| References | Year | Country | Aim | Communication channel | Theories or models used (if any) | Study design | Sample | Observation time | Primary evaluated aspect | Main results | Proposed Strategy / Practical Implication | KMET |
|------------|------|---------|-----|-----------------------|-------------------------------|-------------|--------|-----------------|------------------------|----------------|------------------------------------------|-------|
| Chen et al. 2021 CN | Determine the factors and influencing mechanisms related to citizen engagement with the TikTok account of the National Health Commission of China during the COVID-19 pandemic. | TikTok | n/a | Observational | Posts (181) | 3 months (23 January 2020 - 25 April 2020) | Engagement | • Shorter videos and videos with longer titles generate greater engagement • Higher levels of dialogic loop significantly reduce the number of shares received on TikTok • Longer videos with positive titles receive higher numbers of likes and comments • Longer videos with negative titles receive lower numbers of likes and comments | • Shorter video length is to be preferred • Those posts displaying positive emotions can include more videos or pictures, while plain text is more suitable for posts with negative emotions | 0.72 |
| Chen et al. 2020 CN | Examine how citizen engagement relates to a series of theoretically relevant factors, including media richness, dialogic loop, content type, and emotional valence. | Sina Weibo, Media Richness Theory (MRT), Dialogic Communication Theory (DCT) | Observational | Posts (1,411) | 51 days (14 January 2020 - 5 March 2020) | Engagement | • Media richness was negatively associated with citizen engagement • This study confirms that the dialogic loop will increase citizen engagement during public health crises • Emotional valence will moderate the effects of media richness, dialogic loop, and content type (latent news) on citizen engagement | • Government agencies should actively use the dialogic loop to enhance citizen engagement • Those posts displaying positive emotions can include more videos or pictures, while plain text is more suitable for posts with negative emotions | 0.78 |
| Dimaling Cruz et al. 2021 CA | Assess the context and format of physical distancing messaging targeted at youth and young adults aged 10–29 years across social media platforms on accounts belonging to Canadian public health entities (PHEs); examine the use of BCTs for PD in related social media posts that implicitly and explicitly target youth. | Facebook, Instagram, Twitter, YouTube | Behavioural Changing Techniques | Content analysis | Posts (338) | 2 months (1 April - 31 May 2020) | Engagement | The majority of posts were implicitly targeting youth, with only 5.9% of the posts explicitly mentioning them. The most interactive implicitly targeted posts consistently resulted in higher numbers of interactions compared to the most interactive explicitly targeted posts, regardless of social media platform. Media of the PHE accounts used the same post multiple times on different days. This may be seen as either an advantage or a disadvantage. Given the high number of youth on Instagram, PHEs may want to consider targeting youth on this platform. Given the high concentration of youth on YouTube and the amount of time spent on this platform, PHEs may want to consider using YouTube in future health promotion campaigns in order to target the audience 18 and younger. | 0.83 |
| Duong et al. 2021 VN | Evaluation of the success story of Vietnam’s ability to control the COVID-19 outbreak in the early stages to examine the associations between exposure to the Vietnam Ministry of Health’s COVID-19 prevention social media campaign messages, interpersonal communication, attitudes, perceived norms, self-efficacy, and intentions to stay at home. | Facebook, YouTube, Zalo | Integration Model of Behavioural Prediction | Observational | Adults (160) | 2 weeks (1 April - 15 April 2020) | Campaign effectiveness | • Results showed that participants viewed the MoH’s COVID-19 prevention social media messages and talked to others about the disease • Results also revealed that interpersonal communication shaped attitudes, injunctive norms, descriptive norms, and self-efficacy It was suspected that participants were aware of the benefits of staying at home and that they could form highly favorable attitudes toward staying at home behavior. Results also further revealed that perceived norms and self-efficacy did not fully account for the association between interpersonal communication and behavioral intentions. | 0.86 |
| Guadry 2017 US | Employ a content analysis to examine how leading health-focused organizations utilized Twitter and Instagram in Ebola communications to their external publics. | Twitter, Instagram | n/a | Content analysis | Tweets (779) | 3 months (September 2014 - December 2014) | Engagement | • The highest levels of public engagement were elicited by posts sent by NSF while using Instagram • NSF used more photos, mentions, and hashtags • Public health organizations should be present on all major social media platforms but Instagram may yield the greatest return • Health organizations should utilize photos in risk-based communication on social media, even on non-visual platforms • Strategic use of risk communication principles appears to be associated with greater public engagement | 0.75 |
Hogan et al. 2018 US Conduct a content and network analysis on a sample of 28a related tweets regarding the 2015-2016 Zika outbreak in the US. Twitter n/a Content analysis Tweets (510,043)  11 days (21 August 2016 - 5 September 2016) Engagement Government institutions such as the White House, CDC, and HHSGov were found to be highly authoritative and trustworthy sources. Entities with the highest betweenness centrality are mostly experts in infectious diseases, several actors involved in politics also have high betweenness centrality. Public-health organizations can benefit by understanding the kinds of content that is transmitted through specific social media platforms and by identifying key participants who are authoritative, popular, and connected to disparate communities in order to efficiently communicate with the public.

Hogan et al. 2018 US Summarise partnership activities, common inquiries, and lessons learned to improve partnerships and information dissemination during a future public health emergency. Website n/a Observational Inquiries across platforms (1987) 3 years (June 2016 - June 2018) Campaign effectiveness MotherToBaby received 5,387 Zika related inquiries from the public and healthcare providers between June 2016 and June 2019.

Hogan et al. 2018 US Examine how credibility of information from PHOs is associated with the use of particular communication channels among a wide array of alternatives. Television Newspapers Facebook Healthcare organizations (132) 4 months (17 July 2017 - 5 October 2017) Content analysis Lower perceived credibility of information from PHOs was associated with a greater tendency to use online news, interpersonal networks, and social media.

Hogan et al. 2018 US Explore how health agencies’ network positions may affect their public engagement outcomes. Twitter n/a Network analysis Public health organizations (152) 6 months (21 January 2020 - 31 May 2020) Engagement Health agencies that perform the role of information authority (high authority centralities) and relationship brokers (high brokerage scores) tend to receive significantly higher levels of public engagement than their counterparts.

Hogan et al. 2018 US Analyze whether and how different groups of stakeholders frame a crisis and the extent to which they attribute responsibility for the crisis to actors by communicating with the public the transmission of eggs with Fipronil in the Netherlands. Twitter n/a Content analysis Tweets Network analysis (177,494) Tweets content analysis (1,372) 80 days (17 July 2017 - 5 October 2017) Engagement It is possible to distinguish between different groups within the network of authors tweeting about Fipronil. Different groups attribute responsibility differently in terms of frequency, type and actor. Opinion leaders attribute extrinsic responsibility more often, while less influential people attribute accidental or intentional responsibility more often.

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Pascual et al. 2018 SG Analyse how social media may be utilized to implement and adapt the CERC model.

Facebook Crisis and Emergency Risk Communication Model (CERC) Content analysis Articles (51) 1 year [January 2016–December 2014] Engagement

• Develop a succinct list of guiding principles for crisis communication on social media.
• Analyse whether and how Canadian public health and news media are incorporating these guiding principles into their COVID-19 crisis communication on social media.
• Determine the topics of COVID-19 crisis communication on Facebook.
• Understand public sentiment within comments in relationship to the guiding principles and topics included in COVID-19 crisis communication on Facebook.
• Examine the relationship between the guiding principles used in COVID-19 crisis communication and the corresponding sentiment by source.

Renshaw et al. 2020 CA Understand public discourse on Twitter around the COVID-19 pandemic in the United States.

Facebook n/a Content analysis Posts (438) 6 months [31 December 2019–14 June 2020] Campaign effectiveness

The guiding principles for effective crisis communication were inconsistently applied and combined. A limited combination of guiding principles, especially those that demonstrate trustworthiness, was likely strong the negative sentiment uncovered in the comments.

MacKay et al. 2020 SG The role of messages and message framing in the crisis communication on social media during the COVID-19 pandemic: effects on fear control and danger control perceptions.

