

Modeling Vaccination Intentions Through E-Health Literacy, Confidence, and Hesitation: A PLS-SEM Approach

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ABSTRACT

Purpose: The purpose of this study was to examine how vaccine hesitancy and e-health literacy influence intention to vaccinate, and to investigate the mediating role of vaccine confidence in these relationships. The study aimed to integrate psychological attitudes, digital information skills and trust-based mechanisms into a unified model of vaccination decision making. **Method:** A quantitative cross-sectional design was adopted, and data were collected from 290 adult participants using standardized scales adapted from previous research. Smart-PLS was used to assess both the measurement and structural models, evaluating direct relationships and mediation effects. **Findings:** The results revealed that vaccine hesitancy significantly reduced intention to vaccinate, while e-health literacy significantly enhanced it. Vaccine confidence showed a strong positive effect on intention and was found to mediate the relationship between hesitancy and intention as well as between e-health literacy and intention. The findings highlight confidence as a central psychological pathway through which attitudes and digital competencies influence vaccination decisions. **Originality or Implications:** This study extends current understanding by integrating hesitancy, confidence and e-health literacy within a single behavioral framework. The findings offer valuable implications for designing targeted communication strategies that strengthen digital literacy, reduce hesitant attitudes and build trust in vaccination systems.

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1. Introduction

Even the most effective method of preventive measures against infectious diseases, the vaccination has long been identified as a highly effective type of public health intervention, although nowadays, the global immunization campaigns are confronted with significant challenges as the impact of psychological, informational and social issues on personal immunization decisions is increasing (Tian et al., 2023). As digital information channels are developing, people also use online sources to make their opinions on vaccines; this has changed the nature of accepting vaccines in the entire globe (Ruggeri et al., 2024). New cases of preventable diseases and the decreasing vaccination coverage in various areas have triggered a revival of the interest in studying behavioural determinants that would affect the willingness of people to be vaccinated (Baldwin et al., 2023). According to scholars, intention to vaccinate, which is a willingness or a readiness of a person to be vaccinated against a recommended vaccine, is a complicated process that involves trust in vaccines, perceived benefits, fears about safety and the capacity to assess health information (Mäki et al., 2024). Subsequently, the interplay of psychological constructs, including vaccine hesitancy, vaccine confidence, and e health literacy, to determine the impact on vaccination intention has emerged as an urgent study agenda in contemporary population health.

There is increasing empirical data that demonstrates vaccine hesitancy is a reliable predictor of reduced intention to vaccinate in a range of demographic groups with an array of vaccine types (Liu et al., 2023). The research findings of different nations have found out that the people who express doubts about the safety, effectiveness or need of vaccinations are much less likely to demonstrate positive intentions to vaccination even in cases when these vaccines are readily available (Pourrazavi et al., 2023). Studies also point to the fact that vaccine confidence is a critical process that connects the attitudes to behavioural consequences because the increased the trust towards scientific institutions and medical practitioners, the stronger the intention to vaccinate (Adeyemo et al., 2025; Collini et al., 2023; de Figueiredo et al., 2023).

Additionally, digital health studies have shown that e-health literacy has become an important determinant of health behaviour, and the people with stronger digital appraisal abilities are more prone to trust medical information and have more intentions of being vaccinated (Jiao et al., 2024). All these results are indicative of the fact that psychological trust, attitudinal hesitation and information processing aptitude jointly determine the decision of a person to undergo vaccination.

Even though the existing body of research is quite rich, a number of critical gaps in it are yet to be addressed. To begin with, most studies analyze vaccine hesitancy and vaccine intention to vaccinate as direct predictors without investigating the psychological processes that mediate the relationship between hesitant attitudes and behavioural intentions (Kafadar et al., 2023). This is too small of a scope to understand the interaction of trust related variables like vaccine confidence with hesitancy to create actual decision patterns (Tiwana & Smith, 2024). Moreover, although a number of researchers have explored the predictive power of confidence, there are fewer studies that have examined the possibility of confidence as a mediating variable explaining why indecisive people are eventually persuaded to vaccinate or not (Nazari et al., 2023). The underlying mechanisms involved in the middle processes should be further studied to formulate more effective interventions that would enhance the acceptance of vaccinations.

The other distinct gap comes with the little emphasis given to e-health literacy in regard to the vaccine confidence and vaccination intention. Even though digital health literacy has become prominent, not many studies have incorporated it into the mediation based models that measure the role of digital evaluation skills in determining behavioural intentions based on trust building processes (Song & Lee, 2023). The current literature is inclined to consider literacy and intention as independent predictors instead of examining the impact of the capacity to analyze data on online health-related information as a strengthening or weakening of vaccine-related confidence (Kayupova et al., 2024). Such a gap is especially problematic in fast-digitizing communities where the information on vaccinations is mainly consumed online (Tian et al., 2023). In addition, the majority of previous studies have been done in Western or high income, which creates a gap in comprehending how the variables work towards South Asian or low and middle income setting where vaccine hesitancy and misinformation prevalence are higher (Fenta et al., 2023). To fill these gaps, a detailed framework is needed that would look at a combination of vaccine hesitancy, vaccine confidence, and e health literacy as a mechanism of finding their mutual influence on intention to vaccinate.

This research aims at exploring how vaccine hesitancy affects intention to vaccinate, to determine the effect of e health literacy on intention to vaccinate, to understand how vaccine confidence influences vaccination intention and whether vaccine confidence mediates the relationship between hesitancy and intention and between e-health literacy and intention. The goals of these objectives include bringing psychological, informational and behavioural constructs into a coherent system that describes the way people make their decisions in respect to vaccination.

