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Impact of Social Media Exposure on Vaccine Trust and Vaccine Utilization During Public Health Emergencies

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ABSTRACT

The study seeks to investigate how exposure to social media affects vaccine trust and its resultant vaccination Utilization in times of pandemic during a public health emergency with a case study in District Sargodha, Pakistan. The quantitative, cross-sectional design was used to gather the data on 300 responders in the tehsils of Bhera, Bhalwal, and Silanwali through the use of a structured questionnaire. The proposed relationships were tested using statistical analysis, which was conducted with the help of SPSS and comprised descriptive statistics, reliability test, and Pearson correlation. The results indicate that there is a high yet statistically significant positive correlation between the exposure to social media and the vaccination trust ($r = .717$, $p < .01$) meaning that greater exposure to vaccine-related information on online platforms has a significant influence on the development of trust in the efficacy and safety of vaccines. Moreover, the vaccination trust had a strong positive correlation with the actual vaccination utilization ($r = .760$, $p < .01$), which validated its status as a behavioral determinant that is critical. Social media exposure and vaccination uptake were also associated with a direct significant positive correlation ($r = .675$, $p < .01$). It closes by offering strategic advice that the health authorities proactively use these platforms to communicate transparently and evidence-based messages to support the trust of the people and increase their acceptance of vaccines during related emergencies.

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1.0 Introduction

Health emergencies such as the public health crisis are significant issues of health systems, the government, and even the communities when the population is necessitated to take a behavior in a short period such as taking the vaccine to help in minimizing the spread of the disease. Vaccination has been characterized as one of the most effective measures of intervention in the sphere of morbidity and mortality prevention in case of an outbreak of an infectious disease, but the vaccine acceptance and confidence issue is not unanimous, specifically, in case of a crisis situation (De Figueiredo et al., 2020). In the last few years, the rise of social media as the primary health information provider has radically transformed the way individuals perceive vaccines, assess risks, and make decisions regarding vaccination in case of an emergency in the entire healthcare system (Wilson and Wiysonge, 2020).

In the case of health emergencies, Facebook, Twitter (X), YouTube, and WhatsApp have been employing two functions in social media. On the one hand, they enable the dissemination of accurate information concerning the situation in the state of public health in a rapid manner, simplify the official information, and enable the interaction of the community. On the contrary, they have proven to be fertile platforms to spread misinformation and conspiracy theories and unproven facts on vaccine safety, efficacy, and necessity (Roozenbeek et al., 2020; Chou et al., 2022). Empirical evidence suggests that exposure to misinformation regarding vaccines in the social media has a significant negative influence on vaccine confidence and results in increased hesitance, even in patients who were already predisposed to vaccinating (Loomba et al., 2021; Jennings et al., 2021).

The element of confidence in the safety and efficacy of vaccination and the governmental agencies delivering such vaccines is a determining factor of vaccine use when it is called vaccine confidence (De Figueiredo et al., 2020). Reduced vaccine confidence during the COVID-19 pandemic had a strong connection with the reliance on the social media as the health information source, particularly when they substituted the traditional or official sources (Allington et al., 2021; Wilson and Wiysonge, 2020). Studies done on a number of countries have shown that individuals who consume content on social media the most about vaccines are more prone to mistrust, fear of side effects and lack of trust with the government and health officials, which negatively affect the intent and behavior to get vaccinated (Cascini et al., 2022; Wang et al., 2022).

The causal relationship between intention to take the vaccination and exposure to misinformation on social media is also demonstrated in the quantitative study. Even a temporary exposure of false information about the vaccines, according to the results of the experiments, the desire to be vaccinated and the attitude to the effectiveness of the vaccine drop to a much lower level (Loomba et al., 2021). The effectiveness of the interrelations among the usage of social media, the formation of a conspiracy belief, and hesitancy toward the vaccine in the case of the pandemic is also supported by cross-sectional and longitudinal studies (Roozenbeek et al., 2020; Jennings et al., 2021). These effects are ubiquitous, and they exist in the general population, as well as in health care employees, nurses, and students, and that is why the effects of social media are rather pervasive and widespread between the demographic and workplace groups (Kwok et al.,

2021; Moffett et al., 2024).

