

Determinants of health-related misinformation sharing on social media – a Scoping Review

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General information

We aim to review the published evidence on misinformation sharing on social media and categorize it in line with the Theoretical Domains Framework (TDF; Cane et al., 2012).

1. Titles

“Determinants of health-related misinformation sharing on social media - a scoping review”

2. Research team and organisational affiliations

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Organisational affiliations:

- (1) University of Bremen, Faculty of Human and Health Sciences, Institute for Public Health and Nursing Research, Bremen, Germany
- (2) Leibniz Science Campus Digital Public Health Bremen, Bremen, Germany
- (3) University of Bremen, Human-Computer Interaction, Bremen, Germany

3. Timeline

1. Start date: 10.05.2021
2. Anticipated completion date: 31.08.2021
3. Project stage at registration (10.05.2021):
 - Project conception, defining project aims: December 2020
 - Preparation of search syntax, preliminary searches: February – April 2021
 - Final literature search: 11.05.2021
 - Protocol preparation: April 2021
 - Study selection and data coding: starting after protocol submission 2021

Study details according to the PRISMA-ScR checklist

The study adheres to the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist (Tricco et al., 2018; Appendix I).

Item 1. Title

“Determinants of health-related misinformation sharing on social media - a scoping review”

Item 2. Abstract

Not applicable at the protocol stage

Item 3. Rationale

Public Health responses often rely on changing individual health-related behaviours (Glanz & Bishop, 2010). Many potential measures to achieve this aim critically depend on the information available to the target population and whether they provide trustworthy and reliable guidance (De Vries, 2017). As exemplified during the Covid-19 pandemic, false information may pose a key threat here, as they have been shown to reduce adherence to behavioural guidelines, promote engagement in false prevention measures and encourage hate and exclusion. Tackling their spread has thus been established as a research priority in the WHO Response Strategy (WHO, 2020).

As the rapid distribution of dis- and misinformation (dis-information: information intended to deceive; mis-information: wrong information, but not intended to deceive) is largely occurring through social media, government efforts have focused on reducing their spread and availability on different platforms (Pennycook & Rand, 2021). These efforts have mostly focused on misinformation, which is making up the far bigger share, and strongly relied on partnering with tech companies for fact checking, offering more trustworthy information or removing false information (Pennycook & Rand, 2021). However, this work has exclusively focused on deliberate and reflective mental processes not accounting for other potential determinants (e.g., fast, reactive and impulsive processes that drive most of individuals’ decision making as well as contextual effects) of why users misjudge their trustworthiness

and share false information. As a result, interventions have mostly failed to considerably reduce misinformation sharing (Pennycook & Rand, 2021).

It is thus crucial to better understand misinformation sharing behaviour and the multitude of its determinants. Viewing sharing of misinformation through a behavioural lense opens different avenues to comprehensively and integratively study its determinants. One especially promising avenue is the use of behavioural frameworks such as the Theoretical Domains Framework (TDF; Cane et al., 2012). It is a continuously updated integrative framework summarizing evidence-based determinants of behavior (with 14 key domains) and behavior change (i.e. facilitators and barriers), allowing to systematically understand mechanisms of change and inform intervention design as well as their evaluation.

Item 4. Objectives

Research questions are:

1. Which behavioural determinants are associated with misinformation sharing behaviour on social media according to published evidence?
2. Under which broader theoretical domains of behavioural determinants can the published associations be grouped?

Item 5. Protocol and registration

This protocol will be prospectively registered at PsychArchives (www.psycharchives.org).

Item 6. Eligibility criteria

The eligibility criteria for the study are based on the P I/E C O S (Population, Intervention / Exposure, Comparison, Outcome, Study type) criteria.

Inclusion criteria:

1. **P: Population:** Human samples of social media users of any age
2. **I/E: Intervention / Exposure:** Behavioural determinants of the Theoretical Domains Framework
3. **C: Comparison:** -
4. **O: Outcome:** Sharing of health-related misinformation on social media.
5. **Study type:** *Original study*

6. Publication status: published in peer-reviewed journals

Exclusion criteria:

1. Non-human samples
2. Publication in another language than English or German
3. Study published before 2006
4. No original study
5. Study does not examine identification or sharing of misinformation
6. Study does not study social media
7. No TDF domain examined (see Appendix III)

Social media is defined as “internet-based channels that allow users to opportunistically interact and selectively self-present, either in real-time or asynchronously, with both broad and narrow audiences who derive value from user-generated content and the perception of interaction with others” (Carr & Hayes, 2015). Determinants of behaviour will include all determinants which are listed in the Theoretical Domains Framework (see Appendix III).

Item 7. Information sources

The following bibliographic databases will be searched in titles and abstracts on 11 March 2021:

1. PubMed
2. Web of Science
3. Scopus

The reference lists of the most relevant studies will be screened for further sources of interest.

