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Ideation Factors for Health Behaviour to Prevent Non-Communicable Diseases (NCDs)

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ABSTRACT

One of the health problems in Indonesia is the increasing death rate caused by non-communicable diseases (NCDs). This problem is related to the increasing number of people who engage in unhealthy behaviours. In the context of health communication, health campaign activities are expected to reduce these problems. This research analyzes the factors that influence health behaviour using a theoretical framework of ideation. Data was collected through a survey method using a self-administered questionnaire. The survey was conducted in Depok City and Bogor Regency, West Java, Indonesia. The respondents were residents aged fifteen years and over who had been exposed to health promotion campaigns or activities from the various communication channels used. The total sample size was 240 respondents. The variables in this research were education, communication channels, ideation, and health behaviour. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to analyze the empirical data and test the hypotheses. The results of the research demonstrate that the factors that directly influence health behaviour are communication channels and ideation. Education was found to not be able to directly influence health behaviour, but it does use ideation as a mediating variable. This research also proves that ideation can be a mediating variable in health behaviour. Ideation is a significant factor influencing health behaviour. The findings of this research have implications for health campaign program designers, who should consider incorporating campaign messages that can increase ideation factors to improve public health behaviour and prevent NCDs.

Keywords: *Communication channel, health behaviour, health campaign, health communication, ideation.*

INTRODUCTION

Non-communicable diseases (NCDs) are approaching a global crisis (Agustina et al., 2019; World Health Organization, 2023). Deaths from NCDs are anticipated to continue to increase worldwide, representing one of the most significant global health concerns. Globally, NCDs have resulted in hundreds of millions of individuals experiencing poverty and financial constraints in accessing health services (Agustina et al., 2019).

The results of the basic health research (Riskesdas) 2018 survey in Indonesia indicate an increase in the prevalence of NCDs. The findings of this study indicate that the prevalence of NCDs has increased in comparison to the 2013 Riskesdas survey. The diseases in question are cancer, stroke, chronic kidney disease, diabetes mellitus (DM), and hypertension. The prevalence of cancer increased from 1.4% to 1.8%, that of stroke from 7% to 10.9%, and that

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of chronic kidney disease from 2% to 3.8%. Based on blood sugar checks, the prevalence of diabetes mellitus (DM) increased from 6.9 percent to 8.5 percent. Similarly, the results of blood pressure measurements indicated a rise in hypertension, which increased from 25.8 percent to 34.1 percent (Ministry of Health, 2020).

The rising prevalence of NCDs is attributable to shifts in lifestyle and individual behaviour. These changes are manifested in the form of minimal physical activity and the continuous consumption of fast food (Ministry of Health, 2020). The prevalence of NCDs will continue to increase as the proportion of individuals who adopt healthy living behaviours declines. Previous research has demonstrated a correlation between healthy living behaviours and an individual's health status (Fitriah & Haris, 2021; Jeong et al., 2021).

At the national level, the government has established the Healthy Living Community Movement (Germas) based on Presidential Instruction (Inpres) No. 1 of 2017. This initiative aims to accelerate and synergize actions from promotive and preventive efforts for healthy living. The objective is to increase population productivity and reduce the burden of financing health services due to disease. This is in line with Minister of Health Regulation No. 71 of 2015 concerning NCDs prevention. The regulation stipulates that prevention is achieved through health campaign activities, early detection of risk factors, and special protection. The health campaign aims to create a healthy life by establishing and perpetuating behaviours: (1) Regular health checks, (2) Eliminating cigarette smoke, (3) Regular physical activity, (4) Balanced diet, (5) Getting sufficient rest, and (6) Managing stress, which has become popular as a '*CERDIK*' health campaign.

The Social and Behaviour Change Communication (SBCC) program, through health campaigns, has the objective of reducing the number of people with NCDs and their death rates. In essence, health communication campaigns directly provide education to the public so that they can adopt or change health behaviours. Campaign objectives often represent a systematic understanding of how behaviours should occur in a target population (Zhao, 2020). SBCC campaigns are designed to act on cognitive, social, and emotional factors at the individual or community level. As stated by Kincaid (2000), the combination of several factors is referred to as ideation.

The Indonesian government has implemented a number of health campaign programmes, including initiatives focused on advocacy, community empowerment, and the fostering of a supportive media environment. The communication channels employed include seminars, talk shows, mass media, social media, training of health cadres and health workers (Ministry of Health 2020). Nevertheless, the findings on the ground indicate that individuals continue to engage in unhealthy behaviours. As indicated in the 2018 Riskesdas report, there has been an increase in the NCDs related to lifestyle factors, including smoking, physical activity, and fruit and vegetable consumption. Since 2013, the prevalence of smoking has continued to increase, from 7.2% in 2013 to 9.1% in 2018. Similarly, the proportion of individuals engaging in insufficient physical activity increased from 26.1% to 33.5% (Ministry of Health, 2020).

