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The Attribute-Centered Approach for Understanding Health Behaviors: Initial Ideas and Future Research Directions

Much of the extant literature on health behavior change has focused on isolating and intervening upon individual- and environment-level behavioral determinants. Behavior change theories, particularly those adopting a social psychological approach, have delineated concepts (risk perception, self-efficacy, normative beliefs) at the individual level that are thought to have a bearing on people's actions. Similarly, theorizing about environmental determinants by those adopting a social epidemiological perspective, among others, have focused on the social determinants of health and well-being. Relatively little attention has been paid to understanding characteristics of behaviors themselves – the very things we wish to change. Hence, we have theories about people and we have theories about social and environmental factors; we do not have theories about behaviors. This paper proposes that the next generation of behavioral research focus on understanding and theorizing about behavioral attributes, which can be considered the building blocks of behaviors, the constituent characteristics that comprise a behavioral domain. Focusing on attributes allows researchers to theorize across behaviors and to test hypotheses that are based on interactions among determinants and attributes. This paper proposes initial theorizing of such a model to serve as a basis for future research.

Keywords: health behavior, theory, attribute, social determinant, psychosocial factors.

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1. Introduction

Prevention is the name of the game. Rapidly rising global prevalence of chronic diseases, particularly those associated with obesity, threaten many societies' ability to cope (WHO 2011), requiring the scientific community to place greater emphasis on demand-side than on supply-side solutions (Bandura 2004). Demand-side solutions speak to things people can do – exercise, eat well, refrain from smoking – by way of prevention, before common conditions deteriorate into full-blown diseases. Although supply-side solutions (which may include the development of new drugs and screening methods) are still important, prevention of diseases also requires a focus on behavior change and maintenance. Many behaviors (leading a sedentary lifestyle and poor diet, for example) have multiple health outcomes (obesity, heart disease, to name a few), and many negative behaviors (having high-risk sex and using heroin, for example; Lejuez et al. 2005) are enacted in clusters (Alamian & Paradis 2009; Meissner et al. 2009). Changing specific behaviors, thus, can go a long way in promoting long-term well-being. Furthermore, behavior change can often be compensatory in nature (Rimal et al. 1999), whereby performing a healthy behavior (running regularly) may provide cognitive license to indulge in an unhealthy one (over-eating). Chronic disease prevention efforts must therefore go beyond the focus on a single behavior at a time and consider transforming groups of behaviors simultaneously.

This paper is intended to prompt to shift the dominant prevention paradigm – from individual behavior change to transformations of behavioral clusters. The model we propose is built by returning to first principles, by studying the building blocks of behaviors – behavioral attributes – whose differential configurations define similarities and differences across behaviors. Transformations on behavioral clusters require understanding the common attributes across both healthy and unhealthy behaviors. We also envision that the effects of behavioral attributes on human behavior vary by the presence (or absence) of other determinants (including, for example, environmental facilitators or barriers to act), which requires testing interaction models. The goal of the proposed attribute-centered approach is to meet these challenges. In this paper, we provide a roadmap for doing so. It is our hope that future researchers will build on the foun-

dations we provide in this paper for investigating how the study of behavioral attributes can provide theoretical insights into transformations of behavioral clusters.

2. Background

A great deal of progress has been made in the last four decades in understanding and changing human behavior for promoting health and well-being. Behavioral researchers have developed and refined theories that continue to inform the design and implementation of interventions for social change. Many of these theories focus on understanding characteristics of audience members whose behaviors are targeted for change. For example, the theory of reasoned action (Ajzen & Fishbein 1980), the health belief model (Becker et al. 1978) protection motivation theory (Rogers 1975), and the transtheoretical model (Prochaska et al. 1992) are all concerned with delineating important characteristics of individuals in order to predict the likelihood of action.

Each of these theoretical perspectives identify the largely psychological factors believed to drive behavioral decisions. In the theory of reasoned action, personal attitudes and beliefs about norms influence peoples' behavioral intentions. In the health belief model, important people-specific variables are people's perceptions about susceptibility, severity, benefits, costs, and self-efficacy regarding the behavior in question. The protection motivation theory focuses on individuals' threat and coping appraisal processes. In the transtheoretical model, the variable of primary concern is one's readiness to change. All of these variables describe, in some way, characteristics of the individual enacting the behavior. The focus of these theories is not specifically on the behavior itself that is being targeted for change. This may explain why applications of these theories pay scant attention to the boundary conditions of the targeted behaviors, which leaves the impression that their purview applies across all behaviors, regardless of their underlying characteristics.

