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Information Adequacy and Strategic Behavioral Change Communication as a Pandemic Management Tool: The Mediating Role of Interaction Resonance

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Abstract

A strategic approach to behavioral change communication streamlines communication processes of a health institution in a crisis setting like COVID-19 pandemic. In such a setting, it is important to focus communication efforts to reach the different audience groups and ensure common understanding and willingness to act by all the groups in order to achieve the institution's mission of curbing the pandemic. This study contributes to these efforts by examining the mediating effect of interaction resonance in the relationship between information adequacy and strategic behavioral change communication. The study adopted a cross sectional survey design that involved collecting quantitative data from 223 health organizations of Uganda's health sector in the different regions of the country. In order to test the study hypotheses, the study used Structural Equation Modeling of AMOS and the bootstrapping approach to test the mediating role of interaction resonance. The results revealed that interaction resonance fully mediates in the relationship between information adequacy and strategic behavioral change communication. This implied that having adequate information per say, does not cause behavioral change among the intended message recipients but requires a communication system that enables high quality interactions.

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information adequacy, interaction resonance, strategic communication, behavioral change communication, health communication

Introduction

The likelihood of epidemics/pandemics has increased over the past century and is expected to continue intensifying (Madhav et al., 2017). This is because, the contributing factors like global travels, integration, urbanization, changes in land use, and exploitation of the natural environment are not expected to reduce in the near future (Jones et al., 2008). The reoccurrence of pandemics have not only over strained the capacities of health institutions in the third world countries, but also their economic, political, and social capacities thus warranting prompt control of the spread of pandemics like COVID-19 (Zaman et al., 2020). Curbing pandemics requires well-coordinated situational awareness and buy-in of masses for behavioral change to be realized following the guidelines of the health authorities (Hinyard & Kreuter, 2007). This thus calls for a strategic approach to communication practices (Hallahan et al., 2007; Mahoney, 2010).

This strategic approach to communication involves exchanging adequate information in line with the changing audiences' patterns of interaction to permit audiences' participation and involvement in the exchange of messages. These elements drive audiences into implementing the action points in the exchanged messages in order to achieve the health institution's target of curbing the pandemic.

In this study, we were interested in promoting effective behavioral change in a pandemic setting like COVID-19 through adopting strategic communication approaches. Specifically, we attempted to explain the effects of information adequacy and interaction resonance on strategic behavioral change communication in the Ugandan healthcare system. More importantly, we sought to examine the mediating effect of interaction resonance in the relationship between information adequacy and strategic behavioral change communication. This study contributes to the existing debate and practice of strategic communication in the following ways; first, our findings emphasize that strategic behavioral change communication is measured in terms of cognitive awareness, affective feelings, self-efficacy, and self-identity with the purpose for communication (behavioral change). We therefore argue that strategic behavioral change communication is achieved through focusing on information adequacy and interaction resonance among parties. This communication context enables the health institution to achieve their goal of changing behaviors of their audiences in an epidemic/pandemic setting.

Secondly, our study confirms the interdisciplinary nature of health communication. We believe that the 21st century complex health environment that is characterized by fragmented audiences and delivery platforms makes it hard to isolate communication topics. It thus calls for a holistic and interdisciplinary approach in examining the health communication phenomena in order to achieve health communication goals (Cornish et al., 2011; Hallahan et al., 2007; Mahoney, 2010; Zerfass & Huck, 2007). This study

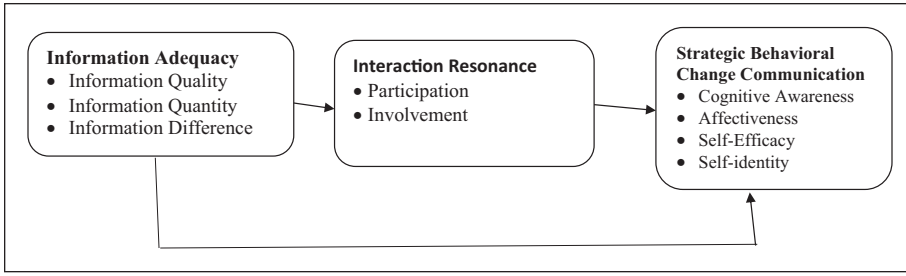

Figure 1. Conceptual framework.
Source. (Anderson, 1999; Barney & Clark, 2007; Cornish et al., 2011; Eoyang & Holladay, 2013; Goldstein et al., 2010; Hallahan et al., 2007; Hinyard & Kreuter, 2007).

therefore combines insights from health communication, organizational communication, marketing communication, strategic communication, and psychology to discuss strategic behavioral change communication. Thirdly, this research builds on and confirms complexity theory. We find that in a pandemic setting like COVID-19, disseminating sufficient information to cause behavior change toward adopting the necessary standard operating procedures requires high interaction resonance between the communicating parties and the health message recipients. This interaction resonance builds willingness to carry out communicated action points thus facilitating the attainment of communication goals.

Earlier studies have looked at behavioral change communication with limited emphasis on interaction resonance. A shift of emphasis from mere disseminating of information to quality of interactions between key players is a clear manifestation of the power of complexity theory in achieving behavioral change in epidemic/pandemic management settings. Policy makers can gain relevant insights to influence high interaction resonance and information adequacy that are conducive to strategic behavioral change communication. Based on the above arguments, this research is guided by the framework illustrated in Figure 1.

Theory and Literature Review

Theoretical Review

Complexity theory contends that the world is full of changes and chaos, which are entwined and do not occur in a linear and orderly fashion (Goldstein et al., 2010). The theory argues that every organization is a complex system and consists of a large number of interdependent agents whose interactions over time establish system-wide patterns of behavior (Eoyang & Holladay, 2013). This is because as agents interact with one another, each party's expectations, meaning of interaction, and interaction rules keep changing causing emergent properties like structures, processes, functions, memory, measurement, and novelty which affects the subsequent interactions with same

and or new interactants (Hargie, 2016; Walton, 2016). The whole system therefore keeps changing leading to adaptation and co-evolutions over time (Anderson, 1999). The success of organizations depends on the ability to understand the patterns of interactions of agents in order to design appropriate strategies for exploiting and using system wide information from both internal and external sources (Goldstein et al., 2010).