2. Literature Review

Vaccine hesitancy has turned out to be a significant obstacle to the health work of the population, especially in the societies, where the lack of information, distrust in the healthcare systems, and cultural beliefs affect the decision-making process (Lip et al., 2023). Other theoretical concepts like the health belief model and the theory of planned behavior emphasize the fact that perceived susceptibility, perceived benefits, safety concerns, and social influence collectively influence personal attitudes to vaccination (Sinuraya et al., 2024). Current research insists upon the idea that indecisiveness is not confined to the fear of side effects but is becoming more and more influenced by online misinformation and conspiracy theories that spread like wildfire via the Internet (Carrieri et al., 2023). Scholars have observed that the population with a low level of trust in scientific institutions and the inability to assess online health assertions is more prone to turn down vaccination recommendations (Çetin & Sögüt, 2024). Emotion, poor scientific literacy and listening to positive anti-vaccine stories increase the level of doubt in even those who may be convinced of the effectiveness of routine vaccination (Carrieri et al., 2023). Consequently, vaccine scepticism has remained a challenge in the world to maintain the same level of herd immunity and now the matter has become even more complicated due to increased use of online information sources as a source of health information (Goje & Kapoor, 2024).

E-health literacy has become a relevant issue of vital importance in defining how individuals can search, interpret, assess and use digital health data (Zhang et al., 2023). As digital health communication is growing, people are turning to social media, websites, and online forums to make their decisions about vaccination (Çetin & Sögüt, 2024). The presence of high e-health literacy helps users to evaluate the quality of information critically, distinguish between reliable and misleading material, and make informed decisions thus having more chances to be convinced to accept vaccination (Song & Lee, 2023). The study shows that people with high digital health competencies have more trust in the authorities in the sphere of public health and have greater vaccination intentions than people with lower competencies (Wiegand et al., 2023). On the other hand, poor e-health literate people are more prone to misinformation and will tend to evade vaccination because of confusion or mistrust (Okan et al., 2023). The interplay of vaccine hesitancy and e-health literacy thus plays an important role since better digital skills decrease fear due to misinformation and increase confidence in vaccines, which finally leads to an increased desire to vaccinate.

2.1 Vaccine Hesitancy and Intention to Vaccinate

The phenomenon of delay in vaccine acceptance or refusal despite being available is known as vaccine hesitancy and is caused by safety issues, mistrust in health authorities, cultural beliefs, and misleading information (Tian et al., 2023). Intention to vaccinate is a willingness or an intended behaviour of an individual to receive a recommended vaccine and it occurs as a result of attitudes, perceived risks and social factors (Morales-García et al., 2022). Empirical research that has been conducted in the recent past highlights that hesitancy is highly correlated with low confidence in science-based recommendations, high vulnerability to rumors, and emotional reactions that do not favor rational decision making (Huynh et al., 2023). A study revealed that highly hesitant people were much less willing to receive routine and new vaccines due to fears of side effects being bigger than the perception of disease severity (Nowak & Cacciatore, 2023). The same results were identified by Mäki et al. (2024) when the researchers received lower acceptance intentions in participants with negative beliefs on vaccine efficacy despite receiving credible information on health (Gagneur et al., 2024). These analyses affirm that psychological opposition to vaccination is always a debilitating force on behavioural intentions and demonstrates that hesitancy is a significant precursor to vaccination behaviour.

Extrapolating on this evidence, the existing literature suggests a solid argument in favors of the association between vaccine hesitancy and intention to vaccinate as a part of behavioural modelling (Qorib et al., 2023). Research that is based on the theory of planned behavior and health belief model shows that negative beliefs towards vaccines considerably diminish behavioural intentions by diminishing perceived benefits and amplifying perceived barriers (Wu et al., 2023). The empirical studies on various populations indicate consistently that people who are more hesitant exhibit less motivation to obtain immunization, non-visitation of vaccine related appointments, and doubtfulness about future vaccination, which decreases the intention to vaccination. According to Carrieri et al. (2023), the lack of trust in the systems of healthcare was a significant mediator of hesitancy, which, in its turn, resulted in lower intentions to vaccinate even the most educated groups.

H1: Vaccine hesitancy has a significant impact on intention to vaccinate.

2.2 E-health Literacy and Intention to Vaccinate

E-health literacy is defined as the capability of a person to seek, comprehend, assess and make use of health information which is found online enabling an individual to take informed decisions about preventive behaviours (Jiao et al., 2024). Intention to vaccinate is the movement of a person to be motivated or make a planned probability to have a recommended vaccine. Empirical studies reveal that e-health literacy is an important factor in influencing decision-making in health matters especially in digitally oversaturated settings (Maciuszek et al., 2023). Recent research revealed that people who possessed a high e-health literacy had a better ability to recognize trustworthy information about vaccinations and misleading information on the Internet, and this ability enhanced their trust in vaccination (AVÇİN & CAN, 2023). Ranjbaran et al. (2023) indicated that individuals with good digital health literacy expressed higher levels of trust in government-based health institutions and had a higher assessment of willingness to take seasonal and novel vaccination types than those with poorer health literacy. There are also indications that the e health literacy minimizes the psychological uncertainty that is commonly linked with the issue of vaccine safety since people are able to critically evaluate the scientific explanations and public health guidelines, which result in a more favorable position on the issue of vaccination (Fenta et al., 2023).