An effective health campaign will enhance knowledge about health. Once individuals have a deeper understanding of health in terms of maintenance and prevention, their attitude towards health may also change (Karim, 2020). Among the factors that can elevate an individual's health literacy is their information-seeking behaviour. Mazlan et al. (2021) conducted a study on online health information-seeking behaviour that can influence health outcomes for the prevention of non-communicable diseases. The conceptual framework underlying this research is the ideation framework, a meta-theoretical model of health

communication that integrates various communication, social and health behaviour change theories. This ideation concept not only concerns health literacy, but also integrates various concepts to facilitate behavioural change in health. Storey et al. (2018) posited that most changes in health behaviour are not driven by a single variable or determinant. This happens because various factors can influence a person's behaviour. The more ideational variables that apply to a person, the more likely the individual is to adopt a behaviour (Kincaid, 2000).

The ideation variable is also influenced by communication, either through social interaction, mass media, or interpersonal communication (Olapeju et al., 2022). Furthermore, Okoh et al. (2021) demonstrate that the use of mass media can effectively influence ideation variables for health behaviour. The health campaign to prevent and control NCDs in Indonesia employs a variety of communication channels, including public health advertisements on television and radio, the use of communication channels in the form of billboards, pamphlets, TVC Communterline, and also various seminars, workshops, group discussions, and assistance from health cadres at Community Health Centers (Ministry of Health, 2020).

Previous research has demonstrated the efficacy of ideation in predicting health behaviour. This occurs through its intermediary role between communication and health behaviour change. Among the studies identified, the majority focused on the themes of family planning and contraceptive use (Babalola et al., 2019; Getinet et al., 2022), exclusive breastfeeding campaigns (Abegunde et al., 2021; Anaba et al., 2022), behaviour in treating pneumonia (Anaba et al., 2020) as well as malaria, use of mosquito nets and hygiene care related to malaria (Kumoji et al., 2022; Okoh et al., 2021; Olapeju et al., 2022; Storey et al., 2018).

A comprehensive examination of previous studies reveals that the ideation framework has yet to receive significant attention in the field of NCDs prevention and intervention efforts. This research is based on this premise. In light of these considerations, the objective of this research is to analyze the factors that influence health behaviour using a theoretical framework of ideation.

LITERATURE REVIEW

Ideation for Health Behaviour

Ideation is a construct that is defined as a set of ideas that a person holds and these ideas influence people's behaviour. Ideation relates to people's perceptions in the present while behaviour relates to how people see themselves in the future. Ideation is also a meta-theoretical model of health communication that integrates various communication, social and behaviour change theories and identifies psychosocial or ideational variables that are expected to influence behaviour. This framework posits that behaviour is a function of individual ideas or thoughts and that changes in behaviour are linked to changes in beliefs, which are typically influenced by exposure to mass media and social interactions. Media and social interactions contribute to the formation of these views and ideas (Kincaid, 2000; Kincaid et al., 2012).

Ideation is classified into three broad domains: cognitive, emotional, and social. Communication is designed to alter these factors. The cognitive domain encompasses psychosocial concepts, including, knowledge, attitudes, perceived risk, norms, and self-image. The emotional domain encompasses elements related to feelings and emotions that are associated with the behaviour in question. This domain encompasses emotions and self-efficacy. The social domain is related to interpersonal relationships and the influence of

family, friends, or the broader community. This domain encompasses social support and influence, as well as personal advocacy (Kincaid, 2000; Okoh et al., 2021).

Ideation variables are key components of several behaviour change models. The ideation and behaviour framework propose that the more factors or variables from ideation that are applied or implemented, the more probable it is that someone will take action or intend to take action in the future (Kincaid, 2000). Storey et al. (2018) states that the ideation model is unique in that it emphasizes three things: (1) The individual decision-making process that leads to behavioural choices is complex and can involve many variables simultaneously. (2) Ideational variables are specific to behaviour. (3) The influence of several of these variables is cumulative.

A number of studies have yielded findings pertaining to the mediating role of ideation in communication and health behaviour. Some of these studies were conducted by Getinet et al. (2022). Getinet et al. (2022) examine the ideation factors that influence the behaviour of using family planning among fertile women. The findings of the study indicate that the intention to utilize contraceptive methods is contingent upon the ideation factors present. The use of mosquito nets to treat malaria was the subject of a study by Kumoji et al. (2022). The findings indicate that ideation plays a significant role in influencing the health behaviour of treating mosquito nets with pesticides. Olapeju et al. (2022) demonstrated that multi-channel media campaigns can effectively enhance ideation. Okoh et al. (2021) explored the relationship between mass media interventions and behaviour change with bed net use in relation to malaria. Their research encompassed thirteen ideational factors and yielded evidence that ideational factors can exert an influence on bed net use behaviour.

Communication Channels in Health Campaigns

The term "health communication" is defined broadly as the study or use of communication techniques to improve the health status of a community. The importance of the field of health communication allows people to gain a better understanding of how to maintain a healthy lifestyle and learn about further major health risks that threaten their communities (Mheidly & Fares, 2020). Health communication can enhance awareness, knowledge, and skills related to healthy lifestyles and motivate individuals to adopt healthy lifestyles (De Cocker et al., 2021).

