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Application of the Health Belief Model (HBM) in HIV Prevention: A Literature Review

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Abstract: As part of a study that explored the factors associated with consistent condom use among senior secondary school female learners in Mbonge subdivision of rural Cameroon, the Health Belief Model (HBM) was used as the framework. Literature was reviewed to ascertain how the entire HBM has been defined and what recommendations have been made as to how to apply the HBM as a framework in studies regarding HIV/AIDS prevention. To achieve this, a systemic review of literature was undertaken. Electronic databases, academic journals and books from various sources were accessed. Several key search terms relating to the HBM and HIV/AIDS prevention were used. Only references deemed useful for bibliographies of relevant texts and journal articles were included. The inclusion criteria were articles that provided information about HIV/AIDS prevention and the HBM constructs. Six constructs of the HBM (perceived susceptibility to HIV/AIDS, perceived severity of HIV/AIDS, perceived benefit of condom use, perceived barriers to condom use, cues to action for condom use and condom use self-efficacy), and modifying factors were identified and applied as the framework for the study. The HBM was identified as the most commonly used theory in health education, health promotion and disease prevention, and thus provided the framework for the study. The underlying concept of the HBM is that behaviour is determined by personal beliefs or perceptions about a disease and the strategies available to decrease its occurrence.

Keywords: Health Belief Model (HBM), HIV/AIDS Prevention, Sexual Behaviours, Consistent Condom Use

1. Introduction

During the initial stages of the HIV/AIDS pandemic, studies were conducted on individuals and the main focus was on their sexual behaviours [1]. It was assumed that once people were aware of HIV and the mode of transmission, their behaviours would change.

Most information campaigns on HIV/AIDS are based on behaviourist and behavioural theories, like the Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB), the Social Learning/Cognitive Theory (SCT), Bruner's Theory of Discovery Learning, the Theory of Classical Conditioning and the Health Belief Model (HBM). The premise of these theories is that actions are based on a person's intentions and behaviours [2]. These theories of group behaviour can be used to study individuals as a group. The HBM as one such theory was used in the study to investigate the factors associated with consistent condom use to prevent HIV/AIDS among senior secondary school female learners in Mbonge subdivision of rural Cameroon.

The HBM was one of the first theories developed to explain the process of change in relation to health behaviour [3, 4]. When used appropriately, it provides organised assessment data about clients' abilities and motivation to change their health status. Health education programmes can be developed to better fit the needs of clients [5].

The HBM asserts that the motivation for people to take action to promote or prevent disease is based on:

- How strongly they believe that they are susceptible to the disease in question.
- Whether the disease would have serious effects on their lives if they should contract it.
- The suggested health intervention is of value.
- Whether the effectiveness of the treatment is worth the cost.
- Which barriers people must overcome to institute and maintain specific behaviours.
- Influence by another person close by, who may have been susceptible to the same disease, signalling the need for action.

The model is divided into three major components:

- The individual's perceptions about health.
- The modifying factors which include demographic, socio-psychological and structural variables.
- The benefits of taking preventive measures [3].

As HIV transmission is propelled by behavioural factors, theories about how individuals change their behaviours have provided the foundation for most HIV prevention efforts worldwide. These theories have been created using cognitive attitudinal and affective-motivational constructs [6].

Health theories importantly focus on psychosocial factors such as knowledge, attitudes, beliefs, intentions, and personality traits that influence behaviours. In health research, it is recognised that these factors could influence the behaviours of individuals and therefore are crucial in health promotion practices [7].

Throughout the plethora of HIV related articles that have emerged over the past decade, a surprisingly large section of these articles focus on social cognitive models, comprising a broad category within social psychology that differs from Bandura's specific social learning/cognitive theory. Social cognitive models are models used in the social sciences to recognise and understand phenomena in the social sciences. Cognitive models emphasised that behaviour is a function of the subjective value of an outcome and the subjective probability or expectation that a particular action will achieve that outcome [8].

