

What Lessons Can Be Learned for the Agroecological Transition From the Use of Social Media in Preventive Medicine?

Vincent Soullignac, INRAE, France

François Pinet, INRAE, France*

Mathilde Bodelet, INRAE, France

Hélène Gross, ACTA, France

ABSTRACT

In agriculture, web-based social media are increasingly used to share knowledge concerning best practices. One goal of agroecology is to reduce the use of synthetic chemical inputs. Agroecology represents a contrast with intensive agriculture in that it better manages interactions with life forms. It is crucial to help people share their knowledge to accomplish the agroecological transition. This paper proposes an analogy between the use of social media to facilitate (1) caring for plants in the context of agroecology and (2) preventing human diseases in the context of medicine. The authors created a bibliography of scientific publications related to social media use in preventative medicine to identify best practices for social media use (and the associated drawbacks) that can be applied to develop social media dedicated to agroecology.

KEYWORDS

Agroecology, Internet, Medicine, Social Media, Web-Based

INTRODUCTION

There is strong societal demand for agricultural production practices to become more environmentally friendly. Agroecology represents a contrast with intensive agriculture in that it better manages interactions with life forms. Unlike forms of intensive agriculture, which respond to problems by proposing one identical solution for all cases, agroecology is based on the management and optimization of natural processes. This framework is contextual. It requires a process of observation and continuous adaptation over a long period featuring many agricultural rotations. Because these interactions include multiple parameters, the agronomic knowledge associated with this type of agriculture is not only extensive but also unstable. In fact, a lack of the ability to capitalize on the knowledge involved in sustainable agriculture and the failure to disseminate such knowledge have been highlighted in Soullignac (2012) and constitute an obstacle to the development of these practices.

DOI: 10.4018/IJAEIS.316936

*Corresponding Author

This article published as an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and production in any medium, provided the author of the original work and original publication source are properly credited.

In agriculture, as in any undertaking (Le Boterf, 2008; Nonaka & Takeuchi, 1995), knowledge is very important. Farms are very small companies that, out of necessity, establish numerous ties with other stakeholders, such as their peers and professional agricultural organizations both upstream and downstream of production. However, the proliferation of the different types of knowledge (empirical, scientific, local) that are required in agroecology and the call to implement a learning process both initially and continuously require new, more interactive ways of establishing relationships and using them as assets. The development of digital tools and social media in particular meets this need.

Canadian communication theorist Marshall McLuhan (1964) and writer Régis Debray (1991) highlight the major role played by information transmission technologies in the structure of organizations. In this sense, Guyot (2002) defines information not only as a resource but also as a “social and organizational binder.” For example, in the case of agriculture, social media promote the emergence of professional communities that are novel in terms of both their composition and their operation. We believe—given the limited feedback concerning the use of these new techniques in agriculture—that it is relevant to explore social media use in other domains. However, one way of reducing the use of phytosanitary products is to adopt a prophylactic vision of the health management of plants and animals. Agroecology therefore relies on practices that mitigate diseases before they occur rather than treating them using phytosanitary products and antibiotics. A challenge for agroecology is the task of reducing the use of synthetic chemical inputs by ensuring that agroecosystems function properly. The purpose of preventive medicine is to ensure that the human organism functions properly so as to avoid the necessity of using synthetic products to address health problems. Based on an analogy between caring for plants (and animals) and the prevention of human diseases, we created a bibliography of scientific publications concerning social media use in preventative medicine to accomplish multiple goals:

- to identify and characterize interesting case studies,
- to identify best practices for social media use (and the associated drawbacks),
- concerning the form of social media, to highlight the commonalities between disease prevention in humans and agriculture, particularly in the context of environmental protection, as in the context of agroecology, and
- to examine the potential application of social media to agroecology.

Social media are used to share knowledge concerning preventative actions that are beneficial for health, and they can also be used to share knowledge related to beneficial actions in agriculture that can be implemented in the context of agroecology. In addition, both agriculture and medicine focus on natural processes. A parallel between the two fields thus emerges.

In the following sections of this paper, we present the method that we used, the results that we obtained from the thirty articles we surveyed, and a critical discussion of these results. This research was conducted as part of the French Casdar AGOR@GRI project, the purpose of which is to provide key resources to farmers, advisers, trainers, and other stakeholders in development with the aim of optimizing their social media use to promote and support the agroecological transition. The AGOR@GRI project aims to (a) define best practices and identify obstacles and (b) define ideas related to various features, services, and attributes that we could use as sources of inspiration to design social media for use in the field of agroecology and to support entities wishing to develop such social media.

The approach presented in our paper focused on searching for scientific articles that describe and analyze different uses of social media in the context of preventive medicine. Subsequently, we highlighted the ways in which these uses can be applied in the context of agroecology. The following sections explain our methodology for searching papers concerning the use of social media for preventive medicine, summarize the main aspects of each of the papers found in the search, indicate how these aspects can serve as a source of inspiration for the use of social media in the field of agroecology, and highlight the lessons that can be learned from these papers for the agroecological

transition, before proposing to aggregate the different ideas found in the papers. We group the papers in accordance with their key ideas. The goal of this aggregation is to obtain a general view of the analyses of the papers. The conclusion addresses the contribution of this paper and suggests perspectives for future research.