Item 8. Search

The search will be conducted in English, including only studies published after 2005. The search strategy was developed iteratively by the team in consultation with a professional librarian. We will use the following syntax for the search (translations for each database can be found in Appendix II):

("online" OR "social" OR "media" OR "news" OR "twitter" OR "Facebook" OR "google" OR "platform" OR "telegram" OR "chat" OR "messenger" OR "line" OR "instagram" OR "Weibo" OR "WeChat" OR "snapchat" OR "baidu" OR "app*" OR "messag*")

AND

(„determinant of health behaviour“ OR „determinants of health behaviour“ OR „determinant of health behavior“ OR „determinant* of health behaviour“ OR „health behaviour determinant*“ OR „cognit*“ OR „social cognit*“ OR „health cogniti*“ OR „theoretical domains framework“ OR knowledge OR skill OR skills OR competence OR ability OR practice OR identity OR „professional role“ OR „professional boundaries“ OR „professional confidence“ OR leadership OR „organisational commitment“ OR „organizational commitment“ OR „self-confidence“ OR „perceived competence“ OR „self-efficacy“ OR „perceived behavioural control“ OR „perceived behavioral control“ OR PBC OR belief* OR self-esteem OR empowerment OR optimism OR pessimism OR „outcome expectancies“ OR „outcome expectations“ OR „anticipated regret“ OR consequence* OR reward* OR reward* OR incentive OR incentives OR punishment OR reinforcement OR contingenc* OR sanction OR sanctions OR intention OR intentions OR motivation OR „transtheoretical model“ OR „stages of change“ OR goal OR goals OR „action planning“ OR memory OR attention OR „decision processes“ OR „decision making“ OR „cognitive *load“ OR „cognitive tiredness“ OR „environmental context“ OR „environmental stressors“ OR resources OR „organisational culture“ OR „organisational climate“ OR „organizational culture“ OR „organizational climate“ OR „salient events“ OR „critical incidents“ OR „person x environment interaction“ OR barriers OR facilitators OR „social influence“ OR „social influences“ OR „social pressure“ OR „social norm“ OR „social norms“ OR norm* OR „group conformity“ OR „social comparison“ OR „group norms“ OR „subjective norm“ OR „social support“ OR power OR „intergroup conflict“ OR alienation OR modelling OR emotion OR fear OR anxiety OR affect OR stress OR depression OR burn-out OR „behavioural regulation“ OR „behavioral regulation“ OR self-monitoring OR „breaking habit“ OR attitude OR attitudes OR „risk perception“ OR „risk awareness“ OR vulnerability OR severity OR motive OR motives OR „theory of planned behaviour“ OR „reasoned action“ OR „social cognitive theory“ OR „health action process approach“ OR „i-change model“ OR „precaution adoption process“ OR „health beliefs“ OR „health belief model“ OR „protection motivation theory“ OR „parallel process model“ OR „self-regulation“ OR „action control“ OR implicit* OR explicit*)

AND

("spread*" OR "propagat*" OR "disseminat*" OR "circulat*" OR "communicat*" OR "diffuse*" OR "broadcast*" OR "shar*" OR "tweet*" OR "thread*" OR "post*" OR "inform*" OR "provid*" OR "recogni*" OR "distinguish*" OR "understand*" OR "detect*" OR "believ*" OR "belief" OR "identify*")

AND

("health*" OR "diseas*" OR "infectious*" OR "virus" OR "vaccin*" OR "ebola" OR "zika" OR "measle*" OR "covid*" OR "corona*" OR "medic*" OR "hospital" OR "clinic*" OR "medicin*" OR "influenza" OR "pandem*" OR "epidem*" OR "cancer*" OR "therap*" OR "respirator*" OR "outbreak")

AND

("misinformation" OR "fake news" OR "disinformation" OR "rumor*" OR "false" OR "mislead*" OR "myth" OR "conspira*")

Item 9. Selection of sources of evidence

The search syntax was checked and approved by a professional librarian. The search will be conducted by the team assistant and the results will be stored in the reference management software, Zotero. After deduplication in Zotero, two authors will independently assess all titles/abstracts for inclusion using Rayyan (www.rayyan.ai). The final consensus on studies to be assessed in full-text will be reached through discussion. Two authors will independently assess the studies selected for full-text inspection and reach consensus on the final studies to be included.

Item 10. Data charting process

A data-charting form for coding and capturing of all data will be developed in Excel and calibrated within the team. Two authors will then independently categorize each included study to the TDF domains, code all data and reach consensus during discussion.

Item 11. Data items

The following data items for data-charting will be coded:

Bibliographic information

1. First author
2. Year of publication
3. Country of corresponding author
4. Funding sources/conflict of interest

Study aim and design

5. Study aim (according to authors)
6. Study design type

Study population

7. P: Population
8. P: Social media platform

Intervention / Exposure

9. I: Any TDF determinant examined (one column each)

Outcomes

10. O: Behavioural outcome (identification or sharing of misinformation; one column each)

11. O: Relationship of any TDF determinant with misinformation identification or sharing
(one column each)

12. O: Statistical method

13. O: Results

Limitations and conclusions

14. Main study limitations reported by authors

15. Main conclusion according to authors

Item 12. Critical appraisal of individual sources of evidence

We will not use any specific appraisal tools.

Item 13. Summary measures

Not applicable for scoping reviews.

Item 14. Synthesis of results

Studies will be grouped according to their TDF domains. A qualitative summary of study characteristics will be provided based on the charted information.

Item 15. Risk of bias across studies

Not applicable for scoping reviews.

Item 16. Additional analyses

Not applicable for scoping reviews.

Items 17-26: Results / Discussion

Not applicable at the protocol stage.

Item 27: Funding

This project is funded by a grant of the VolkswagenStiftung awarded to Prof. Dr. Johannes Schöning (Lichtenberg Professorship).

References

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Appendix I: PRISMA extension for scoping reviews (PRISMA-ScR) checklist

Section	Item	PRISMA-ScR Checklist Item
Title	1	Identify the report as a scoping review.
Abstract		
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.
Introduction		
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.
Methods		
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.
Information sources	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.
Selection of sources of evidence	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.
Data charting process	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.
Critical appraisal of individual sources of evidence	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).