These models generally do not consider the interaction of social, cultural and environmental issues as independent of individual factors. Although each model is built on different assumptions, they all state that behavioural changes occur by altering potential risk-producing situations and social relationships, risk perceptions, attitudes, self-efficacy beliefs, intentions and outcome expectations [9]. The term 'cognitive' refers to "the internal mental processes of human beings, and encompasses the domains of memory, perception and thinking," while 'perception' refers to an organised process in which the individual selects cues from the environment and draws inferences from these in order to make sense of his experiences [10].

Numerous studies have shown that social cognitive models are the most effective and valuable theoretical tools in predicting HIV-preventive behaviours and can provide theoretical guidance on psychological changes likely to result in HIV-preventive behaviour change [6].

A model is often described as a symbolic depiction of reality. It provides a schematic representation of some relationships among phenomena and uses symbols and diagrams to represent an idea. A model helps to organise the study, examine a problem, gather and analyse data. Currently the HBM is the most frequently used theory in health education, health promotion and disease prevention [11,12].

The HBM has been modified in various ways over time but the original model contains four psychosocial variables: Perceived susceptibility; perceived severity; perceived benefit and perceived barrier [13].

In summary the HBM deems health behaviour as being established by a person's appreciation of a potentially harmful health concern and understanding that adverse effects can be avoided or minimised [14].

The essential idea of the HBM is geared toward reducing or avoiding a disease condition and aims to explain and predict health behaviours [12]. The main assumption of the HBM is that individuals will act if they feel their personal health is threatened and they perceive the benefit of the health promoting activity outweighs the detriment of following through with the behaviour. The assumption is congruent with the model's focus on health promotion and disease prevention [15]. The functional adequacy of the HBM is easily evaluated due to the length of time since the model's inception in the 1950s.

The HBM was extrapolated from the more abstract theory of Kurt Lewin, recognised as the founder of social psychology. Lewin's theory of goal setting has the individual existing in a life space composed of regions. The regions have positive, negative and neutral values. Diseases are regions of negative valence. Lewin poses that the value placed in a specific outcome (prevention of HIV/AIDS) by a person and the individual's estimation of the likelihood that a specific action (consistent condom use) will provide that outcome, will influence behaviour [16].

The core theoretical concepts are presented clearly and are unique within the HBM. There is no overlap of ideas within the terms. The concepts come together to account for a person's readiness to act.

Through evolution of the theory newer concepts, cues to action and self-efficacy have been added for breadth and depth of the model across a variety of practice settings. A cue to action serves as the catalyst for the decision making process. Examples of cues to action include a symptom of illness or health education from health care providers [13,17]. The concepts and relationships described within the HBM work synergistically to create a greater understanding of the phenomenon of interest, reducing or avoiding a disease condition and an aim to explain or predict health behaviours [12].

The HBM originally developed the theory from the descriptions and stories of participants in a tuberculosis screening program. Questionnaires and interviews are used to obtain perceived susceptibility, severity, benefit and barrier.

Likert scales are used to assess HBM concepts, including self-efficacy [18]. The HBM maintains the original core concepts today to provide researchers and clinicians a means for systematic evaluation.

The HBM is an archetypal (standard) pattern used to evaluate or influence an individual's behavioural changes in regard to a particular health condition. So being an archetypal pattern, it is therefore a model and not a formal theory. The HBM is among the value expectancy theories, which are a family of theories stating that an individual's behaviours can be predicted. The HBM relates theories of decision making to an individual's perceived ability to choose from alternative health behaviours [19].

In the HBM, an individual's motivation to act is analysed

as a function of whether or not one expects to attain a health-related goal. The HBM provides a theoretical basis from which health-related behaviours might be predicted and altered. The HBM is based upon the idea that it is the world as it is perceived that will determine an individual's actions and not the actual physical environment [19]. (This theory is derived from phenomenology, a branch of philosophy).

So, the HBM explains that the likelihood that an individual will engage in a particular undesirable health behaviour is related to one's belief about the seriousness or severity of the potential illness.

The HBM integrates psychological theories of goal setting, decision-making and social learning. It postulates that health-seeking behaviour is influenced by a person's perception of the threat posed by a health problem and the value associated with the actions aimed at reducing the threat [20].