Based on this empirical basis, the recent literature has shown that there is a distinct theoretical and behavioural pathway linking e health literacy to intention to vaccinate (Nazari et al., 2023). The researchers claimed that those who have the skills to check online statements and assess the credibility of digital information have a higher perceived behavioural control, which enhances their will to adopt preventive health behaviour including vaccination (Song & Lee, 2023). Information processing theory-based studies have revealed that as individuals have confidence in navigating electronic health content, they develop more positive attitudes to vaccines, feel less risky, and believe they are able to make better informed decisions, which are all factors that lead to a better vaccination intention (Kim et al., 2023). A study found that e-health literacy has a significant role in predicting intention to vaccinate among diverse populations due to the fact that persons with higher literacy were less susceptible to misinformation on social media and more susceptible to evidence-based health expert communication (Zhang et al., 2023).

H2: E-health literacy has a significant impact on intention to vaccinate

2.3 Vaccine Confidence and Intention to Vaccinate

The term vaccine confidence is typically taken to refer to the level of trust that individuals have towards vaccines, the health system that administers them, and the policymakers that encourage them (de Figueiredo et al., 2023). It generally embraces the beliefs regarding vaccine safety, efficacy, need, and compatibility with personal or cultural beliefs and is commonly presented as one of the key elements of the 3C model of vaccine hesitancy that differentiates confidence, complacency and convenience (Adeyemo et al., 2025). Intention to vaccinate is a self-reported probability or willingness of

a person to take a recommended vaccine relatively soon and in models like the Theory of Planned Behavior is assumed to be the nearest predictor of actual vaccination behavior (Collini et al., 2023). It is demonstrated by conceptual and review papers following the Covid 19 pandemic that confidence in vaccines is one of the psychological determinants of the intent and uptake of these substances among different pathogens, age groups and health systems, as the individuals who believe that vaccines are safe, effective and important are more likely to subject themselves or their children to the risks and procedures of vaccination (Wiegand et al., 2023; Wood et al., 2023). In situations where there is not much trust, fears of side effects, uncertainty of effectiveness, and lack of trust toward pharmaceutical companies and government agencies are most likely to dominate the decision making process which undermines the desire to vaccinate even in cases where vaccines are offered free and advised by the health care providers (Eagan et al., 2023). By doing this, the conceptualized relationship between vaccine confidence and intention to vaccinate are conceptually connected in that confidence forms the basis of trust on which individuals bring together their intention to be vaccinated.

Empirical studies always report a positive relationship between vaccine confidence and intention to be vaccinated across the populations. One research on Covid 19 vaccines has discovered that more confident participants were much more likely to report a strong intent to become vaccinated compared to less confident participants after considering the sociodemographic factors and perceived risk (Stephenson-Hunter et al., 2023). Polling Australian adults revealed that by indicating a high level of confidence in vaccine safety and effectiveness, individuals who mentioned it most often indicated that they would definitely accept a SARS CoV 2 vaccine, and those with doubts or mistrust tended to report uncertainty or rejection (Baldwin et al., 2023; Liu et al., 2023). More recent studies on Canadian Parents of young children identified that increased confidence in vaccines had a lower likelihood of reporting their intention to vaccinate their child with Covid 19 by far and therefore confidence is a protective factor in preventing reluctance (Syed et al., 2023). The immense scale of behavioural surveillance data, as observed in the United States also suggests that the adult group, which believes vaccines to be safe and important, has significantly higher coverage and intention to receive updated Covid 19 and influenza vaccines than those with lower confidence (Eagan et al., 2023).

H3: Vaccine confidence has a significant impact on intention to vaccinate

2.4 Vaccine Confidence as a Mediator

Research conducted in the past reveals that hesitancy and confidence are two related and yet different psychological processes that are involved in making vaccination decisions (Maciuszek et al., 2023). It is a fact that studies have always found out that people with hesitant beliefs have less confidence in vaccinations, which in turn undermines their intentions to be vaccinated (Pourrazavi et al., 2023; Ruggeri et al., 2024; Tiwana & Smith, 2024). The behaviour based studies have shown that the perceptions of doubt or fear towards vaccines leads to lack of trust in the scientific advice and reliability of the institutions and consequently leads to a decline in their willingness to take subsequent vaccines (Carrieri et al., 2023; Zimmerman et al., 2023). Subsequent research following the Covid nineteen shows that deteriorations in confidence tend to become the most potent forecast of reluctance within the hesitant populations, which would indicate the possibility of hesitancy functioning by confidence mechanisms.

Empirical data indicate that high hesitancies do not necessarily imply that the person does not accept vaccination, only that they are simply lacking the confidence to transform positive or neutral attitudes into a definite intention (Kafadar et al., 2023). The comparison studies conducted on psychological pathways show that, when hedging on confidence, the direct impact of hesitancy on intention to vaccinate has a much weaker impact, and the confidence factor explains the large proportion of the relationship (Qorib et al., 2023; Tian et al., 2023; Wu et al., 2023). Studies other than that have also indicated that interventions that enhance confidence positively influence intention even in people who are moderately hesitant, which is why it is believed that confidence is a mediating factor between attitude and intention (Alsuwaidi et al., 2023; Lip et al., 2023). These trends help to prove that the concept of confidence in vaccines is the mediator due to which the hesitant beliefs can affect the willingness to be vaccinated.

H4a: Vaccine confidence mediates the relationship between vaccine hesitancy and intention to vaccinate

E-health literacy is the capacity to locate, comprehend, estimate and implement online health data towards making educated decisions (Zhang et al., 2023). High e-health literacy enables an individual to detect believable online sources, discern misinformation and understand scientific content relative to vaccination (Çetin & Sögüt, 2024). Vaccine confidence is a belief in the safety, effectiveness, and need of vaccines, whereas intention to vaccinate is an indicator of the willingness to be vaccinated using a recommended vaccine (Aras Doğan et al., 2025). Previous studies show that people who are better equipped with digital health competencies are more likely to build greater trust in medical advice since they can certainly better differentiate credible health advice and false digital information (Jiao et al., 2024; Ranjbaran et al., 2023; Tian et al., 2023). Research indicates that a better literacy level increases the understanding of scientific explanations regarding the creation of vaccines, possible risks, and side effects as protective measures, which also leads to increased confidence (Song & Lee, 2023). Population based research shows that individuals that feel comfortable with the use of online health resources tend to report positive attitudes about the reliability of the vaccines and, thereby, have more intentions to vaccinate (Dağlı & Topkara, 2023).

