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Functional and Emotional Communication in Digital Healthcare: A SEM-PLS Approach to Service Performance

Sudianto[1]*, Aflit Nuryulia Praswati[2], Yusuf Alam Romadhon[3]

1 Program Studi Magister Administrasi Rumah Sakit, Fakultas Kedokteran, Universitas Muhammadiyah Surakarta, Indonesia

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Abstract

This study aims to analyze the influence of Instrumental Interaction and Affective Interaction on healthcare service Performance, with Relationship Marketing as a mediating variable, in the context of social media-based marketing at Clinic X. The research is grounded in the growing importance of effective and empathetic communication in building patient trust and loyalty, particularly in the digital era where social media platforms are widely used for healthcare promotion and interaction. A quantitative approach with a hypothesis testing design was employed. Data were collected from 250 patients using an online questionnaire based on a 5-point Likert scale and analyzed using the SEM-PLS method via SmartPLS 3.0. The results show that both Instrumental Interaction and Affective Interaction have a significant effect on Relationship Marketing. However, both interactions demonstrate a negative direct impact on Performance when applied independently, without the support of long-term relational strategies. Meanwhile, Relationship Marketing significantly mediates the effect of both interactions on service performance, although its mediating strength is not dominant. These findings highlight the importance of integrating both functional and emotional approaches in healthcare services, as well as the need for a more holistic, relationship-centered digital marketing strategy. This research provides practical implications for healthcare institutions to enhance service performance by balancing communication with clear medical information and empathetic engagement.

Keywords: Functional communication, Emotional communication, Digital healthcare

Correspondence
Sudianto
Program Studi Magister Administrasi Rumah Sakit,
Fakultas Kedokteran, Universitas Muhammadiyah Surakarta, Sukoharjo, Indonesia
Email: dr.adhie.s@gmail.com

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1. BACKGROUND

Clinics are an important element of the healthcare ecosystem in Indonesia. Clinics play a vital role in providing primary healthcare services that are more accessible to the public than large hospitals. Clinics in Indonesia vary widely, from general clinics that treat a range of health complaints to specialist clinics that focus on specific services. According to

Kurniawan and Berlianto (2022), patient satisfaction and loyalty to clinic services are strongly influenced by service quality, effective communication, and a trust-based approach. Clinics that build positive interactions with patients tend to gain greater trust, leading to more patients visiting.

In healthcare marketing, the interaction between health workers and patients is crucial. The relationship among Instrumental Interaction, Affective Interaction, Relationship Marketing, and Performance follows a complex yet interconnected pattern. Effective Instrumental Interaction can increase patient trust by providing clear information, thereby contributing to improved Relationship Marketing and healthcare performance. On the other hand, Affective Interaction, which focuses on emotional aspects, can create closer relationships with patients, thereby positively affecting patient loyalty and satisfaction. Kurniawan & Berlianto highlighted that clinics that can combine instrumental and affective approaches are more likely to improve their performance (Kurniawan & Berlianto, 2022).

In addition, Relationship Marketing acts as a mediator, strengthening the influence of Instrumental Interaction and Affective Interaction on health service performance. Research conducted by Hariyanti et al. confirmed that effective relationship-based marketing not only increases patient trust but also positively affects the number of patient visits and the overall clinic reputation (Hariyanti et al., 2023). Therefore, developing a strategy that combines instrumental, affective, and relationship-based marketing approaches is an important step for clinics and healthcare institutions to improve performance. This is supported by a study by Arifah et al., which stated that hospitals are required to maintain customer trust by carefully considering consumer needs to meet their expectations for the services provided (Gonzalez, 2019). Furthermore, Instrumental Interaction and Affective Interaction can also directly influence performance without going through Relationship Marketing. Patients who feel they receive clear information and attentive service tend to have a positive perception of the quality of service they receive. This has implications for increasing patients' decisions to make repeat visits or recommend these services to others. According to Inyang et al., health institutions that consistently apply effective communication strategies are more likely to achieve optimal performance

targets (Inyang et al., 2022). The right marketing strategy ensures hospitals remain competitive and increase their profitability.