Social media exposure has also been linked to actual vaccination uptake besides attitude and intentions. It implies that individuals who are engaged with social media platforms that encourage the dissemination of negative or misinformed vaccine information more actively would not be as willing to have a vaccine as individuals who would approach official or traditional media platforms (Moffett et al., 2024; Zhang et al., 2023). Conversely, authoritative social media interventions that are customized and spearheaded by institutions of public health have demonstrated opportunities in enhancing the vaccine confidence and increasing uptake in the event of interventions at trust-building (WHO, 2021; Chou et al., 2022). This highlights the importance of the awareness of the presence of social media exposure and also the character, reliability and positioning of information on vaccines.

Despite the growing literature, there is also a significant gap in the full understanding of the mechanisms through which exposure to social media contributes to the formation of the trust in vaccination and the utilization of vaccination in the process of the pandemic situation development. The literature available demonstrates the need to conduct further quantitative studies that will conceptualize social media exposure as an independent variable and vaccine confidence as a mediating variable influencing the decision to take a vaccination (Cascini et al., 2022; Wang et al., 2022). The significance of this concept of closing these gaps is in the opportunity to create an adequate communication strategy, to withstand misinformation, and enhance the level of confidence of the population in vaccination programs during the next health crisis.

In such a way, the study will examine the effect of social media exposure on vaccine trust and its further use in a case of an emergency in the context of public health, which would be informed by the current theoretical and empirical data. The analysis of these relationships will ensure that the study will contribute its value to the research on the general public health communication and provide evidence-based advice on what the policymakers and the health authorities can do to improve the results of the vaccination process in case of emergencies.

1.1 Problem Statement

Vaccination is an important preventive measure in the situation of a public health emergency; nevertheless, the level of vaccine trust and uptake is uneven within communities. The District Sargodha in general, and the tehsils of Bhera, Bhalwal, and Silanwali specifically, has seen a lot of people becoming familiar with the social media, and have access to both valid and fake information about vaccines. This exposure has the possibility of affecting the trust of people in vaccines and their willingness to be vaccinated. Notwithstanding the significance of this problem, little empirical research has been conducted at the district level in Pakistan to investigate the impact of social media exposure on vaccine trust and vaccination utilization in case of a public health crisis. The gap is crucial to the development of effective health communication strategies and enhancing the outcomes of vaccination.

1.2 Significance of the Study

The study is important because it gives empirical results on the effect of social media exposure on vaccine trust and vaccine utilization in the event of a public health emergency in

District Sargodha, namely in the tehsils of Bhera, Bhalwal and Silanwali. Past studies have shown that the social media is a key factor in changing the attitudes of people towards vaccines by increasing both facts and false information, which can have a significant impact on vaccine acceptability and trust (Wilson and Wiysonge, 2020; Cascini et al., 2022). It has been demonstrated in experimental and non-experimental research that social media exposure to vaccine-related misinformation suppresses trust in vaccine safety and effectiveness, thereby decreasing the intention to vaccinate and actually do so (Loomba et al., 2021; Jennings et al., 2021). Producing the quantitative evidence of the situation in Pakistan and at the district level, this study will benefit the sparse literature of the low- and middle-income country setting and offer country-specific information that can assist authorities on public health to create focused communication strategies in case of a health emergency in the future (De Figueiredo et al., 2020; World Health Organization, 2021).

1.3 Objectives of the Study

- To investigate the extent of social media exposure to vaccine-related information among the participants.
- To determine the effect of social media exposure on vaccine trust in times of public health emergencies.
- To examine the correlation between vaccine trust and vaccine utilization among the participants of the study.

1.4 Research Questions

- To what extent is the social media coverage of vaccines among people living in District Sargodha?
- How does exposure to social media affect vaccine trust in the event of a public health crisis?
- How is trust in vaccines related to the utilization of vaccines in the chosen tehsils?

