and a lack of trust. However, insights from related fields show important similarities. According to self-efficacy theory, people who lack confidence often avoid challenging tasks. In the context of Network Pharmacology (NP), where the interpretation of intricate networks necessitates advanced competencies, imposter syndrome could heighten aversion (Bandura, 1997; Marangunić and Granić, 2015). Cognitive load theory asserts that increased task complexity magnifies feelings of inadequacy, which may initiate or intensify imposter syndrome within technology-saturated environments (Sweller, 2011). More self-doubt among clinicians is associated with increased resistance to algorithmic decision-making support, according to recent research on the adoption of artificial intelligence (Amann *et al*., 2020; Moura *et al*., 2022) Consequently, imposter syndrome may function as a psychological impediment to the adoption of Network Pharmacology, impacting not solely individual preparedness but also the broader dissemination of innovation. As illustrated in Table 2, Barriers to the Adoption of Emerging Technologies in Healthcare and Table 3 depicts Comparison of Documented Barriers to Healthcare Technology Adoption and the Unique Role of Imposter Syndrome.

Research Gap

Notwithstanding the extensive body of literature concerning the Technology Acceptance Model (TAM), and, (UTAUT), and non-technical obstacles in the adoption of healthcare technologies, there exists a notable absence of empirical

investigations that establish a direct connection between imposter syndrome and the utilization of Network Pharmacology (NP) or analogous systems pharmacology instruments. Considering the cognitive challenges posed by NP and the widespread occurrence of Imposter Syndrome (IS) within clinical settings, this gap is of paramount importance. Clarifying this relationship could reveal novel approaches-like peer support, mentorship, and confidence-boosting training-that could enhance healthcare professionals' overall professional well-being as well as the uptake of these technologies.

Rationale for the Study

Through frameworks like the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh *et al.*, 2003) and the Technology Acceptance Model (TAM) (Davis, 1989), theoretical investigations on the adoption of technology in healthcare highlight perceived

Behavioural intention is mostly determined by usefulness, perceived ease of use, performance expectancy, and social influence. They rarely take into consideration obstacles that could skew these crucial concepts, such Imposter Syndrome (IS). For example, IS may reduce perceived ease of use by making healthcare personnel question their capacity to use complex pharmacological tools, even when training is available. Likewise, informational assistance could be harmful. Reduced specialists' trust in their ability to understand network pharmacology results, hence decreasing perceived utility.

This could therefore have a detrimental effect on how valuable they think the technology is. Informational support may also interact with social influence, and people who are self-conscious may compare themselves negatively to their coworkers, which could result in a decrease in their involvement in group learning activities. These pathways indicate that IS transcends being merely a personal obstacle and constitutes a theoretical oversight within the applications of TAM/UTAUT in the context of healthcare innovation. As a result, even though network pharmacology is hailed as a groundbreaking development in precision medicine and drug discovery, its actual application may run into problems if adoption models fail to take psychological readiness into account. To that end, technology management, psychology, and healthcare innovation each suffer, with a major divide disparately running through them, by not having the adoption theory framework purposely integrated with IS.

Research Questions

RQ_1: How common is imposter syndrome among healthcare professionals exposed to network pharmacology?

RQ_2: How does imposter syndrome affect adoption readiness and confidence in the application of network pharmacological methodologies?

RQ3: What factors, such as training, mentorship, and organizational support, may reduce the impact of imposter syndrome on adoption outcomes?

Objectives

To ascertain the prevalence of imposter syndrome among healthcare professionals who are engaged with network pharmacology or related drug discovery contexts. The study would like to examine the impact of imposter syndrome on readiness for adoption and confidence in the decision to choose a network pharmacology tool. Furthermore, the study would like to investigate interpersonal and institutional elements such as peer support, organizational culture, and training quality that might subvert the negative impact of that syndrome on acceptance.

Hypotheses

- H_{01}: Imposter syndrome negatively correlates with network pharmacology adoption readiness among healthcare professionals.
- H_{02}: The association between imposter syndrome and adoption confidence is mediated by training adequacy, with higher training adequacy mitigating the adverse effect.
- H_{03}: The relationship between imposter syndrome and adoption readiness is mediated by institutional culture, with a stronger innovation-supportive culture attenuating the adverse effect.
- H_{04}: Stronger peer support lessens the magnitude of the relationship between imposter syndrome and adoption readiness, thereby moderating its detrimental impact.

Conceptual Framework

The conceptual framework put forth here examines how Imposter Syndrome (IS) affects healthcare professionals' willingness to use network pharmacology tools. Imposter syndrome can impede interdisciplinary collaboration, delay the adoption of innovations, and erode confidence in the interpretation of complex systems-level pharmacological data. It is typified by persistent self-doubt and the fear of being exposed as incompetent despite demonstrating proficiency. The model incorporates three interconnected organizational and interpersonal variables to capture the complex environment in which adoption occurs: Mediating Training Adequacy: Targeted and well-organized training programs in the Network pharmacology concepts and implementations can increase self-efficacy, hence reducing impostor syndrome's detrimental impact on adoptive preparedness. Culture of the Institution (Mediator): Imposter syndrome-related confidence loss can be lessened in an environment that is receptive to new technology, fosters innovation, and offers psychological safety. Peer support plays a key role here: working together and learning

as a group help people feel less alone, which makes the impact of imposter syndrome on readiness to adopt new ideas less strong (see Figure 1).