A smaller subset of behavioral theories in the health literature acknowledge the role of factors other than individuals in promoting health behavior change. Social cognitive theory (Bandura 1986) points to the important role of environmental determinants, the extended parallel process

model (Witte 1992) highlights the role of message features (particularly the effects of threat in health messages), and theories about social capital (Putnam 1995) and social networks (Berkman 1984; Smith & Christakis 2008) focus on the strength of social ties in promoting behavior change. Likewise, ecological models, such as those outlined by Street (2003), address environmental and social factors, along with psychological drivers of health behaviors. These theories represent a departure from an exclusive individual-level focus, but they, too, stop short of explicitly theorizing about the role of underlying attributes of behaviors. Rogers' (1962) diffusion of innovations theory is unique in this regard. It lists characteristics of innovations – trialability, observability, simplicity, compatibility, and relative advantage – that come closest to our conceptualization of attributes (though the theory pertains not to behaviors but to innovations).

Failure of extant theories to focus more thoroughly on understanding behaviors and their properties has an important consequence for health promotion: the ability to generalize research findings across behaviors has been limited. Because the underlying behavioral properties are not the primary focus, findings that emerge from any given study tend to be restricted in their application to the particular behavior in question, and hence translating these findings to other behavioral domains is often difficult. There is thus a need to shift the focus away from studying behaviors in their composite, in favor of focusing on attributes that comprise various behaviors. The premise of this paper is that a better understanding of the underlying configuration of attributes can help identify the causes of disparate findings in the literature and choose appropriate theories for behavior change.

3. Behavioral Attributes

Attributes are conceptualized as the constituent characteristics that comprise a behavioral domain (Lapinski et al. 2007). Behaviors are defined by a unique configuration of different attributes. For example, smoking, as a behavior, can be thought to comprise a number of attributes, some of which are that it is addictive, it is proscribed in many indoor settings, it comes with a monetary cost, and its use has serious health consequences. Similarly, a behavior of concern in AIDS prevention efforts, use of condoms, has a number of underlying attributes: it is a behavior enacted mostly in a private

setting, the physical product itself has to be obtained in advance (requiring planning), and its use is beneficial for disease prevention (as opposed to detection). This is in contrast to another behavior, jogging, which is enacted in a public setting, usually performed by oneself, requires stamina, and (in many cultures) can be performed with minimal equipment.

These examples also highlight three important characteristics of behavioral attributes. First, the prominence of an attribute in the given behavior – the "weight" with which it defines the behavior – is both dynamic and specific to a country or culture. For example, "proscribed in indoor settings" is a highly apposite attribute for describing smoking behaviors in many cultures today. This, however, is a relatively recent phenomenon in the countries in which it applies and in other countries, this may still not be applicable. Similarly, the same attribute may be much more relevant in one social setting (e.g., a formal gathering) but not in another (a party).

Second, for any given behavior, the importance of particular attributes can be shaped by factors at multiple levels. For example, for alcohol consumption behaviors, primary attributes at the individual, family, and policy levels may be that it is a pleasurable activity, that it is a source of tension in interpersonal relationships, and that it is a source of revenue for governments.

Third, behaviors comprise a plethora of attributes. The objective of the research effort or the nature of the research question being asked should determine which attributes become the focus of attention. The underlying premise of an attribute-centered approach is that identifying the meaningful attributes of a behavior facilitates the selection of the appropriate theory that guides interventions for changing particular behaviors. Some theories and intervention approaches are more appropriate for some behaviors with particular attributes, and less so for others. For example, one of the central assumptions in the theory of reasoned action (Ajzen & Fishbein 1980) is that the focal behavior is under one's volitional control. The theory also assumes that the behavior is enacted solely on the basis of personal factors, such as one's attitudes and perceptions about normative support from others (regardless of actual support). Hence, it would follow that the theory is suitable for behaviors that are defined by a similar set of attributes, and less suitable for behaviors that are enacted mostly because of physiological addiction (thus negating the role of personal volition).

