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On studying the effect of effective communication about climate change on health care : Theoretical Sentiment Analysis based framework

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Abstract

Climate change poses a multifaceted, complex, and existential threat to human health and well-being. There is a need to communicate these threats to the public. Effective communication about climate change's health risks can improve a wide variety of individual and population health-related outcomes by helping people better make the connection between climate change and health risks. The aim of this manuscript is to highlight communication methods that have received empirical support for improving knowledge uptake and/or driving higher-quality decision making and healthier behaviours and to recommend how to apply them at the intersection of climate change and health. The explored methods range from leveraging social networks to making careful choices about the use of language, narratives, emotions, visual images, and statistics. Further the inherent criteria are explored and formed the basis of drawing a conceptual/ theoretical sentiment analysis based framework which was further analysed statistically.

Keywords: Communication, Climate change, Climate change and health, Health and well-being

1. Introduction

Climate change poses a multifaceted, complex, and existential threat to human health and well-being [1]. It is already harming health directly and indirectly. Public health and medical research reveal a wide range of short- and long term effects of climate change on human health at both individual and population levels. These impacts include increased and/or exacerbated disease burdens related to maternal and foetal health harms, food borne illness, and injuries from climate-intensified disasters such as flooding and wildfires, worse mental health, heat morbidity and mortality, respiratory and cardiovascular disease, vector-borne illnesses as well as nutrient penalties [2–10]. Climate change alerts high-quality health care through its effects on supply chains, power delivery, health care utilization, and damage to health system infrastructure [11]. Improved communication about these issues is needed to increase public and political demand for policies and actions so we can minimize the negative impacts of climate change on human well-being now and in the future [12]. Effective communication about climate change's health risks can improve a wide variety of individual and population health-related outcomes, including positive changes in individuals' health-related behaviours; improved public health in the face of climate-intensified pandemics and disasters [13].

1.1 Need for study

In this paper, authors discussed how active communication about climate change can influence health care. This help people make the connection between climate change and health risks in their minds and empower them to act on that new knowledge and understanding. 10 major communication related criteria have received empirical support for improving knowledge uptake and/or driving higher-quality decision making and healthier behaviors at the individual level.

2. Objective: Theoretical Sentiment Analysis based Framework linking Climate Change with Health Care

2.1 Governing criteria

The selected articles explicitly examine factors that influence people opinions about climate change in health care.

S. No.	Criteria	References Nuo.
1	Communication from trusted source	14,15 16, 17, 18
2	Leveraging social networks	19, 20 , 21
3	Establishing and maintaining social norms	22, 23
4	Focus on belonging and empowerment	24, 25, 26
5	Subtle and powerful language choices	27,28,29, 30, 31,32,33,34
6	Use of emotions	35, 36, 37
7	Use of visual images	38,39,40, 41, 42, 43, 44,45 ,46 , 47, 48, 49, 50, 51, 52, 53
8	Use of narrative communication	54, 55, 56, 57, 58, 59
9	Providing people with climate-related health statistics	60, 61, 62 , 63
10	Text messages with target group	64, 65, 66