Summary measures	13	<i>Not applicable for scoping reviews</i>
Synthesis of results	14	Describe the methods of handling and summarizing the data that were charted.
Risk of bias across studies	15	<i>Not applicable for scoping reviews</i>
Additional analyses	16	<i>Not applicable for scoping reviews</i>
Results		
Selection of sources of evidence	17	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.
Characteristics of sources of evidence	18	For each source of evidence, present characteristics for which data were charted and provide the citations.
Critical appraisal within sources of evidence	19	If done, present data on critical appraisal of included sources of evidence (see item 12).
Results of individual sources of evidence	20	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.
Synthesis of results	21	Summarize and/or present the charting results as they relate to the review questions and objectives.
Risk of bias across studies	22	<i>Not applicable for scoping reviews</i>
Additional analyses	23	<i>Not applicable for scoping reviews</i>
Discussion		
Summary of evidence	24	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.
Limitations	25	Discuss the limitations of the scoping review process.
Conclusions	26	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.
Funding	27	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.

Source: (Tricco et al., 2018)

PubMed:

("online"[Title/Abstract] OR "social"[Title/Abstract] OR "media"[Title/Abstract] OR "news"[Title/Abstract] OR "twitter"[Title/Abstract] OR "Facebook"[Title/Abstract] OR "google"[Title/Abstract] OR "platform"[Title/Abstract] OR "telegram"[Title/Abstract] OR "chat"[Title/Abstract] OR "messenger"[Title/Abstract] OR "line"[Title/Abstract] OR "instagram"[Title/Abstract] OR "Weibo"[Title/Abstract] OR "WeChat"[Title/Abstract] OR "snapchat"[Title/Abstract] OR "baidu"[Title/Abstract] OR "app*"[Title/Abstract] OR "messag*"[Title/Abstract])

AND

(„determinant of health behaviour“[Title/Abstract] OR „determinants of health behaviour“[Title/Abstract] OR „determinant of health behavior“[Title/Abstract] OR „determinant* of health behaviour“[Title/Abstract] OR „health behaviour determinant*“[Title/Abstract] OR „cognit*“[Title/Abstract] OR „social cognit*“[Title/Abstract] OR „health cogniti*“[Title/Abstract] OR „theoretical domains framework“[Title/Abstract] OR knowledge[Title/Abstract] OR skill[Title/Abstract] OR skills[Title/Abstract] OR competence[Title/Abstract] OR ability[Title/Abstract] OR practice[Title/Abstract] OR identity[Title/Abstract] OR „professional role“[Title/Abstract] OR „professional boundaries“[Title/Abstract] OR „professional confidence“[Title/Abstract] OR leadership[Title/Abstract] OR „organisational commitment“[Title/Abstract] OR „self-confidence“[Title/Abstract] OR „perceived competence“[Title/Abstract] OR „self-efficacy“[Title/Abstract] OR „perceived behavioural control“[Title/Abstract] OR „perceived behavioral control“[Title/Abstract] OR PBC[Title/Abstract] OR belief*[Title/Abstract] OR self-esteem[Title/Abstract] OR empowerment[Title/Abstract] OR optimism[Title/Abstract] OR pessimism[Title/Abstract] OR „outcome expectancies“[Title/Abstract] OR „outcome expectations“[Title/Abstract] OR „anticipated regret“[Title/Abstract] OR consequence*[Title/Abstract] OR reward*[Title/Abstract] OR reward*[Title/Abstract] OR incentive[Title/Abstract] OR incentives[Title/Abstract] OR punishment[Title/Abstract] OR reinforcement[Title/Abstract] OR contingenc*[Title/Abstract] OR sanction[Title/Abstract] OR sanctions[Title/Abstract] OR intention[Title/Abstract] OR intentions[Title/Abstract] OR motivation[Title/Abstract] OR „transtheoretical model“ [Title/Abstract] OR „stages of change“[Title/Abstract] OR goal[Title/Abstract] OR goals[Title/Abstract] OR „action planning“[Title/Abstract] OR memory[Title/Abstract] OR attention[Title/Abstract] OR „decision processes“[Title/Abstract] OR „decision making“[Title/Abstract] OR „cognitive *load“[Title/Abstract] OR „cognitive tiredness“[Title/Abstract] OR „environmental context“[Title/Abstract] OR „environmental stressors“[Title/Abstract] OR resources[Title/Abstract] OR „organisational culture“[Title/Abstract] OR „organisational climate“[Title/Abstract] OR „organizational culture“[Title/Abstract] OR „organizational climate“[Title/Abstract] OR „salient events“[Title/Abstract] OR „critical incidents“[Title/Abstract] OR „person x environment interaction“[Title/Abstract] OR barriers[Title/Abstract] OR facilitators[Title/Abstract] OR „social influence“[Title/Abstract] OR „social influences“[Title/Abstract] OR „social pressure“[Title/Abstract] OR „social norm“[Title/Abstract] OR „social norms“[Title/Abstract] OR norm*[Title/Abstract] OR „group conformity“[Title/Abstract] OR „social comparison“[Title/Abstract] OR „group norms“[Title/Abstract] OR „subjective norm“ [Title/Abstract] OR „social support“[Title/Abstract] OR power[Title/Abstract] OR „intergroup conflict“[Title/Abstract] OR alienation[Title/Abstract] OR modelling[Title/Abstract] OR emotion[Title/Abstract] OR fear[Title/Abstract] OR anxiety[Title/Abstract] OR affect[Title/Abstract] OR stress[Title/Abstract] OR depression[Title/Abstract] OR burn-out[Title/Abstract] OR „behavioural regulation“[Title/Abstract] OR „behavioral regulation“[Title/Abstract] OR self-monitoring[Title/Abstract] OR „breaking habit“[Title/Abstract] OR attitude[Title/Abstract] OR attitudes[Title/Abstract] OR „risk perception“ [Title/Abstract] OR „risk awareness“ [Title/Abstract] OR

