The Evolution of Preventative Health Theories and Applications to the (A) H1N1 Influenza Pandemic

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Abstract

This study aims to describe theories regarding preventative health behaviors. Specifically examined are the studies used to explain the behavior of vaccination. The predictive capacity of each theory is explored. The study identifies weaknesses with these theories and presents new research that disagrees with classical theory. Finally, the importance of a quality theory and applications to pandemics like the 2009 H1N1 Flu pandemic is discussed.

Introduction

The study of preventative health behavior becomes useful when psychologists are expected to predict the actions of a population in times of health need, like a pandemic outbreak or in an aging population. The theories formed in this area help guide the allocation of resources, the nature and frequency of public health communications, as well as the scope of the programs (Hochbaum, 1956). Preventative health behavior can be defined as "any activity undertaken by a person believing himself to be healthy, for the purpose of preventing disease or detecting it in an asymptomatic state" (Kasl & Cobb, 1966). In the case of communicable diseases, vaccination may mean the difference between health and illness. This paper aims to describe classical health behavior theory, new research molding these theories, the possibility of an integrated theory, and the implications of a complete and predictive model in the study of pandemic influenza like the 2009 H1N1 pandemic.

Health decisions in a steady state

The first approach to health decisions may come from the learning, personality, and social areas of psychological research. Learning and personality psychologists that have applied concepts from their fields to health psychology bring an intrapersonal emphasis, with their analyses focusing on personality factors and reinforcement. Relevant traits can include self-efficacy, intelligence, and conscientiousness (Sarafino, 2008). Conscientiousness and its sub-facets have shown to have strong positive relationships with scores on the Health Behavior Marker Scales (Hagger-Johnson & Whiteman, 2007). Thus, personality based theory correlates an individual's position on a personality spectrum with likelihood to engage in preventative health measures. In a similar way, cognitive and learning psychologists have viewed health behavior as a manifestation of conditioning processes (Sarafino, 2008). Learning theorists

propose that an individual will engage in behaviors if those behaviors have been reinforced in the past, a behavior will become extinct if it is not reinforced, and behaviors will become less frequent when punished (Sarafino, 2008). Preventative health behaviors like vaccination may be learned, and reinforced by the absence of flu symptoms that season. Lastly, preventative health theory also includes emotional factors into its explanation for health behavior. A simple feeling could prompt a health behavior, as is the case with individuals who are stressed and exercise as a coping mechanism (Marks, Murray, Evans & Estacio, 2011). The stable state branch of preventative health theory in this way emphasizes the unchanging characteristics of a person (stable state) are important characteristics in the formation of preventative health behaviors.

Health Beliefs Model

A second approach to preventative health theory emphasizes the individual, and cognitive processes that produce a decision about a specific health behavior like vaccination. The Health Beliefs Model was first proposed by Hochbaum (1956) after studying individuals offered a free chest x-ray for the diagnosis of tuberculosis. Hochbaum conducted interviews with patients after their x-ray, and was able to divide their rationales for having taken the x-ray in to three factors. These factors were perceived susceptibility, possibility of asymptomatic infection, and perception that early detection of tuberculosis would decrease the negative implications of the disease on what the participant valued most (job, relationship, family). Hochbaum acknowledged that a variety of factors would influence the decision to submit to a chest x-ray, however the opportunity for the chest x-ray would be a discrete event, and these three factors would become most salient at the moment of decision. Three decades later, the Health Beliefs Model (HBM) would be revised in to its present form (Janz & Becker, 1984; Rosenstock 1974). The final model included perceived severity of an illness, perceived

susceptibility, benefits, barriers, cues, and self-efficacy (Dutta-Bergman, 2005). The HBM is a psychosocial model that takes in to account a person's environment when making health decisions. The health beliefs model functions like a scale. If severity, susceptibility, self-efficacy and cues are "heavier" than barriers, a behavior is likely to be performed. In fact, barriers have consistently been shown to be one of the strongest predictors of health behavior (Glanz, Lewis, & Rimer, 1997). The health beliefs model put in to surveys has seen its factors explain 46 percent of the variance in the final decision to get a swine flu shot (Oliver & Berger, 1979). The health belief model is the most cited model to date, and continues to inspire new research on health decisions.