This attribute-centered approach incorporates, indeed goes beyond, recent calls for a "transfer-oriented approach" (Peters et al. 2009: 198) that focuses on common determinants across behaviors. Whereas determinants focus primarily on characteristics of actors (e.g., perceptions of efficacy), environments (neighborhood safety), or social ties, attributes pertain to characteristics of behaviors themselves (whether the behavior is volitional or coercive, whether gains are short- or long-term, etc.). Attributes can vary cross-sectionally across contexts (the high price of cigarettes in one country versus the low price in another), longitudinally (a behavior that is initially novel and subsequently becomes habitual), and across levels of analysis (nicotine dependence at the physiological level versus public health costs at the societal level). In the next section, as way of illustration, we provide examples of three behavioral attributes from the literature in order to show how the behavior change scholarship can be informed by an attribute-centered approach.

3.1. Example One: Public or Private Nature of the Behavior

People learn some behaviors through trial and error and others through observation (Bandura 1977; Sumner 1906). According to social cognitive theory (Bandura 1986), observational learning can occur either directly, by observing what others do, or indirectly, through depictions in the media (Bandura 2004). An important assumption in social cognitive theory is that observational learning requires that a behavior be observable. From this, one can derive a key behavioral attribute: whether the behavior is enacted in the presence of other people or in private (Bagozzi et al. 2000; Cialdini et al. 1990; Lapinski & Rimal 2005).

Some behaviors (for example, dental hygiene or condom use) are typically enacted in privacy, away from the presence of others, and other behaviors (running a marathon, sun bathing) are often enacted in the presence of other people. Goffman (1959) recognized this distinction and used the term "façade self" to describe how individuals accentuate or suppress certain aspects of themselves in the presence or absence of others.[1]

[1] Goffman also described a "backregion" or "backstage," where "suppressed facts make an appearance" (1959: 114).

There are, of course, many behaviors that we enact without having first observed them in others. When behaviors cannot be observed in everyday interactions, their mastery must take place through strategic communication activities, by trial and error, or through inferences on the basis of environmental cues (Bandura 2004). Condom use represents a behavior in which privacy constitutes one of the primary attributes. Because condom use is not normally available for public scrutiny, opportunities for modeling the behavior are limited. Mastery of behaviors that are defined mostly by privacy likely occurs through processes other than observational learning. Furthermore, because others' behaviors are not visible, one's perceptions about the prevalence of the behavior are likely to be less accurate in the case of behaviors defined mostly by privacy, in comparison to behaviors defined mostly by their public enactment. Similarly, when one's own behaviors are not visible to others, the influence of social pressures are likely to be much lower than when what one does is publicly visible. This argument would lead to the proposition that the influence of both descriptive norms (perceptions about what others do) and injunctive norms (pressures one feels to conform) are attenuated for behaviors with privacy as the primary attribute. The presence of others is also likely to amplify the influence of perceived norms on behaviors, compared to when there is no referent other present (Bagozzi et al. 2000). The presence of others can provide "social proof" (Cialdini 2001) and thus communicate that, because many others are engaging in a behavior, it must indeed be the appropriate behavior in the given context.

If the presence of others can influence behavior, it is important to determine whether influence attempts have differential effects depending on whether the behavior is enacted privately or in the presence of others (Lapinski & Rimal 2005). The extent to which a behavior is enacted publicly or privately may influence, for example, the strength of the relationship between attitudes, behavioral intention, and behaviors. Both cognitive dissonance theory (Festinger & Carlsmith 1959) and self-perception theory (Bem 1967) are based in part on the assumption that once people "go public" with their beliefs or attitudes, they are more likely to act in ways consistent with them (Cialdini & Trost 1998). Gollwitzer et al. (2009) have found, however, that publicly expressing intentions to enact identity-related behaviors not only tied the behavior more closely

to people's identity, but it also made the actual behavior less likely to occur because, authors believe, it provides people a false sense of goal completeness.

The extent to which behaviors are observable can also affect efficacy perceptions – even when the observation is made symbolically, not through direct exposure. Rimal et al. (2005) demonstrated that reading about behaviors enacted by dissimilar others resulted in heightened levels of personal efficacy to enact the same behaviors. That is, seeing a dissimilar other engage in a similarity-relevant action increased people's perceptions that they themselves were able to enact the behavior.