Developed in the early 1950s, the HBM is one of the most widely used conceptual frameworks for understanding, explaining, and predicting health behaviours [21]. It has been used with great success for almost half a century to promote greater condom use, seat belt use, medical compliance and health screening use as portrayed in figure 1 [22].

2. History and Orientation

The HBM was one of the first models of health-promoting behaviours and it remains one of the most widely recognised conceptual frameworks of health behaviours. The HBM explains health behaviours from a social psychology perspective using theories of value-expectancy and decision-making [24,25].

The HBM was first developed during the early 1950s in the United States (US) of America by psychologists Godfrey Hochbaum, Irwin Rosenstock and Stephen Regels working in the US public health service [26]. The model was developed in response to the failure of a free Tuberculosis (TB) health-screening programme.

The TB screening programme provided adults with free TB screening X-rays from mobile units conveniently located in various neighbourhoods. When few adults used the free services, programme organisers began investigating why more adults did not do so. Hochbaum, however, began to study what motivated the few who did come out. He quickly learned that their perceived risk of disease and perceived benefits of the action were crucial factors in their motivation [22].

3. Meta-Theoretical Assumptions of the Health Belief Model (HBM)

The HBM is a humanistic theory; this belief is based on each of the model's meta-theoretical assumptions:

- Epistemology: The theory comprises multiple truths because it applies to different situations and individuals in various ways. The knowledge gained is interpretive in nature
- Ontology: The theory relies heavily on free will because each individual determines the actions involved. This is an active theory
- Axiology: The theory is value-laden because beliefs and values play a huge role in the ideology of this model [27].

Though the HBM is a humanistic (qualitative) "theory", it was used as the theoretical framework for the current quantitative study because the HBM was developed from the logical positivist paradigm of science; it stands out among the social-psychological models of health related behaviours, and is basically a value expectancy model developed to explain an individual's health actions under conditions of uncertainty [28].

4. Assumptions of the HBM

The developers of the HBM stated the following assumptions related to implementing health related actions [21]:

- The HBM assumes that a person will take a health related action if that person feels that a negative health condition can be avoided. It is necessary to help individuals realise that they have the potential to avoid a condition and this can only happen when one has true knowledge of the problem. It is only when one realises this, that one would be able to take a preventative action.
- The HBM also assumes that a person will take preventative action if that person has a positive expectation that by taking a recommended action, the negative health condition will be avoided. The person needs to see the benefits that one will get from practicing the behaviour. If a person fails to see any benefit, it would be difficult for one to take the necessary action, or to maintain it. Students in the current study must perceive the benefits of male condoms, before they can initiate and maintain their use in order to prevent HIV/AIDS.
- The HBM also assumes that a person takes a health related action if the person believes that one can successfully take the recommended action. It requires the person to feel confident that one has the capacity to take the recommended action, and this would require that the person has the necessary knowledge and skills in a supportive environment to carry out the required action(s).

5. Components of the HBM

The HBM has three major components:

- The individual's perceptions about health.
- The modifying factors which include demographic, socio-psychological and structural variables.
- The benefits of taking preventive measures [3,29].

5.1. Individual Perceptions

Individual perceptions are a person's beliefs about one's

own susceptibility to a disease plus the seriousness with which one views the perceived threat of the illness [29]. In this review, individual perceptions concern adolescents' (students') beliefs about their susceptibility to HIV/AIDS and their perceived severity of HIV/AIDS. In effect, an individual changes perception due to newly acquired knowledge which to a large extent brings about a minimalisation of disease risk [30].

5.2. Modifying Factors

Modifying factors, like demographic, socio-psychological and structural variables may affect an individual's perceptions and thus indirectly influence health–related behaviours. Socio-demographic factors, like educational status, could affect a person's perceptions of susceptibility to and severity of suffering ill effects resulting from HIV/AIDS infection, and one's perceived benefits to be expected from using male condoms effectively as well as barriers to accessing and using condoms and/or condom access points [29,31].

Other modifying factors include socio-psychological variables as well as structural variables (see figure 1), which could modify an individual's decision to use male condoms during sexual intercourse [29].