Empirical research proves that more digitally competent people are more willing to vaccinate mainly due to the fact that they build more confidence in scientific authorities and vaccination systems first (de Figueiredo et al., 2023). According to behavioural models, the more the literacy, the more clear the information processing, and the less the uncertainty and the more the confidence leading to the intention (Baldwin et al., 2023). It has been found that research on direct and indirect effects, sometimes the intermediary variable is confidence whereby the impact of literacy becomes weak when confidence is regulated (Liu et al., 2023). These results indicate that e health literacy helps intention by facilitating understanding as well as by creating trust.

H4b: Vaccine confidence mediates the relationship between E-health literacy and intention to vaccinate

3. Theoretical Framework Supporting the Research

The correlations in this research model are expounded by the health belief model and the theory of planned behaviour, which are models that explain how personal perceptions and cognitive assessments influence preventive health behaviours. According to the health belief model, perceived benefits, perceived risks, and action cues contribute to the decision to act in terms of health, there is a hypothesis that vaccine hesitancy undermines the intention to vaccinate by increasing the perceived barriers and decreasing the perceived susceptibility and perceived benefits (Isonne et al., 2024). Meanwhile, behavioural intentions are predicted by attitudes, subjective norms and perceived behavioural control according to the theory of planned behaviour, which is why the role of e health literacy in strengthening intention to vaccinate by enhancing the capacity to evaluate information, forming positive attitudes towards the vaccine and magnifying the perception of control over health choice can be explained (Ajzen, 1991). These theoretical views demonstrate that hesitancy and literacy can be mediated, in cognitive and motivational processes, to determine the willingness of an individual to vaccinate. Based on these theories, figure 1: conceptual framework demonstrates how vaccine hesitancy and e health literacy are significant predictors of intention to vaccinate, and the psychological and informational bases are used to determine the decision to accept vaccination.

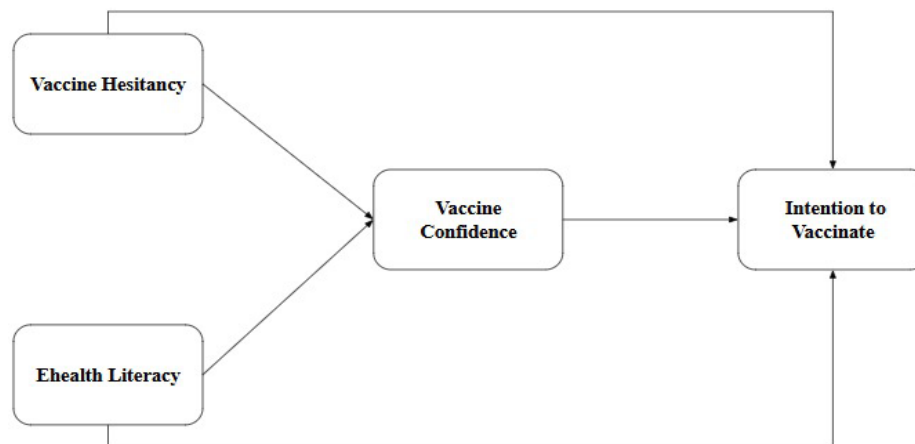


Figure 1: Conceptual Framework

4. Methodology

The research design that has been used in this study is that of quantitative, cross sectional research design to explore the structural relationships between vaccine hesitancy, e health literacy, vaccine confidence, and intention to vaccinate. The survey-based design was chosen on the basis of that it could be used in the effective measurement of psychological constructs in a large and varied population and provide statistical testing of direct and mediating effects in the proposed conceptual framework. The target population was comprising adults who could be vaccinated on a regular basis. The sample of 290 participants was a reasonable sample size to be used in structural equation modelling in terms of the ten times rule and modern-day standards of Smart-PLS estimation. The convenience sampling technique was used to select the participants and this enabled the effective recruitment of participants besides ensuring diversity in terms of age, gender, education and exposure to online health information.

The survey involved the use of structured questionnaire which has a set of standardized scales borrowed off other research questionnaires that had previously been found to be valid. The vaccine hesitancy was assessed based on a validated multidimensional scale that included issues of vaccine safety, perceived need, and trust in scientific advice (Cao et al., 2023). The measurement of e health literacy was based on an adopted scale to determine how much individuals can

search, understand, evaluate and apply online health information (Oliveira et al., 2024). The items used to measure vaccine confidence were those that assessed trust in vaccine safety, effectiveness and reliability of health authorities (Gilkey et al., 2014). Intention to vaccinate was measured by using items that established willingness and readiness of respondents to accept a recommended vaccine (Morales-García et al., 2022). Everything was rated in a five point Likert scale between strong disagreement and strong agreement. The use of validated scales guaranteed the accuracy of content, construct relevance and comparison with previous research.