3.2. Example Two: Costs and Benefits

Behaviors can be studied in terms of the underlying costs and benefits associated with performing them. In the health belief model (HBM; Becker et al. 1978), behavioral action is at least partially predicted by the ratio of perceived benefits of a given behavior to the perceived costs of engaging in that behavior. In a review of studies using the HBM, Janz & Becker (1984) found that perceived costs (i.e., barriers) were highly predictive of behaivors across study designs. It should be noted, however, that "perceived cost," (or barrier) as used in the HBM, is not fully isomorphic (though it shares commonalities) with our conceptualization of a behavioral attribute; in studies that use the HBM, this construct is often operationalized as a perception, and hence a property of the individual. Strictly speaking, behavioral attributes pertain to characteristics of behaviors, not individuals' perceptions. To the extent that a behavior is associated with high costs, it is likely, of course, that it will also be perceived as such, but this need not always be the case. There may be hidden costs associated with a behavior (opportunity costs, or costs not understood at the time of action, for example) that are not perceived by the actor that, nevertheless, define the behavior, as is the case for obtaining a sophisticated and very expensive medical screening (e.g., a magnetic resonance imaging) whose costs are not borne by the patient. Furthermore, interventions (particularly advertising efforts) are often designed to change the most salient attribute of the product being promoted: marketing a particular cigarette

brand as rugged or sexy, for example, is an attempt to impose a positive perception onto a product (a brand of cigarettes) or a product-related behavior (smoking) whose primary attribute may be less so.

Costs associated with behaviors can be monetary (e.g., the price of cigarettes) or non-monetary (death due to lung cancer) in nature, and behaviors guided mostly by cost considerations provide individuals with a ready excuse for not engaging in the recommended actions. When costs associated with compliance with a recommended action are high, it is possible for people to rationalize their noncompliance, thereby reducing dissonance they might experience due to the risky behaviors they enact.

In social marketing, behaviors are often viewed through the lens of an "exchange" (Bagozzi 1975). A "good" exchange applies when benefits for engaging in a particular behavior exceed costs associated with it. Although all health behaviors encompass both costs and benefits, the "exchange" differs significantly across behaviors and serves as an important attribute of that behavior. For example, costs – embarrassment, stigmatization, fear, and anxiety – associated with an HIV-positive test result can be high (Smith 2007), but those for engaging in physical activity – embarrassment of looking silly or becoming tired – tend to be of lesser magnitude.

Behaviors also vary in their locus of benefits – whether they benefit the self or others. Certain behaviors (e.g., exercising) have a direct effect on one's own health and do not directly affect the collective. Other behaviors (such as conserving water; Lapinski et al. 2007), have an effect on a collective and less so on oneself (putting aside the personal satisfaction one might get). And still other behaviors (e.g., not smoking in public) affect both self and collective. Many intervention efforts center around emphasizing one attribute over the other. They can be framed in terms of the larger societal good that one's behavior can promote, the health benefits that one can obtain, or both. Alden & Crowley (1995) differentiated self- and other-referencing by using messages that stressed how a product would benefit purchasers or others: Ads were shown entitled either "When You Think About Protecting Yourself" for self-referencing or "When You Think About Protecting Someone Special" for other-referencing, and these message features had differential impact on purchase intentions. We should note here that the Alden and Crowley manipula-

tion focused on message properties (self- or other-referencing) and not on the behavioral attribute, per se. This is important to note because differential message frames may shift one's attention from one salient attribute to another, but perceptions need not be the defining features of behavioral attributes, as mentioned earlier.

The discussion so far has focused on the main-effects of behavioral attributes, but it is also important to consider how behavioral attributes can interact with person- or environment-specific factors in a multiplicative way. For example, the impact of self- or other-benefit on actual behavior change has been shown to be moderated by culture. Han & Shavitt (1994) examined the wording of advertisements in two popular magazines in the U.S. and Korea and found that Korean advertisements used significantly more terms emphasizing family integrity, social relationships, and group benefits than advertisements in American magazines. In a follow-up study, the authors manipulated the number of relational terms used in messages and found that Koreans were more persuaded than U.S. Americans by advertisements that included more relational terms, whereas U.S. Americans were more persuaded by advertisements stressing individualistic benefits. Similar findings were reported by Gregory & Munch (1997) in Mexico: Mexican participants reported greater liking and purchase intention from advertisements that reflect local cultural norms (i.e., collectivistic family norms).