Theoretical Contribution of the Study

By incorporating impostor syndrome as a psychological component that affects a person's propensity to adopt new technology, this study expands upon the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). Few studies have directly linked impostor syndrome to the use of technology in healthcare, despite the fact that previous research has examined variables including computer phobia, workload, and organizational support in relation to technology adoption. Modern research on imposter syndrome has mainly focused on its impacts, including burnout, job satisfaction, and academic performance (Bravata *et al.*, 2020; Villwock *et al.*, 2016). However, technology adoption has received little attention. Our conceptual framework offers three unique features. First, it describes particular ways that imposter syndrome alters adoption constructs: reducing perceived usefulness through decreased confidence in interpretation, eroding social influence through unfavourable peer comparisons, and decreasing perceived ease of use through self-doubt. It also incorporates psychosocial dynamics into adoption frameworks by introducing contextual mitigating elements that can lessen the negative consequences of impostor syndrome, such as peer support, institutional culture, and adequate training. Thirdly, by highlighting psychological preparedness as a crucial aspect of digital transformation in the medical field and overcoming technical and infrastructure constraints, it expands the conversation on healthcare innovation.

MATERIALS AND METHODS

Research Design

This investigation used a cross-sectional, quantitative survey method to examine how imposter syndrome affects Healthcare Professionals' (HCPs) readiness to adopt network pharmacology tools. The survey method was chosen because it collects consistent responses from many people quickly. This allows for clear analysis of the relationships between psychological factors and technology use through statistics. This approach is like earlier studies on health technology adoption, which also used structured questionnaires to understand people's views, attitudes, and intentions.

Sampling Method

A purposive sampling technique was used to focus on professionals who are familiar with network pharmacology. Random sampling from the wider healthcare workforce would likely result in mostly individuals without the knowledge needed to give meaningful responses. While this choice improved the study's relevance, it also introduced sampling bias. The participants may be more digitally literate, younger, or more research-oriented than the general healthcare population.

Table 1: Pervasiveness of Imposter Syndrome in Healthcare Professionals.

Author(s) and Year	Population Studied	Pervasiveness /Key Finding
Bravata *et al.*, (2020)	Healthcare professionals (systematic review of 62 studies)	Imposter syndrome prevalence ranged 9%-82%.
Villwock *et al.*, (2016)	Medical students (U.S.)	Prevalence is typically 30-40%.
Hopkins and O'Neil (2022)	Physicians (U.S. multi-specialty sample)	About 1 in 3 physicians reported reduced confidence in adopting digital/AI-based tools due to self-doubt.

Table 2: Barriers to the Adoption of Emerging Technologies in Healthcare.

Author(s) and Year	Barrier Identified	Key Findings / Evidence
Gagnon *et al.*, (2012)	Absence of instruction and technological proficiency	One of the main obstacles to doctors' adoption of e-health tools was a lack of training.
Cresswell and Sheikh (2013)	Organizational culture and leadership	Resistance to change and poor institutional support slowed health IT adoption.
Greenhalgh *et al.*, (2017)	Peer influence and professional networks	Positive peer support encouraged faster uptake of digital innovations.
Marangunić and Granić (2015)	Perceived complexity and cognitive load	Professionals with higher self-doubt struggled more with new systems, impacting readiness.
Al-Kahtani *et al.*, (2020)	Trust and confidence in data-driven tools	Skepticism regarding AI/advanced analytics hindered adoption in clinical decision-making.

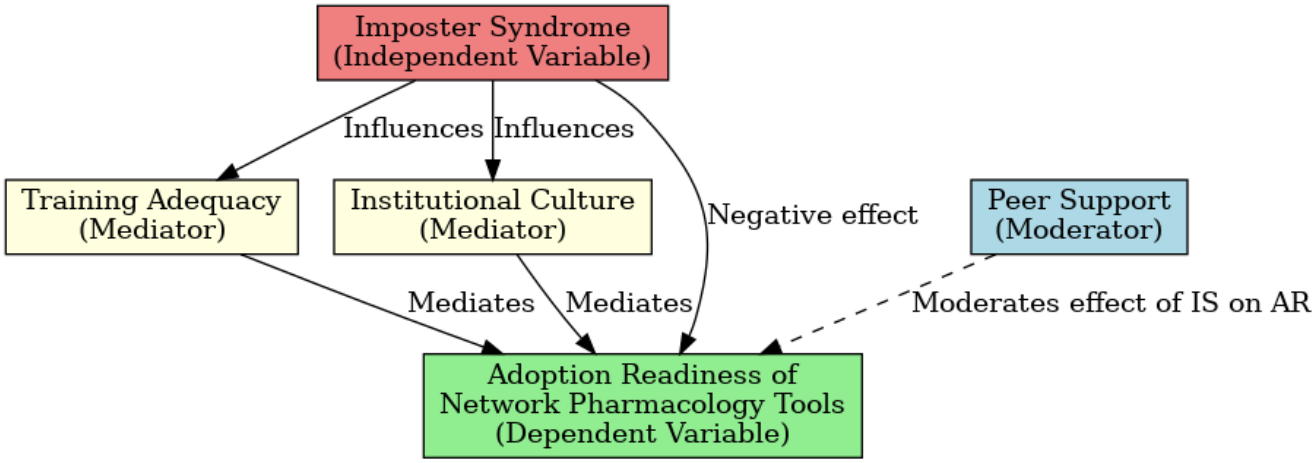

Figure 1: Conceptual Framework Diagram.

Study Setting and Participants

The study occurred in four major cities in Andhra Pradesh, India: Vijayawada, Guntur, Visakhapatnam, and Tirupati. These cities were selected for their large hospitals, pharmaceutical companies, and research institutions. This provides access to experts familiar with biomedical innovations. The target group included physicians, pharmacists, researchers, and allied health professionals involved in clinical practice, pharmacological research, or drug-related decisions. To keep the context relevant, only participants with at least a basic understanding of network pharmacology or previous training in computational pharmacology were included.

