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ORIGINAL RESEARCH

INTERPERSONAL COMMUNICATION AND PATIENT BEHAVIORAL UNDERSTANDING IN HEALTH SERVICES: A SOCIOPSYCHOLOGICAL STUDY IN INDONESIAFitri Rahmadani Darwis¹, Tuti Bahfiarti², Muhammad Farid³,¹Departement of Communication Science, Faculty of Social and Political Science, Hasanuddin University, South Sulawesi, Indonesia. darwisfr24e@ms.unhas.ac.id²Departement of Communication Science, Faculty of Social and Political Science, Hasanuddin University, South Sulawesi, Indonesia. tutibahfiarti@unhas.ac.id³Departement of Communication Science, Faculty of Social and Political Science Hasanuddin University, South Sulawesi, Indonesia. muhhammadfarid@unhas.ac.id**Corresponding author:** Fitri Rahmadani Darwis Departement of Communication Science, Faculty of Social and Political Science, Hasanuddin University, South Sulawesi, Indonesia. darwisfr24e@ms.unhas.ac.id**Received:** Nov 29, 2025; **Accepted:** Dec 27, 2025; **Published:** Jan. 6, 2026**Abstract**

The phenomenon of low patient understanding of medication use and treatment procedures remains a challenge in healthcare services, especially in outpatient services where interactions are brief. This problem can hinder treatment compliance and impact the effectiveness of treatment. This study aims to analyze the effectiveness of interpersonal communication by pharmaceutical personnel and its relationship with the level of patient understanding based on the Elaboration Likelihood Model (ELM) framework, which explains how the quality of messages and communicative relationships influence the process of elaborating health information. The study used a quantitative method with a cross-sectional survey design, involving outpatient patients who received medication information services. Data were collected through questionnaires and analyzed using descriptive and inferential statistics. The results showed that the effectiveness of interpersonal communication by pharmaceutical personnel was in the good to very good category, especially in terms of empathy, openness, support, and clarity of message. The level of patient understanding was also in the good category, as reflected in their ability to translate, interpret, and relate drug information to their daily conditions. Correlation analysis showed a significant positive relationship with moderate strength between interpersonal communication and patient understanding, while demographic variables did not show a significant influence except for consultation frequency. These findings reinforce the ELM assumption that high-quality communication promotes cognitive elaboration through central pathways, thereby strengthening patient understanding. Practically, this study confirms the importance of improving the interpersonal communication competence of pharmaceutical personnel as an effort to improve the quality of drug education and patient safety. The benefits of these findings can be used as a basis for developing communication training, formulating drug information service policies, and conducting further research related to therapy compliance and the quality of patient experience.

Key words: Pharmacists, Interpersonal Communication, Patient Understanding, Healthcare Services, Empathy, Communication Effectiveness.**INTRODUCTION**

Interpersonal communication between healthcare professionals, especially pharmacists, and patients is an important aspect of healthcare that contributes to patients' understanding of medical information^{1,2}. Effective communication plays an important role in

improving patients' understanding of the treatment they receive, which in turn affects their adherence to treatment and the expected therapeutic outcomes³⁻⁵. In Indonesia, although healthcare services are increasingly patient-centered, communication based solely on the delivery of accurate medical information often neglects patients' deep understanding of that information, which

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can affect the quality of care received^{6,7}.

Previous studies have shown that communication based on empathy, openness, support, positive attitudes, and equality can improve patients' understanding of the treatment provided⁸. Communication that emphasizes these socio-emotional aspects has the potential to improve the patient's experience of undergoing treatment and strengthen the relationship between patients and health workers⁷⁻⁹. However, in Indonesia, although families and communities play a major role in health decision-making, pharmacist-patient communication still tends to focus on biomedical aspects, while the social-emotional dimension is still neglected¹². This leads to an imbalance in communication, which has the potential to reduce patients' understanding of treatment. Although there are studies that highlight communication in the context of health and its influence on patient understanding, a major gap in the literature is the lack of studies examining the influence of interpersonal communication dimensions in improving patient understanding in the context of outpatient care in Indonesia. Most existing studies focus more on analyzing pharmacist communication patterns or biomedical communication in care, while socio-emotional factors such as empathy and openness are still rarely discussed in health research in Indonesia. This gap creates a need for more in-depth research on the dimensions of interpersonal communication and how it affects patient understanding, especially in outpatient services.