3.3. Example Three: Dependency/Addiction

Behaviors can also be aligned along a continuum of addictiveness. According to the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV), at the behavioral level, addictiveness is characterized by seven properties – tolerance, withdrawal, using/engaging in behavior more than intended, difficulty controlling use/behavior, spending a great deal of time, giving up other activities, and using/behaving despite harm. Addictiveness is generally understood to incorporate the idea of dependence, but also includes a social or pathological component (although, for the purview of this paper, we use the two terms interchangeably).

Addictiveness or dependence is often associated with tobacco, alcohol, drugs, and similar substances, but researchers have written extensively

about other behaviors that can fall under the same purview. For example, Heckman et al. (2008: 451) note that "similarities between excessive tanning and substance use disorders or addiction have been discussed formally in the literature recently and anecdotally for years." Similarly, Warthan et al. (2005) found that approximately a quarter of the beachgoers they surveyed met the modified CAGE criteria (Mayfield et al. 1974) – used for screening alcohol dependence – for tanning. Likewise, approximately half met modified DSM-IV criteria for tanning dependence.

This suggests that behaviors other than substance use, including excessive amounts of eating, exercising, or gambling, can exhibit properties that are closely aligned with the medical definition of dependence or addictiveness (Heckman et al. 2008). Pelchat (2009: 621) notes, for example, that the "neurochemistry of reward provides a great deal of evidence for similarity between food and drug cravings." Reviewing tanning behaviors through the lens of the CAGE and DSM-IV criteria, Mosher & Danoff-Burg (2000) found support for the idea that tanning can be conceptualized in addiction terms. They also found an association between anxiety and depression as comorbid with dependence on indoor tanning.

This review leads us to note that psychological, biological, and sociocultural constructs all contribute to the idea of addiction, and that it is not a dichotomous variable; severity associated with addiction is manifest in different degrees along a continuum. More relevant to this paper, our review suggests that the notion of dependence or addiction signifies a progression from voluntary to involuntary behavior and that it applies across a host of behaviors that are of concern to health communication and public health scholars. The key, perhaps, is the idea that dependence or addiction is characterized by an impairment of control in engaging in (or abstaining from) the behavior (Li, Hewitt & Grant 2007), which indicates that this attribute is applicable across a range of behaviors. Related attributes are that, when engagement in the behavior is excessive, the behavior stops being pleasurable and, in fact, becomes harmful.

4. Attribute-Centered Approach: Methods

Given our discussion about the attribute centered approach for studying behaviors, and the three examples of attributes that we have briefly

reviewed, we next provide some broad guidelines on how scholarship on behavioral attributes could proceed. The methodological approach we outline in the next few pages is but one of many possibilities, and thus it is not meant to be comprehensive or exhaustive. Rather, we hope that future researchers will develop and test the efficacy of more novel approaches beyond those that we have outlined.

Step 1: Generation of Attributes. In order to determine how different attributes map on to behaviors of concern, the first step is to generate a list of attributes. We have noted three properties of attributes that are important to consider in this initial step: Attributes are dynamic (their importance can change over time), they are understood in a cultural context, and their influence on behaviors is a multilevel phenomenon. Hence, the process used to generate attributes to include in one's analysis must be broad enough in scope to incorporate these characteristics.

A convenient starting point is to conduct a behavior-specific content analysis of various types of literatures, which may include historical records, scientific reports, advertising and marketing materials, and policy documents. The focus here would be on understanding particular aspects of the behavior that are highlighted in each source document. For example, if tanning behavior is the focus, then one might ask what characteristics of this behavior are being discussed in the scientific literature. As noted previously, one of the key attributes that scholars have highlighted is the level of addictiveness associated with tanning. Similarly, there may be key differences in tanning behaviors according to another behavioral attribute: whether it is practiced indoors (under a sunlamp) or outdoors. In advertising and marketing documents, one may discover that use of sunlamps is being promoted by highlighting physical attractiveness or the protective effects of acquiring a "base tan," including its protection against breast cancer through Vitamin D (see, for example, the tanning industry's web site: https://smarttan.com). From a policy perspective, there is growing interest in some jurisdictions in the United States in imposing stricter regulations pertaining to indoor tanning. Currently, many jurisdictions have regulations pertaining to intensity (how long one can stay under a sunlamp) but not frequency (how often one tans) of this behavior.

