keynote article

Can our health behaviour models handle imagery-based processes and communications?

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Health psychology researchers have devoted tremendous efforts to understanding the attitudes, beliefs and appraisals influencing health decisions, and to using theoretical models of these conceptual factors to develop and evaluate the persuasive effects of communications. For example, models such as the theory of planned behaviour and protection motivation theory focus on conceptual factors such as social norms, behavioural control, estimates of severity and likelihood of health threats, and self-efficacy. These constructs are typically assessed with text-based measures and, more often than not, interventions attempting to alter them rely primarily on text-based messages. From this research, we have learned a great deal about these abstract, conceptual factors and how individuals process and respond to linguistic and numeric information aimed at changing them. Yet research on concrete-experiential processes and constructs, such as those involving imagery, has lagged behind.

There are several potential reasons for this emphasis on abstract, conceptual processes as opposed to non-verbal, concrete-experiential processes. First, much of the research on health attitudes and behaviours has its foundations in early cognition research in which the focus was on rational decision-making processes. Second, experimental research on attitudes and behaviour evolved from a tradition of using text-based stimuli, presumably on the basis that: (a) communications in applied settings were predominantly text-based; and (b) text-based and numeric messages have a high degree of experimental precision, so that responses to variations of key words or numbers could be easily calculated and understood, and the messages could be replicated easily and with considerable accuracy in further research.

This emphasis on conceptual processes has grown increasingly divergent with ongoing trends in utilizing image-based modes of communications. With the rapid expansion of visual media and computer-based information using sophisticated graphics and imaging techniques, consumers are increasingly receiving health information in the form of pictures and images. How well do our current theories of health information processing and behaviour account for responses to these image-based communications, given their evolution from research focusing on conceptual processes?

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The Common Sense Model (CSM) provides a theoretical framework for accounting for responses to imaged-based communications as it delineates the roles of concrete-experiential processes and imagery contents of mental representations of health threats (Leventhal, Brissette, & Leventhal, 2003). Nevertheless, recent research guided by this model has focused primarily on the conceptual contents of mental representations by using conceptually-focused measures such as the IPQ-R (Moss-Morris, et al., 2002). Yet what are the mental images that are stored alongside these conceptual beliefs and appraisals? What are the reciprocal influences of concrete imagery and conceptual contents in terms of retention and accessibility? How do imagery contents influence motivations and behaviours—independently as well as in combination with conceptual contents?

How Images and Words are Processed Differently and Why it Matters

Research in perception and cognitive neuroscience indicates that written, auditory, and imagery-based information is processed differently and encoded in distinctive memory systems (Mayer, 2008; Paivio, ►

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Walsh, & Bons, 1994; Stacy, Ames, & Knowlton, 2004). Information represented as images is processed more rapidly than linguistic information, and it is closely linked with affect and highly accessible to recall. All in all, evidence suggests that images can outperform words and numbers in terms of fostering learning, motivation and behaviour change (Cameron & Chan, 2008).

Evidence on the relative impact of images versus text-based information on health cognition and motivation exists within the domain of anti-smoking communications research. Experimental findings demonstrate that information about the consequences of cigarette smoking is more easily recalled and induces more intrusive thoughts when it is presented in image format (e.g., a picture of a blackened lung) than when it is presented in a verbal format (e.g., with the words, "smoking causes lung cancer"; McCaul, Mullens, Romanek, Erickson, & Gatheridge, 2007). Moreover, warning labels depicting such images have been found to be more effective than text-based warning labels in eliciting negative emotional reactions and attempts to quit smoking (Hammond, Fong, McDonald, Brown, & Cameron, 2003). Because images are more likely to stick in memory and intrude into consciousness, they may be more effective as cues to action in the long term.

The implications are clear: Images must be chosen with care. An inadvertently placed image in a health communication may overpower or counteract verbal statements that are carefully constructed to address risk, response efficacy, and other factors. Unfortunately, developers of health communications tend to select graphic images and pictures on the basis of intuition rather than theory and empirical evidence, and their independent influences are not systematically evaluated.

Techniques for Assessing Mental Imagery

Given that images in health communications are likely to be stored as mental images in representations of illness and illness risk, we need to know more about these "images in our heads" and how they influence health behaviours. Yet assessing mental imagery poses clear challenges.

One approach involves asking individuals to draw or artistically represent the images in their minds. Projective drawing and art techniques have a long history as research and therapeutic tools, and recent years have seen increases in their use within health psychology research. For example, applications of the Draw-An-Event Test have yielded new insights into the mental representations created by media messages about alcohol, and these techniques hold considerable promise for assessing salient, non-verbal aspects of health-related media (Stacy, Ames, & Leigh, 2004). Recently, researchers have used an art "toolkit" containing pens, modelling clay, textured papers, and other materials for the purposes of exploring mental images of breast cancer held by breast cancer survivors (Harrow, Wells, Humphris, Taylor, & Williams, 2009). The qualitative findings indicated that women tended to differ in terms of whether their representation of cancer was creature-like (e.g., like a black snake or jellyfish, with tentacles that spread or bodies that grew) or substance-like (e.g., as hard lumps or inert matter). Women with creature-like images appeared to be relatively more distressed and have more intrusive thoughts.