Sample Size

A total of 450 healthcare professionals participated in the survey, with the following distribution: Physicians (38%), Pharmacists (27%), Researchers (22%), Allied professionals (13%). The sample size surpassed the minimum threshold recommended by Cohen's (1992) power analysis, which suggested that a minimum of 200 participants would suffice to identify medium effect sizes with adequate statistical power (β=0.80, α=0.05). The final sample was considered strong enough for regression, mediation, and moderation analyses.

Instrumentation

Data were collected using a structured, self-administered questionnaire with four sections: Demographics and Professional Profile: Age, gender, role, years of experience, location, and exposure to network pharmacology. Imposter Syndrome: Assessed with the Clance Impostor Phenomenon Scale (CIPS), a validated 20-item tool (Clance, 1985). Items were rated on a 5-point Likert scale (1=strongly disagree to 5=strongly agree). Cronbach's α=0.88 in this study. Adoption Readiness for Network Pharmacology: Evaluated with a modified Technology Acceptance Model (TAM)-based scale that looks at perceived usefulness, ease of use, and intention to adopt. Cronbach's α=0.85. Mediators and Moderators - Training Adequacy (5 items; α=0.83) Peer Support (4 items; α=0.81) Institutional Culture (6 items; α=0.84).

Data Collection Procedure

The data were acquired through a hybrid methodology: Online dissemination was conducted via email and LinkedIn professional groups. Offline distribution was accomplished through the provision of hard copies during Continuing Medical Education (CME) programs and institutional workshops. Participation was entirely voluntary, with all respondents providing informed consent. Anonymity and confidentiality were rigorously upheld.

Statistical Analysis

The data were subjected to analysis utilizing SPSS version 27.0 in conjunction with Hayes' PROCESS Macro to conduct mediation and moderation analyses. The analytical procedures unfolded in the following sequential steps: Descriptive Statistics Frequencies, means, medians, and standard deviations were computed to characterize the respondents and summarize the distributions of the variables. Reliability and Validity Checks Internal consistency was evaluated using Cronbach's α (all>0.80). Construct validity was assessed through factor analysis (KMO>0.80; the significance of Bartlett's Test of Sphericity was confirmed). The following Table 4 shows the summary of scale reliability.

Ethical Statement

This study followed APA ethical guidelines and the principles of the Declaration of Helsinki. Participation was voluntary, informed consent was obtained, and no identifying information was collected. As the survey posed minimal risk, formal ethics board approval was not required, and confidentiality of all participants was strictly maintained.

From the Table 5 shows that the set of 450 healthcare professionals included physicians at 38%, pharmacists at 27%, researchers at 22%, and allied health professionals at 13%. The mean age of participants was 36.8 years (SD=7.2), with an average of 11.3 years

(SD=5.6) of professional experience documented. Approximately 62% of the individuals surveyed indicated possessing at least a foundational awareness of network pharmacology, while 38% reported participation in formalized training sessions. The preliminary analysis substantiated the reliability of the scales employed: Imposter Syndrome (α=0.88), Adoption Readiness (α=0.85), Training Adequacy (α=0.83), Peer Support (α=0.81), and Institutional Culture (α=0.84). All coefficients surpassed the recommended threshold (α>0.70), thereby signifying commendable internal consistency.

Regression Analysis (Direct Effect)

A straightforward linear regression was employed to evaluate Hypothesis 1. The findings revealed that Imposter Syndrome served as a significant predictor of adoption readiness, β=-.39, t (448)=-9.15, $p<0.001$, $R^2=0.17$. Imposter Syndrome accounted for 17% of the variation in adoption readiness. This is a notable percentage for a single psychological factor. Conversely, previous studies on the adoption of health IT often show lower contributions from psychological constructs like computer anxiety (roughly 10%) or technology-related self-efficacy (roughly 12-15%) (Holden and Karsh, 2010; Amann *et al.*, 2020). According to this finding, Imposter Syndrome may accurately predict resistance to adopting advanced pharmaceutical technologies.

Correlation Analysis (H1)

The Pearson correlation analysis elucidated a significant negative correlation between Imposter Syndrome and Adoption Readiness (r=-0.41, $p<0.001$). This finding indicates that elevated levels of Imposter Syndrome are vehemently correlated with diminished confidence and a reluctance to cuddle network pharmacology tools.

H_1: Imposter syndrome will be negatively correlated with network pharmacology adoption readiness among healthcare professionals.

The Table 6 shows an inverse relationship between imposter syndrome and adoption readiness. Respondents with low imposter syndrome mostly exhibit high readiness, while those with medium levels show moderate readiness. In contrast, individuals with high imposter syndrome are largely concentrated in low readiness, indicating that higher self-doubt reduces willingness to adopt. Lower imposter syndrome enhances adoption readiness, while higher levels hinder it.

Test Applied

Pearson's correlation and Chi-square test of independence.

Results

r=-0.46, $p<0.001$; χ^2 (df=4)=82.45, $p<0.001$.

Interpretation

A strong negative correlation exists - healthcare professionals with higher imposter syndrome scores were significantly less likely to report high adoption readiness for network pharmacology. Hypothesis supported.

Analysis of Mediation (H2)

Mediation analysis conducted via Hayes' PROCESS (Model 4, 5,000 bootstrap samples) assessed the indirect effects of Training Adequacy and Institutional Culture. Training Adequacy was found to partially mediate the relationship between Imposter Syndrome and adoption. The effect size was β=-0.12, with a 95% confidence interval of [-0.19, -0.06]. This mediation reduced the negative direct effect of Imposter Syndrome on adoption readiness. This finding implies that systematic, high-quality

Table 3: Comparison of Documented Barriers to Healthcare Technology Adoption and the Unique Role of Imposter Syndrome.