vulnerability[Title/Abstract] OR severity[Title/Abstract] OR motive[Title/Abstract] OR motives[Title/Abstract] OR „theory of planned behaviour“[Title/Abstract] OR „reasoned action“[Title/Abstract] OR „social cognitive theory“[Title/Abstract] OR „health action process approach“[Title/Abstract] OR „i-change model“[Title/Abstract] OR „precaution adoption process“[Title/Abstract] OR „health beliefs“[Title/Abstract] OR „health belief model“[Title/Abstract] OR „protection motivation theory“[Title/Abstract] OR „parallel process model“[Title/Abstract] OR „self-regulation “[Title/Abstract] OR „action control“ [Title/Abstract] OR implicit* [Title/Abstract] OR explicit* [Title/Abstract])

AND

("spread*" [Title/Abstract] OR "propagat*" [Title/Abstract] OR "disseminat*" [Title/Abstract] OR "circulat*" [Title/Abstract] OR "communicat*" [Title/Abstract] OR "diffuse*" [Title/Abstract] OR "broadcast*" [Title/Abstract] OR "shar*" [Title/Abstract] OR "tweet*" [Title/Abstract] OR "thread*" [Title/Abstract] OR "post*" [Title/Abstract] OR "inform*" [Title/Abstract] OR "provid*" [Title/Abstract] OR "recogni*" [Title/Abstract] OR "distinguish*" [Title/Abstract] OR "understand*" [Title/Abstract] OR "detect*" [Title/Abstract] OR "believ*" [Title/Abstract] OR "belief" [Title/Abstract] OR "identify*" [Title/Abstract])

AND

("health*" [Title/Abstract] OR "diseas*" [Title/Abstract] OR "infectious*" [Title/Abstract] OR "virus" [Title/Abstract] OR "vaccin*" [Title/Abstract] OR "ebola" [Title/Abstract] OR "zika" [Title/Abstract] OR "measle*" [Title/Abstract] OR "covid*" [Title/Abstract] OR "corona*" [Title/Abstract] OR "medic*" [Title/Abstract] OR "hospital" [Title/Abstract] OR "clinic*" [Title/Abstract] OR "medicin*" [Title/Abstract] OR "influenza" [Title/Abstract] OR "pandem*" [Title/Abstract] OR "epidem*" [Title/Abstract] OR "cancer*" [Title/Abstract] OR "therap*" [Title/Abstract] OR "respirator*" [Title/Abstract] OR "outbreak" [Title/Abstract])

AND

("misinformation" [Title/Abstract] OR "fake news" [Title/Abstract] OR "disinformation" [Title/Abstract] OR "rumor*" [Title/Abstract] OR "false" [Title/Abstract] OR "mislead*" [Title/Abstract] OR "myth" [Title/Abstract] OR "conspira*" [Title/Abstract])

Web of Science:

TS=(“online” OR “social” OR “media” OR “news” OR “twitter” OR “Facebook” OR “google” OR “platform” OR “telegram” OR “chat” OR “messenger” OR “line” OR “instagram” OR “Weibo” OR “WeChat” OR “snapchat” OR “baidu” OR “app*” OR “messag*”)

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AND

TS= ("spread*" OR "propagat*" OR "disseminat*" OR "circulat*" OR "communicat*" OR "diffuse*" OR "broadcast*" OR "shar*" OR "tweet*" OR "thread*" OR "post*" OR "inform*" OR "provid*" OR "recogni*" OR "distinguish*" OR "understand*" OR "detect*" OR "believ*" OR "belief" OR "identify*")

AND

TS=("health*" OR "diseas*" OR "infectious*" OR "virus" OR "vaccin*" OR "ebola" OR "zika" OR "measle*" OR "covid*" OR "corona*" OR "medic*" OR "hospital" OR "clinic*" OR "medicin*" OR "influenza" OR "pandem*" OR "epidem*" OR "cancer*" OR "therap*" OR "respirator*" OR "outbreak")

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TS=("misinformation" OR "fake news" OR "disinformation" OR "rumor*" OR "false" OR "mislead*" OR "myth" OR "conspira*")

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TITLE-ABS ("spread*" OR "propagat*" OR "disseminat*" OR "circulat*" OR "communicat*" OR "diffuse*" OR "broadcast*" OR "share*" OR "tweet*" OR "thread*" OR "post*" OR "inform*" OR "provide*" OR "recogni*" OR "distinguish*" OR "understand*" OR "detect*" OR "believe*" OR "belief" OR "identify*")

AND

TITLE-ABS ("health*" OR "disease*" OR "infectious*" OR "virus" OR "vaccin*" OR "ebola" OR "zika" OR "measle*" OR "covid*" OR "corona*" OR "medic*" OR "hospital" OR "clinic*" OR "medicin*" OR "influenza" OR "pandem*" OR "epidem*" OR "cancer*" OR "therap*" OR "respirator*" OR "outbreak")

AND

TITLE-ABS("misinformation" OR "fake news" OR "disinformation" OR "rumor*" OR "false" OR "mislead*" OR "myth" OR "conspira*")