Literature Review on Study Variables

Strategic behavioral change communication. Strategic communication is the organization's purposeful use of communication to achieve the set mission (Hallahan et al., 2007). Thus strategic behavioral change communication is the purposeful use of the communication function to achieve behavioral change among message recipients. Cornish et al. (2011) argue that communicating strategically involves communicating to win the heart and the mind of the audience in order to take the necessary actions that warrant achievement of the communication purpose. Communicating to win the mind is operationalized in this study as cognitive awareness and communicating to win the heart is operationalized as arousing feelings of affectiveness, self-efficacy, and self-identity with the purpose for communication. In this study therefore, we build on the views of Cornish et al. (2011) to conceptualize strategic behavioral change communication to comprise cognitive awareness, affectiveness, self-efficacy, and self-identity to behavioral change as the purpose for communication.

We conceptualize cognitive awareness, as the recognition, recall, top-of-mind awareness, knowledge dominance, and recall relevance of the message (Hsiao et al., 2014). This means that when the audience is cognitively aware of a certain message, the action requirement in the message receives first priority because he/she will at all the time recall the relevance of acting upon the message which is on his/her top of the mind. Affective feelings refer to the audience's instinctive feelings toward the message. Self-efficacy refers to the audiences' judgment of their capabilities to organize and execute courses of action required to attain designated types of performance. Self-identity is when the audience defines and expresses him/herself to the action point in the message and maintains the continuity of self across time (Bandura, 1977).

Information adequacy. Information has been described as the most powerful engine of an organization without which, the organization activities will remain at a standstill. This is why Barney and Clark (2007), referred to information as the medium that presents knowledge or facts necessary for the smooth running of the organization. For organizations to achieve its communication goals, the information exchanged within and with the external environment should be adequate. Such information has sufficient quantity, quality, and differences. Quantity information is the perceived amount of available information to create a common understanding between parties. Quality information is the fitness for use of available information to achieve a communication purpose as perceived by the information recipient. Information differences is the

extent to which each communicating party has different and unique information on the subject of interaction (Golicic et al., 2012).

Interaction resonance. Interaction resonance comprises of audience participation and involvement. Audience participation is the ability of the communication system to support both communicating parties to use concurrent and multiple communication modalities to achieve active engagement in the interaction. Audience involvement is the degree to which both communicating parties perceive they are cognitively, affectively, and behaviorally engaged in the interaction to promote common understanding with one another (Burgoon et al., 2000).

Literature Review on the Relationship between Variables

Interaction resonance and strategic behavioral change communication. Drawing from the complexity theory, interaction is an important element of communication that leads to emergent properties like structures, processes, memory, patterns, and meaning (Feuerhahn & Eichenlaub, 2010; Goldstein et al., 2010). As implied by Burgoon et al. (2000), interaction resonance promotes cognitive and physical engagement in the interaction. This is because when parties continuously interact with each other, a sense of psychological closeness is created and expressed through both verbal and non-verbal behaviors. Non-verbally, psychological closeness is expressed in form of close proximity, facial and vocal expressivity, coordinated conversation, attentiveness, and moderate relaxation. Verbally, psychological closeness is expressed in form of personal disclosures. It is these behaviors if practiced by communication agents that promote common understanding and readiness by audiences to behave in a manner that warrants achievement of the institution's communication goal.

The relationship between interaction resonance and strategic behavioral change communication is further implied by the findings of Goldstein et al. (2010). These scholars consent that relation connectedness promotes sharing of information in a system. This is true because as parties continuously interact, they develop a tendency of depending on each other for information concerning the issue of discussion. This creates trust and belief in the message exchanged and willingness to behave in accordance to the message. These arguments are in line with the findings of Smith (2006) that direct interactions promote strong relationships characterized by high level of closeness and reciprocity, promoting readiness to implement the action points in the message shared.

In another argument, Hallahan et al. (2007) defined strategic communication as the process of sharing meaning whereby the more parties interact, the more common understanding and consensus is created. This implies that when communication agents continuously interact with their audiences, there are high chances of the audiences liking the communicating body and behaving as desired by the institution. This indicates that increased participation and involvement in communication between the organization and the target audiences promotes audiences' willingness to act upon the received message thus achieving the communication goal of behavioral change.

Our arguments are further supported by the findings of Ramalingam and Jones (2008) who found out that increased transparency and willingness for self-disclosure as a result of increased participation and involvement, builds a high sense of awareness and willingness to act. This is because transparent people trust each other and feel attracted to each other. Such parties can easily achieve common understanding due to the built rapport and willingness to continue with the interaction (Ollhoff & Walcheski, 2002). Perinbanayagam (2003) adds that greater involvement in the interaction and mutuality of parties leads to favorable judgments of credibility and attractiveness of messages that are exchanged. Another study by Reuzel et al. (2013) revealed that individuals that are highly involved in an interaction, recall more factual information and argument content from conversations. They also present more logical arguments, process more information, are better at adjusting their behaviors in relation to the messages, and can easily accomplish conversational goals. These arguments imply that increased quality of interaction between the organization and the audiences has a positive impact on the audiences' willingness to behave in line with the exchanged messages. Based on this review of literature, we hypothesize that;

H1: Interaction resonance and strategic behavioral change communication are positively related.

Information adequacy and interaction resonance. Scholarly evidence supports the relationship between information adequacy and interaction resonance. Information is a valuable resource that forms the substance of interaction (Golicic et al., 2012). With this, information enables the organization to generate and implement strategies that improve efficiency and effectiveness, exploit opportunities and neutralize threats in a firm's environment. This is possible because exchanging quality information with clients increases their willingness to deal with the organization. Hon-Snir et al. (2012) add that exchanging valuable information (timely and relevant) encourages a high rate of interaction. This is true because when stakeholders perceive information to be of value, they are willing to participate in the interaction by attending to it and disseminating it to other parties. Further, perceived valuable information promotes interaction involvement where individuals feel cognitively, affectively, and behaviorally engaged in the interaction because they trust the information. Additionally, mutuality between the interacting parties increases when both perceive the information exchanged as relevant (Ge & Helfert, 2007). This is because the receiving party feels relationally connected and interdependent with the communicating party.