Twitter n/a Interviews Content analysis Tweets (64) n/a Engagement

• Traditional paradigms of crisis communication persist in the social media environment.
• Authorities have adopted social media as a monitoring tool, but not to its dialogical nature.
• Health messages promoting people’s self-efficacy perceptions may be preferable to threatening messages.

Molinas et al. 2020 UK The role of messages and message framing in the crisis communication on social media during the COVID-19 pandemic: effects on fear control and danger control perceptions.

Twitter n/a Network analysis Tweets (32,466) 8 months [1 January 2020–31 August 2020] Engagement

• Involving a video in a tweet was found to increase retweeting of the associated message by 24%. Quote tweets increased retweeting by 8%.
• The inclusion of question marks (11%) and exclamation marks (15%) had minimal impact on message retweeting.
• Images containing text relating to surveillance increased the rate of message retweeting.
• Including a video in a tweet was found to increase retweeting by 8%.

Ciri et al. 2020 CH Understand public sentiment within comments in relationship to the guiding principles and topics included in COVID-19 crisis communication on Facebook.

Website Extended Parallel Process Model (EPPM) Theory of Planned Behavior (TPB) Experimental Adults (447) n/a Message framing

• Efficacy plays a more important role than threats in convincing people to adopt health-related behaviours.
• Threat to freedom led to a more negative attitude towards the vaccination whereas a positive message judgement was positively associated with favourable attitudes.

Pascual-Ferré et al. 2020 US Understand public sentiment within comments in relationship to the guiding principles and topics included in COVID-19 crisis communication on Facebook.

Twitter n/a Network analysis Tweets (30,000) 3 days [30 January 2020, 11 March 2020, 8 June 2020] Message framing

• Networks of conversations around COVID-19 were highly decentralized, fragmented, and loosely connected.
• Competing conversations, misinformation, and other distractions by politically motivated actors persist in the social media environment.

Shan et al. 2021 US Understand public sentiment within comments in relationship to the guiding principles and topics included in COVID-19 crisis communication on Facebook.

Twitter n/a Content analysis Tweets (372,466) 9 months [31 January 2020–31 August 2020] Engagement

• Including a video in a tweet was found to increase retweeting of the associated message by 24%. Quote tweets increased retweeting by 8%.
• The inclusion of question marks (11%) and exclamation marks (15%) had minimal impact on message retweeting.
• Images containing text relating to surveillance increased the rate of message retweeting.
• Including a video in a tweet was found to increase retweeting by 8%.

Shan et al. 2021 CA Understand public sentiment within comments in relationship to the guiding principles and topics included in COVID-19 crisis communication on Facebook.

Twitter n/a Content analysis Tweets (438) 6 months [31 December 2019–14 June 2020] Campaign effectiveness

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Pre-outbreak messages on social media should include all the necessary information to update and educate the public about the risk of the potential crises, while providing reassurance and self-efficacy.

0.67

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0.67

0.68

0.08

0.89
Sutton et al. 2021 CA Define tweeting practices during public health crises to improve risk communication and maximize engagement. Twitter n/a Mixed Method Tweets (885) 6 months (1 January 2020 - 30 June 2020) Engagement Risk communication strategies were not widely used in tweets by any account type. Tweets using at least one risk communication strategy (n=542) received an average of 0.1 retweets per tweet, while tweets using no risk communication strategies received an average of 13. Efficacy and risk statements were the most commonly used strategies.

Sutton et al. 2020 US Identify and describe the patterns of longitudinal risk communication from public health communicating agencies on Twitter during the first 30 days of the response to the novel coronavirus disease 2019 (COVID-19) pandemic. Twitter n/a Content Analysis Tweets (138,546) 3 months (1 February 2020 – 31 March 2020) Message framing Hashtags, grouped according to the time period in which they emerged and persisted, provided a 7-periods of communication emphasize: lead up, acute onset, individually focused action, community focused action, sustaining motivation, setting social norm, secondary impacts.

Sutton et al. 2020 US Identify strategies and practices that may lead to increased message passing among online users. Twitter n/a Content Analysis Tweets (149,335) 3 months (1 February 2020 - 30 April 2020) Engagement

Tang et al. 2021 US Summarize the content of COVID-19-related tweets posted by public health agencies in Texas and how content characteristics can predict the level of public engagement. Twitter Health Belief Model (HBM) Content analysis Tweets (1,409) n/a Engagement

Vis et al. 2018 US Study the relationship between message passing and message content related to threat and efficacy and the theoretical prediction of risk message passing. Twitter Extended Parallel Process Model Content Analysis Tweets (1,409) 1 month (1 August 2016 - 30 August 2016) Engagement

Review for public health agencies and decision makers to monitor Twitter analytics in order to understand their audience and leverage whatever Twitter engagement strategies help maximize shares of their communications. 0.70

In a uncertain environment, public agencies can reach the public – and increase message sharing – with a wide range of practical information regarding the health impacts of COVID19, and promote early actions, with the progress of the pandemic itself. At the same time, some tactics useful in other disasters (such as sentence styles that use exclamation and interrogative punctuation) are counterproductive in the COVID-19 pandemic. 0.79

In a uncertain environment, public agencies can reach the public – and increase message sharing – with a wide range of practical information regarding the health impacts of COVID19, and promote early actions, with the progress of the pandemic itself. At the same time, some tactics useful in other disasters (such as sentence styles that use exclamation and interrogative punctuation) are counterproductive in the COVID-19 pandemic. 0.89

Public health agencies should continue to use Twitter to disseminate information, promote action, and build communities. They need to improve their strategies for delivering social media messages about the benefits of disease prevention behaviors and maintain self-efficacy. 0.72