Health campaigns are a part of health communication that aims to promote public health by providing new health interventions. Health campaigns are generally designed to increase awareness of health threats and mobilize target audiences to support public health (Supriyanto & Widati, 2023). Health campaigns aim to increase awareness, knowledge, and encourage target audiences to adopt desired attitudes and behaviour (de Morais Pinto et al., 2021).

Health campaigns also intend to influence individual behaviour through the dissemination of behaviour change messages, such as healthy eating, physical activity, anti-smoking, and the implementation of preventive behaviours, including vaccination awareness and the promotion of screening services for the detection of sexually transmitted infections. Furthermore, health campaigns can be designed to assist professionals, practitioners, and the general public in making informed decisions, as well as to enhance awareness and comprehension of critical health issues (de Morais Pinto et al., 2021).

Zhao (2020) defines a health campaign as an effort to influence the behaviour of a large number of audiences within a specific time through a series of organized communication activities and the display of a series of messages in various communication channels. The

dissemination of campaign messages may occur through a variety of channels, including various forms of media, interpersonal networks, community settings, and promotional events. In the past, large-scale campaigns have typically relied on mass media, particularly television, as the primary means of disseminating messages. In light of the emergence and rapid development of social media, campaigns are becoming increasingly creative and diverse in their channel strategies, with the objective of capitalizing on the vast potential of this new media platform (Zhao, 2020).

Schiavo (2014) categorizes communication channels in the context of health communication into five distinct categories. The first category encompasses mass media channels, including print and broadcast media, the internet, and more established new media. The second category includes new media channels, such as social media, social networking sites, mobile technology, and others. The third category encompasses interpersonal channels, which include counseling, interpersonal meetings, meetings with health service providers, and meetings with health cadres. The fourth category is community channels, which include meetings at educational institutions, theaters, community meetings, local markets, meetings at places of worship, and others. Finally, the fifth category is professional channels, which encompasses professional conferences and online forums.

Several studies have demonstrated that communication channels in health campaigns are an important element in health behaviour change efforts. Muturi (2022) and Swoboda et al. (2019) highlight the importance of understanding how different sources of health information influence individuals' perceptions and motivations to engage in health behaviours. Wu and Kuang (2021) emphasize the importance of social media in shaping health-related behaviours and the need for further research in this area. Goldberg et al. (2022) state that television is the most commonly used mass media for health campaigns, combined with other media such as radio, print and billboards.

Health Behaviour Through the 'CERDIK' Health Campaign

Health behaviour is defined as any action taken by an individual improve or maintain their health. These behaviours are often deeply ingrained and carried out without conscious awareness, and are therefore considered healthy habits (Taylor & Stanton, 2021). Tamanal and Kim (2020) define health behaviour as a sufficient positive attitude, regular exercise, sufficient water intake, a good environment, self-control, and even interpersonal relationships. To achieve and maintain a healthy lifestyle, individuals must be able to control their behaviour, make informed decisions, and overcome negative situations.

As previously stated, health campaigns are designed to encourage individuals to engage in specific health behaviours (de Morais Pinto et al., 2021; Supriyanto & Widati, 2023). The Healthy Living Community Movement (Germas) is a program initiated by the Ministry of Health of the Republic of Indonesia in 2016. This program is a systematic and planned action carried out collectively by all components of the nation with awareness, willingness, and ability to engage in healthy behaviours to enhance quality of life. This movement is founded upon the tenet of integrated and multisector disease control, as espoused in Presidential Instruction No. 1 of 2017. The overarching objectives of Germas are to reduce the incidence of infectious diseases and non-communicable diseases (NCDs), including mortality and morbidity, to mitigate the financial burden on health services due to rising disease prevalence, to prevent a decline in population productivity and to avoid an increase in the population's financial burden for health expenditure.

One potential avenue for achieving success with Germas is to implement a popular health behaviour campaign known as 'CERDIK'. The objective of this health campaign is to encourage the public to adopt healthy behaviours that can help to prevent or delay the onset of NCDs, such as cardiovascular disease, diabetes, and kidney disease (Ministry of Health, 2020). The health behaviours being campaigned are as follows:

a. Regular health checks represent an effective means of facilitating the early detection of internal diseases.
b. Get rid of cigarette smoke related to the importance of knowing the adverse effects of smoking behaviour on the health of yourself and others. The negative impact of smoking behaviour is not only on health but also on finances. People must quit smoking in order to have a better life.
c. Regular physical activity or exercise is essential for maintaining health and preventing diseases such as cardiovascular disease. Regular physical activity, defined as at least 30 minutes of exercise per day, three to five times per week, is beneficial for maintaining health.
d. Healthy and balanced diet. Balance exercise by having a healthy and balanced diet by eating 5 servings of fruits and vegetables per day. Limit sugar consumption to no more than 4 tablespoons per day per person, and salt to no more than 1 teaspoon per day per person. In addition, limit fat consumption (GGL) or at least no more than 5 tablespoons per day per person.
e. Get enough rest for adults, get enough rest by sleeping for 7-8 hours per day.
f. Manage stress is concerned with reducing the potential for cardiovascular disease by managing stress. There are several ways that can be done such as recreation, relaxation, positive thinking and chatting with others.