The novelty of this study lies in the integration of interpersonal communication theory with a sociopsychological perspective, which introduces a new analysis of the influence of pharmacist-patient communication on patient understanding of medication. This study also presents a new contribution to health communication studies by exploring communication dimensions such as empathy, support, and equality, which are rarely discussed in depth in the existing literature. In addition, this study will consider Indonesian social and cultural factors that influence communication between pharmacists and patients, which provide a unique context for this study.

This study aims to measure the level of effectiveness of pharmacists' interpersonal communication in outpatient services and analyze its influence on patients' understanding of medication. The specific objectives of this study are to: (1) assess the quality of pharmacists' interpersonal communication, which includes the dimensions of openness, empathy, support, positive attitude, and equality, in influencing patients' understanding of medication; (2) analyze the relationship between pharmacist communication and patient behavior understanding; and (3) identify factors that strengthen or weaken this relationship, such as the

frequency of pharmacist consultations with patients.

The main argument of this study is that effective interpersonal communication, with an emphasis on socio-emotional dimensions such as empathy and openness, can improve patients' understanding of their medication¹³. Improved patient understanding of medication will not only affect medication adherence but can also improve overall therapeutic outcomes^{11,12}. Therefore, more humanistic and empathy-based interpersonal communication has great potential to improve the quality of health services in Indonesia.

In addition, this study argues that pharmacists, as part of the medical team, need to strengthen their interpersonal communication skills to create a more open and supportive environment for patients. With a more open and empathetic approach, pharmacists can build stronger relationships with patients, which in turn can improve patients' understanding of treatment and improve their adherence to therapy^{16,17}. This study not only contributes theoretically to the understanding of pharmacist-patient communication but also provides practical implications for improving communication training for pharmacists in Indonesia.

METHODOLOGY

This study adopted a descriptive quantitative research design to assess the effectiveness of pharmacists' interpersonal communication in outpatient services and analyze its impact on patients' understanding of medication-related information [18]. The study used a survey approach, with a questionnaire as the main instrument to gather data from patients receiving pharmaceutical services at Batara Siang Regional General Hospital, Pangkajene and Kepulauan Regency, Indonesia.

Research Design

This study used a cross-sectional design, employing a quantitative descriptive approach to assess the relationship between pharmacists' interpersonal communication and patients' understanding of medication. The sample for this research was determined using the Slovin formula and purposive sampling, selecting 386 outpatient patients who met the inclusion criteria. The study employed a questionnaire based on DeVito's theory of interpersonal communication, which includes five key dimensions: openness, empathy, support, positive attitude, and equality⁹. The questionnaire was designed to measure patients' perceptions of pharmacist communication quality and their understanding of medication, using Bloom's taxonomy¹⁹.

Population and Sample: The population of this study consisted of outpatient patients registered at Batara Siang Regional General Hospital, totaling 10,821 patients. The sample size of 386 patients was selected using the Slovin formula, with the criteria focusing on

patients who had received services from pharmacists and interacted with them during outpatient visits. The sample was selected to represent various demographic categories, including gender, age group, highest level of education, occupation, and frequency of consultation with a pharmacist^{20,21}.

Data Collection Technique: Data were collected in two phases. The first phase involved administering a questionnaire to assess pharmacist interpersonal communication, focusing on dimensions such as openness, empathy, support, positive attitude, and equality. A 4-point Likert scale was used to measure patient perceptions (1 = strongly disagree, 4 = strongly agree)²². In the second phase, respondents were asked to complete a questionnaire evaluating their understanding of medication-related information, using the cognitive dimensions of Bloom's taxonomy (Translation, Interpretation, Extrapolation)¹⁹.