5.3. Variables Affecting the Likelihood of Initiating and Maintaining Action

In the current study these variables refer to a student's perceived benefits of practising safer sex (using male condoms effectively) minus the perceived barriers to taking action (accessibility, affordability and acceptability of condoms); this equals the likelihood of taking actions to change behaviours (see figure 1) [29].

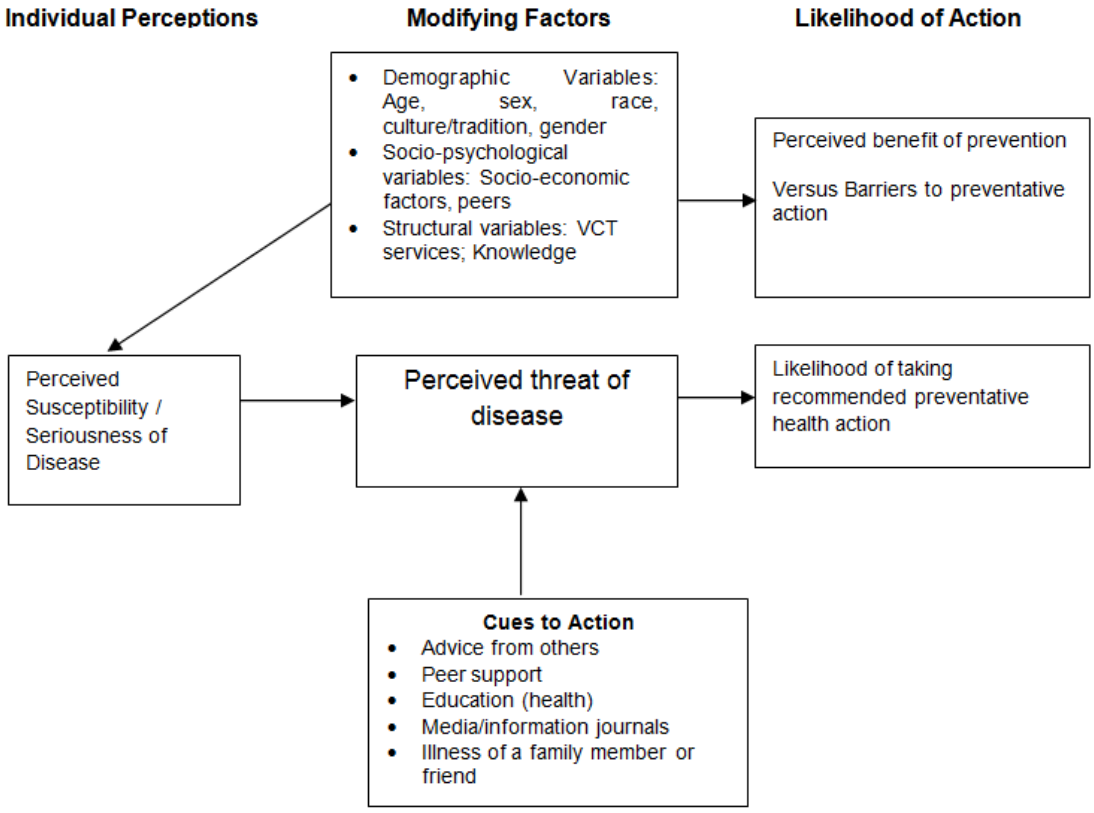

Figure 1. *Conceptual Model of the HBM.*

[3,23]

6. Concepts of the HBM

The HBM is a value expectancy theory, with two values:

- The desire to avoid illness or to get well.
- The belief that specific health actions available to an individual
- would prevent undesirable consequences [29].

In the current study, the desire would be to avoid HIV/AIDS infection, and the specific available health action would be effective and consistent use of male condoms during sexual intercourse, and the undesirable consequences would be HIV/AIDS infection.

A concept is a "complex mental formulation of experience" and it is extracted from life experiences, clinical practice or research [32].

The HBM is based on the following concepts: perceived susceptibility, perceived severity, perceived benefits,

perceived barriers, cues to action and self-efficacy [23,33]. The concept of self-efficacy, the most recent addition to the HBM was directly transferred from the work of Bandura [7], while cues to action was added to estimate events or experiences that fuel a person's direct need to take action.