Research Model and Hypotheses

Kincaid et al. (2012) described ideation as a metatheoretical model of health communication that integrates various communication, social and behaviour change theories to identify psychosocial or ideational variables that are expected to influence behaviour. Storey et al. (2018) and Okoh et al. (2021) explained that different theories tend to emphasise different factors or variables associated with behaviour change. Ideation incorporates concepts from different behavioural theories, including the health belief model, the theory of planned behaviour, the extended parallel process model and social cognitive theory. Ideation conceptualises and structures the psychosocial factors in behaviour to provide a better understanding of the various factors that determine behaviour.

The research model can be seen in Figure 1. It can be seen that health behaviour is influenced by education, communication channels, and ideation. Various sociodemographic factors, especially education, are believed to have indirect effects on behaviour. Education is an important factor that influences individual beliefs (Pakpahan et.al., 2021). In addition to education, health campaigns use various communication channels in their implementation. Communication channels are one of the important variables associated with behaviour change (Supriyanto & Widati, 2023).

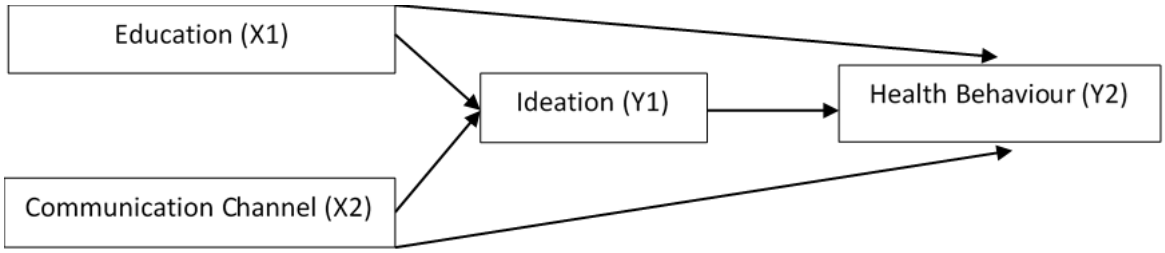

Figure 1: Research model

Health information sources play an important role in shaping a person's attitude and behaviour towards health issues (Swobodo, 2019; Muturi, 2022). Communication channels for health promotion need to look at many things, one of which is the channel as a source of messages (Muturi, 2022). In addition, the role modifier of the ideation factor is also influenced by communication, either through social interaction, mass media or interpersonal communication (Olapeju et al., 2022). Okoh et al. (2021) showed that media use can effectively influence ideation variables for a health behaviour.

As Okoh et al. (2021) have observed, the concept of communication and behaviour change models within the ideation conceptual framework has been employed effectively in a number of health domains to inform the strategic design and evaluation of health communication interventions. Furthermore, ideation variables are also influenced by communication, whether through social interaction, mass media or interpersonal communication (Olapeju et al., 2022). Additionally, the findings of Okoh et al. (2021) demonstrated that the utilisation of mass media can effectively impact ideation variables, including attitudes, perceptions, beliefs, values, emotional and social considerations.

Based on the literature review and Figure 1, the following seven hypotheses were formulated for this study:

Hypothesis 1 : Education is a direct predictor of ideation.
Hypothesis 2 : Education is a direct predictor of health behaviour.
Hypothesis 3 : Communication channel is a direct predictor of ideation.
Hypothesis 4 : Communication channel is a direct predictor of health behaviour.
Hypothesis 5 : Ideation is a direct predictor of health behaviour.
Hypothesis 6 : Education is an indirect predictor of health behaviour, which is mediated by ideation.
Hypothesis 7 : Communication channel is an indirect predictor of health behaviour, which is mediated by ideation.

METHODOLOGY

This research employs a positivistic paradigm and an explanatory quantitative research design. The research was conducted between December 2023 and January 2024 in the West Java province of Indonesia. In data on health behaviour, this province is ranked second for the proportion of less fruit or vegetable consumption (West Java Health Office, 2022). The study population comprised individuals aged 15 years and above who had been exposed to health promotion campaigns or activities disseminated through various communication channels. The sample for this study was drawn from two distinct geographical areas. The study employed a two-city approach, with Depok City representing an urban context and Bogor Regency representing a rural context.

In Indonesia, the productive group is defined as individuals aged 15 years and above, as defined by the Indonesian Central Bureau of Statistics. Furthermore, the Indonesian Health Survey, conducted by the Ministry of Health, employs this age threshold as the minimum age for respondents. Consequently, this demographic may be regarded as a non-vulnerable group, and thus an ethical clearance process was not deemed necessary by IPB University.The sample was selected using a purposive technique, given the uncertainty regarding the exact population size. Furthermore, in accordance with the recommendations set forth by Hair et al. (2022) for PLS-SEM processing, the minimum sample size required for SEM estimation is 5 times the estimated parameters. At the conclusion of data collection, the sample size obtained in each area was 120, resulting in a total sample size of 240 respondents.