METHOD

The bibliographical research methodology used in this investigation consisted of three stages.

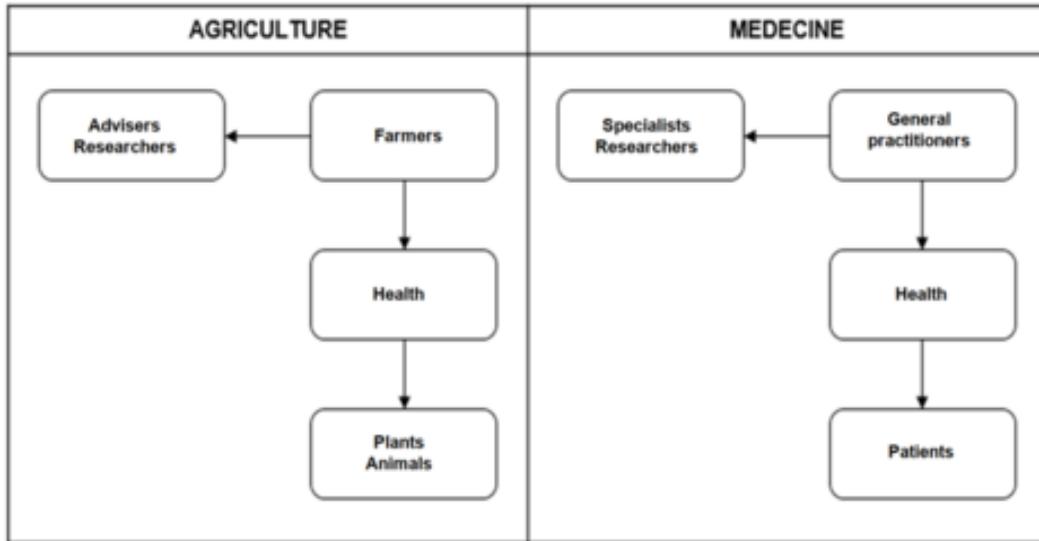
Stage 1

A preparatory phase focused on defining parallel terms between agroecology and medicine (see Figure 1). We communicated with the librarians who participated in the project to define our needs clearly, structure a query that would allow us to extract a bibliography, identify the information sources we should use, and define the format in which we should report the results. Our work was based on the assumption that farmers who are or wish to become involved in the agroecological transition desire to reincorporate natural processes and biodiversity into the heart of their system, to contribute to the local food system, to promote ecological services, or to minimize their use of inputs and fossil fuel resources (Fondation Terre Solidaire, 2019). By promoting the resilience of their farming system, farmers can increase their ability to prevent disasters and crises as well as to anticipate, absorb, accommodate or recover from them in a timely, efficient and sustainable manner (Organisation des Nations Unies pour l'alimentation et l'agriculture, 2020). This context, in which farmers attempt to establish an ecosystem that preserves the health of their plants and/or animals, implies the need for continuous learning and/or adaptation. For such adaptation to be possible, farmers can turn to their peers, to agricultural advisers, or to researchers. With respect to the medical context, we proposed two specific goals for our study: (a) to identify the social media platforms used in the context of preventive medicine to provide technical advice and (b) to find analyses of their use. With regard to the stakeholders considered in this study, we included potential patients, general practitioners/specialists, and researchers (see Figure 1). Whether in the agricultural world or the medical world, the number of stakeholders is much larger than the set that we consider here. For this reason, depending on the results, we also considered potentially conducting a query to expand the typology of the stakeholders. We considered including nurses and paramedical workers. Subsequently, to highlight the maximum number of relevant results, we developed sets of keywords based on the type of social media (e.g., health social media, Facebook, YouTube, telecare platform, or participatory media), the type or group of actors (e.g., virtual community of practice, health professional, physician, clinician, doctor, or peer-to-peer healthcare), the type of medicine (e.g., preventive medicine or preventive healthcare), and the type of behavior with respect to the content (e.g., usage, impact and utility, interprofessional collaboration/relation/education, information seeking, experience/information sharing, social interaction, or health decision making).

Stage 2

This second step consisted of searching for scientific papers written between 2010 and 2022. Successive queries were conducted on different information sources, such as Medline, Scopus, and Web of Science. All bibliographic resources were made accessible to the project's partners through a database shared via Zotero. The papers were classified into three categories: *relevant*, *interesting*, and *irrelevant*. In the two sets of query results, 32 scientific papers were relevant to the topic under study. Some of these articles discussed the social media platforms used in the study—those appearing most frequently were (in the following order): Facebook, Twitter, YouTube, LinkedIn, and WhatsApp—while others chose not to include this information. Social media remain a fairly recent phenomenon, and the time to research such a topic and publish the results takes several years. We did not broaden our queries beyond the professions (doctors) that were initially chosen.