Findings from previous research indicate significant differences in the effectiveness of social media-based marketing across platforms. Social media such as Instagram, Facebook, and Twitter have different user characteristics, so the marketing approach applied to each platform needs to be customized to achieve optimal results (Setya Saputra et al., 2018). The study found that visual platforms, such as Instagram, tend to be more effective at attracting patients' attention through visual content, such as photos and health education videos. Meanwhile, Facebook performed better in building long-term relationships with patients through discussions in community groups or interactive forums that extend ongoing patient engagement. Twitter, on the other hand, is more effective for delivering quick information such as health campaigns, service notifications, or brief education on specific health conditions. These variations in effectiveness highlight the need for a more contextualized approach to social media-based marketing in the healthcare industry.

This discrepancy is reinforced by the findings of Dzakiyya & Hati, who highlighted that the effectiveness of marketing through social media is strongly influenced by users' demographic characteristics and their preferences for certain content (Dzakiyya & Hijrah Hati, 2024). The study revealed that younger patients tend to interact more actively with visual content on Instagram. In contrast, older age groups tend to prefer social media that offers more detailed, interactive information, such as Facebook. This factor poses a challenge for healthcare institutions in designing marketing strategies that effectively reach diverse patient segments.

Although research on social media-based marketing in the healthcare industry has been extensive, there is a significant gap in understanding how deeper communication elements, such as Instrumental Interaction and Affective Interaction, contribute to stronger relationships with patients. The study by Zhang and Mac highlighted that emotion-based or affective approaches have a significant impact on patient loyalty, but did not specify how these approaches can be effectively applied across diverse social media platforms (Zhang & Mac, 2023). This suggests an urgent need to explore

how Instrumental and Affective Interactions can be applied contextually to social media-based marketing strategies in the healthcare sector.

Furthermore, previous research by Liu et al. highlighted that Relationship Marketing plays a key role in fostering long-term relationships with patients (Liu et al., 2022). However, these studies have not explicitly examined how Relationship Marketing acts as a mediating variable, strengthening the impact of Instrumental Interaction and Affective Interaction on healthcare performance. This research is important because it fills a gap in the literature by examining the mediating role of Relationship Marketing in social media-based healthcare marketing.

The urgency of this research is even greater, given that patients are now more likely to seek health information through social media before deciding to access health services. According to research by Hariyanti et al., patients tend to trust health institutions that consistently provide health information through social media platforms (Hariyanti et al., 2023). The study also highlighted that the marketing performance of health institutions is not determined solely by the content delivered, but also by their ability to build relationships based on trust and care through effective communication.

In addition, the different characteristics of social media platforms also have implications for the effectiveness of communication built by health institutions. Findings from a study show that patients who receive clear, detailed, and data-based information tend to trust the health institution more (Al Aufa & Sipahutar, 2022). This indicates that Instrumental Interaction plays an important role in increasing patient trust through communication based on facts and reliable information. However, patients also demand a more personalized and empathetic approach in receiving health services. Communication that emphasizes empathy and care can create positive experiences that strengthen patient loyalty to health institutions (Mazursky et al., 2022).

This research also has high strategic urgency, given increased competition in the healthcare sector, which is increasingly requiring healthcare institutions to adopt more effective and innovative marketing approaches. Healthcare institutions that build strong relationships with patients through effective communication are more likely to achieve optimal performance (Inyang et al., 2022). By combining

Instrumental and Affective Interaction-based approaches with Relationship Marketing strategies, healthcare institutions are expected to increase patient satisfaction, strengthen patient loyalty, and ultimately improve their overall performance.

2. METHODS

This study uses quantitative methods within a hypothesis-testing research design to examine the causal relationships among Instrumental Interaction, Affective Interaction, Relationship Marketing, and Performance. The sample was purposively selected from the population of patients who had received services at the clinic, and data were collected via an online questionnaire in Google Forms using a 5-point Likert scale. Data analysis was conducted using the Structural Equation Modeling-Partial Least Squares (SEM-PLS) method in SmartPLS 3.0, including validity (outer loadings, AVE), reliability (Cronbach's alpha, composite reliability), and tests of direct and mediating relationships with bootstrapping. The research instrument was prepared based on relevant theoretical indicators, and the research was approved by the ethics committee, with informed consent, confidentiality of respondent data, and use of data for academic purposes only guaranteed.