Data were collected by applying the survey method using a self-develop questionnaire. Data were collected using interview techniques with printed questionnaires and assisted by trained enumerators. The research questionnaire was subjected to a series of tests to ascertain its validity and reliability. The former was evaluated using Pearson Product Moment item-to-total correlation, while the latter was gauged through Cronbach alpha analysis on 30 respondents who were not part of the research population but who shared similar characteristics.

The results of the construct validity test indicate that the correlation coefficient for the questions ranges from 0.361 to 0.903, with a significant value below 5%. The results of the reliability test for the variables indicate that the Cronbach alpha coefficient value ranges from 0.725 to 0.959. This value is above the threshold value for the variable to be considered valid and reliable. The Partial Least Squares Structural Equation Modeling (PLS-SEM) technique was employed to assess the model and hypotheses of this research.

The research employs four variables: education (X1), communication channel (X2), ideation (Y1), and health behaviour (Y2). The education variables are measured in terms of the level of education attained. The variables communication channels are measured in terms of frequency, message effectiveness, channel trustworthiness, attractiveness, and credibility. The five channels identified by Schiavo (2014) are included in the measurement: mass media, new media, interpersonal media, community media, and professional media. The ideation variables encompass knowledge, attitudes, self-image, perceived risk, norms, self-efficacy, emotions, social support and influence, and personal advocacy (see Table 1). The next variable, health behaviour, is measured through respondents' behaviour towards health behaviour in the ‘CERDIK’ health campaign. The variables are measured using a Likert scale (1-4), with the options "strongly disagree," "disagree," "agree," and "strongly agree”.

Table 1: Variables and indicators

Variable	Indicator	Sample of question
Cammunication channel	Frequency	*In the past month, how often have you watched/read/listened to/seen information about NCDs (e.g. types of NCDs/risk factors for NCDs) through the following channels.*
	Message effectiveness	*Did the campaign messages make you start paying attention to your health?*
	Channel trustworthiness	*In general, are the following channels trustworthy when delivering messages/information about health behaviours?*
	Channel attractiveness	*In general, are the following channels appealing when delivering messages/information about health behaviours?*
	Channel credibility	*In general, are the following channels provide correct/valid information when you get information about health behaviours?*

Ideation	Knowledge	*How much do you know about the risk factors of NCDs due to smoking?*
	Attitude	*What are your beliefs and values towards periodic health checks?*
	Self-image	*I am a person who is confident about my health because I have done regular health checks in the past year*
	Perceived risk	*NCDs (e.g. hypertension, diabetes, kidney disease, heart disease) are serious and silent killers*
	Norms	*Most people think I should have 'CERDIK' health behaviour*
	Self-efficacy	*I am confident that I can perform regular and periodic health checks*
	Emotion	*I feel at ease if I have done a health check*
	Social suppurt and influence	*My family influences me to have 'CERDIK' health behaviour*
	Personal advocacy	*In the past week, I often discussed 'CERDIK' health behaviours with my family about some or all of them.*
Health behaviour	Regular health checks	*In the past one year, I have had a health check-up*
	Get rid of cigarette	*I avoid cigarettes and smoking environments*
	Regular physical activity	*How often have you exercised in the past week?*
	Healthy and balanced diet	*How often do you eat vegetables in a week?*
	Get enough rest	*In the past week, I have experienced sleep disturbances/ insomnia*
	Manage stress	*In the past week, how often have you chatted with other people?*

RESULTS AND DISCUSSION

Respondent Profile

The research involved 240 respondents, all of whom were residents of the Depok City and Bogor Regency. All respondents were those who were exposed to health campaigns from various communication channels used by the government. Table 2 shows that in general, the majority of respondents were female, namely 65 percent, and 35 percent male. This is because the data collection period was during weekdays, not on weekends. This is due to the fact that in Indonesia, there is a proclivity for women to assume the role of housewives. On weekdays, the male respondents are typically absent from the household due to their employment. Consequently, the majority of respondents are women.

Table 2: Respondent profile

		Frequency	**Percentage (%)**
Gender			
Man		84	35.0
Woman		156	65.0
	Total	**240**	**100**
Age			
Teenagers (15-18 years)		11	4.6
Adults (19-44 years)		132	55.0
Pre-elderly (45-59 years)		64	26.6
Elderly (>60 years)		33	13.8
	Total	**240**	**100**
Education			
<6 years		58	24.2
6-9 years		59	24.6

9-12 years		115	47.9
>12 years		8	3.3
	Total	**240**	**100**
Occupation			
Not working		10	4.1
Housewife		112	46.6
Student		15	6.3
Private Sector Employee		27	11.3
Entrepreneur		52	21.6
Farmers		15	6.3
Others		9	3.8
	Total	**240**	**100**

In terms of age profile, the majority of respondents were in the adult category (19-44 years), representing 55 percent of the total sample. This is followed by the pre-elderly age category, representing 26.6 percent, and the elderly, representing 13.8 percent. The majority of respondents (47.9%) had completed between nine and 12 years of education. The proportion of respondents with more than 12 years of education or who have graduated from high school is 3.3 percent in urban areas. This indicates that none of the respondents in rural areas have pursued higher education. Another noteworthy finding is the type of work respondents engage in. The majority of respondents (46.6%) are housewives, while 21.6% are entrepreneurs. In urban areas, no respondents indicated that their occupation was that of a farmer. This work is carried out in rural areas to the same extent as in urban areas, at 6.3 percent.