Figure 1. Analogy between the set of stakeholders considered in the agricultural domain and those considered in the context of preventive medicine



Stage 3

The process of studying the 32 relevant articles exhibited two stages. The first stage consisted of writing a monograph containing the following information for each article:

- the abstract of the article,
- identification of the community studied,
- identification of the type of content shared,
- identification of the medium used by the community for sharing,
- details regarding the research method,
- an overview of the main results and analysis, and
- an interpretation of these results to translate them to agroecology.

During the second stage, to obtain a more general picture, we established correlations among all the entries in the monograph. The purpose of this process was to reveal topics for reflection that were relevant to agroecology.

LITERATURE REVIEW

In this section, we present a review of these 32 articles concerning the use of preventive medicine in social media. Our contribution is to highlight the points drawn from the field of preventive medicine that seem to be fruitful for the agroecological transition. The text of this section includes paraphrases, reformulations, and passages drawn from the articles thus presented (occasionally in the form of quotations for the longest or most relevant aspects). Readers can refer to the original articles for further details.

As indicated by Adilman et al. (2016):

Cancer management requires coordinated care from many health care providers, and its complexity requires physicians be up to date on current research. Web-based social media support physician collaboration and information sharing, but the extent to which physicians use social media for these purposes remains unknown.

The community studied consisted of oncology physicians and physicians-in-training. Facebook and Twitter were the social media platforms that survey respondents used most commonly for personal or social purposes. The researchers contacted the study participants described in the article using their email addresses, which were taken from public directories. A total of 680 individuals were selected. To evaluate generational differences in social media use, respondents were divided into age categories: 18–24, 25–34, 35–44, 45–54, and ≥ 55 years old. The survey questionnaire was emailed to the 680 individuals selected from July to September 2013. It contained nine multiple-choice questions. The responses sent to the researchers were anonymous. Of the 680 surveys distributed, a total of 207 responses (30%) were received; 72% of respondents reported using social media. Social media use was highest, at a rate of 93%, among respondents aged 25–34 years and lowest, at a rate of 39%, among those aged 45–54 years, with 59% of members of the ³ 55 years or older group indicating that they used social media. As indicated in the paper, this demonstrates a significant gap in social media use between younger users and mid-to late-career users. The generational effect described in this article can be applied to agriculture stakeholders. We can assume that physicians in the 35–44 and 45–54 age categories are often very active in professional and familial activities in progress and, as a result, must dedicate more time to these two activities than is required for physicians in the other age categories. In addition, the youngest physicians were largely able to acquire their skills in social media before even beginning their working lives.

Avery et al. (2016) highlighted a new trend that has emerged on social networks. This trend involves young people engaging in high-risk activities, filming their acts, and subsequently posting them on social media to make them visible to friends. In the fire challenge, for example, an individual covers himself or herself with isopropanol or acetone before igniting the liquid. Thereafter, the participant must attempt to extinguish the flames before serious injuries result. A study was conducted to investigate this subject following the admission of a patient who participated in this challenge to a medical center for the treatment of severe burns. This instance was not the medical center's first case of a patient involved in the fire challenge, but it was the first case in which the aim of the patient was to post a video on social media.

Approximately fifty real cases have been found on YouTube and analyzed. The videos posted online rarely show the potentially devastating consequences of this kind of challenge. No video shows serious injuries caused by this challenge. This aspect suggests that participants with burns are less likely to post their video or that they may even omit that part of the video. Adolescents who utilize social networks thus see only happy endings with respect to this kind of challenge, which minimizes the real risks of this type of behavior. It is a personal act resulting from community pressure and represents a kind of rite of passage. This challenge includes both physical links (i.e., the group of friends who attend the challenge and the participant) and social links (i.e., the group of friends who watch the video (Facebook friends) and friends of friends or other people who access the video via YouTube). Agricultural social networks exist that allow anyone to participate in a public community (using posts, forums, etc.). Farmers can share whatever they want (whether the full truth or a partial truth) in both public and private exchanges. Network members who post messages can minimize or conceal the poor reliability of certain practices in their messages. Some people may draw their own conclusions without being certain that they have all the relevant information. It is important to bear in mind that, no matter the space in which the exchange takes place, the interlocutors employ filters in the comments they publish (such as to manage their own image or to avoid disseminating economic data). The question that thus emerges is the following: “Does the use of social media contribute to the construction of a professional identity?”