We also argue that sufficient information enables development of appropriate responses by the interacting parties. This is through making interaction easy, timely, and promoting more interactions (Golicic et al., 2012). Rasmusen and Yoon (2012) add that when the information quality is high, mistakes and redundancies will be mitigated, enabling more and high quality interactions among the communicating parties. These assertions complement the earlier arguments by Clemons (2010) that information quality increases interactivity through promoting transparency and certainty of a partner's communication behaviors. This is possible because when the communicating

parties are certain about the other party's communication behaviors, trust and mutuality will be built thus promoting more participation and involvement in the interactions. In line with the debate of interactivity, complexity theory contends that to achieve high quality interaction, each interacting party must have information of a slice of the issue of interaction and when they meet, each party over time experiences a shift in perspective and a new understanding of the greater issues of the whole. It is this change of perspective and understanding that encourages subsequent interactions with same or new interactants (Reuzel et al., 2013).

In support of complexity theory, Hon-Snir et al. (2012) consent that when organization stakeholders perceive the exchanged information to be unique, they will be willing to participate in the interaction by attending to it and disseminating it to other parties thus promoting high interaction resonance. This review of literature reveals this hypothesis;

H2: Information Adequacy is positively related to Interaction Resonance.

Information adequacy, interaction resonance, and strategic behavioral change communication. Previous studies support the direct relationship between information adequacy and strategic behavioral change communication (Barney & Clark, 2007; Conradie et al., 2014; Teresa, 2017). Although this study tested this relationship, the focus of the study is the mediation role of interaction resonance in the relationship between information adequacy and strategic behavioral change communication. This is because complexity science looks at interaction resonance as a central element of a complex system that enables functioning of an eco-system (Goldstein et al., 2010). However, there seems to be insufficient direct attempt in health communication scholarship to study the mediation effect of interaction resonance.

This study closes this gap by arguing that interaction resonance mediates the relationship between information adequacy and strategic behavioral change communication. We argue that information is the substance of communication (Wang & Strong, 1996). When a party has sufficient information to sustain a discussion with another party, he/she can easily participate and gets highly involved in the discussion. Such a party has more chances of influencing the audience to behave in a manner that promotes achievement of the communication objective of behavioral change. This is possible because when the communicating party exchanges an appropriate amount of information required by the recipient to understand the message, the recipient builds trust in the message and the communicating party. In such a situation, the recipient is willing to continue interacting and implementing the desired action points in the message (Burgoon et al., 2000).

We further argue that organizations that enjoy informational advantage over others can use their superior information to develop communication strategies that promotes continuous information flow among organization stakeholders in order to achieve set goals (Golicic et al., 2012). Having information advantage implies that the organization has mechanisms of acquiring and using information from stakeholders. This supremacy enables the organization to observe the changing patterns of interaction

with the different parties and develop appropriate communication structures that facilitate active information exchanges among members of the institution (Burgoon et al., 2000). This argument is in conformity with Golicic et al. (2012) who asserted that adequate information allows provision of consistent and high value messages which promotes message recognition and recall. Information adequacy also means having reputational information which is easy to interpret, believe and understand by the receiving party (Clemons, 2010). When parties have this kind of information, they can easily have common understanding of the messages exchanged. This enables parties to commit the received messages to their top of the minds and be willing to act upon the message at an appropriate time (Smith, 2006). This review of literature reveals this hypothesis;

H3: Interaction Resonance mediates the relationship between Information Adequacy and Strategic behavioral change Communication

Methodology

Research Design

In this study, we adopted a survey design that involved administering a questionnaire to collect quantitative data. This was in two phases; phase one involved distributing the questionnaire using the online platform during COVID-19 total lockdown between April and June 2020. Phase two involved physical distribution of printed questionnaires to those respondents who had not yet responded to the online questionnaire. This was after lifting COVID-19 total lockdown between July and August 2020. The survey design was correlational in nature, measuring relationships between information adequacy, interaction resonance and strategic behavioral change communication. (Neuman, 2007).

Sample Size and Procedure

We drew a sample of 380 out of 40,132 health sector organizations that were involved in general behavioral change campaigns and those that were involved in controlling the spread of COVID-19 and or in handling COVID-19 patients (Krejcie & Morgan, 1970). We conducted our study in Uganda and specifically the Ugandan health sector because in addition to the current COVID-19 pandemic, 75% of the disease burden in Uganda is preventable through behavioral change (Ministry of Health, 2019). Our intention was therefore to design a model of strategic behavioral change communication to guide in the curbing of COVID-19 pandemic and other health communication campaigns of different health sector institutions not only in Uganda but also in other countries where the health burden can be drastically reduced through behavioral change.

We therefore selected organizations in eight clusters ranging from District Local Governments (Public Health Departments) to Health Center Twos across thirteen districts of Uganda from the four regions of the country (see Table 1) (Ministry of Health,

Table 1. Descriptive Characteristics of Respondent Organizations.

Categories of respondent organizations		
Categories	Frequency	Percent
Health center II	31	13.9
Health center III	78	35.0
Health center IV	28	12.6
General Hospital	23	10.3
Regional hospital	15	6.7
National referral hospital	2	0.9
District local government	4	1.8
Health NGOs	42	18.8
Total	223	100.0
Age of organizations		
Age	Frequency	Percent
1–5 years	20	9.0
6–10 years	55	24.7
11–15 years	44	19.7
16–20 years	29	13.0
Above 20 years	75	33.6
Total	223	100.0
District of location		
District	Frequency	Percent
Lira	60	26.9
Gulu	2	0.9
Kamuli	8	3.6
Mbarara	3	1.3
Tororo	3	1.3
Jinja	18	8.1
Mukono	7	3.1
Kibaale	3	1.3
Kabale	2	0.9
Arua	9	4.0
Wakiso	16	7.2
Kampala	40	17.9
Kitgum	52	23.3
Total	223	100.0
Region of location		
Region	Frequency	Percent
Central	72	32.3
Eastern	30	13.5
Nothern	115	51.6
Western	6	2.7
Total	223	100.0

Table 2. ANOVA; Comparing Means of Communication Officials and Target Audiences.