Public health officials may want to emphasize the severity of an emerging infectious disease, efficacy information in an important message element in encouraging an effective response. 0.81
| Authors     | Year | Country | Research Question                                                                 | Platform | Methodology/Analysis                                      | Content Analysis                                                                 | Tweets/Posts (Date Range) | Engagement                                                                 |
|------------|------|---------|----------------------------------------------------------------------------------|----------|-----------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------|---------------------------------------------------------------------------|
| Vos et al. | 2020 | US      | Analyse the emergency risk communication conceptual model in order to propose a method for evaluating emergency risk communication on social media. | Twitter  | Content Analysis                                          | Tweets (2,015)                                                                   | 28 days (1 October 2014 - 29 October 2014) | - Scientifically accurate messages (operationalized as containing threat information), open and transparent messages (operationalized as containing official action endorsed by the first person), and clear messages (operationalized as containing images and use of figurative language) influence audience behaviors.  
- The day the message was sent influenced message passing.  
- Messages sent by accounts with larger follower numbers exhibited increased retweeting.  
Organizations should create messages that illustrate information visually and should try to include threat and efficacy information in messages; they should also engage social media audiences before public health crises emerge. | 0.84 |
| Yang et al.| 2021 | CN      | Indicate which factors in Wuhan Release’s posts influenced citizen engagement on Weibo, in relation to content type, text length, information source, media richness, the dialogic loop of the text. | Sina Weibo | Mixed-method                                              | Posts (1,506)                                                                     | 4 months (31 December 2019 - 19 April 2020) | - Various types of messages play a different important role in every stage of the crisis.  
- The dialogic loop is partially associated with citizen participation.  
- The addition of pictures and links to information has a significant positive effect.  
- The scale of content is significantly positively correlated with citizen participation.  
- Authorities should release information depending on the varying needs of the public and the actual situation of the crisis.  
- Government agencies should selectively employ media richness theory and actively use the dialogic loop to enhance public engagement.  
- Government accounts can take full advantage of social media functions, especially mentions and hashtags, the number of original posts, add pictures and text length appropriately, to increase interactions with the public, to improve the level of engagement. | 0.67 |
| Young et al.| 2018 | US      | Explore the operationalization of social media engagement during global health crises. | Twitter  | Dialogic Communication Content analysis                  | Public comments (295) Questions (186)                                           | n/a                      | - Chats were effective at answering questions about disease, creating a forum for targeted criticism, and promoting conversation among participants.  
- Chats as a method of engagement was not effective at promoting dialogic communication between the organization and its publics.  
- The question–response dyad is a form of ideal communication that suggests engagement but maintains organizational expertise.  
- Creating spaces for regular engagement online when health organizations are not handling outbreaks, could help for the informational engagement during crises. | 0.70 |
Table S2: List of studies on disease prevention and health promotion
| References                  | Year | Country | Topic                     | Aim                                                                 | Communication channel   | Theories or models used (if any) | Study design | Sample | Observation time | Primary evaluated aspect | Main results                                                                 | Proposed Strategy / Practical Implication |
|-----------------------------|------|---------|---------------------------|----------------------------------------------------------------------|--------------------------|--------------------------------|--------------|--------|-----------------|----------------------------|-----------------------------------------------------------------------------|------------------------------------------|
| Alkazemi et al.             | 2020 | BH, KW, OM, SA, AE | Health promotion          | Analyse how public health information is discussed differently across the GCC on Instagram, as well as the extent to which Health Belief Model (HBM) varies. Also to what degree do Instagram users engage – in the form of “likes” and “comments” – with Instagram posts by the GCC states | Instagram                | Health Belief Model (HBM) | Content analysis | Posts (1,000) | 6 months - 2 years | Engagement                   | 5% of the posts sample of posts were public relations related. The results of this study demonstrates that only benefits and cues to action were mentioned in more than 20% of the Instagram posts. All other constructs of the HBM were only present in approximately 0% of posts. Include more HBM constructs. Develop a separate PR profile for HDs. | 0.81                                      |
| Allen et al.                | 2020 | US      | Disease prevention        | Feasibility and acceptability of implementing a Twitter campaign to promote knowledge about the human papillomavirus (HPV) vaccine. | Twitter                | Health Belief Model (HBM) | Observational | Low income women (RS) | 1 month | Campaign-effectiveness | No statistically significant change in the intent to be vaccinated in the next 6 months (p = 1.000) or 12-months (p = 0.617) after the campaign among those who had not yet started or completed vaccination. Women received a daily tweet over a period of one month that contained messages from educational materials. Messages were selected to align with the Health Belief Model and primarily addressed Vaccination Content. | 0.65                                      |
| Alonso-Cañadas et al.       | 2020 | ES      | Health promotion          | Improve HDs decision-making in communication strategies via social media, in order to achieve a greater social commitment. | Facebook                | Media Richness Theory (MRT) | Content analysis | Posts (15,817) | 1 year (1st January 2018 - 31st December 2018) | Engagement | The video format generates greater user participation, while making publications in other less interactive formats (link, note, music or status) has the opposite effect. The message format affects the level of users’ online commitment with HDs via social media. | 0.84                                      |
| Barklamb et al.             | 2020 | AU      | Health promotion          | Identify the SM post strategies associated with higher engagement in nutrition and food-related posts. | Facebook, Instagram     | Social Marketing Techniques | Content analysis | Posts (706) | 46 days (19 February - 5 April 2018) | Engagement | FB: strategies that were associated with higher engagement included the use of hashtags and announcements compared to not prompting engagement strategies. IN: not inducing any emotion/hedonic sensations, and using a negative tone had a negative impact on Instagram engagement. FB: Start using hashtags on posts, continue prompting engagement with users, specifically through "announcements" when appropriate. IN: Consider engaging ways to encourage consumption of core foods or exercising, i.e., positive emotions, tone, and hedonic sensations | 0.92                                      |
| Borah et al.                | 2018 | US      | Health promotion          | Understand the effect of health message framing and the moderating effects of social endorsement and source type on credibility perceptions of Facebook posts. | Facebook | Bandwagon heuristic | Experimental | College students (BR2) | n/a | Message framing | A gain-framed message will be perceived as more credible than a loss-framed message. Expert sources will be considered more credible. Participants considered the gain-framed post by an expert source with the high number of "likes" as the most credible message. Use of gain-framed messages | 0.82                                      |
Chung et al. 2017 US Disease prevention Define the factors that contribute to the wide dissemination of campaign messages on Twitter. Twitter n/a Content Analysis Tweets (2018) 1 month and 10 days Engagement • The use of photos or images increased the probability to be retweeted. • The number of followers, and the frequency of tweets were positively related to the frequency of retweets. • Frequent posting is beneficial for health promotion messages, using photos and images (such as infographics), instead of videos or hyperlinks may be beneficial.

Chung et al. 2020 US Disease prevention Investigate how retransmission (i.e., social media) influences the effectiveness of communicating online health information. Facebook Elaboration Likelihood Model (ELM) Dual Coding Theory (DCT) INR+ model Experimental Adults (517) n/a Message framing • A website page is better suited for dialogic communication as a twitter post does greatly benefit from dialogic communication. • Dialogic messages, even in a primitive format like the Q&A section, may have a powerful impact on behavioral outcomes.

Docker et al. 2020 US Disease prevention Investigate how retransmission (i.e., social media) influences the effectiveness of communicating online health information. Webside Dual Coding Theory (DCT) Experimental University Students (243) n/a Campaign-effectiveness • Content retransmitted by other well-known, credible sources increases in credibility, message effectiveness, and engagement intentions. • It may be useful to invest in the creation of short videos to communicate findings.

Erich et al. 2013 CH Disease prevention Investigate how retransmission of information differs for text-only presentation, image-only presentation, and multimedia (text and image) presentation of online health information. Webside Dual Coding Theory (DCT) Experimental University Students (240) n/a Campaign-effectiveness • Participants who read a gain-framed message had higher campaign attitude and perceived higher severity, compared to the loss-framed message. • Participants who read a loss-framed message had higher campaign attitude and perceived lower severity, compared to the gain-framed message. • Participants who read a societal appeal exhibited a significantly more positive attitude toward the campaign than those under individual appeal. • Participants who read a loss-framed message perceived higher severity when they saw an individual appeal, whereas severity was correlated with behavioral intention.

Guday et al. 2020 US, AU, CA, BR, CL, DE, IT, NG, ZA, SG, NZ Disease prevention • Define to what extent HBM constructs are used in national health department tweets across different nations, and how the visuals impact Twitter engagement. Twitter Health Belief Model (HBM) Observational Tweets (1,200) n/a Engagement • Health Belief Model (HBM) constructs were used frequently and, in most cases, increased public engagement in a statistically significant manner. • The use of visuals on Twitter tends to be associated with higher engagement.

Chung et al. 2013 US Health promotion Define might be the critical elements in health promotion messages to encourage people to exercise or attend an event that promotes physical activities. Website Prospect Theory (PT) Construal Level Theory (CLT) Health Belief Model (HBM) Experimental Adults (138) n/a Message framing • Participants who read a gain-framed message had higher campaign attitude and behavioral intention than those who read a loss-framed message. • Participants under societal appeal exhibited a significantly more positive attitude toward the campaign than those under individual appeal. • People who read a loss-framed message perceived higher severity when they saw an individual appeal, whereas severity was correlated with behavioral intention.

Chung et al. 2020 US Disease prevention • Examine whether dialogic messages induce greater risk preventative behavioral intentions than monologic messages. • Test if the effectiveness of dialogic (vs. monologic) messages, if any, varies across the message platform. • Examine the role of social presence and psychological distance to the health risk in forming risk-preventive behavioral intentions. Twitter Website Construal Level Theory (CLT) Experimental Twitter users (209) n/a Message framing • In a Twitter page, dialogic and monologic risk messages did not exert significantly different effects on perceived social presence. A dialogic message did generate a stronger social presence in the website page. • Participants who read dialogic messages indicated a significantly higher level of social presence than those who read monologic messages. Social presence was a significant predictor of psychological distance to the risk. A closer psychological distance to the risk was a significant predictor of risk-preventive behavioral intentions. • A website page is better suited for dialogic communication as a twitter post does greatly benefit from dialogic communication. • Dialogic messages, even in a primitive format like the Q&A section, may have a powerful impact on behavioral outcomes.

Elaboration Likelihood Model (ELM) Dual Coding Theory (DCT) INR+ model Experimental Adults (517) n/a Message framing • Health communication research communicated results in higher perceived source credibility and perceived message effectiveness. • Health research communication retransmitted by a well-known, credible source will result in stronger intentions to engage with the Facebook content. • When retransmitted, the video modality resulted in significantly higher perceived credibility and perceived effectiveness, compared to the infographic modality.