Charles-Smith et al. (2015) presented a meta-analysis of all articles that have mobilized social media to optimize public health practices. The social media studied in the papers included in this meta-analysis are mainly Facebook, MySpace, blogs, microblogs (e.g., Twitter), and forums. The analysis of this article focused on research published between 2009 and 2013 in Dutch, Italian, German, English, Spanish, and Japanese. This systematic review answers two questions:

- Can social media be integrated into disease surveillance and epidemic management practices to improve public health? (33 analyzed papers)
- Can social media be used to effectively target populations, especially vulnerable populations, with the objective of testing interventions and/or interacting with a specific community to improve treatment or public health? (32 analyzed papers)

This study was conducted by distinguishing among different types of pathologies and subjects: influenza, infectious diseases, noninfectious diseases, vaccines and treatments, risky behavior, and others. The analysis ultimately indicates rather positive responses to the questions listed above. Social media content analysis provides access to more global information, thus allowing certain trends (e.g., the eating and lifestyle habits of people with a given pathology) to be explained in more detail. Social media make it possible to reach out to communities that occasionally exist outside traditional information systems and to transmit messages that are more targeted and adapted to the people concerned. Social media are virtual places that can be used by people who do not necessarily dare to exchange information regarding illnesses and prevention in their real lives. While this article's conclusions regarding social media are generally positive, the article highlights some limitations. Certain apparent advantages can also be drawbacks: massive diffusion of fake information to particularly vulnerable audiences, an excessive focus on negative opinions, or a lack of evidence and tangible results in practice. For individuals, social media provide added value at the psychological level (by facilitating exchanges among people suffering from the same pathology), but there is no proven link with changes in people's behaviors. However, the authors of the article find that despite these potential benefits, the use of social media and the analysis of the data they provide for improving public health management and epidemic monitoring remain very limited; this subject has hitherto received only marginal study. The authors recommend identifying opportunities to allow public health professionals to integrate social media analysis into disease surveillance and epidemic management practices. The article highlights the lack or absence of support from public authorities for this kind of study. It seems these authorities do not (yet) view social media as tools that can optimize and improve public policies (biological monitoring, etc.). The authors also highlight the need to define an ethical framework to promote such uses of social media in public policy mechanisms. A question concerning skills and resources is also relevant. We can thus draw the following parallels with agroecology:

- The article highlights the potential of social media to target audiences and thus optimize the communication of R&D structures and adapt messages to the target communities and their concerns. However, it does not provide solutions to the problem that communication from institutions or from certain structures is not always welcome in certain networks.
- Social media can serve as a means of accessing information to which traditional R&D structures do not have access (exchanges among farmers who are located outside institutional advice circuits).
- There are two types of social media use: (1) distributing content and reaching certain populations and (2) analyzing data produced (e.g., the geo-locations of contributors or keywords in the content exchanged), for example, to measure the propagation of a pest.
- Negative feelings are more contagious than positive feelings. It is important to decode the keys to good communication via social media.

According to Chretien and Kind (2014):

The authors propose viewing physicians' social media use as a hierarchy of needs, similar to Maslow's psychological theory which posits that more basic levels of needs must be met before higher, aspirational levels can be fully attained. The three levels in the social media in medicine's hierarchy of needs are Security, Reflection, and Discovery. Critical to this model is respecting the essential need for Security in order to move towards Reflection and into Discovery. The social media in medicine hierarchy of needs pyramid rests on a foundation of Public Trust. A victory for online professionalism would be providing trainees with the tools and guidance needed to ascend to Discovery, while ensuring that their basic social media needs are first met. (page 1318)

The community studied is the physician community, including physicians-in-training and working professionals. This article examines the ways in which physicians' online behavior can affect their professional lives. Physicians-in-training have realized that their online accounts on different social media platforms may be evaluated. They have two possible reactions to this realization: to hide all their accounts or to withdraw from social media completely. In the context of the agroecological transition, how can digital social credibility be constructed? This question pertains both to farmers and to agricultural advisers. One must bear in mind that farmers must be professionally credible with respect to both their colleagues and consumers. They must also seek to expand their social and professional networks and find the best ways of maintaining those networks. They can reflect on ways of using their networks to improve their credibility in relation to the new methods that they share.

As described by Das et al. (2015):

People who undergo weight loss surgery require a comprehensive treatment program to achieve successful outcomes. eHealth solutions, such as secure online portals, create new opportunities for improved health care. (paragraph "Background")

The aim of this study was to characterize and assess the impact of an eHealth portal on health care professionals' interaction with patients in bariatric surgery. (paragraph "Objective")

By providing an eHealth portal to patients in a bariatric surgery program, health care professionals can observe patients' writings and revelations thereby capturing patient challenges and acting and implementing measures. Interacting with patients through the portal can prevent dropouts and deterioration of patients' health. However, professionals report on organizational challenges and personal constraints related to communicating with patients in writing online. Further development of guidelines and education of health care professionals about how to handle, prioritize, communicate, and facilitate patients online is required. (paragraph "Conclusions")

Social media can therefore comfort a person who encounters a challenge, such as a farmer undergoing a phase of transition, who encounters problems and thus becomes discouraged. By being present, community members can function both as a form of technical assistance and as resource persons who boost farmers' morale. Similarly, through the portal, physicians can observe patients' discomfort and therefore interact with them directly without requiring an appointment. Moreover, the use of a social media platform can change the contents of the interaction between a physician and a patient—the same is true in the context of agroecology. Social media enables a postponed response, which allows individuals to address questions more efficiently. In addition, social media engages professionals to be responsible for what they write and encourages them to provide high-quality responses.