Strategic communication	Sum of squares	*Df*	Mean square	*F*	Sig.
Between groups	0.427	1	0.427	1.955	0.163
Within groups	96.945	444	0.218		
Total	97.372	445			

2019). For every sampled organization, we purposively selected three communication/public health officials and three community opinion leaders (representatives of target audiences) within the locality of the health organization as the study respondents. The intention was to capture views of both the senders and the receivers of health messages (Burgoon & Hale, 1987).

We administered the same questionnaire but with varied questions depending on the category of respondent (communication officials and target audiences). We then aggregated and interpreted data from the two categories of respondents at organization level which was our unit of analysis. Following the guidelines of Field (2009), before aggregating, we subjected the two sets of data to Analysis of Variances (ANOVA) test to confirm that the variances in the two sets of data were statistically the same. As indicated in Table 2, the results conformed to this requirement. We then merged and aggregated the data. We thus collected data from 223 organizations (Table 1).

As illustrated in Table 1 (Appendix section), data were collected from mainly Health Centers Three (35%) followed by Health NGOs (18.8%). According to the Ministry of Health annual report of 2019, these categories of health organizations interact more with the local communities regarding behavioral change practices. Additionally, majority of respondent organizations (33.6%) had been involved in behavioral change practices for a period of 20 years and above. This indicates that data were collected from organizations that had enough experience of interacting with community members.

Measurements Scales

Information adequacy. In this study, we operationalized information adequacy to comprise information quantity, information quality, and information difference (Goldstein et al., 2010; Golicic et al., 2012; Rasmusen & Yoon, 2012). We measured information quantity by adopting eight items scale developed by Wang and Strong (1996) and Yanga et al. (2005). We measured information quality by adopting 39 items scale from Yanga et al. (2005) and Christensen (2014). In order to measure information differences, we developed six items from reviewing the work of Goldstein et al. (2010) on information differences. After modifying all the adopted items, we pretested and subjected the developed information adequacy instrument to Confirmatory Factor Analysis (CFA) to test the validity and reliability of the instrument. As a result, the CFA measurement model was within the acceptable fit indices.

Interaction resonance. We operationalized interaction resonance to comprise participation and involvement (Burgoon et al., 2000; Goldstein et al., 2010). We measured participation by adopting the 31 items scale developed by Sally et al. (2002) and Ashford et al. (1991). We measured involvement by adopting the 24 items scale developed by Cegala (1981) and Burgoon and Hale (1987). The CFA measurement model was within the acceptable fit indices.

Strategic behavioral change communication. We operationalized strategic behavioral change communication to comprise cognitive awareness, affectiveness, self-efficacy, and self-identity with the purpose for communication (Pierce et al., 1991, 2001, 2003; Shu & Peck, 2011). We measured cognitive awareness by adopting the five items tool developed by Yoo and Donthu (2001). We measured affectiveness by adopting the 30 items emotional scale developed by Klaus and Scherer (2005). We measured self-efficacy by adopting the 20 items tool developed by Sherer and Maddux (1982). We measured self-identity by modifying the 10 items tool developed by Armitage and Conner (1999) and Callero (1985). The CFA measurement model was within the acceptable fit indices. However, the measurement model indicated that three out of the six covariances between the variable constructs are negative, indicating an inverse association among the variable constructs.

Reliability and Validity of Study Instruments

We subjected the measurement scales to validity and reliability tests using composite reliability and Average Variance Extracted (AVE). As indicated in Table 3, the measurement models of study variables (model 1s) had composite reliability of greater than .7, an indication that all the measurement models used in this study can consistently reflect the construct that they are measuring among the different groups of the population (Hair et al., 2010). Table 3 further shows that the AVE for every variable was greater than .5 and the composite reliability for every variable was greater than AVE. This shows that the instrument measures for every variable are associated and converge to form study variables. This indicates that the measures were valid and could correctly measure the study variables (Field, 2009). In order to test for discriminant validity a requirement for structural modeling, we compared CFA fit indices when all items of a variable are combined to form one construct with the fit indices when items are not combined. The fit indices for the uncombined models (model 1s in Table 3) were greater than those for the combined models (model 2s). This confirmed that the measurement models could validly be used to construct structural models in order to test the study hypothesis (Hair et al., 2010).

Data quality control. We managed response bias at two levels. At the first level, we designed a questionnaire without a middle point. This is because according to Krishnaveni and Deepa (2013), many respondents tick the middle point whenever they do not want to think much about the questionnaire items. However to reduce on the effect of forced response due to not having a mid-point in the scale, we increased the number of

Table 3. Measurement Models' Fit Indices, Validity, and Reliability of Study Variables.

	Variables					
	Information adequacy		Interaction resonance		Strategic behavioral communication	
Fit indices, validity & reliability	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Chi-square (χ^2)	39.51	*492.04*	43.91	*146.56*	56.37	*1147.34*
χ^2 *p*-value $<.05$	0.02	*0.00*	0.08	*0.00*	0.03	*0.00*
Goodness-of-fit Index (GFI >0.95)	0.96	*0.64*	0.96	*0.87*	0.96	*0.55*
Adjusted goodness of fit index (AGFI >0.95)	0.91	*0.35*	0.92	*0.77*	0.93	*0.44*
Root mean square error of approximation (RMSEA <0.08)	0.077	*0.33*	0.06	*0.14*	0.05	*0.33*
Standardized root mean square residual (SRMR <0.05)	0.03	*0.17*	0.01	*0.03*	0.03	*0.27*
Tucker–Lewis Index (TLI >0.95)	0.96	*0.33*	0.97	*0.86*	0.98	*0.15*
Normed fit index (NFI >0.95)	0.96	*0.52*	0.96	*0.88*	0.96	*0.23*
Comparative fit index (CFI >0.95)	0.98	*0.52*	0.98	*0.90*	0.99	*0.27*
Relative Fit Index (RFI >0.95)	0.94	*0.32*	0.95	*0.83*	0.95	*0.14*
Incremental Fit Index (IFI >0.95)	0.98	*0.53*	0.98	*0.90*	0.99	*0.28*
Average Variance Extracted (AVE >0.5)	0.72		0.65		0.74	
Composite Reliability (CR >0.7)	0.95		0.94		0.97	

Notes. Model 1 = fit indices when items are unfixed (not combined to form one construct), Model 2 = fit indices when all items of different constructs of the global variables are combined to form one construct.