Measurement Model

a. Convergent Validity

Convergent validity testing is conducted to ascertain the degree of validity of each relationship between the indicator and its latent construct. In this test, indicators are deemed valid if they exhibit a loading factor value > 0.7, and each construct is found to have an AVE value > 0.5 (Hair et al., 2022). The results of the outer model test in Table 3 demonstrate that all indicators in the PLS model are valid in measuring the construct, as evidenced by their loading factor values exceeding 0.7 and the analysis results indicating that each construct has an AVE value exceeding 0.5.

However, there are several indicators that have been removed from the measurement because the value exceeds the specified limit. These indicators are message effectiveness for communication channel variable; attitude for ideation variables; get rid of cigarette smoke, regular physical activity or exercise and get enough rest for health behaviour variable.

Table 3: Convergent validity

Variable	Indicator	Loading Factor	AVE	Result
Education (X1)	X1	1.000	1.000	Valid
Communication channel (X2)	X2.1	0.800	0.777	Valid
	X2.3	0.900		Valid
	X2.4	0.919		Valid
	X2.5	0.902		Valid
Ideation (Y1)	Y1.1	0.740	0.599	Valid
	Y1.3	0.703		Valid
	Y1.4	0.705		Valid
	Y1.5	0.824		Valid
	Y1.6	0.817		Valid

	Y1.7	0.783		Valid
	Y1.8	0.787		Valid
	Y1.9	0.822		Valid
Health behaviour (Y2)	Y2.1	0.765	0.602	Valid
	Y2.4	0.781		Valid
	Y2.6	0.783		Valid

b. Discriminant Validity

The purpose of testing discriminant validity is to ensure that each concept represented by a latent variable is different from other variables. In this test, indicators are considered to have met the required discriminant validity criteria if the HTMT between constructs is below 0.9 (Hair et al., 2022). The results of the discriminant validity test, as presented in Table 4, show that the HTMT value between constructs is below 0.9, which indicates that the discriminant validity of each construct has been met.

Table 4: Discriminant validity - HTMT

	X1	**X2**	**Y1**	**Y2**
Education (X1)	1			
Communication channel (X2)	0.098	1		
Ideation (Y1)	0.139	0.307	1	
Health behaviour (Y2)	0.175	0.494	0.877	1

c. Composite Reliability and Cronbach Alpha

Composite reliability is a measure of the true reliability value of a variable, while Cronbach's alpha is a measure of the lowest value (lower bound) of the reliability of a variable. In measuring construct reliability, the requisite Cronbach's alpha value is > 0.7, as well as the requisite composite reliability value is > 0.7 (Hair et al., 2022). The results of the construct reliability test, as presented in Table 5, demonstrate that the Cronbach's alpha value for all constructs is > 0.7, as well as the composite reliability value for all constructs > 0.7. This indicates that all constructs in the PLS SEM model are reliable.

Table 5: Composite reliability

	Cronbach's Alpha	**rho_A**	**Composite Reliability**
Education (X1)		1.000	
Communication channel (X2)	0.906	0.935	0.933
Ideation (Y1)	0.904	0.906	0.923
Health Behaviour (Y2)	0.673	0.678	0.820

Structural Model

The structural model includes the relationship between hypothetical constructs. The primary criteria for evaluating the structural model or inner model are multicollinearity, assessment of the goodness of fit of the structural model and assessment of path coefficients. The test results at this stage can be utilized to test the research hypothesis. Multicollinearity in the PLS SEM model is tested according to the VIF value of the inner model. The SEM PLS model must be free from multicollinearity as indicated by the VIF inner model value <5.00 (Hair et al., 2022) . The analysis results in Table 6 show the VIF value of the inner model of all constructs <5.00, which means that there is no multicollinearity in the regression model.

Table 6: VIF inner model

	VIF
Education	1.112
Communication channel	1.112
Ideation	1.284

The goodness of fit of the PLS-SEM model can be observed from the R Square, Q Square, and SRMR model values. The R square value shows the strength of the model in predicting endogenous variables. an R square value >0.67 indicates that the PLS-SEM model is in the strong category, an R Square value between 0.33 – 0.67 indicates that the PLS-SEM model is in the moderate category and an R Square value between 0.19 – 0.33 indicates that the PLS-SEM model is in the weak category (Hair et al., 2022). The Q Square value of the model indicates the degree of predictive relevance of the model. The Q Square value is categorized into three categories: A Q Square value of 0.02–0.15 is classified as small, a Q Square value of 0.15–0.35 is considered medium, and a Q Square value of >0.35 is defined as large. The SRMR model is related to the sample's ability to explain the population. SRMR values are classified into two categories: a perfect model fit is indicated by an SRMR value of less than 0.08; a model is deemed fit if its SRMR is between 0.08 and 0.10; conversely, a model is deemed unfit if its SRMR exceeds 0.10 (Hair et al., 2022).