As presented by Garrett et al. (2016), with regard to HIV/AIDS, "some of the most affected sub-populations include men who have sex with men (MSM), male and female sex workers, injecting drug users, youth (aged 15–24), and women. (page 56,)" According to these authors, a barrier to HIV

prevention is HIV-related stigma, which is related to negative attitudes and behaviors that discourage people from accessing HIV-related information and services. This attitude “leads to individuals who are unaware of their HIV status, not in treatment, and continuing to engage in high-risk behaviors that sustain the epidemic. (page 56)” A number of public health researchers and practitioners have begun to explore the potential of using online social networks and online communities to deliver health information and services. An important discovery reported by this work is that social media is especially suited for disseminating information on sensitive topics (e.g., sexual risk) and stigmatized diseases such as HIV/AIDS:

The freedom to access information and services at any time/location, along with a degree of anonymity, allows some of the stigma and discrimination associated with the disease to be avoided. (page 57)
In addition, social influence is a primary facilitator in behavioral change. (page 57)

The parallel that we can draw between the results of this study and farmers is as follows: Farmers who can access social media to collect information concerning the agroecological transition do not have to focus exclusively on content spread by the most popular social networks. While some social media platforms may appear to be less well known and less used, they can still offer a significant amount of relevant content. It is thus necessary to be very familiar with the entire digital landscape. In the event that studies are conducted to investigate farmers who wish to engage in agroecology, it would be necessary to represent farmers who have been farming in this manner for different periods of time. Specifically, each farmer has his or her own goals, which are defined within a context that varies in terms of the associated constraints. As a result, subpopulations of farmers who are engaged in the transition can emerge and should therefore be considered relevant to study.

Holt and Graham-Phillips (2017) noted that “African American faith-based organizations (FBOs) can play an important role in addressing health disparities. Increasingly, churches offer health fairs, screenings, or education through health ministries. However, little is known about linking these organizations with evidence-based interventions (EBIs) developed by research.” (page 1). This article furthermore proposed that the Internet could serve as a vector for transmitting this knowledge, but it cautions that some people—particularly older adults—face obstacles when using digital tools. The study therefore highlights the need for human contact alongside the use of digital tools. Knowledge transfer from research centers or technical institutes to farmers is essential. For example, knowledge management tools were developed in the context of the Ecophyto plan, such as EcophytoPIC or the GECO semantic tool (Hirschy et al., 2018; Soullignac et al., 2019). However, if different target audiences are to understand how to find information using these tools, the learning associated with the tools must be adapted to those audiences. For both farmers and agricultural advisers, assistance combined with physical presence during the use of these tools could be useful for enabling their adoption by the end users.

According to Langenfeld and Barta (2017):

When utilized properly, social media offers several personal and professional benefits for the practicing surgeon, including peer networking, education, e-mentorship, marketing, recruitment, and patient outreach. However, unprofessional online behavior is common among surgeons, and this improper use of social media can be quite dangerous. This article reviews the dangers of social media and illustrates this with examples of unprofessional behavior and the associated consequences. It also provides recommendations for maintaining a professional and productive online persona. Surgeons must understand the various social media platforms and their target audience while upholding online professionalism at all times. (page 264)

This article examines the general principles underlying social media use. These principles can also be applied to agroecology and can therefore be adopted in their current form. The article provides advice that is directly applicable in this context, such as fully understanding how social media functions,

verifying that the person disseminating information is actually visible online, or considering the target audience of the content that this person is to share online and adapting that content to suit this intended audience.

McLoughlin et al. (2017) emphasized the facts that:

Current methods of education have arguably failed to overcome inequitable health systems lacking universal health coverage, due to their curricula rigidities, professional silos and limited adaptation to local context. This failure is especially evident within primary care where the need to break down professional silos via interprofessional education (IPE) is necessary. (section “Introduction”, paragraph 1)

Moreover, they noted that the findings of previous research show that a key approach to supporting IPE and IPC [interprofessional collaboration] has been the use of communities of practice. Despite the emergence of virtual communities of practice (VCoPs), little research has been conducted to investigate the benefits of these communities when applied to IPE and IPC. This article therefore aims to explore the literature concerning VCoPs to determine their potential use for supporting IPE and IPC. Furthermore, it states that “tools such as discussion forums and social networks have been reported to offer virtual environments where VCoPs can take place, allowing members from different geographical locations, different professions and different levels of experience to collaborate within a community.” (section “Results”, paragraph “Technological infrastructure”). VCoPs could allow farmers to interact with one another independently of their work philosophies (whether focused on conventional, organic, conservative, or sustainably intensive agriculture, agroecology, etc.). Without discrimination or a hierarchy of participants, all types of content could be addressed. Nonetheless, to encourage more active participation, it would be necessary to create subgroups that discuss only a single topic. Like any users of social media, farmers must be respectful of one another, place their trust in one another, maintain the confidentiality of discussions, and not dedicate an excessive amount of time to acquiring the knowledge necessary to use social media (which is facilitated by the use of the same type of social media in both private and professional life). The benefit of using social media lies in the fact that communication via this medium can be asynchronous and take place anywhere, for example, at the farm or in the field.