Research Instrument: The research instrument was a structured questionnaire based on DeVito's interpersonal communication theory and Bloom's taxonomy^{9,19}. The questionnaire was designed in two parts: the first part assessed the quality of pharmacist-patient communication, and the second part measured patient understanding of medication-related information. The instrument was tested for validity by experts and

methodologists, and reliability was assessed using Cronbach's Alpha, which showed a reliability value above 0.7, considered satisfactory for this study²³.

Data Analysis: Data analysis was performed using JAPS software. The analysis techniques included Pearson's correlation to assess the linear relationship between pharmacist communication quality and patient understanding, Spearman's Rho correlation for ordinal data, and multiple linear regression to identify the influence of independent variables on patient behavioral understanding²⁴⁻²⁷. Descriptive statistics were used to summarize the demographic characteristics of the sample and the distribution of responses.

RESULTS

Level of Interpersonal Communication Effectiveness

Based on research data, Table 1 illustrates the effectiveness of interpersonal communication between pharmacists and outpatients at Batara Siang Regional General Hospital. This table analyzes communication indicators such as openness, empathy, support, positive attitude, and equality. In addition, the research data for each element of communication effectiveness is explained in detail below.

Table 1. Total Frequency Distribution of Respondents

Question Item	Response Frequency				Total
	Strongly disagree	Disagree	Agree	Strongly agree	
Openness Item 1	2 (0.5%)	8 (2.1%)	139 (36.0%)	237 (61.4%)	386 (100%)
Openness Item 2	13 (3.4%)	25 (6.5%)	163 (42.2%)	185 (47.9%)	386 (100%)
Openness Item 3	4 (1.0%)	22 (5.7%)	169 (43.8%)	191 (49.5%)	386 (100%)
Empathy Item 1	2 (0.5%)	10 (2.6%)	144 (37.3)	230 (59.6%)	386 (100%)
Empathy Item 2	2 (0.5%)	13 (3.4%)	180 (46.6%)	191 (49.5%)	386 (100%)
Empathy Item 3	2 (0.5)	27 (7.0%)	177 (45.9%)	180 (46.6%)	386 (100%)
Empathy Item 4	11 (2.8%)	33 (8.5%)	152 (39.4%)	190 (49.2%)	386 (100%)
Support Item 1	3 (0.8%)	23 (6.0%)	177 (45.9%)	185 (47.4%)	386 (100%)
Support Item 2	4 (1.0%)	23 (6.0%)	156 (40.4%)	203 (52.6%)	386 (100%)
Support Item 3	4 (1.0%)	12 (3.1%)	171 (44.3%)	199 (51.6%)	386 (100%)
Positive Item 1	2 (0.5%)	11 (2.8%)	141 (36.5%)	232 (60.1%)	386 (100%)

Positive Item 2	3 (0.8%)	12 (3.1%)	158 (40.9%)	213 (55.2%)	386 (100%)
Positive Item 3	2 (0.5%)	25 (6.5%)	168 (43.5%)	191 (49.5%)	386 (100%)
Equality Item 14	1 (0.3%)	11 (2.8%)	176 (45.6%)	198 (51.3%)	386 (100%)
Equality Item 15	1 (0.3%)	10 (2.6%)	170 (44.0%)	205 (53.1%)	386 (100%)

Source: Researcher Data Analysis Results, 2025

Upon analyzing the communication indicators, Table 1 shows that: For Openness, Item 1 has an overall score of 61.4% Strongly Agree and 36.0% Agree. Item 2 shows 47.9% Strongly Agree and 42.2% Agree. Item 3 has 43.8% Agree and 49.5% Strongly Agree. The respondents' views on openness reflect high levels of agreement.

For Empathy, Item 1 shows 59.6% Strongly Agree and 37.3% Agree. Item 2 has 49.5% Strongly Agree and 46.6% Agree. Item 3 shows 46.6% Strongly Agree and 45.9% Agree, while Item 4 has 49.2% Strongly Agree and 39.4% Agree. The findings indicate strong support for the importance of empathy in communication.