Another method of generating a list of attributes is through discussions with those who practice (or abstain from) the particular behavior. Using this method, one can ask individuals to engage in a thought-listing exercise, whereby they audio record all thoughts that come up as they review materials about or are asked to reflect upon the relevant behaviors. Coders can then review transcripts to determine the primary attributes that pertain to the behavior in question.

An initial read of the source documents and content from the thought-listing exercises are used to generate a list of attributes pertaining to the behaviors in question in order to develop the Behavior Matrix, described subsequently in Step 3. Once this initial list of attributes is developed, the documents are reread in order to verify the applicability of attributes across the two methods. This iterative process will also produce attributes that are unique as well as those that overlap across the two methods. For example, the content analysis of source documents may generate, say, 10 attributes, and the thought-listing exercises may generate 12 attributes. This will not result in 22 unique attributes, as many are likely to overlap, but the list of unique attributes are then used across the behaviors being studied. The reliability and validity of the method proposed here can be maximized and assessed in the same manner as one would when conducting a content analysis (for example, developing a codebook, using multiple coders, and assessing inter- and intra-coder reliability).

The review of source documents and the analysis of outputs from thought-listing exercises do not, of course, provide a comprehensive list of attributes, but the use of these methods can highlight how the same behavior is viewed differently by different parties at different levels of analysis. Furthermore, because the significance of attributes varies by context and culture, the validity of findings from the use of these procedures will be greatly enhanced to the extent that these methods can be implemented across multiple cultures. The dynamic nature of behavioral attributes also means that the significance of any given attribute is likely to vary over time for the same individual. In order to capture this variation, adopting a longitudinal design or incorporating a life-course perspective is likely to be beneficial.

Step 2: Validation of Generated Attributes. Once a comprehensive list of attributes has been generated, the second step is to test and validate

the influence of attributes on multiple behaviors. A convenient way of doing so is through surveys that ask people about the importance of each attribute for each behavior under study. Statistical analyses, including tests of psychometric properties, can then be done to assess the underlying factor structures and to test the congruence between attributes generated through the content analytic and thought-listing techniques, on the one hand, and extent of importance ascribed to each attribute, on the other.

Consider an example. For each attribute generated through the first two steps, a survey item can ask respondents to indicate, on a Likert-type scale, the importance of the attribute for the range of behaviors being studied. If "monetary cost considerations" and "observable" are the two attributes generated, and if indoor tanning and condom use are the two behaviors under study, then each of the two attributes can be rated for their importance for each of the two behaviors. One may find, for example, that the attribute pertaining to monetary cost is more important for the indoor tanning behavior than for condom use; importance of the attribute pertaining to observability may be comparable across both behaviors. In this way, attributes are then linked with all behaviors. Factor analytic techniques can then be used to determine how attributes for each behavior cluster together and these clusters can be compared across behaviors.

This direct-assessment method captures the relevance of each attribute as perceived by the actor, and it allows for the comparison of the relative weight of each attribute across a range of behaviors. The scope of this method, however, is limited in light of our earlier observation that attributes can also exert their influence without the person's direct awareness. Hence, survey methods outlined here should be supplemented with other, less obtrusive techniques. One such alternative is to experimentally manipulate exposure to messages that highlight one attribute over another and then test hypotheses based on ease of processing. For example, one could test the hypothesis that messages concordant with respect to underlying attributes will be processed with more ease, in comparison to messages that are discordant. This could be assessed through measures of latent response times.