According to Partridge et al. (2017):

A sizeable proportion of the burden of CHD [coronary heart disease] is avoidable by targeting modifiable risk factors such as tobacco use, high blood pressure, physical inactivity, poor diet, high body mass, and alcohol use. Furthermore, attendance at group-based cardiac rehabilitation programs improves risk factors and subsequently reduces recurrent events. Despite the benefits of cardiac rehabilitation, a vast majority of eligible patients, particularly those aged over 65 years, do not attend in-person services because of geographical barriers, misconceptions, scheduling of programs, and conflicting demands. (section “Introduction”, paragraph 1)
[Using a survey format,] this study aims to describe cardiac rehabilitation patients’ social media use; and among current users, their experience and perspectives on using Facebook to support their cardiac health through secondary prevention. (section “Introduction”, paragraph 5)

It identifies three components that characterize the use of social media in the context of medicine: motivation, opportunity, and apparent capability. These three components can also be applied to agroecology. Social media use by an individual depends on his or her personal motivation for such use, his or her capability/aptitude regarding such use, and the opportunities presented to him or her. Social media use can thus be better or worse, easier, more challenging, or more or less frequent. At

present, in the context of a change in the system, we wonder whether it is necessary to encourage farmers to interact with one other (and to encourage the oldest farmers to communicate with the youngest farmers) with respect to social media, its use, the attitudes that should be adopted in this context, etc. If the appropriation of such media turns out to be interesting, then it would be necessary to study the conditions under which this use can be optimized.

As shown by Ponsford et al. (2017), the need to transmit public health knowledge to stakeholders in the field is widely acknowledged. Digital tools could serve as a medium for this transfer of knowledge. However, little research has been conducted to investigate the use of new digital tools by VCoPs. This study explores the reasons why potential users do not employ a digital information tool that is nonetheless appropriate for their needs. The main reason indicated by this study is that users already believe that they have access to good knowledge translation tools. Using a new piece of software and the associated resources requires users to spend time that their professional life does not always allow. The group studied is a community of practice (CoP) consisting of public health professionals that focuses on the topic of preventing alcoholism. Candidates were selected from community members who had previously received printed documentation. The authors allowed volunteers from this CoP to access a website that provided knowledge concerning the harmful effects of alcohol. The users used the new online information tool if it offered a competitive advantage. The tool had to provide relevant, well-summarized, and easy-to-access information. Users are continually afraid to invest time in learning a new tool when they already possess functional applications. Their professional time is limited, and they cannot allow it to be wasted. The social media market can become saturated, and a new tool may not find a user base. In agriculture, the social media market also offers numerous tools. In this case, the use of digital tools similarly follows the law of competition. A farmer or agricultural adviser may fail to make use of a new tool due to the risk it represents, in particular, the risk of wasting his or her time. Beyond the level of individual behavior, the success of a tool depends on the involvement of a network of actors that exists prior to the emergence of the tool. Therefore, a market study of targeted communities must be undertaken systematically prior to any software development.

Prybutok (2013) evaluated the effectiveness of viewing YouTube videos on the prevention of sexually transmitted diseases (STDs) among students aged 18–24. The effectiveness of video tone was evaluated by comparing videos featuring a light and casual tone to videos that were much more formal. Students responded to a survey in the form of a test to evaluate their knowledge of STD prevention. Some participants responded prior to viewing a YouTube video on the subject, while others responded after watching the video. The survey also asked them to rate the videos' effectiveness in terms of prevention. Students viewed either a video presented in an entertaining format featuring a casual tone or a more formal video involving health professionals. The following elements were compared (in a combined sample): (a) the scores of participants who responded to the survey prior to viewing the video versus those of participants who responded afterward and (b) the scores of participants who viewed the formal video versus those of participants who viewed the video with a more informal tone. On average, viewing the two videos enabled an increase in scores. In total, 60% of participants in the formal video group and 67% of participants in the informal video group believed YouTube to be a good media platform for STD prevention. A large proportion of the participants in both groups identified the fact that the video was created or presented by health professionals to be a determining factor with respect to the relevance of the knowledge presented. This methodology is interesting and can be applied to other contexts, such as agroecology. Performing knowledge tests before and after media use is interesting, including in the context of agroecology, to identify the impact of media on knowledge. In the case of agroecology, this approach would need to be applied to a highly specialized subject (to facilitate conducting a test). Furthermore, it is important to be aware of the initial knowledge levels of all participants to assess changes in such knowledge. Analysis of tone (formal versus informal) could also prove to be useful. In addition, this comparative approach could be used to understand the impact of the transmission of knowledge in accordance with the

formats used to convey content (videos, files, etc.) as well as the associated communication channels and types of transmitters (such as transmission by an advisor or another farmer).