For Support, Item 1 has 47.4% Strongly Agree and 45.9% Agree. Item 2 shows 52.6% Strongly Agree and 40.4% Agree. Item 3 has 51.6% Strongly Agree and 44.3% Agree. The majority of respondents agree on the importance of support in communication.

For Positive Communication, Item 1 has 60.1% Strongly Agree and 36.5% Agree. Item 2 shows 55.2% Strongly Agree and 40.9% Agree, while Item 3 has 49.5% Strongly Agree and 43.5% Agree. This highlights the respondents' strong inclination towards maintaining a positive communication attitude.

For Equality, Item 14 shows 51.3% Strongly Agree and 45.6% Agree. Item 15 has 53.1% Strongly Agree and 44.0% Agree. The data reflect strong agreement on the importance of equality in communication.

Level of Understanding of Outpatients

Based on the research data, Table 2 shows the frequency distribution of the level of understanding of outpatients at Batara Siang Regional General Hospital. This table analyzes the indicators of understanding, namely Translation, Interpretation, and Extrapolation. In addition, the research data for each element of patient understanding is described in detail below.

Table 2. Total Frequency Distribution of Respondents

Question Item	Response Frequency				Total
	Strongly Disagree	Disagree	Agree	Strongly agree	
Translators Item 1	1 (0.3%)	18 (4.7%)	155 (40.2%)	212 (54.9%)	386 (100%)
Translators Item 2	1 (0.3%)	29 (7.5%)	146 (37.8%)	210 (54.4%)	386 (100%)
Translators Item 3	21 (5.4%)	93 (24.1%)	187 (48.4%)	85 (22.0%)	386 (100%)
Translators Item 4	15 (3.9%)	30 (7.8%)	195 (50.5%)	146 (37.8%)	386 (100%)
Interpretation Item 1	66 (17.1%)	103 (26.7%)	142 (36.8%)	75 (19.4%)	386 (100%)
Interpretation Item 2	8 (2.1%)	58 (15.0%)	215 (55.7%)	105 (27.2%)	386 (100%)
Interpretation Item 3	5 (1.3%)	27 (7.0%)	189 (49.0%)	165 (42.7%)	386 (100%)
Extrapolation Item 1	5 (1.3%)	51 (13.2%)	194 (50.3%)	136 (35.2%)	386 (100%)
Extrapolation Item 2	39 (10.1%)	98 (25.4%)	152 (39.4%)	97 (25.1%)	386 (100%)
Extrapolation Item 3	8 (2.1%)	49 (12.7%)	214 (55.4%)	115 (29.8%)	386 (100%)

Source: Researcher Data Analysis Results, 2025

Upon analyzing the patient comprehension indicators, Table 2 shows that: For Translation, Item 1 has an overall score of 54.9% Strongly Agree and 40.2% Agree. Item 2 shows 54.4% Strongly Agree and 37.8% Agree. Item 3 has 22.0% Strongly Agree and 48.4% Agree. Item 4 has 37.8% Strongly Agree and 50.5% Agree. Respondents' views on translation show strong agreement on the importance of translation in facilitating communication.

For Interpretation, Item 1 shows 19.4% Strongly Agree and 36.8% Agree. Item 2 had 27.2% Strongly Agree and 55.7% Agree. Item 3 showed 42.7% Strongly Agree and 49.0% Agree. These findings indicate that despite a moderate level of agreement, interpretation is still considered crucial in ensuring effective communication.

For Extrapolation, Item 1 shows 35.2% Strongly Agree and 50.3% Agree. Item 2 shows 25.1% Strongly Agree and 39.4% Agree. Item 3 shows 29.8% Strongly Agree and 55.4% Agree. These results show that the majority of respondents agree on the importance of extrapolation in communication, highlighting its relevance in understanding and applying information in a broader context.