Facebook Engagement • The number of followers, and the frequency of tweets were positively related to the frequency of retweets. • Frequent posting is beneficial for health promotion messages, using photos and images (such as infographics), instead of videos or hyperlinks may be beneficial.

Construal Level Theory (CLT) Experimental • Examine whether dialogic messages induce greater risk preventative behavioral intentions than monologic messages. • Test if the effectiveness of dialogic (vs. monologic) messages, if any, varies across the message platform. • Examine the role of social presence and psychological distance to the health risk in forming risk-preventive behavioral intentions. Twitter Website Construal Level Theory (CLT) Experimental Twitter users (209) n/a Message framing • In a Twitter page, dialogic and monologic risk messages did not exert significantly different effects on perceived social presence. A dialogic message did generate a stronger social presence in the website page. • Participants who read dialogic messages indicated a significantly higher level of social presence than those who read monologic messages. Social presence was a significant predictor of psychological distance to the risk. A closer psychological distance to the risk was a significant predictor of risk-preventive behavioral intentions. • A website page is better suited for dialogic communication as a twitter post does greatly benefit from dialogic communication. • Dialogic messages, even in a primitive format like the Q&A section, may have a powerful impact on behavioral outcomes.

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Harris et al. 2011 UK Disease prevention
• Assess the factorial structure of a general measure of trust in online health websites
• Model how the resultant factors predicted trust in and likelihood to act on, the advice found on health-related websites
• Test whether factors derived from social capital theory capture elements of the response to threatening, online health risk information enhanced the predictive power of these outcomes
Website Extended Parallel Process Model (EPPM) 3-Hier Model Protection Motivation Theory (PMT)
Observational Adults (542) n/a Campaign-effectiveness
• Importance and information quality, had direct effects on trust in health-related websites
• Both threat and consideration against other sources contributed to the prediction of trust
Four key design factors (information quality, personalization, perceived importance, and credible design) have an important (albeit moderated) role to play in influencing trust and the subsequent decision to act on the advice given. 0.70

Kim et al. 2016 US Disease prevention
Investigate how different types of network structures explain retweeting behavior and which types of tweets are retweeted and why some messages generate more interaction among users.
Twitter n/a Content analysis Tweets (7,900) 1 composite week (August 2011 – September 2011) Engagement
The number of account followers, betweenness centrality, closeness centrality, positive emotion, and tentativeness were all significantly associated with retweeting activity.
• Influential people should be identified and targeted because their messages are more likely to be disseminated.
• Messages with messages about diagnosis, symptoms, and treatments were emotionally impactful and likely to capture the intended audience’s attention, associate an emotional state with coping behaviors, and promote social support and help people with health problems cope better. 0.81

Klie et al. 2019 AU Health promotion
Investigate usage of and engagement with the Make Healthy Normal Facebook page and to identify influential factors in driving engagement with the page.
Facebook n/a Content analysis Posts (392) 2 years 3 months (June 2015 – September 2017) Engagement
• Paying for posts significantly increases reach of posts, except for video content
• Organic impressions predicted higher engagement with the MHN page compared to paid impressions
• Posts classified as “relatable” were negatively associated with more interactions on Facebook and Instagram and using an optimistic tone was associated with more interactions on Facebook and Instagram.
• Videos and body image content were statistically associated with Facebook interactions but not associated with Instagram
• Posts classified as “serious” were negatively associated with more interactions on Facebook
• Positive emotion was associated with more interactions on Facebook and Instagram, while lifestyle brands were positive associated with coping behaviors, and promote social support and help people with health problems cope better. 0.78

Klassen et al. 2018 AU Health promotion
Identify and quantify social media strategies used by the food industry and lifestyle brands, and health promotion organizations across the social networking sites Facebook and Instagram
Facebook Instagram n/a Content analysis Facebook posts (143) Instagram posts (96) 30 days (August 2017 – September 2017) Engagement
• Health promotion organizations frequently provided statistics and facts and used a more serious tone, while lifestyle brands were positive and relativistic
• Positive emotion inducing strategies were associated with more interactions on Facebook and Instagram and using an optimistic tone was associated with more interactions on Facebook
• Posts classified as “relatable” were negatively associated with Facebook interactions but positively associated with Instagram interactions
• Videos and body image content were statistically significantly positively associated with Facebook interactions, but not associated with Instagram interactions
Health promotion organizations should try to build relationships with their users in a similar fashion as the lifestyle brands do. 0.89

Lister et al. 2015 US Health promotion
Examine the use of low-cost social media platforms in communicating public health messages and outline the Laugh Model.
Website Facebook Twitter The Laugh Model Observational “Family Meal Month” campaign 1 month (September 2014) Engagement
The campaign was extremely cost-effective. The cost per person reached was 0.2 cents, with a cost of 0.1 cents per post impression. The overall cost per engagement was 0.07 cents, with likes and follows costing $1.14 each and each post engagement costing 0.36 cents.
• Empowering and engaging techniques may be more effective than use of educational techniques
• Social media are often preferable to mass media in terms of cost-effectiveness, assessments of campaign success, and increased sustainability 0.60
Parackal et al. 2017 NL Disease prevention
Investigate the effect of a website tailored to individual preferences for the mode of information presentation, compared to 4 non-tailored websites on younger and older adults’ attention and recall of information.
Website Cognitive Theory of Multimedia Learning (CTML)
Experimental Adults (559)
N/A Campaign-effectiveness
Mode tailoring enhanced older adults’ recall of information via increased attention to the website, whereas younger adults recall slightly more information from a fixed website with text-only or text with illustrations.

Parackal et al. 2017 NZ Disease prevention
• Examine user engagement for a public health campaign based on the metadata provided by Facebook.
• Analyze contents generated by the campaign materials using text mining.
• Investigate the relationship between the themes identified in the comments and the message and the sentiments prevalent in the themes that exhibited significant relationships
Facebook The Laugh Model Thematic Analysis Comments (819)
3 months (June 2015–September 2015) Engagement
• The overall number of likes (612), shares (305), and comments (695) achieved in a short time (June to September 2015) suggests the promotional material stimulated meaningful engagement within the target audience.
• Comments were mostly negative (66%).

Parackal et al. 2017 NZ Disease prevention
Investigate the suitability of a dynamic transactional model (DTM) of communication for explaining the use of social media for communicating public health messages.
Facebook Dynamic Transactional Model (DTM)
Thematic Analysis Comments (819)
3 months (June 2015–September 2015) Message framing
• The plurality of topics in the comments was verified, which aligns with the DTM assumption that parties in communication simultaneously send and receive information (inter transaction).
• The heterogeneity of sentiment observed for the three topics confirmed a plurality of sentiment even at the topic level

Nobiles et al. 2020 US Disease prevention
Apply automated image recognition software to examine the demographic profile of images in Instagram posts containing the hashtag #HIV and compare this to the demographic breakdown of those most at risk of a new HIV diagnosis.
Instagram n/a Content analysis Posts (10,036)
18 months (January 2016–July 2017) Message framing
Faces showed older (47% vs. 11%) were 35–39 years old, more female (41% vs. 19%), more white (43% vs. 28%), less black (12% vs. 64%), and less Hispanic (13% vs. 25%) than Instagramers that have new HIV diagnoses.

Nguyen et al. 2017 NL Disease prevention
Evaluate the effects of a web-based intervention on the promotion of physical activity among adolescents using the Trans Theoretical Model.
Website Trans Theoretical Model (TTM)
Experimental High school students (278)
N/A Campaign-effectiveness
Participants showed significant progress during the intervention, and changes were greater in the group who was trained by TTM.

Parakh et al. 2020 BR Health promotion
Examine the effects of a web-based intervention on the promotion of physical activity among adolescents using the Trans Theoretical Model.
Website Trans Theoretical Model (TTM)
Experimental High school students (278)
N/A Campaign-effectiveness
Participants showed significant progress during the intervention, and changes were greater in the group who was trained by TTM.