1.5 Research Hypotheses

H_1: Social Media Exposure has a significant effect on Vaccine trust.

H_2: Social Media Exposure has a significant direct effect on Vaccine Utilization

H_3: Vaccine trust has significant effect on vaccine utilization.

H_4: Social Media Influence moderates the relationship between Vaccine trust and Vaccine Utilization.

2.0 Literature Review

The rapid evolution of the social media has caused a significant shift in the manner health information is shared in case of health crisis particularly in vaccination. The social networks have become the meaningful sources of information on vaccination, and perceptions, attitudes, and behavior of individuals that determine their attitude towards immunization are developed. Some of the researchers have found a close relationship between aspects like the reliance on social media to seek information about health and anti-vaccination and a drop in trust in vaccines (Wilson and Wiysonge, 2020; Puri et al., 2020). The use of social media was a two-edged sword in the time of COVID-19 as on the one hand, it was necessary to relay information on the topic of public health

as quickly as possible and on the other hand, mobilize the promotion of fake information and conspiracy theories that undermined trust in a vaccine (Roozenbeek et al., 2020). This has brought out grave interests regarding the significance of social media exposure in influencing obedience of the population to the vaccination programs, during times of emergency.

The empirical evidence reveals that the vaccine misinformation on the social media negatively affects the vaccination intention and confidence towards the vaccines. The findings of the experimental study conducted by Loomba et al. (2021) indicated that the misguided information about vaccination (even in the short-term outlook) had led to the fact that the levels of willingness to vaccinate and the attitude toward the safety and efficacy of vaccines in individuals had decreased significantly. Similarly, observational studies have determined that frequent visits to social media websites are associated with conspiracy theories, distrust of health authorities, and skepticism of vaccine campaigns (Jennings et al., 2021; Allington et al., 2021). Social media exposure also has been shown to play an essential role in the development of vaccine-related perceptions in various groups of people, including healthcare professionals and students, regardless of their professionalism (Kwok et al., 2021; Xin et al., 2021).

Vaccine confidence has been identified to be the mediating factor in the mediating impact of social media exposure on vaccination uptake. As has been noted by De Figueiredo et al. (2020), one of the most significant factors that control the behavior of vaccine consumers is vaccine safety and efficacy and health institution trust. As soon as this trust is gone because of the fear-inducing message or misinformation on social media, the confidence in vaccinations is reduced, leading to increased hesitancy and reduced uptake (Chou et al., 2022; Wang et al., 2022). The findings of cross-national and systematic reviews show that individuals who use social media as the main source of information on the topic of vaccination have lower chances of reporting a high level of confidence than others who use the opportunities to talk to health professionals or the official sources (Cascini et al., 2022; Recio-Román et al., 2023). These findings are used to highlight the necessity to examine the confidence in vaccines as a medium process where exposure to social media plays some role in the vaccination outcome.

In addition to attitudes and intentions, a recent literature body now connects exposure to social media with real-life vaccination uptakes at a time of social health crisis. The study which has been conducted on the status of vaccination has noted that there are significant differences on the trend of social media use among the vaccinated and unvaccinated individuals, and therefore, information environment on social media can influence the health-related behavior in the real world (Moffett et al., 2024; Greenleaf et al., 2023). Conversely, it can also be stated that social media interventions specified by reliable health officials can make a positive impact on vaccine confidence and up-takes in the event of proper and transparent dissemination of information (Grosso et al., 2023). Though they are being understandable there has been a dearth of quantitative research at the district level in low and middle-income countries such as Pakistan, which underscores the fact that localized research is required to enhance the knowledge regarding the impact of social media exposure on the vaccine confidence and vaccination uptake in times of health emergencies.

2.1 Theoretical Framework

The sociological and communication theories used in this study inform the approach of the interplay of media exposure on beliefs and the related health behaviors in times of crisis. According to Social Cognitive Theory, people develop attitudes and behaviors due to observation and socialization more specifically by means of media environment (Bandura, 1986). In the context of public health emergencies, social media is a significant observational platform that subjects people to vaccine-related accounts, experiences, and perspectives in large volumes. This exposure has the ability to influence cognitive appraisals of vaccines hence affecting vaccine confidence.