Table 4. Descriptive Characteristics of Respondents.

	Communication officials		Target audiences	
	Frequency	%	Frequency	%
Ages of respondents				
Age				
18–35 years	464	70.1	303	79.5
36–50 years	187	28.2	66	17.3
51–69 years	11	1.7	12	3.1
Total	662	100.0	381	100.0
Gender of Respondents				
Gender				
Male	348	52.6	171	44.9
Female	314	47.4	210	55.1
Total	662	100.0	381	100.0
Education levels of respondents				
Level of education				
High School Certificate	222	33.5	123	32.3
Diploma	220	33.2	51	13.4
Degree	133	20.1	130	34.1
Masters	46	6.9	23	6.0
PhD	5	0.8	1	0.3
Professional course	36	5.4	53	13.9
Total	662	100.0	381	100.0

anchors for respondents to have sufficient number of options from which to choose (Chyung et al., 2017). Based on this argument, we anchored all the measurement scales at 6 point Likert scale ranging from 1 = strongly disagree to 6 = strongly agree.

At the second level, we managed response bias by first administering the first part of the questionnaire (Independent and Mediating Variables) and then administered the second part (Dependent Variable) to the same respondents after 2 weeks (Podsakoff et al., 2012). On returning the two portions of the questionnaire, we added them together to form a complete questionnaire. We took this procedure because according to Podsakoff et al. (2012), to ensure that respondents' responses on the dependent variables are not influenced by their responses on the independent variable which is an indication of response bias, the two portions of the questionnaire should be administered separately. This procedure also helped to control response fatigue since the questionnaire was fairly long (Field, 2009).

The incomplete questionnaires and or those that had straight-line responses were excluded from data analysis. As a result, out of 2,280 questionnaires that were distributed to 380 organizations by both online and physical, the usable questionnaires were 1,043 from 223 organizations. This indicates a 58.7% response rate. Out of 1,043 questionnaires, 662 were from organization communication officials and 381 from organizations' target audiences (Table 4).

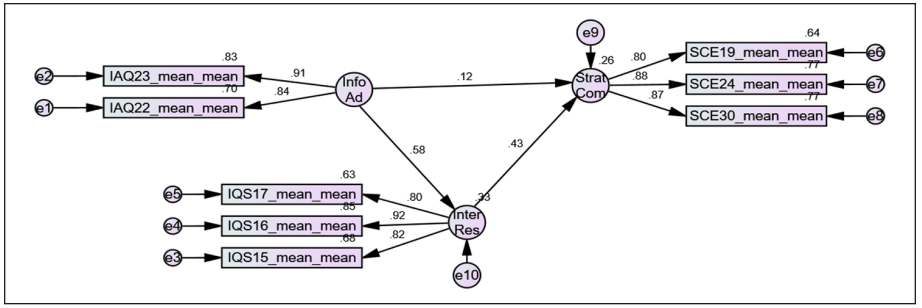

Figure 2. Final structural model.
$\chi^2 = 28.17$, χ^2 *p*-value (<.05) = .043, DF = 17, GFI(>0.95) = 0.97, AGFI(>0.95) = 0.94, RMSEA(<0.08) = 0.05, SRMR(<0.05) = 0.02, TLI(>0.95) = 0.98, NFI(>0.95) = 0.97, CFI(>0.95) = 0.99, RFI (>0.95) = 0.96, IFI (>0.95) = 0.99.

Analysis and interpretation of results. We used Statistical Programe for Social Scientists (SPSS) version 20 to code, edit, and explore data. We further used structural equation modeling (SEM) to test the study hypotheses. This is because according to Hair et al. (2010), SEM can examine a series of dependence relationships simultaneously. It could therefore test the conceptual model at once by assessing both measurement properties and the theoretical relationship between variables. We used bootstrapping method of SEM to test the mediation role of interaction resonance between information adequacy and strategic behavioral change communication (Hayes, 2009; Shrout & Bolger, 2002).

Results

In order to test the study hypotheses, we transformed the measurement models into a structural model following the guidelines of Hair et al. (2010). The process of fitting the structural model involved combining all the retained measurement items of each variable constructs into one model and the most significant items under each variables were retained as indicated in Figure 2. As illustrated in Table 5 and Figure 2, information adequacy and interaction resonance predict strategic behavioral change communication with 26% variances being explained. We now specifically explain the results following the study hypotheses;

Interaction Resonance and Strategic Behavioral Change Communication

We found a positive and statistically significant relationship between interaction resonance and strategic behavioral change communication; $\beta = .43$, within the Confidence Intervals of 0.21 (lower boundary) and 0.67 (upper boundary), $p = .002$, thus hypothesis one was supported. The results show that the more parties participate and psychologically get involved in the interaction, the more common understanding and consensus is created. Implying that when health organizations continuously interact

Table 5. Total, Direct, and Indirect Effects.

Total effect	Standardized estimates	Lower boundary	Upper boundary	*p*-Value
Strategic BC Comm' ← Information Adq'	0.37	0.22	0.51	.002
Direct effect				
Strategic BC Comm' ← Information Adq'	0.12	−0.12	0.34	.265
Interaction Reson' ← Information Adq'	0.58	0.40	0.72	.002
Strategic BC Comm' ← Interaction Reson'	0.43	0.21	0.67	.002
Indirect effect				
Strategic BC Comm' ← Information Adq'	0.25	0.10	0.46	.002
Standardized *R* squared	Estimate	Lower	Upper	*p*-Value
Interaction Resonance	0.33	0.16	0.51	.002
Strategic BC Comm'	0.26	0.12	0.40	.004

***sig at $p < .005$.
Strategic BC Comm' = Strategic Behavioral Change Communication, Information Adq' = Information Adequacy, Interaction Reson' = Interaction Resonance.

with their message recipients, a sense of mutuality is created which warrants the audience to reciprocate by acting upon the communicated message through utilizing all possible feedback opportunities. Further, increased interactional resonance through increased transparency and willingness to self-disclosure, promotes a feeling of reliability, trustworthiness, and attractiveness to each other. This set of feelings builds a high sense of cognitive awareness and attachment to the communicated messages, thus encouraging parties to act in accordance to the exchanged message.