The analysis tool was Smart-PLS version 4 because variance based partial least squares structural equation modelling is ideally applicable in predictive analysis and research on complex mediation structures. This analysis was done in two stages. The measurement model was evaluated in the first phase to test the reliability of the indicators, internal consistency reliability, convergent validity and discriminant validity. Composite reliability and Cronbach alpha were used to determine reliability and average variance extracted was used to determine convergent validity respectively. The Heterotrait Monomethod ratio were used to determine the discriminant validity. The evaluation of the structural model was done in the second phase to come up with path coefficients, coefficient of determination and the size of effect. Significance of both direct and mediated relationships was tested with the help of bootstrapping with 5000 resamples. The mediation analysis was used to determine the mediation of vaccine confidence between vaccine hesitancy and intention to vaccinate in between e health literacy and intention to vaccinate. The analytic approach has offered in-depth information on the predictive associations as well as the indirect impacts in the suggested model.

5. Results

Table 1 shows the statistics of reliability and validity of the four major constructs in the study, which include e health literacy, intention to vaccinate, vaccine confidence, and vaccine hesitation. The findings indicate that Cronbach alpha scores of all items are between 0.888 and 0.950 that portrays high levels of internal consistency. The values of composite reliability also reinforce this conclusion and all constructs have a high mark of over 0.70, and a range of value between 0.911 and 0.957, which means that the items are always valid in their measuring of the different constructs. The extracted values, the average of the values of variance that are explained by the construct as opposed to measurement error, are between 0.563 and 0.691 and none of them is less than 0.50 which is the minimum acceptable level of variance. This demonstrates that both of the constructs can be considered to have acceptable convergent validity. In general, Table 1 confirms that the measurement model (Figure 1) possesses a good degree of reliability and convergent validity, which will enable the further structural analysis to be viewed with certainty.

Table 1: Construct Reliability and Validity

Construct	Cronbach Alpha	CR	AVE
E-Health Literacy	0.888	0.911	0.563
Intention to Vaccinate	0.935	0.944	0.586
Vaccine Confidence	0.922	0.936	0.648
Vaccine Hesitation	0.950	0.957	0.691

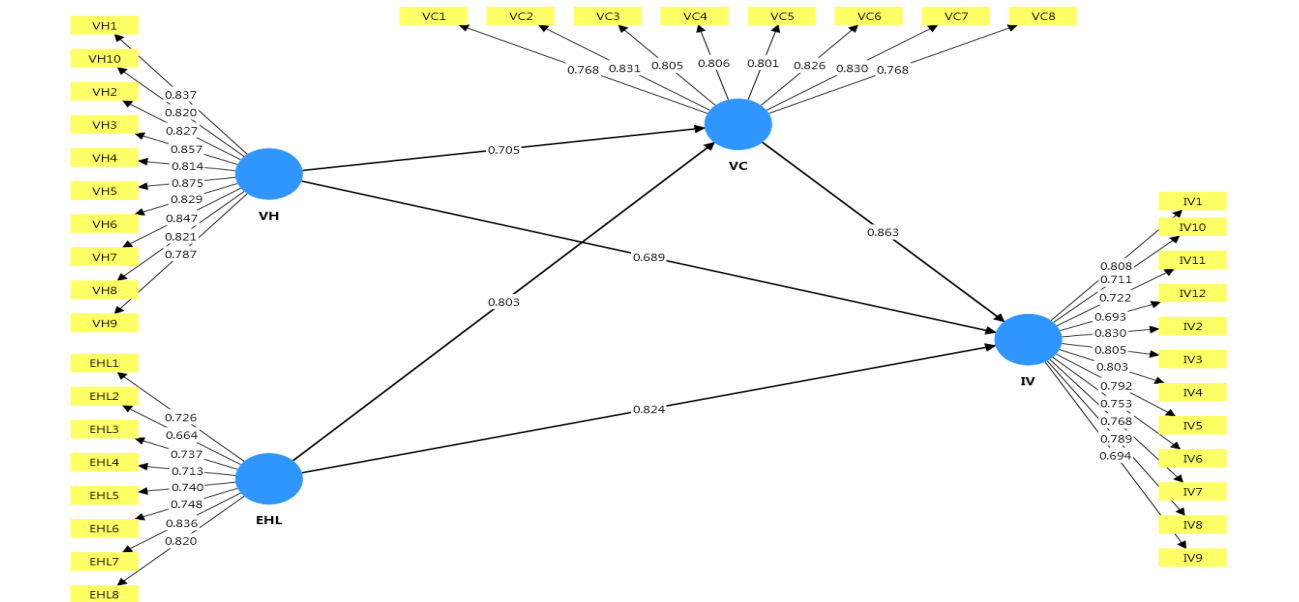


Figure 2: Measurement Model

Table 2 gives the outer loading values of all the items contained in the measurement model and gives the degree to which each item was a significant contributor to the particular construct it is associated with. In the case of e health literacy, the loading value of all eight items are acceptable between 0.664 and 0.836 which implies that they all significantly depict the construct. Construct intention to vaccinate has a good loading on twelve items that vary between 0.693 and 0.830 thus demonstrating that the construct is multidimensional and measures well the behavioural and attitudinal indicators. Confidence in vaccines also possesses high loading values with the scores ranging between 0.768 to 0.831 indicating that all items are effective in the capturing of the perceived trust and belief in vaccination. Vaccine hesitation has the most overall loadings of 0.787 to 0.875, which is in line with the items being extremely good predictors of negative attitudes, doubts and perceived barriers to vaccination. The reliability of the measurement items is high as the outer loadings of all constructs are consistently high, and the items show a very good indicator reliability.