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Appendix III: Definitions of TDF domains and determinants

TDF Domain	TDF Constructs	Definitions	Target: identifying misinformation	Target: sharing misinformation
Knowledge (an awareness of the existence of something)	Knowledge (including knowledge of condition)	The state of being familiar with something or aware of its existence, usually resulting from experience or study; the range of one's understanding or information ¹	Knowledge about the existence of false information and misinformation	
	Procedural knowledge	Knowledge about how to do something ²	Knowledge about how to distinguish trustworthy from false information / misinformation	
	Knowledge of task environment	Knowledge of the social and material context in which a task is undertaken ³	knowledge about how sharing connects users' feeds	Knowledge of the user interface of social media platform; knowledge about how sharing works
Skills (an ability or proficiency acquired through practice)	Skills	An ability or proficiency acquired through training and/or practice ³	Skills to distinguish trustworthy from false information / misinformation	
	Skills development	The gradual acquisition or advancement through progressive stages of an ability or proficiency acquired through training and	Development of skills to distinguish trustworthy from false information / misinformation	

		practice ³		
	Competence	One's developed repertoire of skills, especially as it is applied to a task or set of tasks ¹	Competence to distinguish trustworthy from false information / misinformation	
	Ability	Existing competence or skill to perform a specific physical or mental act. Ability may be either innate or developed through experience ¹	Ability to distinguish trustworthy from false information / misinformation	
	Interpersonal skills	Aptitude enabling a person to carry on effective interactions and relationships with others, such as the ability to communicate thought and feeling or to assume appropriate social responsibilities ¹	Interpersonal skills to discuss trustworthiness of information with others; to discuss social responsibilities when sharing information	
	Practice	Repetition of an act, behaviour, or series of activities, often to improve performance or acquire a skill ¹	Practice / training to distinguish trustworthy from false information / misinformation	
	Skill assessment	A judgment of the quality, worth, importance, level, or value of an ability or proficiency acquired through training and practice ³	Assessment (self-evaluation) of one's skills to distinguish trustworthy from false information / misinformation; assessment of the importance of these skills	

Social/Professional Role and Identity (A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting)	Professional identity	The characteristics by which an individual is recognised relating to, connected with or befitting a particular profession ³	Professional identity as someone who recognizes false information / misinformation (probably not relevant)	Professional identity as someone who does not share false information / misinformation (probably not relevant)
	Professional role	The behaviour considered appropriate for a particular kind of work or social position ³	Not recognizing false information / misinformation considered not appropriate for professional role	Sharing false information / misinformation considered not appropriate for professional role
	Social identity	The personal qualities that one claims and displays to others so consistently that they are considered to be part of one's essential, stable self ¹	Social identity as someone who recognizes false information / misinformation; recognizing aligns with self-defined personal qualities	Social identity as someone who does not share false information / misinformation; sharing does not align with self-defined personal qualities
	Identity	An individual's sense of self defined by (a) a set of physical, psychological, and interpersonal characteristics that is not wholly shared with any other person and (b) a range of affiliations (e.g., ethnicity) and social roles ¹	Identity as someone who recognizes false information; recognizing false information / misinformation aligns with self-defined personal characteristics	Identity as someone who does not share false information; sharing false information / misinformation does not align with self-defined personal characteristics

	Professional boundaries	The bounds or limits relating to, or connected with a particular profession or calling ³	Not recognizing false information / misinformation considered outside of the limits of one's profession	Sharing false information / misinformation considered outside of the limits of one's profession
	Professional confidence	An individual's belief in his or her repertoire of skills, and ability especially as it is applied to a task or set of tasks ³	Belief in one's skills and ability to distinguish trustworthy from false information / misinformation within professional context	Belief in one's skills and ability to not share false information / misinformation within professional context
	Group identity	An individual's sense of belonging to a particular social, cultural, or subcultural group ⁴	Displaying recognizing false information / misinformation as representation of one's individual sense of belonging to a certain group	Displaying blocking / not sharing false information / misinformation as representation of one's individual sense of belonging to a certain group
	Leadership	The processes involved in leading others, including organizing, directing, coordinating, and motivating their efforts toward achieving certain group or organizational goals ¹	Displaying recognizing false information / misinformation due to others' efforts to lead towards group / organisational goal	Displaying blocking / not sharing false information / misinformation due to others' efforts to lead towards group / organisational goal
	Organisational commitment	An employee's dedication to an organisation and wish to remain part of it.	Displaying recognizing false information / misinformation as representation of one's	Displaying blocking / not sharing false information /

		Organisational commitment is often described as having both an emotional or moral element and a more prudent element ⁵	individual sense of commitment to a certain organisation	misinformation as representation of one's individual sense of commitment to a certain organisation
Beliefs about Capabilities (Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use)	Self-confidence	Self-assurance or trust in one's abilities, capacities, and judgment; a belief that one is capable of successfully meeting the demands of a task ¹	Self-confidence in one's abilities, capacities to distinguish trustworthy from false information / misinformation	Self-confidence in one's abilities, capacities to not share false information / misinformation
	Perceived competence	An individual's belief in his or her ability to learn and execute skills ¹	Perceived competence in one's abilities to effectively distinguish trustworthy from false information / misinformation	Perceived competence in one's abilities to not share false information / misinformation
	Self-efficacy	An individual's subjective perception of his or her ability to perform in a given setting or to attain desired results ¹⁵	Self-efficacy to effectively distinguish trustworthy from false information / misinformation	Self-efficacy to not share misinformation / false information
	Perceived behavioural control	The extent to which a person feels able to perform the behaviour ⁶		Perceived behavioural control to not share misinformation / false information
	Beliefs	Something believed; a proposition or set of propositions held to be true ⁷	A set of propositions held on distinguishing of false information / misinformation	A set of propositions held on sharing of false information / misinformation