Theory of Reasoned Action/ Planned Behavior

Fishbein and Azjen (1974) proposed a new preventative health model that emphasized intention to perform a preventative health behavior and attitudes towards it as the main driving force of the decision. Oliver and Berger (1979) studied individuals in a community that could potentially contract a virus like the (A)HIN1 flu. In the study, intention along with attitude and subjective norms accounted for 56% of the variance in the final decision to be inoculated. The theory of reasoned action is limited to voluntary behavior, and attempts to describe the components missing from the HBM, specifically attitudes.

Transtheoretical Model

The transtheoretical model originates in the field of psychotherapy and behavioral change. There are six stages describing the movement of a person from a state of performing a harmful behavior to eliminating themselves of it. The theory is mostly descriptive. As an explanatory model, it is mostly of use in the research of damaging personal behaviors like smoking (Prochaska, Velicer, Fava, & Rossi, 1996). One study that designed a treatment program based

on the TTM stages increased abstinence in smokers by 20% in comparison to standard treatment (Prochaska, Diclemente, Velicer, & Rossi, 1993). The theory is limited in predictive capacity and as such is not the best model for the study of health behavior.

Extended Parallel Processing Model

The most recent theory of individual action is the EPPP. The extended Parallel Processing Model theorizes that when a person encounters a message on a health behavior, for example swine flu vaccination, the person will judge perceived threat and perceived efficacy of the proposed intervention. If an individual finds the threat high and intervention good, then the person will follow the advice of the message (Witte, 1992). The model comes from communication theory, and the researchers who proposed it are not psychologists. Regardless, the strength in the EPPM is that it takes in to account the strength of the intervention being proposed. Never before had the effectiveness of a treatment played such an important role in a model. Also, Witte & Allen separated from previous health research at the suggestion that many factors of a situation may be taken in to account at the same time (parallel processes) and not in a linear fashion.

A Reflection on 50 years of research in Preventative Health Theory

Criticism of the preventative health behavior models has been present for almost as long as the theories themselves. Certainly the theories have weaknesses. The linearity, temporality, individual focus, cognitive focus, and lack of affective consideration have all been criticized.

Linearity and Temporality

All of the above models are built in step-wise fashions. The stages of the models are expected to occur one at a time, and in an order. These characteristics are linearity and temporality. Linearity refers to the layout of a theory that assumes things occur one after the other. Temporality refers to the way certain factors within theories are chronologically ordered

and happen at a specific time. These two factors provide inflexibility to the models. The first argument against linearity and temporality is that the human brain is capable of executing many functions at one time. For example, in the Health Beliefs Model, it could be expected that calculations of susceptibility, severity, and barriers be all conducted simultaneously. This violates the sequential order of the model. In the Theory of Reasoned Action, a person may select an action first, then proceed to assess normative values and may change their selection. Instances like these would violate temporality. No evidence exists supporting the ordering of stages in relationship to each other.

Another problem with linearity occurs in the stage concept of all the models. In the Transtheoretical model, the six stages are proposed in a way that determines a person to be in one of the stages. No evidence exists, however, that a person may not be in two stages at the same time (Conner & Norman, 2005). An alcoholic, for example, may attend an Alcoholics Anonymous meeting (action) while still being unsure of complete commitment to the process (contemplation). Again, due to the flexibility of the mind, this may occur. These models must be able to empirically support the stages as discreet. Currently, it is equally likely that the stages in the Transtheoretical model are a spectrum and not discreet stages, moving from pre-contemplation onwards continuously and not jumping from one stage to the next.

Empirical critiques of other stage-oriented models have emphasized the problems with theorizing "stages" for human mind states. The dividing lines between the stages have been critiqued as arbitrary, and the validity of the surveys the stages come from has been questioned (West, 2005). Similarly, the preventative behaviors and intention to perform these may have gradual onsets such that a stage theory would be an inaccurate representation of the constructs.