Moreover, Agenda-Setting Theory will be utilized to explain the impact of the media platform on how people perceive things by putting certain issues at the forefront and making them socially relevant (McCombs & Shaw, 1972). Social media does not only inform people about vaccination but it also influences the frequency and the way the issue of vaccination is talked about. It becomes possible to undermine the trust and confidence in vaccination programs when the agendas of social media are controlled by vaccine-related misinformation or fear-based content.

The Theory of Planned Behavior also elaborates the way vaccine confidence leads to vaccination behavior. This theory further explains that the attitude that individuals maintain towards a behavior is a great determinant of the intentions they have towards the behavior and their actions (Ajzen, 1991). Vaccine confidence, in this case, is one of the crucial attitudinal variables influenced by social media exposure, which, consequently, influences the choice people make to vaccinate or not during the emergence of a public health threat.

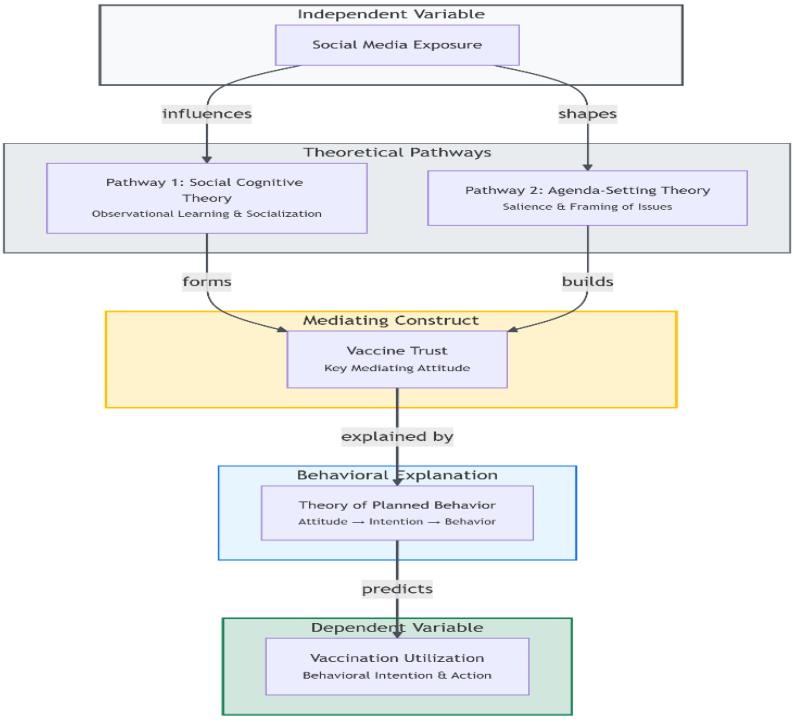

Figure 1: *Theoretical framework illustrating the interplay of social media exposure, vaccine trust, and vaccination behavior, informed by Social Cognitive Theory (Bandura, 1986), Agenda-Setting Theory (McCombs & Shaw, 1972), and the Theory of Planned Behavior (Ajzen, 1991).*

According to these theories, the construct of social media exposure is developed based on the concept of the social influence that affects the vaccine confidence that, in turn, defines the vaccination uptake. This framework offers a sociological perspective of the vaccination behavior as a socially constructed product depending on media environments, trust, and collective meanings.

3.0 Methodology

The research design applied in this study is a quantitative research design with a cross-sectional survey methodology to identify the effects of social media exposure on vaccine trust and vaccine utilization in case of a public health emergency. The study is based on a positivist ontology, which states that the social reality, including the attitudes to the vaccination and media exposure, has its independent existence and can be objectively quantified. The research is based on a positivist epistemology, which focuses on empirical studies and the analytical provide knowledge about the relationship between variables. The research axiological position is the value-neutral, which can guarantee that the researcher and his/her personal beliefs do not impact the data collection, analysis, and interpretation. A deductive method is used, in which the hypothesis based on the available theories and literature are verified with the help of quantitative data.