Step 3: Development of the Behavior Matrix. A key outcome of the attribute-centered approach is the formulation of the Behavior Matrix,

comprising rows that correspond to specific attributes and columns that correspond to focal behaviors. For example, consider the study of three behaviors that, at first blush, may seem to share few commonalities: organ donation, consumption of fruits and vegetables, and alcohol consumption. In the behavior matrix, these three behaviors are represented as three columns. Rows in the matrix correspond to attributes that define these behaviors, generated and validated through the processed outlined in this paper. For example, the social (versus individual) context in which the behavior is enacted may be an attribute (that is, a row) in this matrix, which is applicable for alcohol consumption (one of the columns) and less so for consumption of fruits and vegetables or organ donation. Similarly, level of altruism can constitute another behavioral attribute. As a third example, the long-term duration of the benefits can comprise another attribute, one that is more relevant for consumption of fruits and vegetables and less for the other two.

In the above examples, the match between the particular attribute and the underlying behavior need not be binary; rather, the associations are to be weighted according to their relative importance, and conjoint analysis techniques (Green & Srinivasan 1990) can be used to model the weights. Entries in the behavior matrix cells thus signify the relative weights with which each attribute is associated with the behavior that it defines. These associations are akin to factor loading scores that one derives from a factor analysis algorithm, where cell entries are standardized and thus expressed in the same metric, which allows for direct comparisons with each other. Furthermore, through conjoint analysis techniques, all entries in the behavior matrix can be expressed in such a way that the overall sum totals unity. This allows each cell entry to be interpreted in terms of the magnitude of the attribute-behavior relationship relative to all the other cell entries in the matrix.

5. The Next Wave of Behavioral Research

Individual characteristics – including self-efficacy (Bandura 1977) and risk perceptions (Rimal & Turner 2009) – and environmental factors – including access and availability – affect behaviors, and are collectively referred to as behavioral determinants. In the health communication and

public health literature, behavioral determinants have been the focus of much theorizing, and they have served as entry points for interventions to promote health and well-being through behavioral modification. In this paper, we have proposed that behavioral research needs to shift its focus from determinants to attributes. We have also argued that a focus on behavioral attributes allows us to theorize about clusters of, not just individual, behaviors.

The discussion so far has focused on main-effects: how determinants or attributes affect behaviors. What is missing from the extant literature on behavior change are models that investigate how characteristics of individuals and environments interact with behavioral attributes to determine health behaviors. Are certain attributes, for example, more instrumental in affecting change in certain types of environments and cultures but not in others? It is precisely these interaction-based hypotheses that, we believe, are going to yield fruitful results for the next generation of behavioral research.

Consider, for example, the effects of priming (i.e., making more salient) certain attributes of behaviors. Based on descriptions provided in this paper, we could hypothesize that priming a relevant or critical attribute makes the link between an individual-level determinant (e.g., self-efficacy) and the behavior stronger because it makes the match between the attribute and the characteristic more accessible to the receiving audience. In essence, the link between the determinant and behavioral response is moderated by the accessibility of the link. That is, attributes can be thought of as characteristics of behaviors that actually moderate the relationship between determinants and behavior, similar to attitude accessibility (Fazio, Powell & Williams, 1989). Attitude accessibility has to do with the ease of retrieving an attitude from memory (Roskos-Ewoldson et al. 2002). Fazio et al. (1989) found that attitude accessibility moderated the relationship between attitude and behavior, such that an accessible attitude was more predictive of behavior than a less accessible attitude.

6. Conclusion

The widespread recognition about the need to focus on prevention, particularly of chronic diseases that pose major public health challenges in

the future, has spurred a great deal of scholarship on behavior change. This research has made major inroads in the last half century, but much more clearly needs to be understood about the drivers of behaviors. The attribute-centered approach we propose can act as the catalyst for the next wave of research and practice. The intent is to focus heavily on behaviors themselves (going beyond personal and environmental determinants) in order to understand how attributes of behaviors, their building blocks, are assembled and organized across time and contexts. This focus on behavioral attributes provides a conceptually strategic way of expanding beyond the prevailing practice of studying one behavior at a time; instead, it allows the simultaneous modeling of multiple behaviors – clusters that share the same underlying properties. This has important implications for practice: it promotes the notion that, by focusing on attributes, interventions can bring about changes in clusters of behaviors. Most importantly, the underlying idea being pursued in this project is that, in order to understand (and hence change) behaviors, the scholarship needs to focus on the interactions: between attributes and characteristics of people, and between attributes and social or environmental contexts.

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