Table 7: Goodness of fit model

Endogen Construct	R^2	Adjusted R^2	Criteria	Q^2	Predictive Relevance	SRMR
Ideation	0.098	0.090	Weak	0.056	small	0.087 (Fit)
Health behaviour	0.534	0.528	Moderate	0.310	moderate	

The results of the analysis, as presented in Table 7, indicate that the estimated PLS-SEM model fits the analyzed data. This is evidenced by the model strength in the small and moderate categories, the predictive relevance being small and medium, and the SRMR value of the model being within the fit criteria. Consequently, this model can be considered suitable for testing research hypotheses. The results of hypothesis testing using PLS-SEM analysis are presented in table 8 and figure 2 (trimming model). Hypotheses 1 to 5 are direct predictor between variables, while hypotheses 6 and 7 are indirect predictor between variables which are mediated by the ideation variable. Hypothesis 1 is accepted. Education is a direct predictor of ideation (β=0.101, t=1.675, p<0.05). Hypothesis 2, however, is rejected. Education is not a direct predictor of health behaviour (β=0.038, t=0.833, p>0.05). Hypothesis 3 is also accepted. Communication channel is a direct predictor of ideation (β=0.285, t=6.509, p<0.05). Hypothesis 4 is accepted. Communication channel is a direct predictor of health behaviour (β=0.233, t=5.764, p<0.05). Lastly, hypothesis 5 is also accepted. Ideation is a direct predictor of health behaviour (β=0.621, t=17.074, p<0.05).

Table 8: Hypothesis test result

No	Hypothesis	Path Coefficient	t	p value	Result
1	Education > Ideation	0.101	1.675	0.047	accepted
2	Education > Health behaviour	0.038	0.833	0.203	rejected
3	Communication channel > Ideation	0.285	6.509	0.000	accepted
4	Communication channel > Health behaviour	0.233	5.764	0.000	accepted
5	Ideation > Health behaviour	0.621	17.074	0.000	accepted
6	Education > Ideation > Health behaviour	0.063	1.798	0.041	accepted
7	Communication channel > Ideation > Health behaviour	0.177	6.286	0.000	accepted

In addition, table 8 shows the results of indirect effects between variables. Hypothesis 6 is accepted. Education is an indirect predictor of health behaviour, which is mediated by ideation (β=0.063, t=1.798 p<0.05). The nature of this ideation mediation is full mediation because, in the absence of direct education predictor, health behaviour is not significantly predicted by education factor. Hypothesis 7 is also accepted. Communication channel is an indirect predictor of health behaviour, which is mediated by ideation (β=0.177, t=6.286 p<0.05). The nature of this ideation mediation is partial mediation because directly communication channels can also significantly predictor of health behaviour.

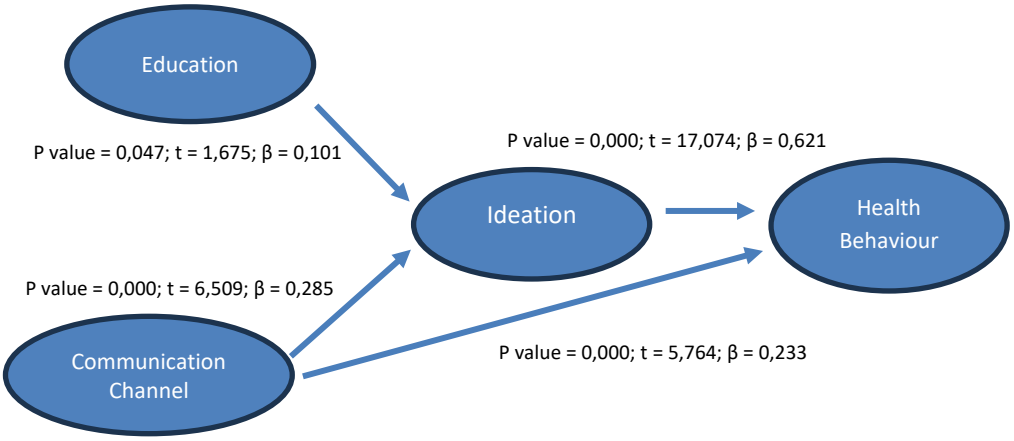

Figure 2: Trimming model

Discussion

The results of hypothesis testing indicate that only communication channels and ideation can directly influence health behaviour. Education can influence health behaviour if it is mediated by ideation. It can be reasonably deduced that an individual's level of education does not necessarily correlate with the adoption of healthy behaviours. The variable representing education yielded results that were not entirely consistent. Education cannot be employed as a measure of behavioural change. The findings of Kumoji et al. (2022) in three countries corroborate these results. Education can be a predictor of health behaviour, but this is not universally true.