2.2 Theoretical sentiment analysis based framework

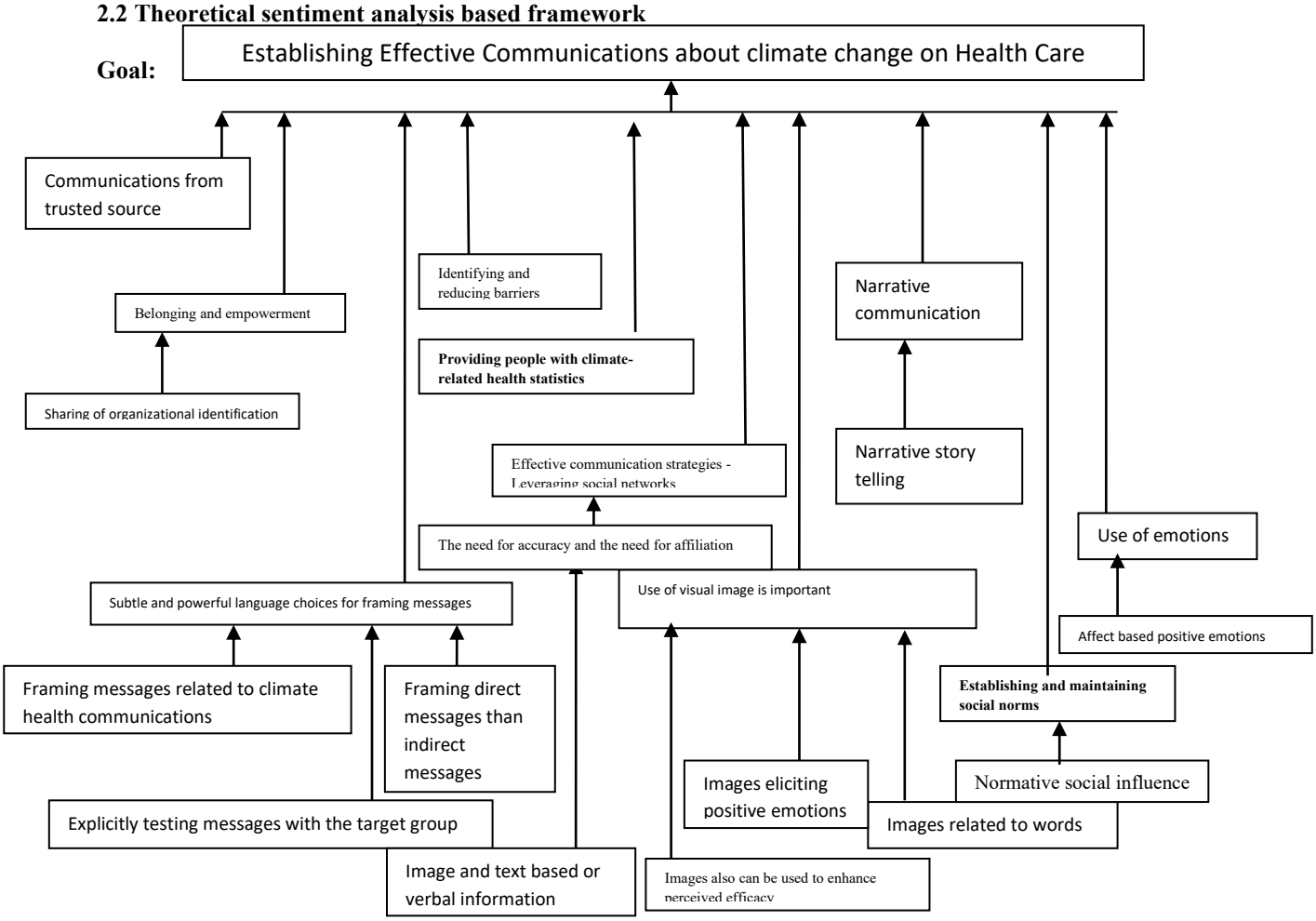


Figure 1: Conceptual framework on Establishing Effective Communications about Climate Change on Health care

2. Hypotheses based on the suggested framework

H01: Communications from trusted source such as scientists and health care professionals has positive impact on delivering right information about impact of climate change on health care.

Healthcare professionals are trusted sources of information; messages they deliver can have great impact, both positive and negative [14]. To the extent trust exists between individual or group and the truth in communication about a health risk drives how messages are attended, processed, and acted upon. Ultimately, messages from trusted sources tend to be more persuasive [15], and people follow recommendations more when they come from a trusted person or group. Indeed, people report that primary care physicians are their most trusted source of information on the health harms of climate change [16]. Public continues to hold science and scientists in high regard [17]. In the case of healthcare professionals as communicators, fundamental values and needs for wellbeing [18] may explain them as trusted sources of all things health-related, including on climate topics.

H02: Effective communication strategies helps in Leveraging social networks which is important for influencing masses about impact of climate change on health care

Effective communication strategies consider simultaneously both social networks (i.e., networks of personal relationships and social interactions) and human social motives (i.e., the process of social influence wherein one person's attitudes and behaviours affect another's) [19]. To understand which type of influencer is more effective and how they might deploy that influence [20]. Specifically, people have varying social motives that have different underlying causes.

H022: **The need for accuracy and the need for affiliation is important to study the impact of climate change on health care**

This stimulates attitude and behavior change *via* mechanisms of compliance and conformity [21]. People with a need for accuracy will be amenable to attitude and behavior change when they receive facts from those they deem to be leaders or experts in their networks. People with a need for affiliation are more likely influenced by those with whom they have close interpersonal network ties.

H03: Establishing and maintaining social norms are crucial for health care related communications

H031: Normative social influence can be an effective strategy to promote behaviour change

Different types of social norms exist and can affect behaviours. Descriptive norms explain prevalence rates in a population whereas injunctive norms relate to beliefs about whether behaviour is generally valued [22,23].

H04: Belonging and empowerment has positive effect on increasing impact of health information

H041: Sharing of organizational identification increases the impact of health information shared

Positive (and negative) effects of organizations' communicating messages emerge because organizations teach people norms, values, and behaviors. When these thoughts, feelings, and actions align, people can feel a shared social identity, known as organizational identification [24]. This increase the impact of health information shared [25]. The positive health effects of organizational identification even extend to online communities, like support groups [26].

H05: Use of subtle, but powerful, language choices while framing and testing messages has positive impact on facilitating acceptances of recommendations on healthy behaviours.

H051: Framing messages related to climate health communication makes the issues relevant

Dearing and Lapinski [27] suggested that when working with stakeholders skeptical of climate change, framing messages around health may better facilitate acceptance of recommendations. Empirical work has focused considerably on healthy behaviors [28]. However, studies demonstrate that pro-environmental behaviors and future time perspectives are positively related [29] which is reasonable for climate-health communication. In general, highlighting or "framing" climate change as a public health issue can make the issues personally relevant [30,31].