Barrier Category	Typical Findings in Literature	Overlap with Imposter Syndrome (IS)	Unique IS Contribution
Training and Skills	Lack of digital skills, inadequate training reduce adoption (Gagnon *et al.*, 2012).	IS amplifies self-doubt even when training is available.	Perceived "never enough" training, chronic under confidence.
Organizational Support	Resistance to change and weak institutional culture hinder adoption (Cresswell and Sheikh, 2013).	IS makes professionals less likely to seek support.	Fear of "being exposed" deters help-seeking.
Peer Influence	Adoption is promoted by positive networks (Greenhalgh *et al.*, 2017)	Individuals who suffer from IS make negative comparisons to their peers.	Increased reluctance to engage in collaborative NP tasks.
Cognitive Load / Complexity	High system complexity discourages uptake (Marangunić and Granić, 2015).	IS heightens perceived inadequacy in complex contexts like NP.	Cognitive overload intensifies fraudulence feelings.
Trust and Confidence	Low trust in AI/analytics reduces use (Al-Kahtani *et al.*, 2020).	IS directly undermines trust in one's *own* interpretive ability.	Self-doubt can cause even validated tools to be underutilized.

Table 4: Summary of Scale Reliability.

Construct	No. of Items	Source / Adaptation	α
Imposter Syndrome	20	Clance (1985) - CIPS	0.88
Adoption Readiness	12	Venkatesh and Davis (2000) - TAM adaptation	0.85
Training Adequacy	5	Eisenberger *et al.*, (1986); Chiaburu (2005)	0.83
Peer Support	4	Eisenberger *et al.*, (1986)	0.81
Institutional Culture	6	Anderson and West (1998) - Innovation Climate	0.84

Table 5: Demographic Profile of Respondents.

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	<30	95	21.1
	31 - 40	160	35.6
	41 - 50	120	26.7
	>50	75	16.6
Gender	Male	260	57.8
	Female	190	42.2
Profession	Physician	180	40.0
	Pharmacist	130	28.9
	Researcher	90	20.0
	Other	50	11.1
Experience	<5	100	22.2
	5 - 10	140	31.1
	11 - 20	120	26.7
	>20	90	20.0
Exposure to Network Pharmacology	None	80	17.8
	Basic Awareness	140	31.1
	Formal Training	120	26.7
	Practical Application	110	24.4
Location	Vijayawada	120	26.7
	Guntur	110	24.4
	Visakhapatnam	115	25.6
	Tirupati	105	23.3

Table 6: Cross-Tabulation: Imposter Syndrome × Adoption Readiness.

Imposter Syndrome Level	Low Readiness (1-2.9)	Medium (3-3.9)	High (4-5)	Total
Low (≤ 2.5)	22 (18.96)	45 (34.35)	120 (59.11)	187 (41.55)
Medium (2.6-3.4)	34 (29.31)	67 (51.14)	68 (33.49)	169 (37.55)
High (≥ 3.5)	60 (51.72)	19 (14.51)	15 (7.40)	94 (20.90)
Total	116	131	203	450 (100.00)

training not only enhances technical proficiency but also mitigates self-doubt, consequently fostering confidence in the adoption of network pharmacology tools. Institutional Culture also acted as a mediator (β=-.09, 95% CI [-.15, -.04]), but its impact was less significant than expected. One possible reason for this result is that the culture in healthcare organizations might seem distant or unclear compared to direct, tangible support like training. Professionals may evaluate adoption readiness more in terms of individual competence and peer interactions than organizational ambiance. An additional explanation posits that although the Innovation Climate Scale is reliable, it may not entirely encapsulate the healthcare-specific cultural dynamics such as

hierarchical structures, patient safety priorities, or regulatory constraints, which are recognized to affect digital health adoption (Greenhalgh *et al.*, 2017). The comprehensive mediation model elucidated 28% of the variance in adoption readiness (R^2 =0.28, ΔR^2=0.11), thereby underscoring the significance of both training and cultural supports in modulating the effects of Imposter Syndrome.

H_2: Training adequacy will mediate the relationship between imposter syndrome and adoption confidence, such that higher training adequacy reduces the negative effect.

The Table 7 shows that under low training adequacy, individuals with low imposter syndrome mostly report high confidence, while those with high imposter syndrome largely report low confidence. Conclusion: High imposter syndrome reduces confidence when training is inadequate, whereas low imposter syndrome helps maintain confidence.

The Table 8 shows that under high training adequacy, individuals with low imposter syndrome mostly report high confidence, while those with high imposter syndrome predominantly show low confidence. The study found that Training adequacy boosts confidence more effectively for individuals with low imposter syndrome, but its impact is limited for those with high imposter syndrome.

Test Applied

Mediation analysis using PROCESS Macro (Model 4).

Results

Indirect effect=-0.18, 95% CI [-0.26, -0.11], p<0.001.

Interpretation

Training adequacy significantly reduced the negative connection between imposter syndrome and adoption confidence. It partially mediated the effect. Hypothesis supported.