Previous research has demonstrated the pivotal role of communication channels in fostering ideation (Babalola et al., 2019; Okoh et al., 2021; Olapeju et al., 2022). Communication channels have a positive correlation with ideation and health behaviour. This implies that augmenting the frequency of utilization, as well as the trust, attractiveness, and credibility of communication channels, will enhance ideation and health behaviour. These results corroborate the findings of Okoh et al. (2021), which posit that the media has the capacity to alter behaviour. The more frequently individuals are exposed to information, the more it will influence their ideation and health behaviour. Furthermore, Olapeju et al. (2022) have demonstrated that mass media, through its various channels, can facilitate ideation.

Ideation is formed through social interaction, communication, and information exchange within the community (Kincaid, 2000; Kincaid et al., 2012). Therefore, communication channels play an important role in forming ideation. Effective communication channels can disseminate accurate, relevant, and trustworthy information about health. For example, public health campaigns, health education programs in schools, interactions between individuals in families and the surrounding environment, and mass media that

provide balanced coverage of health issues can all disseminate accurate, relevant, and trustworthy information about health. All of these communication channels can shape ideation that supports positive health practices.

Storey et al. (2018) posited that most changes in behaviour are not driven by just one variable. This occurs because numerous factors influence a person's behaviour. The ideation factors measured in this research are knowledge, attitude, self-image, risk perception, norms, self-efficacy, emotions, social support and influence, and personal advocacy. The results of the research indicate that ideation has a significant effect on health behaviour. The direction of influence is positive, indicating that an increase in ideation will result in an increase in health behaviour. Ideation is able to mediate the effects of education and communication channels. This is consistent with the findings of previous research conducted by Storey et al. (2018), Babalola et al. (2019), Okoh et al. (2021), and Getinet et al. (2022), which indicate that the ideation variable is the most significant mediator or determinant of health behaviour.

The research results presented have theoretical and practical implications. The theoretical implication is that the results contribute to an ideation framework where ideation is a mediating variable in behaviour change. The ideation framework posits that the greater the number of elements or factors of ideation that are employed, the more probable it is that individuals will engage in action, including with respect to health behaviours (Kincaid, 2000a). The present study has analysed the factors of ideation and demonstrated that ideation can exert an influence on health behaviours. Furthermore, it has been shown that ideation is susceptible to the influence of communication channels. The theoretical significance of this study is that it contributes to the development of effective health promotion programmes by providing insights into the design of powerful and effective messages.

It should be noted that this study is limited in its scope in that it focuses exclusively on the population of Java. Further research could involve the collection of samples from a greater number of locations, thereby ensuring the inclusion of all regions of Indonesia. Additionally, an investigation into the same case in different countries would be beneficial. Furthermore, additional indicators within the communication channels pertaining to health campaigns, such as awareness of these campaigns, can be examined.

There are two practical implications in health campaign communication activities. First, health campaign activities should increase public exposure to health behaviour. This is because there is a relationship between the frequency of using the channel and health behaviour. It is recommended that five communication channels, namely mass media, new media, interpersonal, community, and professional, be utilized intensively and massively in health campaign communication activities. The greater the number of channels utilized, the greater the number of individuals exposed to health messages designed to facilitate behaviour change. This represents a promising approach to the prevention and reduction of NCDs-related issues.

Secondly, health campaign activity messages should consider factors in ideation. This is to align with the characteristics of the message recipients in the campaign area. A total of nine factors must be considered when developing health campaign messages based on ideation factors. These include knowledge, attitudes, self-image, perceived risk, norms, self-efficacy, emotions, social support and influence, and personal advocacy. It is advisable to undertake careful planning to determine which factors should be prioritized during each health campaign. This will, of course, also increase the frequency of using the channel, the effectiveness of the message, and the effectiveness of the channel in influencing health

behaviour. This is because ideation plays a role as a factor that is able to mediate these variables.

CONCLUSION

The results of this study demonstrate that communication channels can exert an influence on ideation and health-related behavioural factors. Ideation can act as a significant mediator of health behaviour implementation. The process of ideation plays a significant role in influencing health-related behaviours. The influence of ideas can be shaped by both positive and negative aspects of existing communication channels. The formation of beneficial health behaviours that can reduce the prevalence of non-communicable diseases (NCDs) and prevent further increases can be supported by the facilitation of high ideas in the community through the utilisation of effective communication channels. Furthermore, the study demonstrated that educational factors did not exert a notable impact on health behaviours.

The PLS-SEM test results yielded a model of health campaign communication that elucidates the formation of 'CERDIK' health behaviour. The campaign is constructed with consideration of the factors that influence the implementation of 'CERDIK' health behaviours. It is essential to consider the role of education, communication channels and ideation in shaping health behaviours. These factors encompass knowledge, self-image, perceived risk, norms, self-efficacy, emotions, social support and influence, as well as personal advocacy.

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