The complete study population is comprised of parents in vaccination centers of the District of Sargodha, that is, Tehsil Bhera, Bhalwal, and Silanwali. To achieve representativeness, a probability-based sampling method (purposive sampling technique across tehsils) is to be used in selecting the sample size of 300 respondents. A structured questionnaire is used to collect data in the form of social media exposure, vaccine trust, and vaccination utilization. The research method is through survey research, and data analysis shall be done by use of SPSS using descriptive statistics, correlation analysis, that shall be used to test the proposed hypotheses.

Ethical considerations are upheld in the course of the study. The survey will be conducted voluntarily and all the respondents will be informed and give their consent before data is collected. The respondents are guaranteed of anonymity and confidentiality and no personal information related to them is revealed. The participants will be made aware of their freedom to withdraw at any point of the research without any penalty.

4.0 Findings and Results

In this section, the statistical analysis of the collected data is provided to investigate the effects of exposure to social media in increasing vaccine trust and vaccination utilization during an emergency in public health. The SPSS software was used to perform the analysis, and it consists of the demographic analysis, descriptive statistics, reliability analysis, and correlation analysis.

4.1 Demographic profile of the respondents

Three hundred respondents took part in the study. Table 4.1 shows the demographics of the respondents.

Table 4.1 *Demographic Profile of Respondents (N = 300)*

Demographic Variable	Category	F	%
Age	18–24 years	25	8.3
	25–34 years	148	49.3
	35–44 years	62	20.7
	45 years and above	65	21.7
Gender	Female	164	54.7
	Male	136	45.3
Education	Master and below	74	24.7
	Bachelor's (BS/BA/BSc)	152	50.7
	Master's (MA/MSc/MPhil)	58	19.3
	PhD	16	5.3
Residence	Rural	142	47.3
	Urban	118	39.3
	Sub-Urban	40	13.4
Monthly Family Income (PKR)	Below 30,000	62	20.7
	30,000–50,000	96	32.0
	51,000–80,000	84	28.0
	Above 80,000	58	19.3
Total		**300**	**100.0**

The demographic profile shows that the sample is mainly comprised of young to middle-aged, most of the respondents fall within the 25-34 age group, representing an active group of social media users who are also eligible with regards to exposure to vaccine information. The sample includes equal representation of both genders and high percentage of rural and urban districts of District Sargodha, which increases the generalizability of the findings.

4.2 Descriptive Statistics and Reliability Analysis

Descriptive statistics were computed to determine the mean, standard deviation, and range of each study variable. Reliability analysis was conducted using Cronbach's alpha to assess internal consistency.

Table 4.2 *Descriptive Statistics and Reliability of Study Variables (N = 300)*

Variable	*N*	*M*	*S. D*	*Range*	*Cronbach's Alpha*
Social Media Exposure (SM)	10	30.63	6.48	38	0.960
Vaccine Trust (VT)	10	29.19	6.34	39	0.951
Vaccine Utilization (VU)	5	15.27	3.28	20	0.907
Moderating Variable (MV) – Social Media Influence	5	15.22	3.44	18	0.921

All constructs are very reliable, and the values of Cronbach alpha are greater than the recommended value of 0.70. The results of the average scores show that the exposure to the social

media, trust in vaccines, and the examples of vaccination among responds are moderate and high.

4.3 Correlation Analysis

Pearson correlation analysis was conducted to examine the relationships among Social Media Exposure (SM), Vaccine trust (VT), Vaccination Utilization (VU), and the Moderating Variable (MV), Social media influencers.