	Self-esteem	The degree to which the qualities and characteristics contained in one's self-concept are perceived to be positive ¹		
	Empowerment	The promotion of the skills, knowledge, and confidence necessary to take greater control of one's life; the delegation of increased decision-making powers to individuals or groups in a society or organization ¹		
	Professional confidence	An individual's belief in his or her repertoire of skills, and ability especially as it is applied to a task or set of tasks ³	Professional confidence in one's abilities, capacities to distinguish trustworthy from false information / misinformation	Professional confidence in one's abilities, capacities to not share false information / misinformation
Optimism (The confidence that things will happen for the best or that desired goals will be attained)	Optimism	The attitude that outcomes will be positive and that people's wishes or aims will ultimately be fulfilled ³	Optimism that one will distinguish trustworthy from false information / misinformation	Optimism that one will not share from false information / misinformation
	Pessimism	The attitude that things will go wrong and that people's wishes or aims are unlikely to be fulfilled ¹	Pessimism that one will not distinguish trustworthy from false information / misinformation	Pessimism that one will share false information / misinformation
	Unrealistic optimism	One's inaccurate perceptions of risk and susceptibility leading to over-rating the chances of positive outcomes	Unrealistic optimism that one will distinguish trustworthy from false information / misinformation	Unrealistic optimism that one will share false information / misinformation

		compared to those of other people ⁸		
	Identity	An individual's sense of self defined by (a) a set of physical, psychological, and interpersonal characteristics that is not wholly shared with any other person and (b) a range of affiliations (e.g., ethnicity) and social roles ¹	Individual's sense of self as someone who does not share false information / misinformation; sharing does not align with self-defined personal characteristics	Individual's sense of self as someone who does not share false information / misinformation; sharing does not align with self-defined personal characteristics
Beliefs about Consequences (Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation)	Beliefs	Something believed; a proposition or set of propositions held to be true ⁷	A set of propositions held on consequences of recognizing false information / misinformation	A set of propositions held on consequences of sharing of false information / misinformation
	Outcome expectancies	Cognitive, emotional, behavioural, and affective outcomes that are assumed to be associated with future or intended behaviours. These assumed outcomes can either promote or inhibit future behaviours ³	The expectancies of cognitive / emotional / behavioural / affective outcomes of recognizing false information / misinformation	The expectancies of cognitive / emotional / behavioural / affective outcomes of sharing false information / misinformation
	Characteristics of outcome expectancies	Characteristics of the cognitive, emotional and behavioural outcomes that individuals believe are associated with future or intended behaviours and	Characteristics of the outcome expectancies described above (see outcome expectancies).	Characteristics of the outcome expectancies described above (see outcome expectancies).

		that are believed to either promote or inhibit these behaviours. These include whether they are sanctions/rewards, proximal/distal, valued/not valued, probable/improbable, salient/not salient, perceived risks or threats ³		
	Anticipated regret	A sense of the potential negative consequences of a decision that influences the choice made: for example an individual may decide not to make an investment because of the feelings associated with an imagined loss ⁵	Anticipated regret of recognizing false information / misinformation	Anticipated regret of sharing false information / misinformation
	Consequences	Anything which follows a behaviour in a given situation ⁹	Consequences of recognizing false information / misinformation	Consequences of sharing false information / misinformation
Reinforcement (Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus)	Rewards (proximal/ distal, valued/ not valued, probable/ improbable)	Return or recompense made to, or received by a person contingent on some performance ³	Rewards received when recognizing false information / misinformation	Rewards received when sharing false information / misinformation

	Incentives	An external stimulus, such as a condition or an object, that enhances or serves as a motive for behaviour ¹	Incentives for recognizing false information / misinformation	Incentives for sharing false information / misinformation
	Punishment	The process in which the relationship between a response and some stimulus or circumstance results in the response becoming less probable; a physically or psychologically painful, unwanted, or undesirable event or circumstance imposed as a penalty on an actual or perceived wrongdoer ¹	Punishments received when recognizing false information / misinformation	Punishments received when sharing false information / misinformation
	Consequences	Anything which follows a behaviour in a given situation ⁹	Consequences of recognizing false information / misinformation	Consequences of sharing false information / misinformation
	Reinforcement	A process in which the frequency or probability of a response is increased by a dependent relationship, or contingency, with a stimulus or circumstance ¹	Reinforcement of recognizing false information / misinformation	Reinforcement of sharing false information / misinformation
	Contingencies	A conditional probabilistic relation between two events. Contingencies may be arranged via	Contingencies of recognizing false information / misinformation	Contingencies of sharing false information / misinformation

		dependencies or they may emerge by accident ¹		
	Sanctions	A punishment or other coercive measure, usually administered by a recognized authority, that is used to penalize and deter inappropriate or unauthorized actions ¹	Sanctions on recognizing false information / misinformation	Sanctions on sharing false information / misinformation
Intentions (A conscious decision to perform a behaviour or a resolve to act in a certain way)	Stability of intentions	The tendency for one's intentions to remain stable over time whether challenged or not by disturbing influences ¹⁰	Stability of intentions to recognize false information / misinformation	Stability of intentions to not share false information / misinformation
	Stages of change model	A model that poses that health behaviour change is accomplished through five specific stages: pre-contemplation, contemplation, preparation, action, and maintenance ^{1,11}		Pre-contemplation of / contemplation of / preparation of / acting on / maintenance of not sharing false information / misinformation
	Transtheoretical model and stages of change	A five-stage theory to explain changes in people's health behaviour. It suggests that change takes time, that different interventions are effective at different stages, and that there are multiple outcomes occurring across the stages ¹		