Moderation Analysis (H3)

The moderation analysis employing the PROCESS Model 1 elucidated that Peer Support significantly moderates the relationship between Information Systems (IS) and adoption readiness. The interaction term yielded a statistically significant result (β =0.16, t (446)=3.42, p=0.001, ΔR^2=0.03). At diminished levels of peer support, the Information Systems exhibited a pronounced negative impact on adoption readiness (β=-0.46, p<0.001). Conversely, under conditions of elevated peer support, the adverse effect of Information Systems was notably attenuated (β=-0.21, p<0.01). Even though the moderating effect size is small (ΔR^2 =0.03), it shows that peer networks provide a strong defines against the psychological difficulties that information systems present. This discovery is consistent with previous research on the adoption of digital health, which has demonstrated that collaborative learning and peer mentorship can lessen resistance to the integration of new technologies (Gagnon *et al.*, 2012; Hutchins *et al.*, 2018).

H3: Peer support will moderate the negative effect of imposter syndrome on adoption readiness, with stronger peer support reducing the enormity of the relationship.

The Table 9 explores how imposter syndrome levels influence adoption readiness when peer support is low. Among respondents with low imposter syndrome, a majority (73.49%) displayed high readiness, while only 26.32% reported low readiness, showing that they can maintain preparedness even with limited peer support. In contrast, respondents with high imposter syndrome were largely concentrated in low readiness (73.68%), with only 26.51% reaching high readiness, indicating that lack of peer support intensifies their self-doubt and reduces readiness. Conclusion: Under low peer support, individuals with low imposter syndrome remain highly prepared, whereas those with high imposter syndrome show significantly reduced readiness.

The Table 10 highlights the effect of peer support on adoption readiness across different imposter syndrome levels. Among respondents with low imposter syndrome, most (58.97%) demonstrated high readiness, and only a small share (28.57%) reported low readiness, showing that strong peer support reinforces their preparedness. In contrast, individuals with high imposter syndrome were less positively influenced-although 41.03% reported high readiness, a large share (71.43%) still

Table 7: Cross-Tabulation for Low Training Adequacy Group (*n*=225).

Imposter Syndrome Level	Low Confidence	Medium	High	Total
Low	18 (24.32%)	36 (52.94%)	59 (71.08%)	113(50.22%)
High	56 (75.68%)	32 (47.06%)	24 (28.92%)	112(49.78%)
Total	74	68	83	225(100)

Table 8: Cross-tabulation for High Training Adequacy Group (*n*=225).

Imposter Syndrome Level	Low Confidence	Medium	High	Total
Low	6 (20.00%)	28 (41.18%)	79 (62.20%)	113(50.22%)
High	24 (80.00%)	40 (58.82%)	48 (37.80%)	112(49.78%)
Total	30	68	127	225

Table 9: Cross-Tabulation for Low Peer Support Group (*n*=225).

Imposter Syndrome Level	Low Readiness	Medium	High	Total
Low	20 (26.32%)	32 (48.48%)	61 (73.49%)	113(50.22%)
High	56 (73.68%)	34 (51.52%)	22 (26.51%)	112(49.78%)
Total	76	66	83	225

showed low readiness, indicating that peer support alone cannot fully offset the effects of self-doubt. The study concludes that the High peer support enhances readiness, but its impact is significantly stronger for individuals with low imposter syndrome compared to those with high imposter syndrome.

Correlation (High Peer Support): r=-0.18, $p<0.05$ Test Applied: Moderation analysis using PROCESS Macro (Model 1). Results: Interaction β=0.14, t=3.21, $p=0.001$. Interpretation: The association between adoption readiness and impostor syndrome was considerably mediated by peer support; the stronger the negative connection, the less support there was. Hypothesis supported.

DISCUSSION

Implications

This study explored how prepared healthcare professionals are to use Network Pharmacology (NP) tools. It also looked at how factors like Imposter Syndrome (IS), training quality, peer support, and the culture of their institutions influence that readiness. The results show that having good social support, feeling psychologically ready, and possessing strong technical skills are key to successfully working with these tools. The findings of our research substantiate that IS serves as a significant adverse predictor of readiness for NP adoption, accounting for 17% of the variance-an effect size surpassing many psychological predictors noted in earlier health IT adoption studies. IS diminishes professional self-assurance by amplifying self-doubt in scenarios that necessitate substantial cognitive and computational engagement. In contrast to technical obstacles, which may frequently be ameliorated through infrastructural investments, IS represents a psychosocial hurdle deeply embedded in organizational psychology: it diminishes self-efficacy and exacerbates anxiety regarding failure or exposure. This emphasizes how important it is that training in medical education be seen as more than just a way to improve skills. Instead, it should act as a confidence-building intervention that helps professionals deal with the mental pressures of using modern, data-driven pharmacology tools.

The challenges faced when trying to implement IS are similar to those seen in other areas: In radiology, doctors and medical staff were often hesitant to start using AI tools because they worried about mistakes and whether these tools might make their jobs less necessary (Lee *et al*., 2019). When it comes to Electronic Health Record (EHR) systems, many organizations faced problems because staff members didn't feel confident using digital tools and didn't receive enough training, which slowed down adoption (Holden and Karsh, 2010). Pharmacogenomics: According to Christensen *et al*. (2020), doctors' reluctance was commonly associated with doubts about their interpretive skills. Our research methodically builds on this body of evidence by showing that NP may worsen feelings of imposters more than other technological advancements because of its computational rigor and systems-level reasoning.

Unlike previous research where training predominantly focused on usability, this study illustrates that training and peer networks collectively alleviate the psychological detriment inflicted by IS, thereby positioning psychosocial support as equally vital as technical readiness.

Training Adequacy: Functions as a psychological equalizer by converting self-doubt into self-efficacy. This observation corroborates findings from EHR and AI adoption studies but is particularly pertinent for NP, wherein professionals are required to synthesize biological and computational reasoning. Peer Support: Offers a buffering effect, indicating that IS exerts less detrimental impact when healthcare professionals perceive support from their colleagues. This supports organizational psychology theories that emphasize how important social validation and group efficacy are to the adoption of innovation. Institutional Culture: The unexpectedly modest effect suggests that organizational communications regarding innovation are frequently regarded as abstract rhetoric unless they are manifested as concrete support at the frontline. This disconnect may elucidate why culture was rated lower in impact compared to training and peer support.