Table 4.3 *Correlation Matrix of Study Variables (N = 300)*

Variables	**SM**	**VC**	**VU**	**MV**
SM	1	.717**	.675**	−.071
VC	.717**	1	.760**	.204**
VU	.675**	.760**	1	.266**
MV (Social medial Influencers)	−.071	.204**	.266**	1

Note: p < 0.01 (2-tailed)

The findings suggest a high positive and statistically significant correlation between the social media exposure and vaccine trust and between social media exposure and vaccination utilization. Vaccination uptake is also closely and positively correlated with vaccine confidence, which explains its central role in vaccination behavior.

Moreover, the moderating variable (social media influence) demonstrates significant positive correlations with vaccine confidence and vaccination uptake, which supports the use of the variable in the study model. This is however not significant in relation to social media exposure and moderate variable.

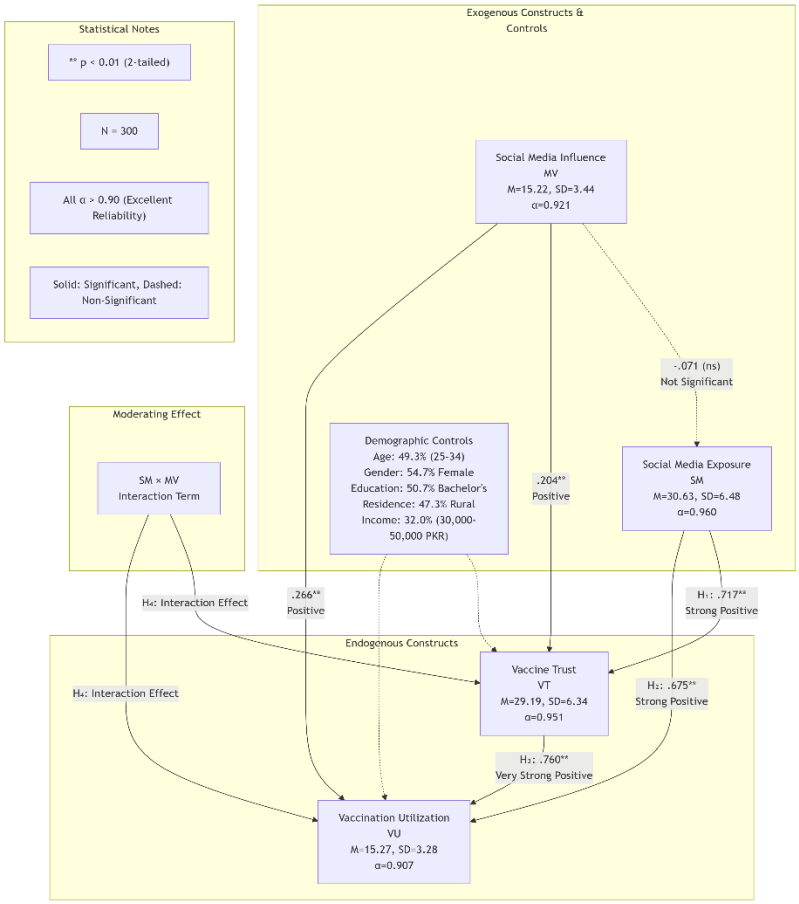

*Figure 1: Research Model Showing Social Media Exposure Predicts Vaccine trust (.717) and Vaccine Utilization (.675), with the Strongest Path Between trust and Utilization (.760**)*

This paper provided a discussion of the gathered data. Descriptive statistics and reliability test established that all the scales were reliable and internally consistent in the study. The analysis of the correlations showed that there were significant and strong relationships between social media exposure, vaccine trust, and vaccination utilization, which empirically supports the presented research framework.

5.0 Discussion and Conclusion

The findings of this study indicate that there exists a positive correlation between social media exposure and vaccine trust among the respondents and the correlation is strong and statistically significant. This result suggests that social media can play a role in shaping the perception, as far as safety, efficacy, and trust are concerned towards vaccination during the time of a public health crisis. The findings correlate with the other studies that provided evidence that personal beliefs and attitudes to vaccination are heavily influenced by the high usage of the vaccine-related content in social media (Wilson and Wiysonge, 2020; Cascini et al., 2022). Even though misinformation has been a common characteristic of social media, even the preceding literature has admitted its possibilities to share useful information through the credibility of its

sources, which further contributes to the confidence in vaccines (Chou et al., 2022; World Health Organization, 2021). The aspect of the correlation being so high in the current study, is an affirmative to the argument that as a leading source of information, social media exposure directly contributes in the determination of vaccine related trust.