Individual Focus

Some branches of psychology focus on the individual, and others focus and interpersonal relations and society. Preventative Health Theory as a field focuses on the individual, and the models reflect decision making on an individualistic case-by-case basis. Theories that attempt to explain how a person will think about a preventative health behavior are called “individual” models.

The critique emphasizes that individuals do not make decisions in the absence of others, or independently from previous decisions. Fishbein & Azjen (1974) were the first to incorporate normative social influence in to a theory. However, the normative social influence remains secondary to personal intention, ignoring the common occurrence that an individual makes a health decision entirely due to social pressure. This occurs for example in children who require vaccinations to attend school. It is also seen in individuals who exercise to be thin in accordance with social perceptions of beauty rather than for their own health and well-being.

The individual focus extends to the individuality of the decision moment. The health models are built to describe the decision process for a single decision at the moment when a response is necessary. No model, however, incorporates any of the "steady state" principles or previous decisions the individual has made. The steady state principles are factors that may impact the way an individual perceives a situation, for example conscientiousness, self-efficacy, or intelligence. Intelligence and education is of particular interest, since these factors have been attributed to more complete knowledge of preventative health procedures. Less educated individuals are more likely to believe vaccines have side effects or are not effective (Akan et al., 2010). Factors like education may come in to play at the moment of a health decision, yet the models do not take these in to account. Further, decisions similar to the decision at hand may

also impact the current decision. Researchers studying yearly flu vaccination behaviors note that sometimes an individual may get a flu shot out of custom, since having done so during flu seasons all their lives may make this behavior automatic (Brewer et al., 2007). This conditioning may affect every sort of preventative health behavior, and is currently not represented in theory.

Cognitive Bias and Affective Factors

The developers of the health models were highly educated researchers who had been immersed in academia for many years. As such, a cognitive focus is very evident in the health models proposed. In every model, beliefs, attitudes, analyses, and rational processes are evident as the main driving factor in preventative health decisions. The EPPM is an excellent example of a cognitive bias. The entire model is a series of cost/benefit analyses that result in a health decision. The models discussed also frequently fail to incorporate affective components in to the decision making process.

New evidence does not support cognitive-based theories. Rhudy, Tucker, Ofstead, and Poland (2010) studied registered nurses fully aware of the benefits and risks of vaccination, and found that even these health professionals considered flu vaccination a low priority.

Further study has questioned the construct of perceived risk as purely a cognitive calculation. Chapman and Coups (2006) note that risks may present as feelings, and it is these feelings that may in turn drive health decisions. Chapman and Coups supported this by showing correlation coefficients of .37 and .4 between anticipated worry and regret, respectively, and vaccination. Negative emotions were more predictive of vaccination than perceived risk.

In this way, the solely-cognitive nature of the health behavior models is proven to be flawed, since even within the individual, affect and social context take very important roles in the formation of health decisions.

Suggestions for Future Theoretical Directions

Ultimately, the models of preventative health behavior have been proposed to better understand preventative health behavior and make health promotion campaigns more effective. However, the low predictive abilities of these models may indicate the need to refocus preventative health research in a different direction. Perhaps a more integrated biopsychosocial model, which will take in to account simultaneously biological, psychological (thoughts, emotions, and behaviors), and social factors. For example, recent studies showed that the amygdala and emotions play key roles in decision-making, especially in the absence of complete information on an illness (De Martino, Kumaran, Seymour & Doulan, 2006).

An integrated preventative model should perhaps recognize the following four concepts: Primarily, preventative health decisions do not occur in a vacuum, so a model cannot ignore stable-state or social contexts where decisions are made. The steady-state context of health behavior decisions (personality, intelligence) will always affect health decisions, since the steady-state affects individual response to external stimuli. The social context may provide an individual with cues as to appropriate behavior (Mischel, 1973). Secondly, a preventative health model should reject the idea of "stages" cognitive processes. The stages may be hardly falsifiable and more importantly, the order in which we consider factors and make decisions is unknown. The point in time at which affective information begins to shape our decision is not yet understood. Thirdly, the affective component should be represented in a preventative health behavior model. Fear is a strong factor in decision-making as indicated by a wealth of research (Chapman & Coups, 2003). Neglecting the affective component restricts the ability of the model

to describe what may be one of the strongest predictors of health behavior (Brewer et al., 2007). Hence, the need for more biopsychosocial models, as mentioned above.