3. RESULTS

Respondent Demographic Profile

To gain a deeper understanding of the research sample's characteristics, a demographic analysis of the respondents was conducted. These demographic factors help contextualize responses and provide insight into participants' backgrounds, which may influence their perceptions and behaviors regarding the study variables. A summary of the respondents' demographic profile is presented in Table 1.

Table 1. Demographic Profile of Respondents (N=250)

Category	Sub-Categories	Frequency (n)	Percentage (%)
Gender	Female	130	52.0
	Male	120	48.0
Age	18–27 Years	90	36.0
	28–43 Years	100	40.0
	44–59 Years	60	24.0

Table 1 shows that of the 250 respondents, 130 were women and 120 were men. This distribution is relatively balanced, so the data reflects the viewpoints of both genders proportionally. In terms of age, the 18-27 and 28-43 year

groups each totaled 90 respondents, while the 44-59 years group totaled 70 respondents. This age variation enables a more in-depth analysis of differences in views and needs regarding health services. Younger age groups tend to be more open to modern approaches, productive age groups have more mature considerations, and older age groups focus more on long-term care. With this distribution, the research can provide recommendations for more targeted communication and marketing strategies for each age segment.

Convergent Validity

To evaluate the convergent validity of the measurement model, the Average Variance Extracted (AVE) was calculated for each construct. Convergent validity is confirmed when the AVE values are equal to or greater than the recommended threshold of 0.50, indicating that the items effectively measure the intended latent variable. The AVE values for all constructs assessed in this study are summarized in Table 2.

Table 2. Average Variance Extracted (AVE)

	Average Variance Extracted (AVE)
Performance	0.718
Relationship Marketing	0.675
Innstrumental Interaction	0.675
Affective Interaction	0.716

Based on the results presented in Table 2, the Average Variance Extracted (AVE) values for each variable are satisfactory, indicating adequate discriminant validity. The AVE value for Performance is 0.718, which is greater than 0.5, indicating that this variable has a good ability to explain the variance of its indicators. Similarly, the Affective Interaction variable, with an AVE of 0.716, indicates that the indicators used to measure affective interaction explain substantial variance, signaling strong construct validity.

For the Relationship Marketing and Instrumental Interaction variables, each has an AVE value of 0.675. Although slightly lower than the other two variables, this AVE value is still above the minimum threshold of 0.5, indicating that both have sufficient convergent validity in measuring the intended construct. Overall, these results indicate that all variables in the research model have a fairly good ability to measure relevant and reliable constructs in this study, and there is no overlap between constructs that can cast doubt on the results of further analysis.

Discriminant Validity

To assess discriminant validity, the Heterotrait-Monotrait Ratio (HTMT) was used as a more rigorous criterion than traditional methods. Discriminant validity is established when the HTMT values between constructs are below the recommended threshold of 0.90, indicating that the constructs are empirically distinct from one another. The HTMT values for each pair of constructs are presented in Table 3.

Table 3. Heterotrait-Monotrait Ratio (HTMT) results

	Performance	Relationship Marketing	Instrumental Interaction	Affective Interaction
Performance	-			
Relationship Marketing	0.473	-		
Instrumental Interaction	0.425	0.876	-	
Affective Interaction	0.857	0.494	0.474	-

Based on the Heterotrait-Monotrait Ratio (HTMT) results shown in Table 3, the discriminant validity of the constructs in this research model is generally met, with one important note. The HTMT value is used to assess the extent to which the constructs in the model differ from one another. Generally, the HTMT value must be below 0.90 for discriminant validity to be considered met, and in some cases, with highly related constructs, the maximum tolerable limit is 0.85. From the table, the relationship between Performance and Affective Interaction shows an HTMT value of 0.857, which slightly exceeds the conservative threshold of 0.85 but is still below 0.90. This suggests a strong correlation between the two constructs, suggesting that some of the indicators in Affective Interaction are similar or overlap in measuring aspects of performance. Although still within reasonable limits, this needs to be examined further in subsequent analyses.