6.1. Perceived Susceptibility

The first concept of the HBM is perceived susceptibility. This defines an individual's beliefs about the chances of contracting a health condition [7,22]. A person's perception that a health problem is personally relevant will contribute to taking the required action to prevent the health problem. For this to take place there must be activities that increase the individual's perception of one's vulnerability to the health condition. People who perceive themselves to be susceptible to HIV/AIDS would more likely use condoms to protect themselves from the sexual transmission of the disease.

6.2. Perceived Severity

The second concept of the HBM is perceived severity. This refers to one's beliefs of how serious a condition and its consequences are [7,22].

When one recognises one's susceptibility to a certain problem or condition, it does not necessarily motivate one to take the necessary preventive actions unless one realises that getting the condition would have serious physical and social implications. It is when one realises the magnitude of the negative consequences of a condition, that one could take the necessary actions to avoid these negative consequences [34].

People must perceive HIV/AIDS as a serious infection that has severe consequences and implications on their physical and social lives, before they would adopt preventative actions (such as consistent condom use) against HIV/AIDS infection.

6.3. Perceived Benefits

Perceived benefits refer to one's beliefs in the efficacy of the advised action to reduce the risk or seriousness of impact [22]. The person needs to believe that by taking a certain action, it will help one to avoid or prevent a problem from occurring. It is this belief that gives a person confidence to take the action because of the expected outcomes [34]. The HBM proposes that the belief about the effectiveness of condom use in preventing HIV/AIDS should correlate positively with their consistent use [35]. The partner's willingness to use condoms and parental support for condom use are significant psycho-social factors in consistent condom use. Perceived benefits are beliefs about the effectiveness of recommended preventive health actions, such as consistent and correct condom use during sexual intercourse to prevent HIV/AIDS.

6.4. Perceived Barriers

Perceived barriers refer to one's belief in the tangible and psychological costs of the advised behaviours [7,22]. There could be several barriers that affect people's decision to take particular actions. Perceived barriers to health actions include phobic reactions, physical as well as psychological barriers, accessibility factors, personal characteristics, possible blocks or hindrances to engage in preventive behaviours, including such factors as cost, inconveniences and unpleasantness [36,37].

Perceived barriers also include costs, duration, complexity of the deserved behaviours and accessibility to services that would support taking and maintaining the required actions. It is only when persons realise that they have the capacity to deal with these barriers, that they would be able to take the necessary actions [20].

6.5. Cues to Action

The HBM's cues to action are events or experiences, personal (physical symptoms of a health condition), interpersonal or environmental (media publicity) that motivate a person to take action [7,22]. Cues to action are when an individual feels the desire to take the necessary action after believing that one has the capacity to do so. The required action will benefit one by knowing how to deal with the expected barriers.

It requires motivation on the part of the person to have the desire to comply with the prescribed action or treatment, to have concerns about health matters, to be willing to seek and accept health care and to engage in positive health activities [20].

6.6. Self-Efficacy

The sixth concept of the HBM is self-efficacy. This is the strength of an individual's belief in one's own ability to respond to novel or difficult situations and to deal with any associated obstacles or setbacks. Self-efficacy is one's ability to successfully take action. One should feel that one is capable of taking the necessary action correctly because it is that confidence that would motivate one to initiate and sustain the action. In this literature, self-efficacy refers to the confidence in one's ability to use condoms [7,22,34].

The six concepts of the HBM can be summarised as follows:

The first two concepts, perceived susceptibility and perceived severity together represent the perceived threat of a situation, characterised by contracting a particular disease. In the current study, it refers to the perceived threat of HIV/AIDS infection. The perceived threat or risk perception may set the stage for contemplating about risk reduction strategies and for enhancing the urgency or motivation to avert the threat [38].

The perceived benefits and barriers combine into the perceived net benefit of implementing a specific health-oriented strategy and affect a person's attitudes towards the action. In the current study, this refers to the perceived net benefit of condom use to prevent HIV/AIDS. Together the perceived benefits and perceived net benefits are thought to account for people's 'readiness to act'.

The concept of cues to action refers to the events or experiences that fuel a person's direct need to take action.