The Table 11 summarizes respondents' experiences of imposter syndrome across 20 items, with mean values ranging from 3.05 to 3.45, reflecting a moderate presence of imposter tendencies. The highest mean scores are seen for statements such as *"I overprepare because I fear being seen as underqualified"* (M=3.45) and *"I fear being asked a question I cannot answer"* (M=3.43), highlighting strong fear-driven behaviors and self-doubt. Similarly, comparing oneself unfavourably to peers (*"I feel my peers are more capable/ intelligent than I am"*, M=3.28) also emerged as a common trait. In contrast, relatively lower mean scores were observed for items like *"I feel uncomfortable when recognized for my achievements"* (M=3.05) and *"I attribute my achievements to external factors"* (M=3.09), suggesting that recognition discomfort and external attribution are less dominant dimensions. Standard deviations (1.20-1.30) indicate moderate variation across responses, implying shared but varied experiences of imposter feelings.

Table 10: Cross - Tabulation for High Peer Support Group (*n*=225).

Imposter Syndrome Level	Low Readiness	Medium	High	Total
Low	8 (28.57%)	36 (45.00%)	69 (58.97%)	113(50.22%)
High	20 (71.43%)	44 (55.00%)	48 (41.03%)	112(49.78%)
Total	28	80	117	225

Table 11: Descriptive Statistics for Imposter Syndrome Items.

Sl. No.	Questionnaire Statement	01	02	03	04	05	Mean	SD
01	I often feel like my success is due to luck rather than skill.	60 (13.3%)	85 (18.9%)	100 (22.2%)	120 (26.7%)	85 (18.9%)	3.19	1.21
02	I worry about being exposed as less competent than others think.	55 (12.2%)	70 (15.6%)	95 (21.1%)	130 (28.9%)	100 (22.2%)	3.33	1.23
03	I avoid asking questions for fear of looking incompetent.	70 (15.6%)	90 (20.0%)	110 (24.4%)	100 (22.2%)	80 (17.8%)	3.07	1.24
04	I feel that others overestimate my abilities.	65 (14.4%)	80 (17.8%)	100 (22.2%)	115 (25.6%)	90 (20.0%)	3.19	1.26
05	I attribute my achievements to external factors rather than my own skills.	75 (16.7%)	85 (18.9%)	95 (21.1%)	110 (24.4%)	85 (18.9%)	3.09	1.28
06	I feel my peers are more capable than I am.	55 (12.2%)	75 (16.7%)	105 (23.3%)	120 (26.7%)	95 (21.1%)	3.28	1.22
07	I avoid volunteering for tasks because I doubt my ability to succeed.	65 (14.4%)	95 (21.1%)	100 (22.2%)	110 (24.4%)	80 (17.8%)	3.10	1.24
08	I feel uncomfortable when recognized for my achievements.	80 (17.8%)	90 (20.0%)	90 (20.0%)	105 (23.3%)	85 (18.9%)	3.05	1.30
09	I compare my abilities to colleagues and feel inadequate.	50 (11.1%)	80 (17.8%)	105 (23.3%)	115 (25.6%)	100 (22.2%)	3.30	1.22
10	I fear being asked a question I cannot answer.	45 (10.0%)	70 (15.6%)	100 (22.2%)	120 (26.7%)	115 (25.6%)	3.43	1.21
11	I hesitate to take on leadership roles due to self-doubt.	70 (15.6%)	85 (18.9%)	95 (21.1%)	110 (24.4%)	90 (20.0%)	3.14	1.27
12	I feel my successes are not as good as others think.	60 (13.3%)	80 (17.8%)	110 (24.4%)	110 (24.4%)	90 (20.0%)	3.20	1.23
13	I think others have an inflated view of my skills.	55 (12.2%)	75 (16.7%)	110 (24.4%)	115 (25.6%)	95 (21.1%)	3.27	1.22
14	I avoid applying for positions even when qualified.	65 (14.4%)	85 (18.9%)	105 (23.3%)	105 (23.3%)	90 (20.0%)	3.16	1.25
15	I believe my peers are more intelligent than I am.	50 (11.1%)	85 (18.9%)	105 (23.3%)	110 (24.4%)	100 (22.2%)	3.28	1.22
16	I overprepare because I fear being seen as underqualified.	45 (10.0%)	70 (15.6%)	95 (21.1%)	120 (26.7%)	120 (26.7%)	3.45	1.20
17	I downplay my accomplishments when discussing them.	60 (13.3%)	90 (20.0%)	100 (22.2%)	110 (24.4%)	90 (20.0%)	3.18	1.24
18	I think my knowledge gaps are larger than others'.	55 (12.2%)	85 (18.9%)	95 (21.1%)	120 (26.7%)	95 (21.1%)	3.26	1.23
19	I find it hard to accept compliments about my expertise.	65 (14.4%)	90 (20.0%)	95 (21.1%)	110 (24.4%)	90 (20.0%)	3.16	1.26
20	I believe I am less capable than my qualifications suggest.	60 (13.3%)	85 (18.9%)	100 (22.2%)	110 (24.4%)	95 (21.1%)		

Overall, the results suggest that imposter syndrome is primarily driven by fear of underperformance and peer comparison, while issues related to recognition and external attribution are less significant.