The Relationship Between Communication Effectiveness and Outpatient Understanding Levels

Based on research data, Table 3 illustrates the Relationship Between Communication Effectiveness and the Level of Understanding of Outpatients at Bsatara Siang Regional General Hospital. This table explores how various communication indicators, such as openness, empathy, support, positive attitude, and equality, correlate with patient comprehension levels, such as Translation, Interpretation, and Extrapolation of medical information. Detailed research data on the influence of each communication element on comprehension is presented below.

Table 3. Relationship between Communication Effectiveness and Level of Understanding

Variable	Variable	Communication Effectiveness	Level of Understanding
Communication Effectiveness	Pearson's r	-	-
	p-value	-	-
	Spearman's	-	-
	p-value	-	-
Level of Understanding	Pearson's r	0.301	-
	p-value	< .001	-
	Spearman's	0.328	-
	p-value	< .001	-

Source: Researcher Data Analysis Results, 2025

Upon analyzing the relationship between communication effectiveness and patient understanding, Table 3 shows that. For Communication Effectiveness, the Pearson correlation coefficient is not applicable (marked with "-"), while the Spearman correlation coefficient is also not calculated. However, the p-values for both measures are not available in this table, as the relationship was not evaluated directly with these variables.

For the Level of Understanding, the Pearson correlation coefficient is 0.301, with a p-value of less than <0.001, indicating a moderate positive relationship between communication effectiveness and the level of understanding. These results show that as communication effectiveness increases, patients' understanding of medical information also increases. Additionally, the Spearman correlation coefficient is 0.328, with a p-value also less than <0.001, confirming a similar moderate positive correlation.

These findings indicate that effective communication significantly contributes to increased levels of understanding among outpatients, and this relationship is statistically significant, as evidenced by the low p-value.

Factors Affecting the Effectiveness of Interpersonal Communication Between Pharmaceutical Staff and Outpatients

Based on research data, Table 4 shows the Factors Affecting the Effectiveness of Interpersonal Communication between Pharmacists and Outpatients at Batara Siang Regional General Hospital. This table displays regression coefficients for various factors such as openness, empathy, support, positive attitude, and equality. This table highlights the strength and significance of each factor's influence on overall communication effectiveness. This data provides a deeper understanding of how each factor contributes to improving communication effectiveness in a healthcare settings.

Table 4. Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M ₀	(Intercept)	51.868	0.318		163.192	< .001
M ₁	(Intercept)	50.500	2.163		23.345	< .001
	Gender	0.705	0.644	0.056	1.095	.274
	Age	0.081	0.279	0.017	0.291	.771
	Highest Level of Education	-0.105	0.251	-0.025	-0.418	.677
	Employment	-0.225	0.148	-0.091	-1.524	.128
	Total Consultations	0.700	0.324	0.112	2,162	0.31

Source: Researcher Data Processing Results, 2025

Table 4 presents the unstandardized coefficients and p-values for the regression models M₀ and M₁, providing insights into the statistical significance of each variable included in the analysis.

In Model M₀, the Intercept has an unstandardized coefficient of 51.868, with a p-value less than 0.001, indicating a highly significant intercept. This suggests that, when all predictors are held constant at zero, the baseline value of the dependent variable is estimated to be 51.868, serving as a crucial reference point for the model. These findings are consistent with previous research, which has emphasized the significant impact of intercept values in predicting outcomes²⁸.

In Model M₁, the Intercept coefficient is 50.500, with a p-value less than 0.001, further reinforcing the strong statistical significance of the intercept. This result underscores the foundational role of the intercept in the model's prediction²⁹.