Meanwhile, the relationship between other constructs shows a fairly safe HTMT value. The HTMT value of 0.876 for Relationship Marketing and Instrumental Interaction is close to the 0.90 limit but still acceptable. The HTMT values for Performance and Relationship Marketing (0.473) and Instrumental Interaction (0.425) indicate moderate correlations, thereby strengthening the discriminant validity of these constructs.

Overall, these HTMT results support the model's discriminant validity, although special attention is needed for the relationship between Affective Interaction and Performance, which shows a high correlation.

Construct Reability

To determine the internal consistency of each construct, construct reliability was evaluated using both Composite Reliability (CR) and Cronbach's Alpha. A construct is considered reliable if the CR and Cronbach's Alpha values exceed the threshold of 0.70, indicating that the measurement items consistently reflect the underlying latent variable. The reliability results for each construct are summarized in Table 4.

Table 4. Construct Reliability

	Cronbach's alpha	Composite reliability
Performance	0.869	0.910
Relationship Marketing	0.931	0.943
Intrumental Interaction	0.940	0.949
Affective Interaction	0.868	0.910

Based on the results in Table 4, all variables in this study exhibit very good construct reliability. The Cronbach's Alpha and Composite Reliability values for all variables are above the minimum threshold of 0.7, indicating that each construct has strong internal consistency in measuring the intended concept.

The Performance variable has a Cronbach's Alpha value of 0.869 and a Composite Reliability of 0.910, indicating that the indicators used to measure clinic performance are reliable and mutually consistent. Similarly, Relationship Marketing showed very high reliability, with a Cronbach's Alpha of 0.931 and a Composite Reliability of 0.943, indicating strong consistency among indicators in measuring relationship-based marketing strategies.

The Instrumental Interaction variable has the highest Cronbach's Alpha value among all variables (0.940) and a Composite Reliability of 0.949, indicating that this construct is well measured by its indicators. Meanwhile, the Affective Interaction variable also showed high reliability, with a Cronbach's Alpha of 0.868 and a Composite Reliability of 0.910. Overall, these values confirm that all constructs in the research model exhibit excellent reliability, allowing them to be used with confidence in the next stage of structural analysis.

Outer and Inner Models

The structural equation modeling in this study involves evaluating both the outer and inner models. The outer model assesses indicator validity and reliability, while the inner model examines the strength and significance of relationships between latent constructs.