Sharma et al. (2014) presented a survey of 52 patients regarding their social media use for preventative purposes (via the presentation of behaviors that are conducive to good health or vaccination campaigns). The study investigated whether patients used Facebook or Twitter pages related to clinical medicine, whether the patients agreed to be vaccinated as a result of the information posted on these pages, and whether this preventive measure was effective. The authors make several recommendations for designing a social media page: (a) avoid pursuing too many types of goals (make a Facebook page focused on a single topic); (b) allow bidirectional communication (i.e., between professionals and patients) by authorizing patient posts, even if accomplishing this goal requires moderation; and (c) seek the assistance of a specialized third party when designing the social media page. This study shows that prevention via social media is both relevant and an influential factor in the case at hand. We can draw a parallel between the effects of Facebook and Twitter pages related to clinical medicine (with respect to good health behaviors) and a similar system in the case of agroecology. It could be interesting to study the rate at which this type of system is used, as in this article.

According to Wittenberg-Lyles (2015):

Although hospices are required to provide caregivers with formal bereavement support when their loved one passes, most bereavement interventions lack standardization and remain untested. The Dual Processing Model of Bereavement was used as a theoretical framework for assessing the potential of a Secret Facebook Group for bereaved hospice caregivers. (page 351)

The caregivers included in this study did not know one another, and their participation in the group lasted 3–6 months. The study analyzed the online communication of these caregivers in terms of their posts and comments. Measures of stress and depression were compared at the end of the experiment. Caregivers had much lower levels of anxiety and depression at the end of the experiment. This study therefore highlights the potential of Facebook to support caregivers. Following the loss of their loved ones, the caregivers communicated regarding their suffering and ways of reducing it. The community created a private Facebook group. A small number of caregivers (16) participated in this group for 3–6 months. At the beginning of the study, they did not know each other, but they were undergoing the same experiences simultaneously. The researchers analyzed the content of the posts and the comments they exchanged. They measured caregivers' levels of depression/stress levels at the beginning and the end of their participation in this Facebook group. Communication among caregivers was helpful. First and foremost, it contributed to the acknowledgment of shared pain and thus encouraged people to take the time necessary to mourn. This relatively long period of time might be less tolerated in the context of communication with family members and friends. Moreover, measures of stress and depression declined during the course of the experiment. The sharing of experiences and advice contributed to this decline. The general idea was that people who did not know each other but were undergoing a difficult situation simultaneously could help each other. We can draw a parallel with the agroecological transition. The agroecological transition is not easy and represents a complicated period for farmers. It must be undertaken with a mental attitude that is both constructive and positive. It is necessary to be motivated in situations when the future is partially unknown or may even contain failure. Sharing negative experiences via social media could allow agricultural stakeholders to cope with a difficult period of time.

Young et al. (2013) argued that social networking technologies are an emerging tool for HIV prevention. The authors set out to determine whether social networking communities can increase HIV testing among African American and Latino men who have sex with men. The group studied consisted of 112 people who were supervised by 16 peer leaders. The peer leaders responsible for disseminating the messages were members of the homosexual community under study. All of these leaders were volunteers. The social media platform chosen was Facebook. Two groups were created

and hosted by peer leaders for a duration of 12 weeks. Members of one of these groups received information concerning HIV/AIDS prevention, while members of the other group received general information regarding disease prevention and the maintenance of good health. A free detection kit was offered systematically to members of both groups. In the first group (the group targeted by messages concerning HIV/AIDS prevention), the levels of interaction in the discussion, screening kit requests, and follow-ups with the results were higher than those observed in the control group. Furthermore, high-risk behavior decreased in the first group. The study therefore confirmed the initial hypothesis. The success of this intervention was related both to the targeted content of the message and to the personality of the community-member peer leaders. Farmers who are involved in a change of practices in the transition to agroecology could use social networks to promote this transition to other farmers who are reluctant to take up this challenge. This working hypothesis raises the following questions:

- Who would initiate such a process? The public authorities, members of the agricultural profession, local governments, or cooperatives?
- How can conventional farmers be targeted on social media?
- Who should be selected as peer leaders, and how should they be recruited? Should they be paid?
- What content should be offered, i.e., technical and/or financial?