Goals (Mental representations of outcomes or end states that an individual wants to achieve)	Goals (distal / proximal)	Desired actions, end-states, or values which seem achievable in short time (proximal) or longer time (distal) ¹²	Goal to recognize false information / misinformation	Goal to not share false information / misinformation
	Goal priority	Order of importance or urgency of end states toward which one is striving ³	Importance of goal to recognize false information / misinformation	Importance of goal to not share false information / misinformation
	Goal / target setting	A process that establishes specific, time-based behaviour targets that are measurable, achievable, and realistic ¹	Setting goal to recognize false information / misinformation	Setting goal to not share false information / misinformation
	Goals (autonomous / controlled)	The end state toward which one is striving: the purpose of an activity or endeavour. It can be identified by observing that a person ceases or changes its behaviour upon attaining this state; proficiency in a task to be achieved within a set period of time ³	See above	See above
	Action planning	Detailed specifications of how to perform the intended behaviour ⁶	Planning of how to recognize false information / misinformation	Planning of how to not share false information / misinformation
	Implementation intention	The if-then plan one creates of when, where and how to perform a	If-then plans of how to recognize false information / misinformation	If-then plans of how to not share false

		particular behaviour or to achieve certain goals ¹³		information / misinformation
Memory, Attention and Decision Processes (The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives)	Memory	The ability to retain information or a representation of past experience, based on the mental processes of learning or encoding, retention across some interval of time, and retrieval or reactivation of the memory; specific information or a specific past experience that is recalled ¹	Use of one's memory to help distinguish trustworthy from false information / misinformation	Use of one's memory to not share false information / misinformation
	Attention	A state in which cognitive resources are focused on certain aspects of the environment rather than on others and the central nervous system is in a state of readiness to respond to stimuli ¹	Use of one's attention to help distinguish trustworthy from false information / misinformation	Use of one's attention to not share false information / misinformation
	Attention control	The extent to which a person can concentrate on relevant cues and ignore all irrelevant cues in a given situation ³	Control of one's attention to help distinguish trustworthy from false information / misinformation	Control of one's attention to not share false information / misinformation
	Decision making	The cognitive process of choosing between two or more alternatives, ranging from the relatively clear cut to the complex ¹	Choosing between different alternatives when distinguishing trustworthy from false information / misinformation	
	Cognitive overload / tiredness	The situation in which the demands placed on a	Abilities to cope with cognitive demands to help distinguish	Abilities to cope with cognitive demands

		person by mental work are greater than the person's mental abilities can cope with ¹	trustworthy from false information / misinformation	to not share false information / misinformation
Environmental Context and Resources (Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour)	Environmental stressors	External factors in the environment that cause stress ³	Environmental stressors that encourage or discourage recognizing false information/ misinformation	Environmental stressors that encourage or discourage sharing of false information/ misinformation
	Resources / material resources	Commodities and human resources used in enacting a behaviour ³	Resources to help distinguish trustworthy from false information / misinformation	Resources to help not share false information / misinformation
	Organisational culture / climate	A distinctive pattern of thought and behaviour shared by members of the same organisation and reflected in their language, values, attitudes, beliefs and customs ¹⁴		Distinctive organisational pattern of presenting a culture / climate of not sharing false information / misinformation
	Salient events / critical incidents	Occurrences that one judges to be distinctive, prominent or otherwise significant ³	Salient events relevant to recognizing false information / misinformation	Salient events relevant to sharing false information / misinformation

	Person x environment interaction	Interplay between the individual and their surroundings ³	Interplay / interaction of personal and environmental factors regarding recognizing false information / misinformation	Interplay / interaction of personal and environmental factors regarding sharing of false information / misinformation
	Barriers and facilitators	Something that restricts/allows, impedes/advances, or blocks/ progress the achievement of an ultimate objective or end ¹⁵	Barriers / facilitators of recognizing false information / misinformation	Barriers / facilitators of sharing false information / misinformation
Social Influences (Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviours)	Social pressure	The exertion of influence on a person or group by another person or group ¹	Exerted social influence on one person by a person / group to not recognize false information / misinformation	Exerted social influence one one person by a person / group to not share false information / misinformation
	Social norms	Perceptions of whether important others support the behaviour/ whether the behaviour is in line with that of referent others; expectations of others ⁶	Perceptions of important others' support of recognizing false information / misinformation	Perceptions of important others' support of sharing false information / misinformation
	Group conformity	The adjustment of one's opinions, judgments, or actions so that they become more consistent with the opinions, judgments, or actions of	Adjustment to recognize false information / misinformation to become consistent with group standards	Adjustment to not share false information / misinformation to become consistent