Proposed Changes to Preventative Health Theory

As described ealier in this paper, preventative health behavior theory has proven to be a multifaceted concept, with the involvement of almost every area of psychology. A biopsychosocial theory that joins the multiple constructs involved in decision-making may be the most successful. Because of social involvement, an integrated theory may not necessarily be individual. Researchers designing health promotion campaigns based on an integrated theory may take a three sided approach to convincing a population to engage in a health behavior like vaccination. The three sides are social, rational-cognitive, and affective as seen in Figure 1. If proposing a vaccination campaign for a town, social promotion may entail portraying vaccination as socially desirable or even pro-social (beneficial to community health). Rational-cognitive promotion may involve describing the disease and symptoms to the population. Lastly, affective promotion may involve fear-based or regret and worry-based messages emphasizing the emotional toll not engaging in a health behavior would entail. We propose that this three-sided attack would address the strongest decision factors present in the literature.

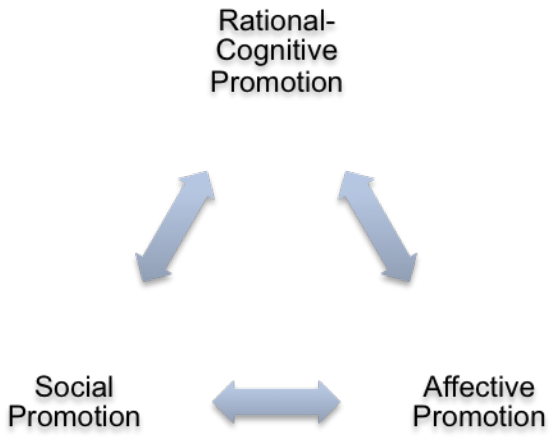

Figure 1. A three-factor approach to preventative health behavior promotion. All three are involved in the delivery of an effective message.

Preventative Health Behavior Decision Making in the 2009 H1N1 Pandemic

The recent A(H1N1) Influenza (commonly called "Swine Flu") pandemic may be one of the best examples of applications of the models, principles, and shortcomings described in this paper. First of all, it is important to note that A(H1N1) flu was not the only potential pandemic of the 2000's. In 2002, an outbreak of Severe Acute Respiratory Syndrome (SARS) in Southeast Asia was the first pandemic alarm of the decade. The SARS coronavirus had a mortality rate of up to 50% (WHO, 2003). The SARS outbreak prompted pandemic preparedness in Southeast Asia and beyond. It is expected that costs related to the SARS epidemic were up to 100 billion dollars (Smith, 2006). The second potential pandemic monitored by health agencies was H5N1 Avian Influenza (bird flu). Also occurring in Southeast Asia, bird flu has had a 59% mortality rate in 510 cases confirmed by the World Health Organization (2010). The appearance of two highly fatal viruses in a short period of time is thought to have prompted governments and citizens to prepare for a deadly pandemic in the future (Sadique et al., 2007). In 2007, the WHO implemented the International Health Regulations, which established reporting of all WHO member states on diseases of international importance. The regulations were designed to unify response in the emergence of pandemics similar to SARS (WHO, 2008).

It is now understood that the 2009 H1N1 pandemic, commonly known as Swine Flu, was no more deadly than the regular seasonal flu (Echevarria-Zuno et al., 2010). However, in April 2009 early reports were contradictory and confusing. Initially, it was difficult to determine if the virus was being transferred from human to human (CDC, 2010). The almost simultaneous appearance of the virus in Mexico and the United States was one of the first reasons the WHO

Director-General declared a public health emergency of international concern (WHO, 2011). Images on television of people in Mexico City with facemasks and constant news updates became common. During the H1N1 pandemic, the WHO held 60 press conferences (CDC, 2010). Government agencies began making announcements related to drugs for the prevention of flu and vaccine. By June 11 of 2009, 74 countries reported laboratory confirmed cases of H1N1, prompting the WHO declaration of a pandemic (Council of Europe, 2010).