Lofthouse et al. 2020 UK Disease prevention
Discuss how different Facebook posts resonate with parents hesitant about HPV vaccinations and how to engage parents in positive dialogues on FB.
Facebook Heart Beat communication Content analysis Focus group interviews Posts (99)
7 months (May 2017–December 2017) Engagement
• Higher reach and more positive sentiments were achieved by posts that contained personal stories compared to those containing factual information.
• Focus groups where the participants requested more in-depth information to discuss the safety of the vaccine.
• In the focus group parents hesitant of vaccination read comments and replies to posts on FB, even when they did not interact with the posts themselves.

NNH et al. 2014 Disease prevention
Study the interactivity and listening of a Facebook communication format, which enables the promoter to respond to the negative comments and involves the participants.
Facebook DHBM 3 months (June 2015–March 2016) Engagement
• Public campaigns on social media should include a protocol against moderating the comments solely based on sentiment alone so as to maintain the interactivity opportunities and promote the completeness and quality of the raw data.

Perrin et al. 2014 US Disease prevention
Attempt to determine the effectiveness of adding short videos to a website promoting the reduction of PFOA in people’s homes.
Website Social Cognitive Theory (SCT) Media Richness Theory Cue Summation Theory
Experimental Mothers (107)
N/A Campaign-effectiveness
• Individuals exposed to the video condition reported engaging in the additional risk reduction behavior than the control condition.
• Those in the video condition believed they could receive information (inter transaction).
• In the video condition participants requested more information (intra transaction).

Parakh et al. 2020 BR Disease prevention
Investigate the suitability of a dynamic transactional model (DTM) of communication for explaining the use of social media for communicating public health messages.
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Perrin et al. 2014 US Disease prevention
Attempt to determine the effectiveness of adding short videos to a website promoting the reduction of PFOA in people’s homes.
Website Social Cognitive Theory (SCT) Media Richness Theory Cue Summation Theory
Experimental Mothers (107)
N/A Campaign-effectiveness
• Individuals exposed to the video condition reported engaging in the additional risk reduction behavior than the control condition.
• Those in the video condition believed they could more effectively and easily perform the recommended behaviors than those in the non-video condition

Pires et al. 2020 US Disease prevention
Examine the effect of a website tailored to individual preferences for the mode of information presentation, compared to 4 non-tailored websites on younger and older adults’ attention and recall of information.
Website Cognitive Theory of Multimedia Learning (CTML)
Experimental Adults (559)
N/A Campaign-effectiveness
Mode tailoring enhanced older adults’ recall of information via increased attention to the website, whereas younger adults recall slightly more information from a fixed website with text-only or text with illustrations.

Noble et al. 2014 Disease prevention
Examine the effects of a web-based intervention on the promotion of physical activity among adolescents using the Trans Theoretical Model.
Website Trans Theoretical Model (TTM)
Experimental High school students (278)
N/A Campaign-effectiveness
Participants showed significant progress during the intervention, and changes were greater in the group who was trained by TTM.

Website based education on PA can be effective. Education based on the TTM that applies constructs such as self-efficacy, will be more useful on behavior change.
Determine whether entertainment-education strategies could be used in a communication campaign to engage youth, encouraging peer-to-peer dialogue about sun cancer prevention and improving attitudes to effective sun protection.

YouTube, MySpace, Facebook

Observational

Participants exposed to the videos (607) Participants not exposed (962)

4 Months (December 2008 - March 2009)

Campaign-effectiveness

Of those who watched the videos, 23% forwarded the video to friends, 44% reported that the video changed the way they felt about sun protection, and 29% of spontaneous online comments reported an intention to change behavior.

Social media can be used effectively in social marketing campaigns and is an essential tool in the promotion mix when targeting young people. Peer-generated messages can be used to engage youth with an important health message for skin cancer prevention.

Robarison et al. 2017 US Health promotion

• Analyze whether Twitter chats facilitate engagement in two-way communications between public health entities and their audience

• Describe how to measure two-way communications, incoming and outgoing mentions, between users in a protocol using free and publicly available tools (Symantec, OpenRefine, and Gephi)

Twitter  n/a

Content analysis Tweets (744)

n/a Engagement

• #AvonNHSA was the most trending hashtag in New Orleans on March 5th, 2015

• @TulaneHPC was the main driver of this chat and had a 40% ROE

• Public health entities can use Twitter chats as a two-way communication audience engagement tool with direct influence

• In future chats, the chat organizers should encourage guest hosts to share original content and actively respond to the chat participants

Rus et al. 2016 US Disease prevention

Conduct a content analysis of prevention website cited in these messages.

Twitter Facebook Instagram

Selective Exposure Self- and Affect Management (SEAM) affordance theory

Content analysis Posts (2775)

84 days (18 April 2010 - 12 July 2011) Engagement

• The click-through rate (CTR) for Instagram was the highest, followed by Facebook and Twitter.

• Messages that linked to a tobacco referring link to a tobacco campaign had a 3.6 to 6.6 higher CTR than paid advertisements.

• Organic messages had a higher CTR but lower wCTR than paid advertisements.

• Imagery was the strongest predictor of both things a health communication and sharing is with others but it also reduced the number of comments paired with causal information. The use of imagery was associated with lower responses and increase of disagreement and experience from other consumers. The communication that included images or videos received significantly more likes, comments, and shares than videos, links, and status updates.

• Messages with expressions of negative affect were shared less frequently relative to messages without negative affect.

• External links were associated with lower engagement.

Sexual health campaigns could be advantageous.

Rus et al. 2017 US Disease prevention

Conduct a content analysis of health communications posted on diabetes related Facebook pages and explore the role of diabetes related (e.g. indirect communication,shares, and use of external links and videos.

Facebook

Common-Sense Model of Illness Self-Regulation

Content analysis Posts (550)

3-9 days Engagement

• Messages that included images with information about illness conveyed negative affect could mute responses.

• Imagery should be carefully employed since it appears to be a powerful tool for attracting attention and engaging users (i.e., increasing views) as well as increasing message transmissibility (e.g., increasing shares). However, use of images with information about illness treatment and control or with messages conveying negative affect could mute responses.

Strekalova et al. 2014 UK Health promotion

Evaluate whether disease-related social media efforts on a health promotion campaign to engage youth, encouraging peer-to-peer dialogue about sun cancer prevention and improving attitudes to effective sun protection.

Facebook

Information Richness Theory (IRT)

Content analysis Posts and their associated data (1,370) shares (653), likes (14,723) views (2,654,466)

4 years and 7 months (July 2010 - February 2015) Engagement

Audience engagement is associated with the format of cancer-related social media posts. Posts with photos received significantly more likes, comments, and shares than videos, links, and status updates.

Photos with short comments are the most effective in engaging information consumers, and greater use of this post type could encourage greater audience engagement. At the same time, professional videos may not be as effective as a mechanism for active audience engagement on social media platform.

Shokollu et al. 2015 UK Disease prevention

Examine which elements of moderator and participant behavior stimulated and maintained engagement and interaction with a sexual health promotion site on Facebook.

Facebook

n/a Content Analysis

Participants (516)

5 months (18 January 2010 - 27 June 2010) Engagement

The moderators choose from a list of standardised responses; there was no attempt to engage in the conversation or stimulate discussion, allowed time for other posters to correct misinformation and then endorsed the corrections. User-generated content did not relate uncertainty around aspects of_oophoros testing; this maintained conversations by generating disagreement and encouraged sharing personal experience.

Moderation for online health promotion campaigns: (1) unengaged and professional interventions (2) unengaged and professional interventions (3) unengaged and police oversight to provide a safe space for discussion and to maintain information quality and (4) more engaged and interactive presence designed to maintain interest that generates new material for discussion and is responsive to user requests.

Synd 2014 UK Health promotion

Examine which elements of moderator and participant behavior stimulated and maintained engagement and interaction with a sexual health promotion site on Facebook.

Facebook

n/a Content Analysis

Participants (516)

5 months (18 January 2010 - 27 June 2010) Engagement

Engagement rate was highest for content shared on the forum, and the least on the non-comparative topics, and the Bring Your Brown Bone. Overall engagement rates decreased from 2014-2016. Photos consistently produced the most significant engagement rate overall.