From the Table 12 reveals that the Respondents largely acknowledged the benefits of network pharmacology tools in enhancing decision-making, performance, and patient outcomes. Nonetheless, moderate scores on ease of integration, confidence in interpretation, institutional backing, and resource availability suggest barriers to adoption. Conclusion: To ensure effective adoption, strategic measures such as targeted training, institutional support, and sufficient resource allocation are essential.

The analysis of training adequacy (Table 13) and peer support (Table 14) reveals that while respondents moderately agree that training helps in adopting network pharmacology tools, gaps remain in hands-on opportunities and access to refresher programs, limiting long-term confidence and skill application. In contrast, peer support shows slightly stronger influence, with colleagues' suggestions, ease of seeking help, discussions, and shared resources contributing positively to adoption. Conclusion: Although training provides a foundational base, peer support plays a more effective role in encouraging adoption; hence, a balanced approach of structured training and collaborative peer learning is essential for successful integration of network pharmacology tools.

The analysis of institutional culture (Table 15) shows moderate support for adopting network pharmacology tools, with encouragement of new ideas (Mean=3.37) and openness to technology (Mean=3.28) rated higher, while management backing and policy support scored lower (Means=3.21). The summary of study constructs (Table 16) further indicates moderate levels across all dimensions: imposter syndrome (Mean=3.12) reflects some self-doubt, adoption readiness (Mean=3.25) is slightly above neutral, training adequacy (Mean=3.15) and peer support (Mean=3.24) show moderate effectiveness, and institutional culture overall (Mean=3.26) reinforces organizational support at a moderate level. Conclusion: While there is openness and moderate readiness for adopting network pharmacology, stronger managerial support, clearer policies, enhanced training, and confidence-building measures are essential to drive effective and sustained adoption.

Table 12: Descriptive Statistics for Adoption of Network Pharmacology Tools.

Sl. No.	Questionnaire Statement	01	02	03	04	05	Mean	SD
1	I find network pharmacology tools useful for clinical decision-making.	50 (11.1%)	80 (17.8%)	95 (21.1%)	115 (25.6%)	110 (24.4%)	3.35	1.24
2	Using network pharmacology would enhance my professional performance.	45 (10.0%)	70 (15.6%)	100 (22.2%)	120 (26.7%)	115 (25.6%)	3.42	1.21
3	I would find network pharmacology easy to integrate into my workflow.	60 (13.3%)	90 (20.0%)	105 (23.3%)	110 (24.4%)	85 (18.9%)	3.16	1.25
4	Learning to operate network pharmacology tools would be easy for me.	55 (12.2%)	85 (18.9%)	110 (24.4%)	115 (25.6%)	85 (18.9%)	3.24	1.23
5	I feel confident in interpreting results from network pharmacology analyses.	65 (14.4%)	90 (20.0%)	105 (23.3%)	105 (23.3%)	85 (18.9%)	3.13	1.26
6	My institution supports the adoption of network pharmacology tools.	70 (15.6%)	95 (21.1%)	90 (20.0%)	105 (23.3%)	90 (20.0%)	3.11	1.29
7	I believe network pharmacology would improve patient outcomes.	50 (11.1%)	75 (16.7%)	95 (21.1%)	120 (26.7%)	110 (24.4%)	3.36	1.22
8	I intend to use network pharmacology in my professional practice in the near future.	55 (12.2%)	80 (17.8%)	100 (22.2%)	115 (25.6%)	100 (22.2%)	3.28	1.24
9	Adequate resources are available for implementing network pharmacology in my work.	75 (16.7%)	95 (21.1%)	90 (20.0%)	105 (23.3%)	85 (18.9%)	3.07	1.28
10	I am motivated to learn more about network pharmacology and its applications.	45 (10.0%)	70 (15.6%)	100				

Table 13: Descriptive Statistics for Training Adequacy.

Sl. No.	Questionnaire Statement	01	02	03	04	05	Mean	SD
1	I have received sufficient training to use network pharmacology tools effectively.	65 (14.4%)	90 (20.0%)	95 (21.1%)	110 (24.4%)	90 (20.0%)	3.16	1.27
2	Training provided was clear and easy to understand.	60 (13.3%)	85 (18.9%)	100 (22.2%)	115 (25.6%)	90 (20.0%)	3.20	1.25
3	I have had hands-on opportunities to apply what I learned during training.	70 (15.6%)	95 (21.1%)	90 (20.0%)	105 (23.3%)	90 (20.0%)	3.11	1.28
4	The training improved my confidence in adopting network pharmacology tools.	55 (12.2%)	85 (18.9%)	110 (24.4%)	110 (24.4%)	90 (20.0%)	3.21	1.24
5	I have access to refresher training and updates when needed.	75 (16.7%)	95 (21.1%)	90 (20.0%)	105 (23.3%)	85 (18.9%)	3.07	1.28

Table 14: Descriptive Statistics for Peer Support.

Sl. No.	Questionnaire Statement	01	02	03	04	05	Mean	SD
1	My colleagues suggest that I use network pharmacology tools.	60 (13.3%)	85 (18.9%)	100 (22.2%)	115 (25.6%)	90 (20.0%)	3.20	1.25
2	I can easily seek help from peers when using network pharmacology.	55 (12.2%)	90 (20.0%)	95 (21.1%)	110 (24.4%)	100 (22.2%)	3.24	1.26
3	Peer discussions help me understand network pharmacology applications better.	50 (11.1%)	80 (17.8%)	105 (23.3%)	115 (25.6%)	100 (22.2%)	3.30	1.23
4	My peers share helpful resources about network pharmacology	65 (14.4%)	85 (18.9%)	100 (22.2%)	110 (24.4%)	90 (20.0%)	3.21	1.26
5	Support from my peers makes it easier for me to use new pharmacology technologies.	60 (13.3%)	90 (20.0%)	95 (21.1%)	110 (24.4%)	95 (21.1%)	3.23	1.25

Table 15: Descriptive Statistics for Institutional Culture.