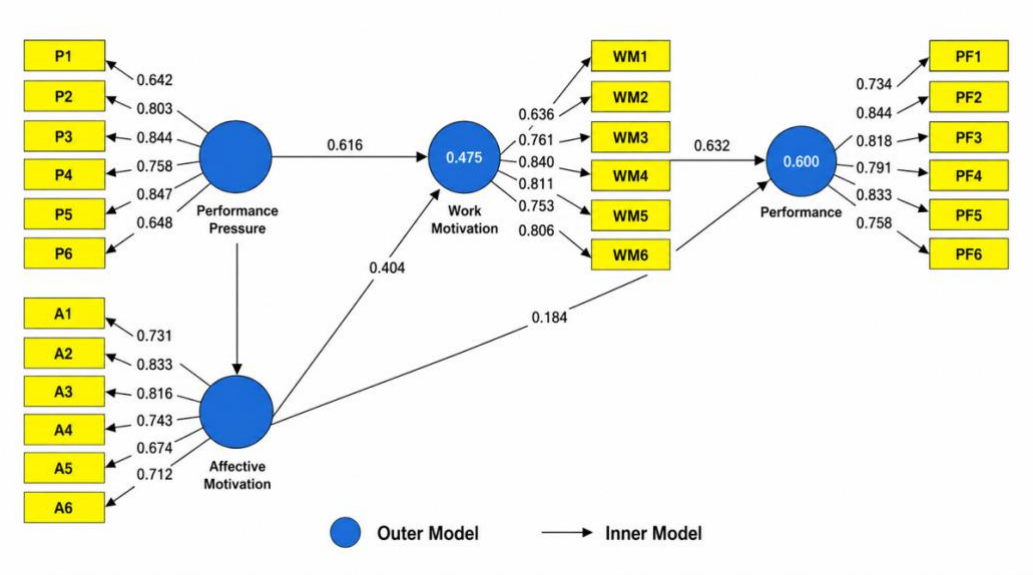

Figure 1. Outer and Inner Model

Based on the explanation above, the mediation in this model is partial. This is based on the results of hypothesis testing and the F-Square value, which indicate that Relationship Marketing, as a mediating variable, has a significant effect on Performance (p-value = 0.000). The direct relationship between Instrumental Interaction and Affective Interaction on Performance also remains significant, though in a negative direction, and the hypothesis is rejected in substance (not statistically).

More specifically, Instrumental Interaction has a negative and significant direct effect on Performance (p = 0.000), and an indirect effect through Relationship Marketing, which has a positive effect on Performance. This suggests that Relationship Marketing partially mediates Instrumental Interaction's influence on Performance, while the direct influence persists. Similarly, Affective Interaction, which has a negative and significant direct effect on Performance (p = 0.001), but also has an indirect effect through Relationship Marketing because both the direct and indirect effects are significant (statistically), then this condition indicates partial mediation, not full mediation. In full mediation, the independent variable's direct effect on the dependent variable should be insignificant after the mediator is included in the model; however, in this result, the direct effect remains statistically significant, albeit negative.

Thus, Relationship Marketing acts as a partial mediator in the relationship between Instrumental Interaction and Affective Interaction on Performance, indicating that even though mediation

occurs, the direct effect still contributes to explaining the variance in Performance.

R-Square

To evaluate the explanatory power of the inner model, the R^2 values were analyzed for each endogenous construct. R^2 indicates the proportion of variance explained by the model; higher values reflect stronger predictive accuracy, as shown in Table 5.

Table 5. R-Square

	R-square	R-square adjusted
Performance	0.259	0.249
Relationship Marketing	0.674	0.673

Based on the results presented in Table 5, the R-square and adjusted R-square values provide an overview of the extent to which this research model explains the variance in the dependent variable. For the Performance variable, the R-square value of 0.259 indicates that this model can explain about 25.9% of the variance in Performance. Although this R^2 value is moderate, it shows that other factors beyond those tested in this study also affect Performance. The adjusted R-square value of 0.249 also yields similar results, indicating that this model still has room for improvement, even though it explains some of the variance in Performance.

Meanwhile, for the Relationship Marketing variable, the higher R-square of 0.674 indicates that this model explains about 67.4% of the variance in Relationship Marketing. This indicates that this model has a fairly strong ability to explain the factors that influence Relationship Marketing. The adjusted R-square value of 0.673 supports this finding, indicating that the model with its variables is sufficiently precise in explaining relationships in the context of Relationship Marketing. Overall, these results suggest that while the model explains most of the variance in Relationship Marketing, there is room for improvement in explaining the variance in Performance, which can serve as a basis for further research on model development.

Hypothesis Testing

The results of hypothesis testing provide insights into the significance and direction of relationships among constructs, which can serve as a basis for further research model development. The summary of path coefficients, t-values, and p-values is presented in Table 6.

Table 6. Hypothesis Testing

Hypothesis	Original Sample	T Statistics	P Values	Analysis
Instrumental Interaction → Relationship Marketing	0.821	43.127	0.000	Accepted
Affective Interaction → Relationship Marketing	0.457	6.450	0.000	Accepted
Relationship Marketing → Performance	0.402	4.376	0.000	Accepted
Instrumental Interaction → Performance	-0.202	4.118	0.000	Rejected
Affective Interaction → Performance	-0.186	3.200	0.001	Rejected
Instrumental Interaction & Affective Interaction × Relationship Marketing → Performance	0.048	1.048	0.295	Rejected

Based on the results of hypothesis testing presented in Table 6, it can be concluded that all hypotheses proposed in this study are accepted, as the p-values for each relationship are smaller than the set significance level (0.05), indicating a significant relationship between the variables tested.