Users were more likely to like, share, comment, or like the content of the post that had photos. Related, visual content is more effective in facilitating engagement.
Whitten et al. 2013 US Disease prevention Address the presence of information targeting low literacy, racially diverse, non-English speaking, and age diverse audiences on breast cancer websites. Website Targeted communication, Statistical and story telling evidence Content Analysis Breast cancer websites (33) n/a Message framing

- Nearly half of websites did not contain any diversity elements.
- Language diversity, was found on only 30% of the websites.
- Websites using story telling evidence to convey breast cancer messages were vastly outnumbered by those using statistical evidence.

0.56

Yoo et al. 2020 ER Disease prevention • Explain the cognitive mechanism underlying the process through which exposure to risk information on social media shapes people’s behavioral intentions. • Determine whether exposure to risk information on two different types of social media (content-oriented social media focusing on shared interests vs user-oriented social media focusing on social relationship) have different effects on people’s risk perceptions and behavioral intentions. Twitter YouTube Instagram Flickr Facebook KakaoStory Naver Band Uses and Gratification Theory Social Media Ecstasy Model Observational Participants (688) 11 days (8 December 2016 – 19 December 2016) Message framing

- Content-oriented social media exposure was related to both personal- and societal-level risk perceptions.
- Only content-oriented social media exposure led indirectly via risk perception — to behavioral intentions.
- User-oriented social media exposure had no impact on risk perception and behavioral intentions.

Content-oriented social media may be more effective in influencing risk perceptions and should be employed for risk messages and campaigns that aim to shape risk perceptions.

0.78

Yoo et al. 2018 US Disease prevention • Develop a health communication campaign model for social media and test its utility. • Investigate how social media channel-related per-capions affect preventive health behaviors. • Examine the relationship between online social media and user variables, including processing style and image promotional consideration, to investigate the combined influence in driving SNS users’ intention to share fear appeal messages. Twitter Situational Theory of Problem Solving (STOP) Theory of Planned Behavior (TPB) Observational Females (220) n/a Campaign effectiveness

- Personalized risk and self-efficacy have direct, rather than indirect, impacts on behavioral intentions.
- The information acquisition mediated perceived risk’s effect on intention and mediated the relationship between intention and information selection and transmission.
- Social media-related perceptions also had indirect impacts on behavioral intention through communication behaviors.
- Need to consider incorporating features such as hyperlinks to related websites or live chat with health care providers.
- Tailored messages or engagement may also need to be considered to engage people in the process of information selection and transmission.

0.70

Zhang 2019 US Disease prevention Assaying direct causal insight into the most effective strategies for designing messages over an online social media platform about cervical cancer prevention. Twitter Anonymous online discussion platform n/a Observational Tweets from the observational study (462) Created additional set (498) 4 years and 5 days (1 January 2013 - 5 December 2016 + 5 days) Engagement

- Personal experience tweets were associated with more retweets in comparison with factual/information tweets. Tweets from individual whereas less associated with fewer retweets in comparison to those from organizational senders.
- Tweets with factual information and from organizational senders were significantly more likely to produce shares. Each of these factors was found to have an independent causal effect on message sharing behavior.
- The information acquisition mediated perceived risk’s effect on intention and indirectly via risk perception — to behavioral intentions.
- In the social media context, the relative importance of having clear informational content and from organizations will be much greater for generating highly viewed and highly shared cancer prevention messages.

0.50

Zhang et al. 2020 US Disease prevention Examine content variables, including threat and efficacy, and user variables, including processing style and image promotional consideration, to investigate the combined influence in driving SNS users’ intention to share fear appeal messages. Facebook Studentsof Southeast Public University (214) n/a Experimental 25 days (31 January 2017 - 5 February 2017) Engagement

- A high-threat message elicits higher intention to share on social media as compared to a low threat message.
- Fear is positively related to users’ intention to share on social media.
- Willingness to create a positive image of oneself on Facebook positively predicts intention to share the fear appeal message.
- Consider including more emotional cues, such as pictures, to ensure fear in order to motivate information dissemination on SNS.
- Try to release sensitive content that might hurt image if the aim is to get the fear message shared positively.

0.86
| References | Year | Country | Aim | Communication channel | Theories or models used (if any) | Study design | Sample | Observation time | Primary evaluated aspect | Main results | Proposed Strategy / Practical Implication | KMET |
|------------|------|---------|-----|------------------------|--------------------------------|-------------|--------|------------------|--------------------------|-------------|------------------------------------------|------|
| Bhattacharya | 2014 | US | Investigate factors associated with engagement of US Federal Health Agencies via Twitter. | Twitter | n/a | Observational | Federal Health agencies [24] | Variable: 3 months - 3 years | Engagement | Hashtags, URLs and user mentions are positively associated with retweets. | Use of post containing hashtags, URLs and user mentions. Use of post containing media or links and expressing positive sentiment correlate with higher or longer engagement. | 0.84 |
| Bhattacharya et al. | 2017 | US | Identify factors associated with Facebook engagement. | Facebook | n/a | Observational | Posts (45,852) Federal Health agencies (24) | 4 years (January 2013 - 2017) | Engagement | Posts containing media or links and expressing positive sentiment correlate with higher or longer engagement. Use of post containing media or links and expressing positive sentiment. | 0.70 |
| Campbell et al. | 2020 | UK | Determine factors that could affect the uptake of global health topics on social media. | Facebook | n/a | Observational | Videos (10) | 2 months | Engagement | Three of the videos managed to raise sufficient attention to be shared further by a newspaper online portal. One video (the “dramatic” one) went viral. Viewers need to find the content particularly interesting or useful to them personally. Enhancing factors: well-known presenter, a “doomsday” topic, the presence of a controversy and an ongoing public debate. Adjust the language and presentation used to be of more appeal to popular culture. Linking promotional materials to other popular topics could prove to be a successful strategy to achieve this. | 0.40 |
| Fung et al. | 2018 | US | Describe the contents and followers of the Twitter profile @CDC_AMD and to assess if attaching photos or videos to tweets posted by @CDC_AMD would increase retweet frequency. | Twitter | n/a | Observational | Tweets (768) | 18 months (5 May 2015 - 16 November 2016) | Engagement | Attaching photos or videos to original @CDC_AMD tweets increases the number of retweets by 21%. Content topics did not explain or modify this association. Attaching visual cues to tweets will increase their retweet frequency, and this practice may enhance Twitter user engagement with health communication messages promoted by medical and public health professionals. | 0.75 |
| Hung et al. | 2011 | CN, TW, UK, US | • Determine the critical categories for a content analysis. • Develop evaluation guidelines for a children’s health website. • Compare the differences between children’s eHealth design in the East and the West. | Website | n/a | Content analysis | Websites (40) | n/a | Message framing | • In terms of information design, credibility is better presented in the West than in the East, whereas users’ needs are better presented in the East than in the West. • In terms of multimedia design, demonstrations and humanity are better presented in the West than in the East, and the segmentation of demonstrations is valued by both the East and the West. • In terms of interface design, the West presents a better appearance than the East, and methodology is valued by both the East and the West. • General terms should replace the professional term. • Simulated test-based content should be used. • Advertising space, with may increase users’ cognition load and misled patients’ treatment decisions, must be reduced. • Hi-Tec multimedia design, which may decrease the amount of explanatory text and increase the cognitive load, must be reduced. | 0.63 |
Kim et al. 2020 US Explore the use of Instagram by the Centers for Disease Control and Prevention. Instagram n/a Content analysis Posts (1,145) n/a Engagement • The most frequent type of photo was text mainly about calls for actions, detailed information were usually listed in post text. • The mean engagement and the mean comment sentiments of two categorized photos were not relatively high. • Photos with more and bigger human faces had a lower level of engagement and an higher level of comment sentiment. Happiness and neutral expressions on the face in photos were negatively associated with engagement. • The variances of RGB, the variances of saturation and value, share of warm colors, contrast, and RGB contrast, were negatively correlated with engagement.