H052: Framing direct messages evoke stronger intentions to take protective actions than indirect messages. Prior research in health contexts has found that direct messages (e.g., a virus can harm a person) evoke stronger intentions to take protective actions than more indirect messages such as saying a person could contract a disease caused by the virus [32,33].

H053: Explicitly testing messages with the target group lead to healthier and climate friendly behaviours

Involving stakeholders in crafting messages likely will lead to messages that resonate better, leading to greater comprehension of key concepts and healthier, climate-friendly behaviors. Communications also should be tested explicitly for their impact on comprehension, affect and emotions, thoughts, risk and benefit perceptions, and, ultimately, behaviors prior to their use. [34].

H06: Using emotions is important for capturing positive effect of climate change on health care

Health psychological research has a long history of using negative emotions to compel behavior change. Such as attempts to scare patients to quit smoking by showing diseased lung tissue. These fear appeals have had limited success as messages by themselves but are more successful when combined with action plans to increase people's confidence in their ability to act (e.g., provide concrete information about how to quit smoking, avoid drug use, and reduce energy consumption at home) [35].

H061: Affect based positive information has direct positive relationship with climate change which inturn has positive effect on climate change and vice versa

Affect can act as information, such as relevant statistics and informing the individual's evaluation of health or environmental threats [36]. Through the workings of the "affect heuristic" [37], people with high levels of negative affect to climate change (e.g., worry, anxiety) may perceive climate change as imminent and catastrophic whereas those with lower levels of negative affect perceive it as an unlikely distant threat not worth their consideration.

H07: Use of visual images is important in health care as wrong image conveys harm of health

H071: Images and text-based or verbal information can differentially influence concern and motivate protective action

First, visual images are superior to text or verbal information in attracting attention [38]. Visual images capture and direct attention, thereby serving as an entry point into the communication. Fear arousal activates the visual-spatial regions of the brain and enhances vigilance in attention to visual-spatial information about the threat [39]. These processes induce richer encoding and memory of the images [40].

H072: Images, relative to words, can induce stronger emotional responses

As per [41,42] that can fuel risk perceptions, concern, and motivations to take protective action. Images can do so by instilling more affective meaning about the issue, which leads people to internalize the information as personally relevant and important [43,44]. As one example in the health domain, pictorial warnings for cigarettes are more effective than text warnings in arousing worry, discouraging smoking, and increasing quit attempts [45-48].

H073: Images eliciting positive emotions can also be impactful

Images depicting actions to mitigate climate change (e.g., solar panels) can promote positive emotions and hope which, in turn, promote actions to mitigate climate change [44, 49]. Communications that use visual images to promote a coherent understanding of the links between risk status, protective behavior, and health outcomes have been shown to enhance protective motivations and behavior change [50, 51]. Environmental threats themselves can be difficult to understand because they tend to be "invisible", complex, distant, and hard to imagine [52].

H074: Images also can be used to enhance perceived efficacy to take actions that contribute meaningfully to climate change mitigation and disease control

Images of people taking pro-environmental actions (e.g., protesting, choosing "green" products at the store) may enhance efficacy beliefs by conveying that many others also are able to engage in those actions [53]. Finally, visual images can out-perform text-based information in communications because they are generally easier to remember [40]. Images can instill vivid mental images that are highly accessible and, when activated, have strong and typically automatic, non-deliberative influences on behavior motivations [40].

H08: Narrative communication is important to bridge the gap between health and climate change

Narratives are stories describing fictional or true-life experiences that address social issues or political events, told in a chronological sequence of events, with a persuasive element that is implicitly embedded within the story [54-56].

H081: Narrative storytelling has power in delivering positive information related to climate change and, independently, to health

These narratives should define the problem (e.g., climate change and its impact on health), indicate the causes (e.g., burning of fossil fuels), and discuss the potential solutions (e.g., transitioning away from fossil fuels to renewable energy) and moral responsibilities (e.g., certain populations disproportionately bear the health burdens; those who contributed the least to climate change suffer the most) [58].

H09: Providing people with climate-related health statistics may positively motivate people and reduce health risks

Because people also prefer getting statistics and perceive them as useful [59,60] providing statistics will help earn the public's trust and build healthier behaviors [61]. In fact, providing numbers matters for health decisions. In one study, participants read about a drug prescribed to treat high cholesterol [62].

H010: Identifying and reducing barriers increases the likelihood of involvement with climate friendly behaviours

Behaviors are determined by how much they are valued balanced against barriers to performing them. Reducing those barriers can help people increase their healthy and climate-friendly behaviors. Other research identifies perceptions of high costs and/or low benefits as barriers [63]. Similarly, active transportation (e.g., biking, scooters) is more likely to be adopted when communicators advocate individual health benefits [64].

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