		those in the general social circle ¹⁵		with group standards
	Social comparisons	The process by which people evaluate their attitudes, abilities, or performance relative to others ¹⁶	Evaluation of one's abilities to distinguish; performance regarding recognizing false information / misinformation relative to others	Evaluation of one's attitudes towards sharing false information / misinformation; performance regarding not sharing false information / misinformation relative to others
	Group norms	Any of the consensual standards determined by a given group in society that indicate (a) what behaviours are considered typical in a given context and (b) what behaviours are considered proper in the context ¹⁵	Perceptions of consensual standards by a given group regarding recognizing false information / misinformation	Perceptions of consensual standards by a given group regarding the sharing of false information / misinformation
	Social support	Emotional encouragement and practical support from others ⁶	Emotional / practical support offered by others to recognize false information / misinformation	Emotional / practical support offered by others to not share false information / misinformation
	Power	The capacity to influence others, even when they try to resist this influence ¹	Missing capacity to resist others' influence regarding recognizing false information / misinformation	Missing capacity to resist others' influence regarding sharing of false

				information / misinformation
	Intergroup conflict	Disagreement or confrontation between two or more groups and their members, such as between work departments, entire companies, political parties, or nations. This may involve interpersonal discord, psychological tension, or physical violence ¹	Displaying recognizing false information / misinformation as representation of a group and its member's disagreement with other groups	Displaying blocking / not sharing false information / misinformation as representation of a group and its member's disagreement with other groups
	Alienation	Estrangement from others, resulting in the absence of close or friendly relationships with people in one's social group ¹	Displaying recognizing false information / misinformation as representation of one's individual sense of missing close or friendly relationships within one's social group	Displaying blocking / not sharing false information / misinformation as representation of one's individual sense of missing close or friendly relationships within one's social group
	Group identity	An individual's sense of belonging to a particular social, cultural, or subcultural group ⁴	Displaying recognizing false information / misinformation as representation of one's individual sense of belonging to a certain group	Displaying blocking / not sharing false information / misinformation as representation of one's individual sense of belonging to a certain group

	Modelling	The process in which one or more individuals or other entities serve as examples (models)	Viewing others identify false information / misinformation	Viewing others not sharing of false information / misinformation
Emotion (A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event)	Fear	A basic, intense emotion aroused by the detection of imminent threat, involving an immediate alarm reaction that mobilizes the organism by triggering a set of physiological changes ¹	Fear of not recognizing false information / misinformation	Fear of sharing false information / misinformation
	Anxiety	An emotion characterized by apprehension and somatic symptoms of tension in which an individual anticipates impending danger, catastrophe, or misfortune ¹	Anxiety about not recognizing false information / misinformation	Anxiety about sharing false information / misinformation
	Affect	Any experience or feeling of emotion, ranging from suffering to elation, from the simplest to feelings, and from the most normal to the most pathological emotional reactions ¹	Affect experienced in relation to recognizing false information / misinformation	Affect experienced in relation to sharing false information / misinformation
	Stress	The physiological or psychological response to internal or external stressors ¹	Stress experienced in relation to recognizing false information / misinformation	Stress experienced in relation to sharing false information / misinformation

	Depression	A mental disorder, characterized by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, feelings of tiredness and poor concentration ¹⁷	Characteristics reduce capacity to identify false information	Characteristics reduce capacity to not share false
	Positive / negative affect	The positive or negative internal feeling state that occurs when a goal has/has not been attained, a source of threat has/has not been avoided, or the individual is/is not satisfied with the present state of affairs ¹⁵	Affect experienced in relation to recognizing false information / misinformation	Affect experienced in relation to sharing false information / misinformation
	Burn-out	Physical, emotional or mental exhaustion, especially in one's job or career, accompanied by decreased motivation, lowered performance and negative attitudes towards oneself and others ¹⁴	Exhaustion reduces capacity to identify false information	Exhaustion reduces capacity to not share false information / reduces capacity to inhibit sharing
Behavioural Regulation (Anything aimed at managing or changing objectively observed or measured actions)	Self-monitoring	A method used in behavioural management in which individuals keep a record of their behaviour (e.g., time spent, form and place of occurrence,	Monitoring of one's recognizing of false information / misinformation (including one's behavioural response to environmental factors)	Monitoring of one's sharing of false information / misinformation (including one's behavioural

		feelings during performance), especially in connection with efforts to change or control the self; a personality trait reflecting an ability to modify one's behaviour in response to situational pressures, opportunities, and norms ¹		response to environmental factors)
	Breaking habit	To discontinue a behaviour or sequence of behaviours that is automatically activated by relevant situational cues ³		Discontinuing the automatically activated sharing of false information / misinformation
	Action planning	Detailed specifications of how to perform the intended behaviour ⁶	Planning of how to recognize false information / misinformation	Planning of how to not share false information / misinformation

Adapted from: Cane, J., O'Connor, D. & Michie, S. (2012). Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implement Sci*, 7, 37.

Sources for operationalization (see reference section for full citation): ¹ APA Online Dictionary of Psychology 2018, ² Anderson 1976, ³ Cane et al. 2012b, ⁴ Chandler & Monday 2011, ⁵ APA Dictionary of Psychology 2007, ⁶ Michie et al. 2014, ⁷ Oxford English Dictionary Online 2019, ⁸ Based on Ogden 2004, ⁹ Based on Oxford English Dictionary Online 2019, ¹⁰ Conner & Godin (2007), ¹¹ Prochaska & Velicer 1997, ¹² Based on Carver 2008 and Michie et al. 2014, ¹³ Based on Prestwich et al. 2015 and Gollwitzer 1999, ¹⁴ APA College Dictionary of Psychology 2016, ¹⁵ Based on APA Online Dictionary of Psychology 2018, ¹⁶ Based on Alicke 2000, ¹⁷ WHO Regional Office for Europe 2019