Table 2: Outer Loading

Variable	Item	Outer Loading
E-Health Literacy	EHL1	0.726
	EHL2	0.664
	EHL3	0.737
	EHL4	0.713
	EHL5	0.740
	EHL6	0.748
	EHL7	0.836
	EHL8	0.820
Intention to Vaccinate	IV1	0.808
	IV10	0.711
	IV11	0.722
	IV12	0.693
	IV2	0.830
	IV3	0.805
	IV4	0.803
	IV5	0.792
	IV6	0.753
	IV7	0.768
	IV8	0.789
	IV9	0.694
Vaccine Confidence	VC1	0.768
	VC2	0.831
	VC3	0.805
	VC4	0.806
	VC5	0.801
	VC6	0.826
	VC7	0.830
	VC8	0.768
Vaccine Hesitation	VH1	0.837
	VH10	0.820
	VH2	0.827
	VH3	0.857
	VH4	0.814
	VH5	0.875
	VH6	0.829
	VH7	0.847
	VH8	0.821
	VH9	0.787

Table 3 presents the value of heterotrait monotrait ratio to determine the discriminant validity between e health literacy, intention to vaccinate, vaccine confidence, and vaccine hesitation. The heterotrait monotrait values are all significantly below the upper limit of 0.85 which is considered to be conservative, meaning that all the constructs are empirically different. The heterotrait monotrait values among e health literacy and the other constructs are between 0.802 and 0.816 as they indicate that there is a relationship but are distinctly different concepts. The correlation between the intention to vaccinate and vaccine confidence has been found to have a value of 0.824 indicating strong but independent relationships between behavioural intention and trust in vaccines. The heterotrait monotrait values of vaccine hesitation are lower than the 0.802, which proves that hesitation is a much different psychological area than confidence, intention, and literacy. Such findings suggest that the discriminant validity is high and the constructs are not conceptually redundant to the extent that it may

undermine the structural model.

Table 3: Discriminant Validity (HTMT)

	EHL	IV	VC	VH
E-Health Literacy				
Intention to Vaccinate	0.812			
Vaccine Confidence	0.816	0.824		
Vaccine Hesitation	0.802	0.723	0.749	

Table 4 shows the goodness of fit statistics of the model and the coefficient of determination of the confidence of the vaccines and intention to vaccinate. The covering of the confidence of the vaccine is 0.794 and the adjusted covering of the vaccine confidence is 0.791 signifying that the predictors in the model elucidate close to seventy nine percent of the variance in the vaccine confidence which is a very good analysis capability. The Q square value of 0.624 also indicates that there is high predictive relevance. The intention to vaccinate construct achieves an R square of 0.653 and the adjusted R square of 0.650, which proves that sixty five percent of its variance is covered by vaccine confidence, vaccine hesitation, and e health literacy. The fact that the Q square of this model is 0.649 is also an additive in support of the predictive power of the model. The standardized root mean square value of residual is equal to 0.080, which implies that the general model is very suitable to the data. Such findings verify that the structural model (Figure 2) has good explanatory and predictive powers.

Table 4: R-Square Statistics Model Goodness of Fit Statistics

Construct	R2	Adjusted R2	Q ² predict	SRMR
VC	0.794	0.791	0.624	0.080
IV	0.653	0.650	0.649	