Information Adequacy and Interaction Resonance

The results further revealed a positive and statistically significant relationship between information adequacy and interaction resonance; $\beta = .58$, within the Confidence Intervals of 0.40 (lower boundary) and 0.72 (upper boundary), $p = .002$, thus hypothesis two was supported. The study findings mean that when adequate information is exchanged, the audience will have the required information to understand the sender's message in order to develop appropriate responses on a timely basis. The results also indicate that when the audience perceives the interaction information to be of value, he/she will feel relationally connected and interdependent with the communicating party. This builds the audience's trust in the message thus promoting interaction involvement where parties feel cognitively, affectively, and behaviorally engaged in the interaction. Information adequacy in form of information differences means that when parties interact with each other, each party having a slice of information of the issue of interaction, over time each party experiences a shift in perspective and a new understanding of the greater issues. This change of perspective and understanding encourages subsequent interactions with same or new interactants.

Mediation Effect of Interaction Resonance between Information Adequacy and Strategic Behavioral Change Communication

The results in Table 5 show that the standardized indirect effect of information adequacy on strategic behavioral change communication through interaction resonance has a point estimate of 0.25 within a 95% bootstrap confidence interval of 0.10 (lower boundary) and 0.46 (upper boundary) with *p*-value of .002. Further, the direct effect of information adequacy on strategic behavioral change communication is non-significant ($\beta = .12$, within the Confidence Intervals of −0.12 [lower boundary] and 0.34 [upper boundary], $p = .265$). This means that providing information of high quantity, quality and with sufficient differences does not necessary promote audiences top of the mind recall and willingness to change their behaviors. The results therefore show that interaction resonance fully mediates the relationship between information adequacy and strategic behavioral change communication (Hayes, 2009), hence hypothesis three (H3) was supported.

This means that when the interaction information is adequate the audience will have the necessary facts to easily interpret and understand the information. The audience will therefore use an appropriate feedback mechanism that allows high rate of participation and involvement to reciprocate the interaction. As parties continue interacting, the audience will develop trust and confidence in the communicating party thus having top of the mind recognition and recall, and willingness to behave in accordance to the interaction messages.

Discussion

Interaction Resonance and Strategic Behavioral Change Communication are Positively Related

The results on hypothesis one indicate that a communication system that allows active direct engagement of parties builds common understanding between them. This kind of communication system allows the interacting parties to use their senses of hearing, seeing, and touching when interacting. Such senses arouse the party's feelings of attachment to each other and drive them to be considerate to each other's interaction expectations. Further, direct continuous interactions enable parties to be familiar with the message and purpose for communication. This builds audience's top of the mind recognition and recall when in a situation that relates to the shared message.

The parties can also draw meaning from the message content and a wide range of contextual cues like communication environment, social, and physical aspects. This allows parties to understand both the expressed and the underlined meaning of the message and decide on the necessary course of action appropriately. In a pandemic setting like COVID-19, though face-to-face interactions may not be permissible, other direction channels like telephone conversations and online communication formats including social media may be used. Such channels are emotionally appealing due to their direct interactions and the diverse contextual messages like oral qualities and the

message designs accompanying the message content. This state of interaction builds the audiences' willingness to behave in accordance to the purpose for communication.

These findings complement Burgoon et al. (2000) and Smith (2006) who found that direct interaction creates a sense of psychological closeness expressed through close proximity, facial and vocal expressivity, and coordinated conversation. Such behaviors encourage parties to develop a sense of transparency and self-disclosure that drives parties to freely discuss any relevant information even when considered personal. As this continues, parties develop trust and feelings of attractiveness for each other thus building a high sense of cognitive, affective, and behavioral attachment to the communicated messages. This is why in health promotion campaigns where social distancing is not a requirement, many Ugandan health sector organizations use avenues like community dialogues and sports to ensure high involvement of audiences in the campaigns.

These avenues encourage members to freely express their opinions and disclose any information related to the issue of discussion. The health organizations get to understand the communication needs and expectations of the audience and when these are addressed, the audiences develop trust and willingness to act in accordance to the communication objectives. In line with these arguments, Ramalingam and Jones (2008) noted that increased interaction characterized by increased transparency and willingness for self-disclosure between parties promotes trustworthiness and attractiveness to each other.

Hypothesis one results also imply that when parties continuously interact they develop a sense of closeness and interdependence. At this point, each party believes and feels part of the other party and is willing to continue with the interactions. This encourages parties to share more information and reciprocate responsibilities by acting upon each other's expectations. In the health sector for example, some organizations invest in a long-term relationship with the target audiences through working with the community members to solve community problems. With such activities, community members feel that the organization is part of them and is concerned about community challenges. Under this situation, when the organization disseminates information on behavioral change, community members are willing to act accordingly. This finding is related to the findings of Perinbanayagam (2003) who contended that greater involvement and mutuality influences group members' perceptions of each other, leading to favorable judgments of each member's credibility to promote attractiveness and accurate understanding of the messages exchanged.

Information Adequacy is Positively Related to Interaction Resonance

The results on hypothesis two (H2) indicate that exchanging information of the required depth and breadth enables appropriate meaning creation and development of appropriate responses. When the amount of the disseminated information is in line with the audience's needs and expectations, it is easy for the audience to synthesize and make meaning of the message in the shortest time possible using minimum effort required. This implies that as part of audience analysis, the communicating party has

to understand the different audience groups depending on their communication needs and proportionally disseminate the required content of information to each group. When the receiving party gets this information, he/she will decode it appropriately and on a timely basis prepare a response that fits the expectations of the communicating party. This gives the communicating party ample time to process and send more information if necessary, depending on the received feedback. The continuation of this process is an indication of more interactions, which leads to improved interactions over time. The implication of this argument is that in a pandemic setting like COVID-19, the health institution should frequently carry out stakeholder mapping exercises to understand the changing information needs of different audience clusters and package adequate information for every cluster. This enables every audience to mentally digest the information and carry out the necessary actions or seek for more information warranting more interactions that result into behavioral change. This is possible because being audience specific develops audiences feelings of personal responsibility for the issue discussed as every person feels talked to individually.