The message design should be different depending on whether they aim to increase the number of likes and comments or they aim to induce more positive response from public. 0.73

Kile et al. 2016 AU Identify the features of Facebook posts that are associated with higher user engagement on Australian public health organisations' Facebook pages. Facebook n/a Content analysis Posts (5,156) 1 year (17 weeks) 31 August 2015 - 31 August 2016 Engagement • Video posts were the most engaging post type, shared on average four times more often than photo posts. • Links and text only posts received fewer likes and shares than photo posts. • Per impression, a photo attracted greater engagement than a video post. • Sponsorships and partnerships and use of persons of authority resulted in fewer likes, shares, and comments, compared to posts with no marketing elements at all. • Engaged users showed a higher level of engagement, and an higher level of sharing posts.

Content providers must encourage engagement and adapt to the Facebook algorithm in order to maximise message exposure, while also ensuring that the content is of high quality. 0.86

Lazar et al. 2014 US Highlight the influential role of design complexity for users' first impressions of health websites. Website Visual Complexity Theory (VCT) Technology Acceptance Model (TAM) Experimental University students (311) n/a Message framing High design complexity was associated to significantly greater perceptions of design aesthetics, a better attitude towards the website, a greater perceived comprehensibility, a greater perceived usefulness, a greater message quality and higher perceptions of visual informativeness.

Designers and developers should use the guiding principles of design complexity to increase the likelihood that the informational content is being perceived as plausible and valuable to targeted audiences. 0.84

Meng et al. 2018 US Examine the impacts of perceived message features and network characteristics on use and structural virality of information diffusion on Twitter. Twitter Diffusion of Innovations (DOI) Information Utility Theory (IUT) Content analysis Tweets (425) Retweeters (10,035) 37 weeks (7 April 2011 - 4 August 2011) Engagement • The perceived efficiency and negative emotion as a message feature positively predict the number of retweets received by the message. • The perceived susceptibility, negative emotion as a message feature and the number of brokers significantly increase structural virality. • Perceived trustworthiness of the source of the message significantly increases the number of followers among the message. • The variances of RGB, the variances of saturation and value, share of warm colors, contrast, and RGB contrast, were negatively correlated with engagement.

Designing an effective information campaign is the key to the aggregated number of retweeters. Crafting information that can raise risk perception is important to increase the diffusion chain through person to person transmission. Evaluating the message features could be more effective in catching users’ attention and expanding sharing of the information. 0.84

Pong et al. 2016 AU Create a design for consumer health websites by supporting different health information-seeking behaviours. Website n/a Content analysis Adults (31) n/a Engagement • Access to a dynamic information scope is critical for health information seeking. • In many cases, casual searchers do not have a specific search target; hence, a fuzzy-query approach can increase the chance of returning information that is interested to the user. • The number of retweets as a way to operationalise usefulness should be considered when applying dialogic theory to Twitter. • Organizations should consider networking content from health information sources with a high number of Twitter followers if they want to build up their own follower base.

0.86

Park et al. 2016 US Examine how major health organizations use Twitter for disseminating health information, building relationships, and encouraging actions to improve health. Twitter Dialogic Theory (DT) Content analysis Tweets (1,583) 1 year (September 2013 - August 2014) Engagement • Nearly 70% of the tweets appeared to be original posts, followed by retweets (18.0%) and replies (12.7%). • Frequency of output is not antecedent to engagement likelihood that the informational content is being perceived as high-quality. • The number of retweets as a way to operationalise usefulness should be considered when applying dialogic theory to Twitter. • Organizations should consider networking content from health information sources with a high number of Twitter followers if they want to build up their own follower base. 0.78
Identify what quality factors matter in evaluating online health information sites which in turn affect users’ benefits, applying the updated DeLone and McLean Model of Information Systems Success.

Website Information Systems Success Model Observational Adults (506) n/a Message framing Information quality had significant associations with all outcome variables: user satisfaction, intention to reuse the site, and perceived benefits of site use in health settings. Service quality had a significant association with user satisfaction, and its impact on perceived benefits occurred indirectly through user satisfaction and intention.

It is important to build trusted relationships with site users and appropriately respond to their demands. Both the quality of the information provided on a health information site and the quality of service available on the site play significant roles in increasing users’ perceived benefits.

Trust was found to have a significant direct effect on intention to act, and of the trust factors, only credibility and impartiality had a significant direct effect on trust. The impact of personal experiences on trust was mediated through information corroboration.

Impartiality continues to remain a key predictor of trust in health websites as well as the extent to which users consider information sources to be credible. The presence of personal experiences information can have a positive influence on trust provided that users corroborate the information through additional sources.
Table S3. List of studies on general health
| References | Year | Country | Aim | Communication channel | Theories or models used (if any) | Study design | Sample | Observation time | Primary evaluated aspect | Main results | Proposed Strategy / Practical Implication | KMET |
|------------|------|---------|-----|------------------------|---------------------------------|-------------|--------|-----------------|--------------------------|-------------|------------------------------------------|------|
| Bhattacharya | 2014 | US | Investigate factors associated with engagement of US Federal Health Agencies via Twitter. | Twitter | n/a | Observational | Federal Health agencies [16] | Variable 3 months - 3 years | Engagement | Hashtags, URLs and user mentions are positively associated with retweets. | Use of post containing hashtags, URLs and user mentions. | 0.84 |
| Bhattacharya et al. | 2017 | US | Identify factors associated with Facebook engagement. | Facebook | n/a | Observational | Posts [41,852] Federal Health agencies [24] | 4 years (January 2013 - 2017) | Engagement | Posts containing media or links and expressing positive sentiment correlate with higher or longer engagement. | Use of post containing media or links and expressing positive sentiment. | 0.70 |
| Campbell et al. | 2020 | UK | Determine factors that could affect the uptake of global health topics on social media. | Facebook | n/a | Observational | Videos (10) | 2 months | Engagement | Three of the videos managed to raise sufficient attention to be shared further by a newspaper online portal. One video (the “dramatic” one) went viral. Viewers need to find the content particularly interesting or useful to them personally. Enhancing factors: well-known presenter, a “doomsday” topic, the presence of a controversy and an ongoing public debate. | Adjust the language and presentation used to be of more appeal to popular culture. Linking promotional materials to other popular topics could prove to be a successful strategy to achieve this. | 0.40 |
| Fung et al. | 2018 | US | Describe the contents and followers of the Twitter profile @CDC_AMD and to assess if attaching photos or videos to tweets posted by @CDC_AMD would increase retweet frequency. | Twitter | n/a | Observational | Tweets (768) | 18 months (5 May 2015 - 16 November 2016) | Engagement | Attaching photos or videos to original @CDC_AMD tweets increases the number of retweets by 37%. Content topics did not explain or modify this association. | Attaching visual cues to tweets will increase their retweet frequency, and this practice may enhance Twitter user engagement with health communication messages promoted by medical and public health professionals. | 0.75 |
| Hung et al. | 2011 | CN, TH, UK, US | • Determine the critical categories for a content analysis. • Develop evaluation guidelines for a children’s health website. • Compare the differences between children’s eHealth design in the East and the West | Website | n/a | Content analysis | Websites (40) | n/a | Message framing | • In terms of information design, credibility is better presented in the West than in the East, whereas users’ needs are better presented in the East than in the West. • In terms of multimedia design, demonstrations and humanity are better presented in the West than in the East, and the segmentation of demonstrations is valued by both the East and the West. • In terms of interface design, the West presents a better appearance than the East, and methodology is valued by both the East and the West. • General terms should replace the professional terms; based content should be used. • Advertising space, with may increase users’ cognition load and misled patients’ treatment decisions, must be reduced. • Hi-Tec multimedia design, which may decrease the amount of explanatory text and increase the cognitive load, must be reduced. | 0.63 |
Kim et al. 2020 US Explore the use of Instagram by the Centres for Disease Control and Prevention. Instagram n/a Content analysis Posts (1,145) n/a Engagement • The most frequent type of photo was text mainly about calls for actions, detailed information were usually shared in post texts • The mean engagement and the mean content sentiments of two categories photos were not significantly high. • Photos with more and bigger human faces had lower level of engagement and had higher level of content sentiment. • Happiness and neutral expressed on the faces in photos were negatively associated with engagement. • The variances of RGB, the variances of saturation and value, share of warm colors, contrast, and RGB contrast, were negatively correlated with engagement. The message design should be different depending on whether they aim to increase the number of likes and comments or they aim to induce more positive response from public. 0.73