The most recent addition to the HBM is the concept of self-efficacy, which was directly transferred from the work of Bandura on this topic [7]. Perceived self-efficacy is one of the several key determinants of HIV sexual risk reduction and reproductive health. Perceived self-efficacy refers to people's judgment of their ability to organise and execute specific behaviours that are required to deal with various future situations. These "self-beliefs" about people's capacity, influence how they behave: expectations of personal efficacy determine whether coping behaviours will be initiated, how much effort will be spent, and how long they will be sustained in the face of obstacles and adverse experiences [39]. With regard to this review, perceived self-efficacy refers to confidence in one's ability to successfully use condoms (see table 1).

7. Scope and Application

Table 1 gives a summary of the six concepts of the HBM and their definitions.

Table 1. *The six concepts of the HBM, their definitions and application regarding HIV prevention.*

Concepts	Definition	Application	Application and Implication regarding the current research
Perceived susceptibility.	A person's beliefs about the chances of contracting a health condition.	Define population at risk and their risk levels. Personalise risk based on a person's trait or behaviours. Heighten perceived susceptibility if low.	Perceived chance of becoming infected with HIV/AIDS.
Perceived severity.	One's beliefs of how serious a condition and its consequences are.	Specify and describe consequences of the risk and the condition.	Perceived seriousness of becoming infected with HIV/AIDS.
Perceived Benefits.	One's beliefs in the efficacy of the advised action to reduce risk or seriousness of impact.	Define action to take: how, where and when. Clarify the positive effects to be expected. Describes evidence of effectiveness.	Perceived benefits of condom use.
Perceived Barriers.	One's beliefs in the tangible and psychological costs of the advised behaviour.	Identify and reduce barriers through reassurance, incentives and assistance.	Perceived barriers to condom use.
Cues to action.	Evidence or experiences either personal (physical symptoms of a health condition), interpersonal or environmental (media publicity) that motivate a person to action.	Provide how–to information. Promote awareness. Promote reminders.	Personal and environmental events motivating a person to use condoms.
Self-efficacy.	Confidence in one's ability to successfully take action.	Provide training, guidance and positive reinforcement.	Confidence in one's ability to successfully use condoms.

[7,22]

The HBM has been applied to a broad range of health behaviours and populations including health education topics such as sexuality education. Since the HBM is based on motivating people to take action, (like using condoms) it is applicable to sexuality education programmes that focus on:

- Primary prevention, for example, programmes that aim to prevent pregnancy, STDs and HIV/AIDS by increasing condom use, and
- Secondary prevention for example, programmes that aim to increase early detection of STIs or HIV to reduce their spread via unprotected intercourse and to ensure the early treatment of the conditions [22].

Applying the HBM to abstinence education is possible but is not necessarily a good fit. Youth abstain from sex for many reasons, religious, logistic reasons, not always primarily to avoid a perceived threat or a negative health outcome. Using the HBM's threat logic model to promote abstinence could be unduly "sex negative" [22].

8. Conclusion

The HBM has been applied to a broad range of health behaviours and populations including health education topics such as sexuality education. Since the HBM is based on motivating people to take action, (like using condoms) it is applicable to sexuality education programmes that focus on:

- Primary prevention, for example, programmes that aim to prevent pregnancy, STDs and HIV/AIDS by increasing condom use, and
- Secondary prevention for example, programmes that aim to increase early detection of STIs or HIV to reduce their spread via unprotected intercourse and to ensure the early treatment of the conditions.

The core theoretical concepts are presented clearly and are unique within the HBM. There is no overlap of ideas within the terms. The concepts come together to account for a person's readiness to act. The concepts and relationships described within the HBM work synergistically to create a greater understanding of the phenomenon of interest, reducing or avoiding a disease condition and an aim to explain or predict health behaviours. The HBM was thus used as the framework for the study to explore the factors associated with consistent condom use to prevent HIV/AIDS among senior secondary female learners in Mbonge subdivision of rural Cameroon. The HBM is thus an appropriate theory to be used in HIV/AIDS prevention and public health research.

Authors' Contributions

EET conceived and wrote the paper; FBZ critically reviewed the paper. Both authors approved the revised manuscript.

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