The first Hypothesis being Instrumental Interaction influence on Relationship Marketing: The t-statistic value of 43.127 and p-value of 0.000 indicate that the relationship between Instrumental Interaction and Relationship Marketing is highly significant. Thus, this hypothesis is accepted, which means that Instrumental Interaction has a positive and significant effect on Relationship Marketing. Second Hypothesis: Affective Interaction on Relationship Marketing. The t-statistic of 6.450 and p-value of 0.000 indicate that the relationship between Affective Interaction and Relationship Marketing is also significant. Therefore, this hypothesis is accepted, indicating that Affective Interaction positively influences Relationship Marketing. The third hypothesis, Relationship Marketing on Performance, is supported: the t-statistic of 4.376 and p-value of 0.000 indicate that Relationship Marketing has a positive and significant effect on Performance. Thus, this hypothesis is accepted, indicating that increased relationship marketing can improve performance.

Fourth hypothesis being Instrumental Interaction on Performance: The t-statistic value of 4.118 and p-value of 0.000 indicate that although this relationship is negative, the effect is significant. This hypothesis is rejected, indicating that Instrumental Interaction has a negative effect on Performance, though the effect is significant. The fifth hypothesis, being Affective Interaction on Performance: The t-statistic value of 3.200 and p-value of 0.001 indicate that the relationship between Affective Interaction and Performance is also significant, although the effect is negative. Therefore, this hypothesis is rejected, indicating that Affective Interaction negatively influences

Performance. Based on the results of the hypothesis test, the effects of Instrumental Interaction and Affective Interaction on Performance through Relationship Marketing are not statistically significant. This is indicated by the coefficient value of 0.048, which indicates a very weak influence, as well as the t-count value of 1.048, which is smaller than the t-table at the 5% significance level. In addition, the p-value of 0.295 exceeds the threshold of 0.05, so there is insufficient evidence to conclude that the relationship is significant. Overall, all hypotheses in this study were accepted, and the analysis showed significant relationships among the variables in the model.

IPMA

To complement the structural model analysis, the Importance-Performance Map Analysis (IPMA) was conducted to identify key constructs that have both high relevance and room for improvement. The results, which guide strategic priorities for enhancing target outcomes, are presented in Table 7.

Table 7. IPMA Result of Importance and Performance

Variabel	Importance	Performance	Result
Performance	0.800	69.652	High Importance;Low Performance
Relationship Marketing	0.000	54.011	Low Importance;Low Performance
Instrumental Interaction	0.400	61.870	Low Importance;Low Performance
Affective Interaction	1.000	70.949	High Importance;Low Performance

Based on the results presented in Table 7, the Importance-Performance Map Analysis (IPMA) provides an overview of each variable's importance and its actual performance in the model. The Performance variable has a high level of importance (0.800) but a relatively low performance (69.652), indicating that although Performance is very important, the results achieved are still far from expectations. This shows that more attention is needed to improve this variable's performance. The Relationship Marketing variable has a very low importance value (0.000) and a low performance (54.011), indicating that it does not contribute significantly to the model and requires improvement in both importance and performance. Likewise, Instrumental Interaction, with an importance of 0.400 and a performance of 61.870, shows that although this variable makes a fairly important contribution, its performance still needs improvement to achieve more optimal results.

Meanwhile, Affective Interaction has a very high importance value (1.000) and a performance of 70.949, indicating that

although this variable is very important, its performance is still suboptimal. Therefore, Affective Interaction is a very important area for improvement to achieve the desired results. Overall, the IPMA results indicate that although some variables are very important, their performance still needs improvement to achieve better results in this research model.

4. DISCUSSION

Based on the results of hypothesis testing in this study, it can be concluded that Instrumental Interaction and Affective Interaction have a significant effect on Relationship Marketing and Performance, both directly and indirectly. The positive effect of Instrumental Interaction on Relationship Marketing underscores the importance of effective, informative communication between medical personnel and patients to build strong, sustainable relationships. This aligns with the findings of Liu et al., who reported that vocal, responsive doctor-patient interactions on digital platforms can build trust and improve service perceptions (Liu et al., 2022). Similarly, Affective Interaction that reflects empathy and emotional attention on the part of service providers has also been shown to support the formation of good relational relationships with patients, as revealed by Zhang & Mac that affective factors in digital interactions can influence consumer perceptions and loyalty, including in the context of health services (Zhang & Mac, 2023).