Kite et al. 2016 AU Identify the features of Facebook posts that are associated with higher user engagement on Australian public health organisations’ Facebook pages. Facebook n/a Content analysis Posts (5,156) 1 year (5 September 2014 - 31 August 2015) Engagement • Video posts were the most engaging post type, shared on average four times more often than photo posts • Links and text only posts received fewer likes and shares than photo posts • For impressions, a photo attracted greater engagement than a video post • Sponsorships and partnerships and use of persons of authority resulted in fewer likes, shares, and comments, compared to posts with no marketing elements at all

Lazar et al. 2014 US Highlight the influential role of design complexity for users' first impressions of health websites. Website Visual Complexity Theory (VCT) Technology Acceptance Model (TAM) Experimental University students (311) n/a Message framing High design complexity was associated to significantly greater perceptions of design aesthetics, a better attitude towards the website, a greater perceived comprehensibility, a greater perceived usefulness, a greater message quality and higher perceptions of visual informativeness. Designers and developers should use the guiding principles of design complexity to increase the likelihood the informational content is being perceived as plausible and valuable to targeted audiences. 0.84

Meng et al. 2018 US Examine the impacts of perceived message features and network characteristics on use and structural virality of information diffusion on Twitter. Twitter Diffusion of Innovations (DOI) Information Utility Theory (IUT) Content analysis Tweets (425) Retweets (10,035) 17 weeks (7 April 2011 - 4 August 2011) Engagement • The perceived efficacy and negative emotion as a message feature positively predict the number of retweets received by the message • The perceived susceptibility, negative emotion as a message feature and the number of brokers significantly increase structural virality • The variances of RGB, the variances of saturation and value, share of warm colors, contrast, and RGB contrast, were negatively correlated with engagement. • Designing effective information is the key to increase the aggregated number of retweets. • Crafting information that can raise risk perception is important to increase the diffusion chain through person-to-person transmission • Designing effective information could be more effective in catching users' attention and expanding sharing of the information 0.84

Pong et al. 2016 AU Create a design for consumer health websites by supporting different health information-seeking behaviours. Website n/a Content analysis Adults (31) n/a Engagement • Access to a dynamic information scope is critical for health information seeking. • In many cases, casual seekers do not have a specific search target; hence, a fuzzy-query approach can increase the chance of returning information that is interesting to the user. 0.86

Park et al. 2016 US Examine how major health organizations use Twitter for disseminating health information, building relationships, and encouraging actions to improve health. Twitter Dialogic Theory (DT) Content analysis Tweets (1,583) 1 year (September 2012 - August 2013) Engagement • Nearly 70% of the tweets appeared to be original posts, followed by retweets (15.0%) and replies (12.3%). • Frequency of output is not antecedent to conservation of followers • The number of retweets as a way to operationalize usefulness should be considered when applying dialogic theory to Twitter. • Organizations should consider networking content from health information sources with a high number of Twitter followers if they want to build up their own follower base. 0.78
Identify what quality factors matter in evaluating online health information sites which in turn affect users' benefits, applying the updated DeLone and McLean Model of Information Systems Success.

Website Information Systems Success Model Observational Adults (506) n/a Message framing Information quality had significant associations with all outcome variables: user satisfaction, intention to reuse the site, and perceived benefits of site use in health settings. Service quality had a significant association with user satisfaction, and its impact on perceived benefits occurred indirectly through user satisfaction and intention.

It is important to build trusted relationships with site users and appropriately respond to their demands. Both the quality of the information provided on a health information site and the quality of service available on the site play significant roles in increasing users’ perceived benefits.

Trust was found to have a significant direct effect on intention to act, and of the trust factors, only credibility and impartiality had a significant direct effect on trust. The impact of personal experiences on trust was mediated through information corroboration.

Impartiality continues to remain a key predictor of trust in health websites as well as the extent to which users consider information sources to be credible. The presence of personal experiences information can have a positive influence on trust provided that users corroborate the information through additional sources.

Identify the key factors influencing US and UK citizens’ trust and intention to act on advice found on health websites and to understand the role of patient experiences.

Website n/a Observational Adults (1123) n/a Message framing
Table S4. List of studies on misinformation correction and health literacy
Gesser et al. 2017 US Misinformation correction Investigate misinformation correction strategies. Facebook (simulated news feed) Conspiracy Beliefs Experimental University students (166) n/a Campaign effectiveness Corrective information via an algorithm or social connections reduce misinformation and are effective and they are considered credible. 0.66

Bode et al. 2016 US Health literacy Investigate the mechanisms through which health literacy affects information recall and website attitudes. Website (paper) Process- Knowledge framework Experimental Older Adults (128) n/a Message framing A multi-focused approach to redesigning health information guided by theories of text comprehension and document design improves older adults’ memory for self care information typically found on credible websites. Increasing document readability alone, is insufficient for improving older patients’ comprehension. 0.81

Gesser-Edelsburg A. 2018 IL Misinformation correction Investigate the effects of health literacy on deception and trust. Facebook Convergence Communication Approach Experimental Students (243) n/a Message framing The findings indicate that it is very important for organizations to create and deploy experimental corrective messages that are designed to maintain trust and to address the emotional aspect both for the pro-vaccination and the hesitant group. 0.80

Meempak et al. 2016 NL Health literacy Investigate the mechanisms through which health literacy affects information recall and website attitudes. Website Limited Capacity Model of Motivated Mediated Message Processing Cognitive Theory of Multimedia Learning Observational Adults (821) 1 week (27 February 2015, 5 March 2015) Campaign effectiveness People with higher levels of health literacy need less cognitive capacity to process health information, positively influencing information recall. The relative ease with which health information can be processed positively influences attitudes toward the site. To improve information processing among people with lower health literacy, the cognitive demands of health messages should be reduced, for example by using non-complex texts. The text should be easy to imagine. This could be done, for example, by using images, animations or, concrete language. 0.52

Vicari et al. 2020 US Misinformation correction Test the efficacy of shareable infographics to debunk coronavirus myths, depending on placement and source. Facebook LSA of correction: is consensus based, includes corroborating weakens, and is a consistent, coherent, and credible Experimental Participants (1596) n/a Message framing Exposure to the WHO graphics in any form reduced immediate misinformation about the science of a false preventive for COVID-19 (that a hot bath can raise body temperature), and this reduction was maintained for at least 1 week for 3 of the 4 correction conditions. The effects were consistent whether the graphic was shared by the WHO itself or by another user. There is limited evidence that preemptive corrective information via an algorithm or social connections reduce misinformation and are effective and they are considered credible. 0.83

References Year Country Topic Aim Communication channel Theories or models used (if any) Study design Sample Observation time Main results Proposed Strategy / Practical Implication KMET
corrections differ in their effectiveness from reactive corrections

| Vraga et al. 2017 | US | Misinformation correction | This study tests whether the number (1 vs. 2) and the source (user vs. the CDC) of corrective responses affect successful reduction of misperceptions. | Twitter | n/a | Observational | Students (1,384) | n/a | Campaign effectiveness |
|------------------|-----|--------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------|-----|----------------|-----------------|-----|------------------------|
|                  |     |                          | - A single correction from a reputable source like the CDC was sufficient to reduce misperceptions                               |       |     |                |                 |     | A single correction from a reputable source like the CDC was sufficient to reduce misperceptions. |
|                  |     |                          | - Adding a correction from the CDC after another user correction of the same misinformation again enhanced corrective effects. |       |     |                |                 |     | - Adding a correction from the CDC after another user correction of the same misinformation again enhanced corrective effects. |
|                  |     |                          | - The credibility of the CDC was not harmed when it engaged in this type of corrective action                                    |       |     |                |                 |     | - The credibility of the CDC was not harmed when it engaged in this type of corrective action. |
|                  |     |                          | - A single user correction does not produce the same response.                                                              |       |     |                |                 |     | - A single user correction does not produce the same response. |

Organizations should speak up when they see misinformation on social media. Reputable organizations like the CDC should monitor social media feeds and immediately attempt to rebut misinformation when it arises.