We further argue that information adequacy signifies credibility which promotes mutuality between the interacting parties. If in every interaction, the communicating party disseminates valuable, timely, and audience specific information depending on the communication needs and interests of the audience, the audience perceive the communicating party and the message as relevant and worth being given first consideration whenever in need of same or related information. With the continuation of this level of trust and confidence, the audience develops feelings of relational connectedness and interdependency with the communicating party, encouraging more interactions of high-level participation and involvement. Based on this debate, we connote that epidemic/pandemic settings require the health institution to continuously monitor and evaluate the behaviors of the audiences after receiving the disseminated information. The study arguments are in support of the views of Ge and Helfert (2007) who noted that when stakeholders perceive information to be of value, they will be willing to participate in the interaction by attending to it and disseminating it to other parties.

In further analysis, the results on hypothesis two (H2) indicate that information adequacy in form of information differences has an effect on interaction resonance. Information differences are as a result of the current information age where information from divergent sources on virtually every aspect of life is in abundance. It is therefore common for many people to have different pieces of information on the same or related issues. When the communicating parties perceive the information exchanged by the other to be different from that known or discussed in the previous sessions, each party will be willing to participate in the interaction in order to satisfy the natural desire to know. However, as they interact each party experiences a shift in perspective and gets a new understanding of the greater issue of interaction. The new understanding will motivate each party to engage in new interactions with the same and or similar interactants on the same or related issues, resulting into high rate of participation and involvement in the interactions. In the Ugandan health sector for example, organizations organize community discussions called *barazzas* where community members freely share their views with health officials on the health issue of community concern.

In these gatherings, both parties get a new understanding of the issue of discussion. When similar discussions are subsequently organized, the community members will be interacting at a higher level of involvement. This implies that in COVID-19 setting for example, the health institution should continuously update the disseminated information in terms of content, dissemination channels, formats, and communication agents. These changes make the messages new and thus attractive to their audiences, and can drive audiences into behavior change.

These findings supplement views of Eoyang and Holladay (2013) and Reuzel et al. (2013) who argued that to achieve quality resonance, each interacting party must have information of a slice on the issue of interaction and when they meet, each party over time experiences a shift in perspective and a new understanding of the greater issue of the whole. This change of perspective and understanding encourages subsequent interactions with same or new parties. The study findings support complexity thinking that every organization is a complex system and consists of a large number of interdependent agents whose interactions over time establish system-wide patterns of behaviors leading to adaptation and co-evolutions over time (Anderson, 1999; Eoyang & Holladay, 2013; Goldstein et al., 2010).

Interaction Resonance Mediates in the Relationship between Information Adequacy and Strategic Behavioral Change Communication

This study established a full mediation effect of interaction resonance in the relationship between information adequacy and strategic behavioral change communication. These results indicate that exchanging information that is believed by both parties to be accurate, objective, relevant, and value adding attracts two-way symmetrical communication that influences top of the mind recognition and recall, and affectionate attachment to the message. This is possible because each party trusts the message and is willing to receive more information and share his/her views on the message. With the two-way communication, each party has an opportunity to send messages and get feedback from the other party sequentially. The feedback confirms to the communicating party whether the audience received, understood, and showed interest in the discussion. In case the audience has not shown interest, the communicating party can still send more information emphasizing relevance of the message to the audience. The audience also has an opportunity to ask for clarifications and more information concerning relevance of the message to him/her. This two-way interaction can continue until when the audience has cognitively and emotionally agreed to behave in accordance to the action points in the messages exchanged.

We further argue that the audience requires information of the required depth and breadth in order to understand the message and decide to take up the necessary action points using an interaction system that permits multiple modalities of interaction like text, audio, visual, etc. This implies that exchanging information through a communication media that allows the audience to use more than one sense to interpret the message has more effect than otherwise. This is because information that the audience can read,

listen to, and watch graphically has double effect on both the cognitive and affectionate senses of the audience. This is an indication that the audience can quickly synthesize the message and act upon it in the shortest time possible. During the COVID-19 outbreak, it is common for many health institution to disseminate messages to audiences in multiple modalities such that when the audience is not aroused by what he/she reads, he/she is attracted by what he/she listens to and or watches. A combination of all these modalities can easily influence the audience both cognitively and emotionally to change behavior in accordance to the action points in the message.

It should be emphasized also that information with sufficient newness requires an interaction system that permits concurrent and multiple communication formats in order to promote top of the mind recognition, recall, and emotional attachment to the purpose for communication. An epidemic/pandemic setting requires communication systems that allow complex interaction where different parties can interact at the same time and use different formats like social media, IEC materials, dialogues, theaters, and role-plays among others. This is because when parties perceive information to be sufficiently new, dyads, and triads will be influenced to participate in the interaction at the same time with some using text, audial, or video or a combination of some or all. With such differences, all categories of audiences can easily be influenced by the disseminated messages in a controlled way to behave in the desired manner. The implication of this argument is that if the communication system allows multiple interactions, many parties will easily become aware and affectionate with the new information and subsequently follow it in the shortest time possible. An epidemic/pandemic setting also requires a communication system where the communicating party can easily observe the changing patterns in the interaction and quickly redirect the discussions if they realize misinterpretation by some audience groups. This is important because in health communication, wrong interpretation of messages is life threatening.

Our arguments are inferred by the views of Goldstein et al. (2010) who consented that a complex organization requires interaction resonance where parties get interdependently highly involved in the interaction to promote co-evolution of the different components of the organization. This is because as agents interact with one another, each party's expectations and interaction rules keep changing which affects the subsequent interactions thus the whole system keeps changing, leading to adaptation, and co-evolutions over time. The success of organizations depends on their ability to understand the patterns of interactions of agents in order to design appropriate strategies for exploiting and using system wide information from both internal and external sources (Anderson, 1999; Eoyang & Holladay, 2013; Goldstein et al., 2010).