It may be logical to explain the time before April 2009 as a conditioning period for the world. Social learning may have facilitated the acquisition of fear and preventative behaviors from SARS and H5N1. Through observation, governments outside of Asia and the WHO had received cues that a potential threat may exist, and developed protocols in case of emergency (Brug, Aro, & Richardus, 2009). From experience, Asiatic countries developed technologies like thermal scanning at airports to control infection. The social context before the 2009 H1N1 pandemic was perfected for acute-threat high-severity disease response (Council of Europe, 2010).

A second component visible in the A(H1N1) flu pandemic of 2009 is affect. Surveys of public response indicate that within a month of the first reported cases, individuals had begun to avoid places with large amounts of people, get prescriptions for antiviral medications, and avoiding people who had recently been in Mexico (SteelFisher, Blendon, Bekheit, & Lubell, 2010). In a telephone survey, Prati, Prietantoni, and Zani (2010) found affective factors predicted behavioral response better than cognitive factors, and the largest determinant of affect was the level of worry in an individual's family and social sphere. Indeed, retrospective inquiry by governmental and non-profit organizations evidences the creation of anxiety amongst citizens

(Council of Europe, 2010; WHO, 2011). This anxiety was criticized as being too large and disproportionate to the severity of the virus.

Extremely relevant to the 2009 H1N1 pandemic is the concept of barriers presented in the Health Belief Model (Hochbaum, 1956). During the initial phases of the pandemic, vaccine was not yet available (CDC, 2010). The first vaccines were available in August, and were reserved for high-risk individuals like healthcare professionals. Vaccine only became widely available in December 2009. In the eight-month period between the pandemic emergence and the availability of the vaccine, the main barrier preventing individuals from becoming vaccinated was the lack of vaccine. However, this barrier did not prevent all health behaviors. Increased hand-washing was seen in more than half of a survey sample within a month of pandemic detection (SteelFisher et al., 2010). Currently, no theory attempts to describe the redistribution of health behavior performance when one behavior is not possible and others are.

The conclusion of the 2009 H1N1 pandemic is related to cognitive factors and information regarding the virus. Van, McLaws, Crimmins, MacIntyre, and Seale (2010) found that decreases in anxiety of university students regarding the virus was correlated with lower numbers of confirmed cases reported. Further concern about the cost of the development of vaccine and costly problems with vaccine distribution shifted attention away from health behavior and towards politics (Council of Europe, 2010).

Reviewers examining international response to the H1N1 have criticized the handling of communication by health authorities (Council of Europe, 2010). Public response due to the substandard quality of information has been related to a strong negative affective response that has in turn provoked several extensive inquiries examining the handling of the pandemic. The H1N1 pandemic of 2009 poses challenges to rational-cognitive preventative health theory, as

well as individualistic behavior theory. An affective response towards preventative behavior had already been formed before even a shallow understanding of the virus (SteelFisher et al., 2010). The temporal order of public response supports recent theory emphasizing affect as a primary predictor of health behavior (Chapman & Coups, 2006), since preventative health behaviors began to occur before the nature of the pandemic was established. Overall, the A(H1N1) influenza pandemic supports affective preventative behavior theory and highlights the flaws of individual and rational-cognitive approaches.

Conclusion

In sum, movement from individual theory towards an understanding of systemic community-based adoption of health behaviors may be the future of preventative health theory. A thorough integrated understanding of perceptions and decisions at the individual, group, and social level can best assist the delivery of health messages and interventions. The emphasis of preventative health behavior on cognition and rationality must be seen as only one part of a greater system involved in decision making. A method of strategic information delivery may be considered, where the quantity and nature of the information provided to individuals through media may be controlled for the creation of an 'ideal' amount of affective motivation to participate in important health behaviors. Examining the impact certain messages on individuals may allow the creation of a controlled affective reaction, avoiding mass hysteria and also passivity.

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