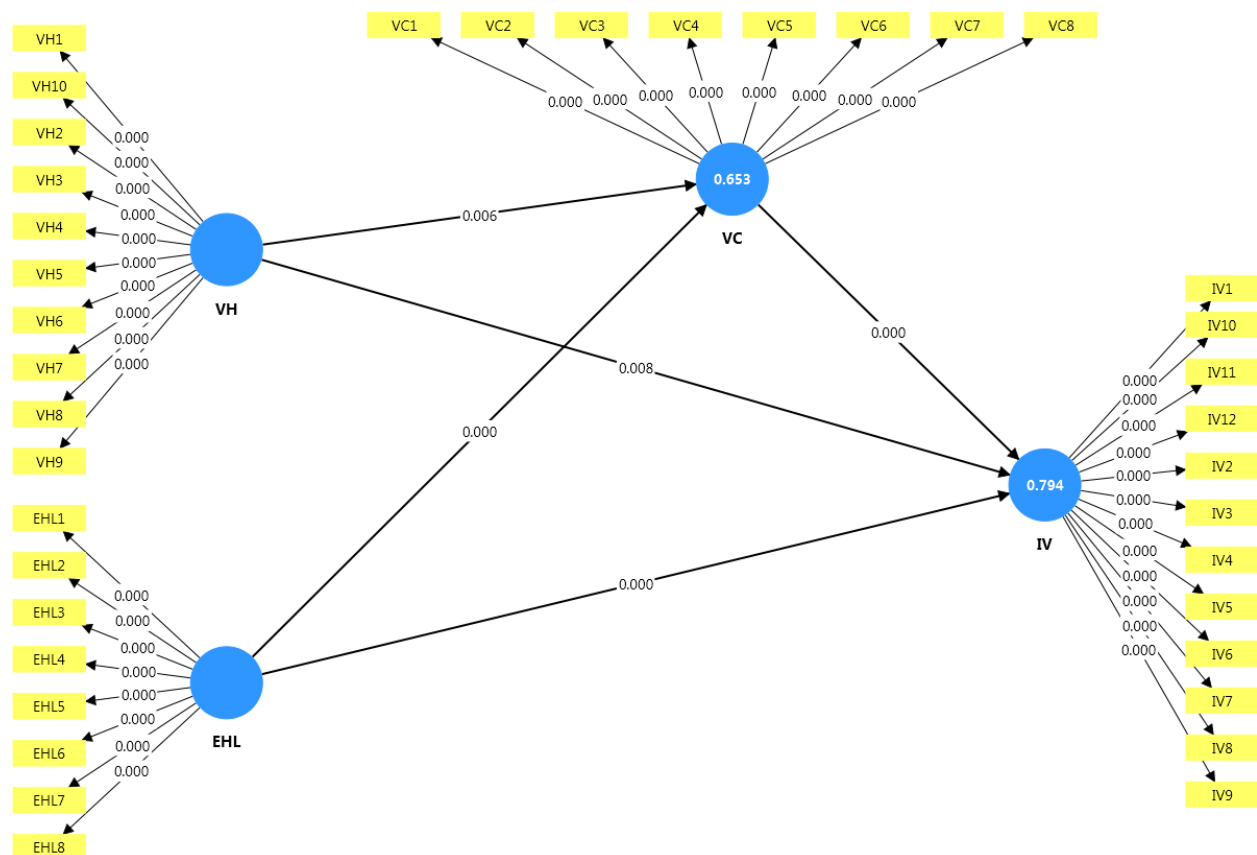


Figure 3: Structural Model

Direct and indirect path analysis to test the hypothesised relationships summarises the results as presented in Table 5. The vaccine hesitation to intention to vaccinate has a small, though statistically significant effect suggesting that the greater the hesitation the lower the intention to vaccinate with a p value of 0.008 showing the statistical support of the effect. E health literacy has a positive and significant impact on intention to vaccinate with t value of 4.721 and p value of 0.000, that being, the higher the digital health skills the higher the intentions. The strongest direct influence on intention to

vaccinate is the vaccine confidence, whose path coefficient is 0.572 and the t value is very high 9.369, which means that trust in vaccines has the strongest predictive power. The mediation findings also indicate that vaccine hesitation has an indirect influence on intention to vaccinate by vaccine confidence with significant mediation effect supported at p value 0.001. Equally, intention to vaccinate is also indirectly affected by e health literacy via the vaccine confidence with a strong mediating effect with p value 0.000. In general, Table 5 shows that the support of direct and mediated relationships occurs, and it emphasizes the idea of vaccine confidence as a key point of connection between literacy and hesitation and vaccination intention.

Table 5: Direct Path Analysis

Hypotheses	β	t-Value	p-Value	Result
Vaccine Hesitancy has a Significant Impact on Intention to Vaccinate	-0.027	0.392	0.008	Supported
E-health Literacy has a Significant Impact on Intention to Vaccinate	0.386	4.721	0.000	Supported
Vaccine Confidence has a Significant Impact on Intention to Vaccinate	0.572	9.369	0.000	Supported
Vaccine Confidence Mediates the Relationship between Vaccine Hesitancy and Intention to Vaccinate	0.198	3.425	0.001	Supported
Vaccine Confidence Mediates the Relationship between E-health Literacy and Intention to Vaccinate	0.219	4.012	0.000	Supported

6. Discussion

The current research paper aimed at unravelling the intricate psychological and informational processes determining the choices of individuals concerning the issue of vaccination as a behaviour that becomes critical to the protection of the overall health in an increasingly connected and digitally affected world. Since societies are still trying to overcome the aftermath of the outbreak of infectious diseases and the fast spread of health information through the Internet, the study of how individuals develop their intentions to be vaccinated has never been as significant (Isonne et al., 2024). This research study has shown that the effect of vaccine hesitancy on intention to vaccinate is significantly and negatively important, which supports the first hypothesis and the vast body of literature that identifies hesitancy as one of the strongest factors that can influence a person to vaccinate. The findings ensure that those who have some doubts concerning vaccines safety, possible side effects, or institutional trust are less likely to manifest high willingness to take prescribed vaccines (Haeder, 2024). This is consistent with the findings of the studies on the role of hesitant attitudes in undermining the perceived benefits and increasing the perceived risks which eventually lead to a decrease in the psychological willingness to take preventive health behaviours. The fact that the given hypothesis has been accepted proves that hesitancy is not only a cognitive issue but a strong affective and motivational tool with which the process of the health decision making is organized (Wiegand et al., 2023). The correlation revealed in this research also underscores that indecency is entrenched in the social and informational space where misinformation, socially endorsed sceptic and negative health discourses may lead to distortion of risk perceptions. These results demonstrate that the decrease in hesitancy might need measures that can be taken to resolve emotional issues, enhance trust towards caregiving systems, and enhance clarity in communication by health officials.

The second hypothesis stating that e-health literacy is a significant determinant of intention to vaccinate was also justified and this is the importance of digital information skills on health decisions (Stephenson-Hunter et al., 2023). This observation shows that those who can find, comprehend, analyze and use online health information are better placed to come up with positive perceptions about vaccination and gain more confidence in scientific advice. Increased literacy will allow individuals to discriminate between reliable and deceptive digital information, decreasing this uncertainty and enhancing their level of control in processing vaccine related information. The observed positive association in the current study indicates that the ability to navigate through digital health environment turns information into meaningful stimulation of behavioural motivation, which in turn enhances the stronger intention to get vaccines (Syed et al., 2023). These findings highlight the necessity to incorporate digital literacy enhancing measures in the programs of public health communication especially where online misinformation viruses are highly prevalent. The fact that the two hypotheses are accepted shows that the psychological attitudes and informational competencies have a combined influence on the vaccination intentions, and effective vaccination campaigns should target the reluctant beliefs and improve the level of digital health among the population simultaneously.

The generalization of the third hypothesis proves that the vaccine confidence produces a strong and positive effect on the intention to vaccinate and it supports the central role played by the trust in creating preventive health behaviours. The results show that the more people think that vaccines are safe, effective and needed, the more willingness to vaccination they build (Wiegand et al., 2023). This finding goes in line with conceptual models that consider confidence as a priming psychological resource that converts attitudes into behaviourally pertinent intentions. The high impact of

confidence, which was found in the current study, indicates that trust is not an added factor but a force that determines whether positive information would be acted upon (Lee et al., 2023). Confidence helps people to trust the validity of health and advice, fears vaccine risks, and fosters belief in the protection of health in the community. Another important finding of this study is that public health communication should emphasise the need to be transparent, and show scientific accuracy and strength of institutional integrity to ensure high confidence levels, which in turn, lead to high levels of vaccination intentions.