Although these methods enable researchers to gather qualitative information about the imagery contents of representations, practical limitations curtail their utility in large-scale studies. Participants are often reluctant to engage in exercises requiring them to draw or artistically represent aspects of their bodies due to embarrassment about their artistic abilities, fears of others negatively evaluating their productions, the time and effort required, and difficulty capturing the images in their minds in their artwork. Similarly, coders can have difficulty interpreting the artistic representations—indeed, their interpretations may reflect their own views as much or more than those of the artist.

An alternative approach involves collecting verbal reports of mental images. For example, the Assessment of Illness Risk Representations (AIRR; Cameron, 2008) includes an imagery subscale in which respondents list the images that come to mind when they think about a particular health threat. In a study of skin cancer risk representations (Cameron, 2008), young adults reported their mental images of skin cancer. Content analyses revealed that most images fell neatly into the representational categories identified by the CSM: identity, cause, consequences, timeline, and control/cure. Moreover, 44% reported a skin symptom image such as a large, black growth or a crusty sore. These symptom images were key predictors of protection motivation: Intentions to engage in sun protection and skin self-examinations were significantly higher for individuals who reported skin symptom imagery in combination with elevated worry about skin cancer. The Exercise Imagery Inventory (Giacobbi, Housenblas, & Penfield, 2005) represents a complementary self-report technique, in which individuals report their experiences of different types exercise-related images (e.g., appearance-based images, such as seeing oneself as fit, and self-efficacy imagery, such as seeing oneself completing a workout). Research suggests that these imagery ▶

experiences predict exercise behaviour and self-efficacy beliefs (Cumming, 2008).

These self-report techniques have several advantages: They are highly applicable in a variety of research settings as they can be completed quickly and scored easily, and they are high in acceptability. However, they are limited in terms of capturing all potentially important features of mental imagery (e.g., object and background details) if these features are not built in to the assessments.

Techniques for Instilling Adaptive Mental Images

Various lines of research are informing the development of methods for altering mental imagery in ways that motivate protective behaviour (Cameron & Chan, 2008). For example, mental simulation techniques have been shown to be potent ways for instilling images that are automatically elicited in target settings so as to motivate protective actions. Among sedentary adults, techniques involving imagery of approach goals (visualizing the rewards of exercising, such as feeling fit and energized) and implementation imagery (visualizing the steps to begin exercising) have been found to increase exercise motivations and behaviour over time (Chan & Cameron, 2009). Further evidence suggests that an asthma management intervention involving mental visualisations of healthy lungs can reduce symptoms and improve asthma knowledge and self-efficacy (Freeman & Welton, 2005). Similarly, use of a brief exercise involving rehearsal of active coping imagery has been found to improve coping efficacy and reduce pain and cortisol levels following abdominal surgery (Manyande et al., 1995).

Other research is demonstrating how the use of theoretically-guided graphics, demonstrations and metaphorical explanations can instil adaptive images that motivate protective behaviours. In one study, patients with end-stage renal disease were given a demonstration utilizing a transparent, stomach-shaped container to show how their phosphate-binding medication can bind with phosphates from foods. Compared to control participants, those viewing this demonstration reported a better and more coherent understanding of their medications and its efficacy in disease control (Karamanidou, Weinman, & Horne, 2008). Additional research has demonstrated the utility of using imagery-evoking communications that provide a coherent understanding of the links between health risk representations and recommended behaviour (Bishop, Marteau, Hall, Kitchener, & Hajek, 2005).

In recent work, we have developed computer-based communications about heart disease risk that incorporate graphics technologies developed as part of the Physiome Project, a world-wide initiative aimed at developing computational models for graphically representing all aspects of human physiology (Hunter & Borg, 2003). The communication programmes, which are guided by the CSM, depict animated images of a beating heart that are tailored to the personal characteristics of the viewer, and they show how changes in health behaviours affect the functioning of the heart (Lee, Cameron, Wünsche, & Stevens, 2009; Rubin, Wünsche, Cameron, & Stevens, 2005). These types of theoretically-guided communications have considerable potential to instil accurate imagery about the relationships between physiological processes, behaviour, and disease development and to do so in ways that motivate protective action.

Conclusion

More than ever, there is strong impetus to translate our theories of health behaviour into effective interventions. To do so, we need to fully develop these theories so that they incorporate all information processes. By increasing our efforts to understand imagery processes, we will be able to develop more sophisticated health communications that take full advantage of recent advances in graphics and media technologies. If we do not do so, we stand to develop health communications containing images that have less-than-optimal or even detrimental effects on health and well-being. ■

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