When examining the predictors in Model M₁, the coefficient for Gender is 0.705, with a p-value of 0.274. This p-value exceeds the conventional threshold of 0.05, indicating that Gender does not have a statistically significant impact on the dependent variable in the context of this model. This aligns with findings from prior studies, which suggest that demographic factors, such as gender, often do not significantly influence outcomes in healthcare models [30]. Similarly, Age shows a coefficient of 0.081, with a p-value of 0.771, suggesting that age does not significantly influence the dependent variable. These findings align with studies indicating that age does not always have a significant effect in pharmaceutical communication³¹. The coefficient for Highest Level of Education is -0.105, with a p-value of 0.677, further supporting the lack of statistical significance for this variable. This suggests that the highest level of education may not significantly affect communication effectiveness, as corroborated by similar research³². Similarly, Employment has an

unstandardized coefficient of -0.225, with a p-value of 0.128, indicating that employment status does not significantly affect the dependent variable. Although the coefficient is negative, the lack of statistical significance suggests that employment status is not a determining factor in this context²⁸.

Finally, Total Consultations exhibits a coefficient of 0.700, with a p-value of 0.31. Although the p-value does not reach the conventional significance threshold of 0.05, the positive coefficient suggests that total consultations may have a positive, albeit marginal, impact on the dependent variable. However, further analysis may be required to establish a clearer understanding of this relationship. This finding is consistent with research suggesting that service-related factors, such as the number of consultations, may influence patient satisfaction.

In conclusion, the results from Model M₁ suggest that while the intercept plays a crucial role, most of the demographic variables tested do not significantly influence the dependent variable in this context. The positive coefficient for Total Consultations warrants further exploration, as it may offer valuable insights for future studies aimed at enhancing the explanatory power of the model. These findings reinforce the literature that emphasizes the role of communication structure and service processes over demographic background in improving healthcare outcomes.

DISCUSSION

The findings show that, in general, the effectiveness of pharmacists' interpersonal communication is in the "very good" category, especially in terms of openness, empathy, support, positive attitude, and equality. This is evident from the percentage of "agree" and "strongly agree" responses that consistently dominate each statement item, with a proportion above 80% for most indicators. This condition indicates that pharmacist-

patient interactions in outpatient facilities are not only transactional and oriented towards the delivery of drug information, but also contain strong relational elements: pharmacists are willing to listen to complaints, explain in easy-to-understand language, show a supportive attitude, and treat patients equally. From the perspective of DeVito's interpersonal communication theory, the combination of openness, empathy, support, positive attitude, and equality is an important prerequisite for effective communication, as it creates a safe psychological climate in which patients feel valued and dare to express their needs⁹. These findings are also in line with the basic assumptions of the Elaboration Likelihood Model (ELM), which states that when the source of a message is perceived as credible, warm, and empathetic, patients tend to pay more attention and are encouraged to engage in cognitive elaboration of the message being conveyed.

On the other hand, patients' level of understanding of health service information was also in the "good" to "very good" category for all three understanding indicators, namely translation, interpretation, and extrapolation. The high percentage of respondents who stated that they were able to translate drug information into their own language, understand the meaning and purpose of treatment, and relate the information received to their daily situations shows that patients not only receive information passively but also process it at a higher cognitive level as classified in Bloom's Taxonomy. From an ELM perspective, this condition reflects the dominance of the "central route" processing pathway, in which patients with high involvement in their health and treatment are encouraged to examine the arguments presented by pharmacists in greater depth. The pharmacist's empathy and openness serve as initial triggers that reduce psychological barriers, while the clarity of the drug explanation provides "strong arguments" that support the formation of stable understanding. Thus, the quality of interpersonal communication acts as a relational context that facilitates the patient's cognitive elaboration of drug information.

The relationship between communication effectiveness and moderate but significant patient comprehension levels (Pearson $r = 0.301$; Spearman $r = 0.328$; $p < 0.001$) indicates that the better the quality of pharmacists' interpersonal communication, the higher the patients' comprehension of medication information. This positive correlation reinforces the ELM assumption that message elaboration is influenced by both message characteristics and the way the message is packaged and delivered. Interestingly, the regression analysis results show that demographic variables such as gender, age, education, and occupation do not have a significant effect on communication effectiveness, while the frequency of consultation with pharmacists

has a significant positive coefficient. This means that it is not the patient's demographic background that is most decisive, but rather the intensity and quality of the communication encounter itself. Within a sociopsychological framework, these findings confirm that repeated pharmacist–patient relationships with consistent patterns of empathetic and equal communication will strengthen patients' cognitive engagement, so that the messages conveyed are processed more through central pathways, leading to increased understanding and the potential for better treatment compliance.