Sl. No.	Questionnaire Statement	01	02	03	04	05	Mean	SD
1	My organization encourages new ideas in clinical practice.	50 (11.1%)	75 (16.7%)	95 (21.1%)	120 (26.7%)	110 (24.4%)	3.37	1.23
2	There is openness to adopting new technologies like network pharmacology.	55 (12.2%)	80 (17.8%)	100 (22.2%)	115 (25.6%)	100 (22.2%)	3.28	1.24
3	The institution offers resources for using technology.	65 (14.4%)	85 (18.9%)	95 (21.1%)	110 (24.4%)	95 (21.1%)	3.22	1.27
4	Management backs training and trying out new tools.	60 (13.3%)	85 (18.9%)	105 (23.3%)	110 (24.4%)	90 (20.0%)	3.21	1.25
5	Institutional policies promote data-driven innovation.	55 (12.2%)	90 (20.0%)	100 (22.2%)	115 (25.6%)	90 (20.0%)		

Table 16: Summary Descriptive Statistics for All Study Constructs.

Construct	Items	Range	Mean	SD	Min	Max	Interpretation
Imposter Syndrome	20	1-5	3.12	1.09	1.00	5.00	Moderate presence of imposter feelings
Adoption Readiness (Network Pharmacology)	10	1-5	3.25	1.11	1.00	5.00	Slightly above neutral adoption readiness
Training Adequacy	5	1-5	3.15	1.26	1.00	5.00	Moderate training availability and quality
Peer Support	5	1-5	3.24	1.25	1.00	5.00	Moderate peer encouragement and assistance
Institutional Culture	5	1-5	3.26	1.25	1.00	5.00	

CONCLUSION

This investigation elucidates imposter syndrome as a formidable psychological impediment to the adoption of NPs among healthcare practitioners. In comparison to previous findings related to Artificial Intelligence (AI), Electronic Health Records (EHR), and genomic medicine, IS emerged as a notably potent predictor of NP acceptance due to the cognitive and computational intricacies inherent in the field. From a practical standpoint, the acceleration of adoption can be facilitated through: Targeted, confidence-enhancing training initiatives (highest priority). Structured peer mentorship and collaborative teams (second priority). Supportive institutional policies that effectively translate the rhetoric of innovation into concrete support at the frontline (third priority). From a theoretical standpoint, the study adds components of social dynamics and psychological preparedness to the Technology Acceptance Model (TAM) and (UTAUT), creating a more thorough framework for adoption. In the end, overcoming psychological obstacles is just as important to the successful integration of NPs as the advancement of technical infrastructure. Final Takeaway: Empowering healthcare professionals through skill enhancement, mentorship, and cultural alignment will not only alleviate the effects of imposter syndrome but also fully realize the potential of network pharmacology within the realm of precision medicine.

The findings indicate that healthcare professionals recognize the potential benefits of network pharmacology tools in improving performance and patient outcomes. However, challenges related to resource availability, institutional support, and confidence in interpreting results may hinder widespread adoption. Strengthening training, organizational backing, and resource allocation will be critical in promoting effective integration of these tools into professional practice.

While training initiatives are moderately effective, gaps in hands-on practice and refresher opportunities limit confidence and sustained adoption. Peer support emerges as a stronger factor in encouraging adoption, with discussions, resource-sharing, and collaborative learning proving more impactful. Thus, strengthening both structured training and peer-driven support systems will be crucial for enhancing the adoption of network pharmacology tools. The findings reveal that although institutions foster innovation and professionals show moderate readiness for adopting network pharmacology, barriers such as limited training depth, modest institutional backing, and imposter feelings restrict full adoption. Conclusion: Enhancing institutional policies, managerial support, and confidence-building initiatives will be key to strengthening adoption readiness and sustaining the use of network pharmacology tools.

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ABBREVIATIONS

AI: Artificial Intelligence; **APA:** American Psychological Association; **CIPS:** Clance Impostor Phenomenon Scale; **CME:** Continuing Medical Education; **DV:** Dependent Variable; **HCPs:** Healthcare Professionals; **IS:** Imposter Syndrome; **IV:** Independent Variable; **KMO:** Kaiser-Meyer-Olkin (Measure of Sampling Adequacy); **NP:** Network Pharmacology; **SPSS:** Statistical Package for the Social Sciences; **TAM:** Technology Acceptance Model; **UTAUT:** Unified Theory of Acceptance and Use of Technology.

CONFLICT OF INTEREST

The authors affirm that there is no potential conflict of interest regarding the publication of this work. Furthermore, ethical considerations, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancy have been thoroughly addressed and upheld by the authors.

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AUTHOR CONTRIBUTION STATEMENT

Mrs. Tiyagura Nagaraja Kumari conceptualized the study, designed the methodology, collected data, and prepared the initial draft of the manuscript.

Dr. Bachunaga Kishore Babu supervised the research design, provided methodological guidance, and reviewed the analytical framework.

Dr. Daniel Pilli contributed to refining the literature review, assisted with data interpretation, and supported manuscript revisions.

Dr. Repalle Giddaiah performed statistical analysis, validated the results, and contributed to final editing and critical revision of the manuscript.

Dr. K. Sowjanya contributed to manuscript review, interpretation of findings, language editing, and overall coordination during the revision and submission process.

All authors read and approved the final version of the manuscript and agree to be accountable for its accuracy and integrity.

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