The results of this study show that instrumental and affective interactions have a significant positive effect on relationship marketing, reinforcing the understanding that communication that is both functional and emotional is an important element in building customer loyalty and trust in the digital era (Rombach et al., 2023). Instrumental interactions provide clarity of medical information, while affective interactions form emotional connections that improve relationship quality (Sbarra & Coann, 2018).

However, the direct effects of both types of interactions on service performance are negative, suggesting a potential misalignment between the communication focus and service efficiency goals. This is consistent with the finding that communication intensity, unaccompanied by expectation management and responsive internal systems, can place an additional burden on services (Lietaert, 2020). Although Relationship Marketing has a significant effect on Performance, the magnitude of this effect is relatively small compared to

the direct path from Instrumental Interaction to Performance, which, in this study, shows a negative effect. This indicates that excessive intensity of instrumental interaction, without accompanying emotional approach or personalization of services, can reduce patients' perceptions of service quality.

This phenomenon is reinforced by a systematic review by Heyn et al., which emphasizes the importance of balancing medical information with positive emotional experiences in healthcare interactions (Heyn et al., 2023). Meanwhile, the negative effect of Affective Interaction on Performance is also a concern, suggesting that although emotional aspects are important for building relationships, when they are not coupled with clarity of information and professionalism, they can reduce overall performance effectiveness. This aligns with the study by Rosis et al., who found that the combination of functional and emotional aspects of service delivery is key to shaping a positive patient experience (De Rosis et al., 2022).

Furthermore, the insignificant indirect effect through relationship marketing confirms that building emotional connections alone is not enough to drive performance if not integrated with supportive operational processes. Therefore, healthcare providers need to adopt a relational marketing strategy that emphasizes communication and is supported by strong service system capabilities (Agarwal et al., 2020)

In the context of social media, healthcare organizations also need to ensure that their two-way communication remains consistent with the promised service value, as inconsistencies in online communication can weaken perceptions of service performance (Khan & Loh, 2022).

Moreover, these results are in line with the views of previous studies, which highlighted that patient satisfaction and loyalty are strongly influenced by the quality of two-way communication as well as long-term relationship management through social media and service innovation (Kurniawan & Berlianto, 2022) (Dzakiyya & Hijrah Hati, 2024). Therefore, clinics and healthcare institutions need to optimize these two types of interactions in a balanced manner, integrating patient-centric and technology-based relational marketing (Bawany et al., 2022) (Setya Saputra et al., 2018). An approach that combines digital technology, empathy, and clear information is a strategic step toward improving overall healthcare performance.

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5. CONCLUSION

This study concludes that both Instrumental Interaction and Affective Interaction have a significant effect on Relationship Marketing and Performance at X Clinic. Instrumental Interaction was shown to impact the formation of patient relationships positively. However, it negatively influenced performance, indicating that technical and informative interactions need to be packaged more communicatively to avoid reducing patient satisfaction. Conversely, Affective Interaction also positively influences Relationship Marketing. However, it shows a negative influence on Performance when standing alone, indicating that empathy without the support of systematic service processes is not enough to create optimal performance perceptions. Relationship Marketing itself is shown to act as a significant mediating variable in bridging the influence of both forms of interaction on performance. However, the strength of its influence is not dominant. Overall, this study confirms the importance of integrating functional and emotional aspects to achieve superior service quality in the healthcare sector.

Future research is recommended to expand the scope of institutions, use mixed methods to gain a more comprehensive understanding, and consider other performance indicators that are more operationally measurable, such as revisit rates, cure duration, or service efficiency. In addition, the dimensions of healthcare digitalization and the influence of medical communication technology are also potential areas for further research.

AUTHOR CONTRIBUTIONS

All author contribute in research activity such as conceptualization, data curation, analysis, writing & editing, manuscript revisions.

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CONFLICT OF INTEREST

The authors declare no conflict of interest for this publication.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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