The fact that the fourth set of hypotheses that tested the mediating effect of the vaccine confidence was accepted provides further understanding of the way in which psychological and informational variables can interact to form vaccination intention. The fact that the first mediation hypothesis was accepted means that vaccine confidence is the mediating variable that allows vaccine hesitancy to positively affect intention in that hesitant people are affected by losing confidence in vaccines and health authorities (Pourrazavi et al., 2023). This result explains that the hesitancy not only undermines the intention but also harms the trust-based channels that are required to develop a solid decision to vaccinate. The fact that the second mediation hypothesis was accepted demonstrates that e health literacy enhances intention mostly because it is able to reinforce vaccine confidence. Persons possessing high levels of digital health competencies form better perception of scientific knowledge, which, subsequently, makes them more trustful to vaccines and more willing to receive the vaccination (Gagneur et al., 2024).

Collectively, the findings of all hypotheses indicate a sensible and valid image where psychological attitudes, digital information capabilities and trust-based mechanisms have a joint effect on the intentions of individuals to vaccinate. Vaccine hesitancy was found to be a major obstacle that undermines intentions whereas vaccine confidence was found to be a strong facilitator of favorable vaccination decision. E-health literacy also enhanced intention by giving people a better way to view and transverse online information space, with more clarity and trust. The mediating analyses revealed that vaccine confidence is the critical mediating factor, via which hesitancy and digital literacy determine behavioural intentions and, therefore, plays a pivotal role in the decision-making process.

7. Implications, Limitations and Future Direction

The results of this research have a number of valuable theoretical implications to the underdeveloped literature on vaccination behaviour and the use of digital health decisions. The study incorporates vaccine hesitancy, e health literacy and vaccine confidence into the same predictive model, further developing already existing behavioural concepts like the Theory of Planned Behavior or the Health Belief Model. The findings reveal that hesitancy and literacy have a direct effect on intention with indirect attitudinal forms, which are mediated with trust-based processes, which means that vaccine confidence is a key mediator between cognitive and emotional determinants of health behaviour. This helps to refine the theories in that it demonstrates that confidence is a mental mediating factor that displays the way in which individuals convert information processing capabilities and risk-based issues into behavioural preparedness. The results are also consistent with models of online health engagement that suggest that literacy promotes trust development and does not necessarily increase knowledge. In addition, the research expands the theoretical base in that it provides evidence of the interaction of several psychological constructs in digitalized health settings simultaneously, thus providing a more comprehensive overview of the process of making decisions on vaccination procedures. These observations indicate that subsequent theoretical approaches ought to anticipate the interrelationships between trust, digital competencies and attitudinal dispositions in anticipating preventive health behaviours.

The real-life applications of this study are important to the health authorities of the society, medical professionals, policy formulators and communication experts who would like to enhance the levels of immunizations. The high adverse impact of vaccine hesitancy on intention sheds more light on the necessity of specific interventions that can help reverse fears, misconceptions and emotions barriers using culturally sensitive and evidence-based communication. As the e health literacy has proven to be a positive predictor of intention, organizations can improve the willingness to vaccinate by promoting digital literacy programs that train people on how to find credible information, how to evaluate online sources and how to confidently interpret and read scientific information. The intermediary effect of vaccine confidence implies that any intervention should focus on trust-building activities, including effective communication about vaccine creation, regular interactions between medical workers and clear communication promoting safety and protection of the community. Literacy enhancement and confidence building strategies used in the course of public health campaigns are most likely to be more effective as compared to the ones which concentrate on the dissemination of information alone. The results also provide an explanation of how to design digital platforms and social media contents that build credibility and minimize misinformation, which will in the end promote national immunization objectives.

Despite the usefulness of the presented work in terms of understanding psychological and informational factors that determine the intention to vaccinate, a number of limitations have to be admitted that further research can be conducted. To begin with, the study adopted a cross-sectional survey design, which does not allow concluding on causal relationships

or attitude changes with time. The longitudinal or experimental design would enable future researchers to study the dynamic processes of hesitancy, confidence, and literacy in specific segments of the vaccination program or an outbreak of a disease. Two, the convenience sample size of 290 participants does not allow generalizing on larger populations, particularly in heterogeneous cultural and socioeconomic settings. Probably, in the future, probabilistic sampling or using a bigger national dataset would be included in the study to ensure a better appeal. Third, self-reported questionnaires were used to measure all the variables and would be susceptible to social desirability bias or inaccurate self-assessment especially in e health literacy measurement. Validity could be enhanced by the inclusion of behavioural indicators, objective performance activities or data on digital traces. Fourth, the model used in this study relied on psychological and informational predictors though it has not included contextual, cultural or policy related factors that could as well influence vaccination behaviours. The model can be broadened in future studies with incorporation of social norms, perceived accessibility, family influence and structural barriers to have a more holistic view. Fifth, the research studied the confidence as a mediator, but it could be a moderator that intensifies or dilutes the effect of hesitancy and literacy, which can be evaluated by future researchers. Lastly, this study was done on one nation and cross-cultural comparative studies should be done to determine whether the relationships found are different between countries having different health systems, digital environments and cultural values towards vaccination. Generally, these restrictions pose significant potentials to the future research to expand theoretical knowledge and the practical applicability of the study of vaccination behaviour.

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