The application of the Elaboration Likelihood Model (ELM) theory in the findings of this study can be seen from the way patients process persuasive messages conveyed by pharmaceutical personnel. In this context, pharmaceutical personnel act as *the source* that conveys messages in the form of drug information, usage procedures, side effects, and the importance of therapy compliance, while patients become *receivers* who assess, elaborate, and respond to these messages. The results show that most patients stated that they understood the information provided, were able to explain it back in their own words, and relate it to their daily lives. This indicates that many patients process messages through the *central route*, which is characterized by motivation and the ability to think critically, weigh arguments, and evaluate the content of messages in depth. Warm, empathetic, clear, and equal interpersonal communication creates psychological conditions conducive to cognitive elaboration, so that health messages are not only received superficially but are processed into more meaningful understanding.

However, the finding that the relationship between interpersonal communication effectiveness and patient understanding is moderate also indicates that *the peripheral route* still plays a role in the message processing process. This means that some patients rely more on peripheral cues, such as the friendliness of pharmaceutical staff, professional credibility, institutional authority, and previous positive experiences, rather than examining medical arguments in detail. Within the ELM framework, this condition commonly occurs when the patient's motivation, opportunity, or cognitive ability to elaborate on the message is not optimal, for example, due to time constraints, low health literacy, or emotional burden during treatment. Therefore, the findings of this study confirm that the effectiveness of interpersonal communication by pharmaceutical personnel must combine two aspects simultaneously: presenting strong and easily understood arguments to encourage *central route* processing, while maintaining credibility, empathy, and support as positive *peripheral cues*. The combination of these two aspects explains why improving the quality of communication contributes to improving patient

understanding, although it does not automatically guarantee a change in attitude and therapy compliance in all individuals.

This study found that interpersonal communication among pharmaceutical personnel was rated as good to very good and contributed positively to patient understanding, in line with the latest discourse on psychological safety and patient-centered communication.³³ Emphasized that *psychological safety* in health services is characterized by strong interpersonal relationships, a work environment that is safe for taking interpersonal risks, and a non-punitive culture. In the context of this study, high scores on the dimensions of empathy, support, and equality indicate that patients feel safe enough to ask questions, express ignorance, and discuss concerns related to medication without fear of blame, thus supporting message elaboration through *the central route* in the ELM framework. This intersects with the study by³⁴, which places patient-centered communication at the core of service quality and highlights institutional, environmental, and behavioral barriers. Our findings show that when these barriers are relatively overcome at the micro-interaction level (pharmacist–patient), perceptions of communication quality and patient understanding tend to increase. On the other hand, the study by³⁵ on online medical consultations during Covid-19 showed that the quality of communication and technical comfort in teleconsultations can be equivalent to face-to-face consultations; this reinforces the interpretation that it is not merely the medium (offline or online), but the quality of the relationship, comfort, and clarity of the message that determines the path of health information elaboration by patients as described in ELM.

Dialogue with other studies also shows consistency that the interpersonal competence of health workers needs to be viewed as the result of a continuous process of education, training, and leadership.³⁶ Found that various educational interventions were able to improve medical students' interpersonal communication and empathy skills, albeit with small effects; this is in line with the moderate correlation in this study, which indicates that improving the communication skills of pharmaceutical personnel contributes significantly, but is not the only determinant, to patient understanding.³⁷ In rural primary care in China showed that the better the doctors' communication skills, the higher the quality of service and patient satisfaction; this pattern parallels our finding that communication effectiveness is positively related to patient understanding. In terms of cultural sensitivity, the study by³⁸ on the cultural competence of community pharmacists in the UAE showed that cultural diversity training was associated with increased *self-perceived competence* and more patient-centered caregiving behaviors; although this study did not explicitly measure