Conclusion and Implications

In this study, we were interested in promoting effective behavioral change in an epidemic/pandemic setting like COVID-19 through adopting strategic communication approaches. Specifically, we attempted to explain the effects of information adequacy and interaction resonance on strategic behavioral change communication in the Ugandan healthcare system. The study revealed that interaction resonance is a

full mediator in the relationship between information adequacy and strategic behavioral change communication in the Ugandan healthcare system. This implies that to curb COVID-19 pandemic, health institutions have to consistently avail the required amount of information with sufficient newness and tailored to the specific communication needs of the different categories of audiences. Achieving this however requires a communication system that allows two-way symmetrical communication between the interacting parties. Such a system enables the communicating party to continuously monitor the changing communication needs of different audiences and address them appropriately. When the audience feels personally addressed, he/she feels a responsibility to personally carryout the necessary action points in the message received.

The study findings also revealed that information adequacy is fundamental toward having high interaction resonance. This is because exchanging information of the required depth and breadth eases interpretation and enables the audience to develop appropriate responses. Perceived valuable information promotes mutuality between the interacting parties and exchanging new information attracts parties to participate in the interaction. The results imply that exchanging accurate, objective, relevant, and value adding information attracts the audiences to participate and get involved in the discussion thus influencing top of the mind recall and affectionate attachment to the message and readiness to behave in accordance to the information received. This outcome is mandatory if an epidemic/pandemic is to be condensed in the shortest time possible.

Managing an epidemic/pandemic situation being a complex task, we deduce that it requires a complex thinking. Complexity theory contends that every organization is a complex system and consists of a large number of interdependent agents whose interactions over time establish system-wide patterns of behavior. The success of any health intervention therefore, depends on the ability to understand the patterns of interactions of agents in order to design appropriate communication strategies that guarantees appropriate behavioral change. The implication of this study to strategic communication discipline is that improved quality of interactions through focusing on two-way symmetrical communications, synchronicity, and multi-modality interactions, encourage high participation and involvement with the different audience categories. This enables the organization to observe and respond to the consistently changing interaction needs and practices thus enabling an organization to achieve its mission.

The empirical evidences from this study are an attempt to guide the health sector on how the communication function can be used not only in a pandemic setting but also to achieve most of the third words' health sector objectives of reducing 75% of health burden that is dependent on behavioral change (Ministry of Health, 2019). We recommend different health institutions to disseminate health messages dependent on the unique communication needs of different audience groups. This may for example involve disseminating health information in both the official and the local languages of masses, and using communication modes and formats that are in line with the norms and values of audience groups.

The study has also indicated that information overloads and under loads are major hindrances to strategic behavioral change communication. This is because when the information is insufficient, the audience will not get the necessary details to guide action. When the information is more than enough, the necessary details will be hidden in the unnecessary details, requiring the audience to have high levels of synthesization and analytical skills to understand the necessary action points. Since information overload is a common phenomenon during COVID-19 outbreak where every source (authorized and unauthorized) disseminate correct, half correct, and incorrect information, we suggest centralized information dissemination by the responsible authority (for example ministry of health) to avoid unnecessary, incorrect, and threatening messages. We also recommend frequent stakeholder mapping campaigns for the health institution to understand the unique information needs of every audience category and be in position to observe the changing interaction practices of the audiences.

Health organizations should also frequently update their information in order to continuously exchange new information. The study's empirical evidences show that information differences drive quality interactions and practices. When the audiences perceive the interaction information to be new; different from what is known or exchanged during the previous interactions, they will be willing to participate in the interaction. In the subsequent interactions with similar or different parties on the same or related issue, the audience will be willing to participate in more interaction because of the previous experience. The study therefore suggests that for every communication campaign, the organization should provide new information content, use new communication agents, and/or new communication contexts. This will attract the audience to pay attention to the message, participate, and get highly involved in the discussion. The action points in the message are likely to receive first priority when the audience is in a situation that requires an action point.

The study suggests to health institutions to have communication systems that support two way symmetrical and synchronic interactions with multi-modality formats. Study findings revealed feedback as an important element of any communication system. Feedback confirms whether the audience received and understood the message and the audience's attitude toward the message. Organizations need to continuously receive feedback on their communication campaigns in order to understand the changing patterns of interactions with the audiences. When organizations use communication systems that support two way communications, there will be high level of participation and involvement where different interacting groups can exchange information at the same time using any or all formats like text, audial, visual, and/or graphic at the same time.

Limitations of the Study

A cross-sectional survey design was employed; hence, this study is limited to a particular occasion of measurement. Given that perceptions and beliefs of respondents change over time, there is need for a longitudinal study. This will provide a more comprehensive picture to researchers and practitioners to understand when perceptions, beliefs,

and behaviors have the strongest relationship. It will also guide practitioners on the best time to introduce the proposed managerial interventions like stakeholder mapping in order to achieve strategic behavioral change communication practices. In addition, the approach did not allow making clear causal attributions for the observed relationships. Therefore, directional influences posited within the hypotheses must be interpreted with caution.

We suggest future studies to use experimental methodologies in order to interpret causal directions in the model with confidence. Further, in this study we collected data from only health organizations in Uganda. Though the findings give an insight into the direction of the discipline, they may not entirely apply to all organizations because organizations in other sectors may have unique communication challenges affecting them. Future studies may validate the study findings on organizations of other sectors. Our study also boarders around gender and cultural issues, future studies should therefore examine whether gender and cultural dimensions influence the effect of information adequacy and interaction resonance on strategic behavioral change communication.

Originality of the Manuscript

This study empirically tests the mediating role of interaction resonance in the relationship between information adequacy and strategic behavioral change communication in health sector organizations of Uganda. This study is an original study and the first of its kind to directly investigate these constructs in the region. This paper is solely submitted to this journal and not published or considered for publication elsewhere.

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