In addition, the results indicate that there is positive correlation between trust in vaccinations and use of vaccines implying that the larger the number of vaccine-confident individuals, the higher the likelihood of them getting vaccinated. It is an expected finding, as the research on the entire world determines confidence in vaccines to be a primary factor determining vaccination (De Figueiredo et al., 2020). It was also observed that the same tendencies were noted in the background of the COVID-19 pandemic, where the confidence in the safety of vaccines, along with health institutions, were directly related to the actual acceptance and adoption of the vaccines (Allington et al., 2021; Jennings et al., 2021). Such sufficiency of this correlation in the present paper justifies theoretical explanations advanced by the Theory of Planned Behavior which remark that a person is more predisposed to engage in a particular health-related behavior due to the positive attitudes towards it (Ajzen, 1991).

Besides, the correlation between the exposure to social media and the use of vaccination is positive and shows that digital media have the indirect and, nevertheless, meaningful influence on the population behavior regarding health. These findings are consistent with the earlier empirical research that showed that individuals subjected to a large amount of content related to vaccines through the social media exhibit measurable changes in their real vaccination status (Loomba et al., 2021; Moffett et al., 2024). Even though misinformation has been known to reduce the intention to be vaccinated, previous studies have also found that structured and authoritative social media communication is effective in modifying hesitancy and increasing its uptake (Roozenbeek et al., 2020; Chou et al., 2022). This fact is supported by the current study, which has defined the exposure to social media as one of the determinants as it pertains to the vaccination behavior in a district-based context in Pakistan.

The overall findings of this research are also in correspondence with the existing international literature and also extend to further support it, providing local empirical data, on the background of low- and middle-income country. The results confirm that social media exposure is a strong predictor of vaccine trust which highly indicates vaccine uptake in case of a public health crisis. These findings are in line with the earlier suggestions of the contextualized quantitative research to learn more about the impact of the media conditions on the health behavior (Cascini et al., 2022; Wang et al., 2022). The study indicates that empathetic, legit, and with evidence-based communication is important in order to use social media strategically to increase the trust level among the population and improve the outcome of vaccination in other health crises.

5.1 Conclusion and Recommendations

This research paper arrives at a conclusion that exposure to social media is an important factor in influencing vaccine trust and utilization in cases of a public health emergency. The results affirm the fact that increased exposure to social media vaccine-related content is closely linked to increased vaccine trust, which consequently results in increased vaccination utilization among

people. The social relevance of the vaccines as an explanatory variable between the exposure to social media and actual vaccination behavior led to the consideration of social media as a central factor in the decision-making of the population in the given area of the vital sphere. These findings confirm the body of theoretical and empirical literature on the importance of trust in vaccinations and health institutions in ensuring the success of the vaccination program, especially in crisis conditions, where the level of uncertainty and fear are high.

Considering these findings, it can be suggested that social media platforms should be explored by the public health authorities and policymakers as the strategic means of sharing accurate, transparent, and evidence-based information on vaccinations in the case of a public health crisis. Misinformation should be combated by timely fact-checking, working together with reputable health professionals, and involving trusted social media figures to increase the trust of the population. Moreover, specific digital communication efforts are to be directed at boosting vaccine confidence through the issues of safety and institutional transparency. It is suggested that future studies should consider the cause-and-effect mechanisms and content-specific effects of exposure to social media on various population groups to build up on the evidence base of effective vaccination communication interventions. .

Contribution

Darain Fatima: Problem Identification and Theoretical Framework
Zarqa Azhar: Data Analysis, Supervision and Drafting
Khawar Hussain: Methodology and Revision

Conflict of Interests/Disclosures

The authors declared no potential conflicts of interest in this article's research, authorship,and publication.

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