cultural competence, high scores on empathy and support indicate the presence of communication practices that are sensitive to the patient's context. Furthermore, the studies by³⁹ on *transformative learning* and⁴⁰ on *health leadership* emphasize the importance of critical reflection, emotional support, and healthy leadership styles in shaping a humanistic communication culture in healthcare facilities. This implies that the quality of interpersonal communication identified in this study is likely supported by a supportive organizational climate and leadership, and opens up space for further research agendas linking pharmacist communication, organizational support, and clinical outcomes and patient compliance behavior within the ELM framework.

The finding that interpersonal communication among pharmaceutical personnel is in the good to very good category and is positively related to the level of patient understanding has important theoretical and practical implications. Theoretically, these results reinforce the main assumption of the Elaboration Likelihood Model (ELM) that the quality of communicative relationships and the strength of message arguments will determine the extent to which patients process health information through *the central route*, resulting in deeper and more stable understanding. Practically, this study emphasizes the need for hospitals and health education institutions to make interpersonal communication training (empathy, support, clarity of explanation, and equality) a core component of pharmaceutical personnel competency development, for example through *patient-centered communication* modules, medication counseling simulations, and structured performance-based feedback. However, this study has several limitations, including a cross-sectional design that does not allow causal conclusions to be drawn, the use of self-report questionnaires that have the potential for social bias, a limited scope of location to one facility/area, thus limiting generalizability, and the failure to measure other important variables such as medication adherence, patient psychological safety, cultural competence, and the context of digital services (tele-pharmacy). Based on these limitations, future research could be directed toward longitudinal or quasi-experimental designs to test the impact of communication training on patient understanding and compliance, expansion of the context to various types of health facilities and more diverse regions, combining objective data (e.g., prescription adherence profiles, revisit rates, or *medication error* indicators), and mixed (quantitative–qualitative) approaches to further explore how psychological, cultural, and organizational factors interact in shaping the persuasive message processing pathway as formulated in ELM.

CONCLUSION

This study was motivated by the question of how effective interpersonal communication by pharmaceutical personnel is in shaping outpatient understanding of medication use and treatment procedures. Amidst the complexity of the healthcare system, it is still common to find patients who lack understanding of the therapy they are undergoing, which has the potential to reduce compliance and clinical outcomes. Based on the Elaboration Likelihood Model (ELM) framework, this study seeks to analyze the extent to which the quality of interpersonal communication by pharmaceutical personnel is related to the level of patient understanding of the healthcare information they receive.

The results of the study show that the effectiveness of interpersonal communication by pharmaceutical personnel is in the good to very good category, especially in terms of openness, empathy, support, positive attitude, and equality. The level of patient understanding regarding the use of medication and treatment procedures is also in the good category, as reflected in the ability of patients to translate, interpret, and relate information to everyday situations. Statistical analysis shows a significant positive relationship with a moderate correlation between communication effectiveness and patient understanding, while demographic variables tend to have no significant effect, except for the frequency of consultation with pharmaceutical personnel. Theoretically, these findings reinforce the ELM assumption that empathetic, clear, and equal communication encourages patients to process information through the central pathway, resulting in deeper understanding. Practically, these results emphasize the importance of strengthening interpersonal communication competencies as an integral part of the professional standards of pharmaceutical personnel.

However, this study has limitations, including a cross-sectional design that does not allow for causality to be drawn, the use of self-report instruments that are prone to social bias, and a limited scope of locations, thereby limiting the power of generalization. Recommendations for future research include the use of longitudinal or quasi-experimental designs to test the impact of communication training on patient understanding and compliance, expansion of settings to various types of facilities and regions, measurement of additional variables such as medication adherence, psychological safety, and cultural competence, and the application of a mixed-methods approach to further explore the dynamics of persuasive message processing in the context of pharmaceutical services.

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DECLARATION

Conflict of interest:

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