Carneiro et al. (2020) examined endometriosis, a nonmalignant gynecological disorder that affects 5–10% of women of reproductive age. For a long time:

The need for invasive diagnostic tools, the complexity of clinical presentation, the multiple morphologies of endometriotic lesions, and the lack of well-designed studies with sufficient numbers of patients have hampered research and delayed the diagnosis and introduction of appropriate treatment for the disease. (page 9)

In addition, there is a paucity of published studies on the perceptions the general public has on endometriosis. (page 9)

This study aimed to assess the performance of a Facebook fan page developed by the Endometriosis Multidisciplinary Team of the Federal University of Minas Gerais to communicate reliable information on endometriosis and pelvic pain. (page 9)

[Moreover, the researchers] searched Facebook for fan pages using keyword “endometriosis” and found pages in Portuguese, English, and Spanish. Relevant pages were selected, obtaining the following data: country of origin, authors (healthcare provider, medical doctor, or lay people), number of fans, number of posts, and posting frequency. (page 10)

This article emphasizes the fact that although the use of social media to provide information is common, health institutions remain hesitant to employ this method. Specifically, medical doctors do not always agree with online communication or its use in day-to-day practice. However, other studies have shown that the general public relies on such online information and often uses the Internet as a primary source of information. The goal of social media use in this context is not to view the internet as a substitute for professional medical advice but rather to understand it as a means of gathering more information concerning one’s health, playing a more active role in one’s own care, and improving communication with one’s doctor. With regard to the agroecological transition and the problems it poses, actors within the agricultural knowledge system could usefully identify the most frequently read subjects and those that are most frequently “liked” on social media or examine people’s expectations regarding these subjects to attempt to identify the go-to people who are able to answer these questions and attempt to understand why these individuals participate or do not wish to participate on Facebook to provide answers. In parallel, it would be necessary to identify the status of each author and participant to understand the connections among them. One possibility would

therefore be to create an inventory of Facebook pages pertaining to a subject linked to agroecology with the aim of exploring which of these pages are active and why as well as identifying the potential connections that can be established among them.

Fischer et al. (2019) indicated that, in South Africa, 5.5% of the population has diabetes, and 9.9% of the population is considered to be prediabetic. Low-income communities are the most vulnerable to this disease due to risk factors such as an unbalanced diet, a lack of physical activity, or a general lack of knowledge regarding this disease. The objective of this study was to determine how health platforms can be paired with education pertaining to the risk factors associated with diabetes to empower these communities to prevent or manage the disease more effectively. Several communication tools were studied, including television, radio, newspapers, and social media. Given that the mobile phone market has extended to 68% of the population in South Africa, it is possible to estimate that up to 90% of smartphone users regularly use at least one app-based messaging service, such as WhatsApp or Facebook Messenger. The top two most effective media for disseminating information are television and WhatsApp, but other mobile-based media have been associated with statistically significant results. According to one perspective, users can be offered a multifaceted approach to health: the acquisition of information should not rely solely on a single method of transmission. In addition, traditional broadcasting methods such as television, radio, and newspapers can be used, since these methods have also exhibited significant correlations with several risk factors. These traditional media generally offer only one channel of communication. Perhaps they should be used as a tool to redirect users to interactive health platforms. Ultimately, traditional platforms remove barriers that prevent users from accessing platforms and improve user experience. Although social networks have implemented multiple initiatives to disseminate health information to various populations, few of these initiatives have focused on noncommunicable diseases such as diabetes. With respect to these initiatives, it can be seen that health applications and platforms can induce changes in behavior. However, to ensure the acceptability of these platforms to end users, it is necessary to integrate those end users into the design process. The digital field is very dynamic and exhibits constant change. The media in use change in accordance with consumer demand. Therefore, a farmer cannot be satisfied with a single platform or a single medium to share/acquire information. To gather information most efficiently, he or she must ensure that he or she feels comfortable with the platforms on which he or she interacts. More precisely, each platform pertains to very specific subjects. Therefore, the farmer must constantly seek the information that he or she wants and supplement it with additional secondary information that is found elsewhere. This situation implies that the farmer will have to think about ways in which he or she can validate this additional information. Depending on the interest that the farmer may have in social media, it may be necessary to raise awareness of or even provide training for these new tools and ways of validating their content.

As shown by Gatewood et al. (2019), social media has become a cost-effective way to transmit, communicate and respond to public health information. In fact, an increasing number of scientists use social media to share journal articles, promote their views, and spread information, particularly concerning upcoming events. However, scientists and practitioners do not always know how to use social media to disseminate their research results most effectively. This article describes, in a first step, efforts to expand the reach and accessibility of the journal *Public Health Management and Practice* via social media. Subsequently, this article synthesizes dissemination strategies that researchers, practitioners, and public health organizations can use to accomplish the following goals:

- influence the public's perception of this subject,
- improve public awareness of factual information, and
- encourage the implementation of scientific discoveries.

Based on this experience, the JPHMP journal identified the following best practices for disseminating content:

- understand and use appropriate channels to distribute content,
- constantly generate relevant digital content that engages stakeholders,
- use highly visual images or videos, and
- understand the level of effort required by the tool and use resources/tools to streamline processes.

Better dissemination of information can be achieved by combining a web page with a blog. Care must be taken to become familiar with the audience receiving this information so that it can be made relevant to their expectations. In addition, sharing reliable, consistent, and well-argued information with this audience increases the recipients' level of awareness of the issue of agroecology and, therefore, their interest in this type of agriculture, especially if they are not yet engaged in the transition themselves.

As indicated by Ho et al. (2019), liaison psychiatry is a specialty that intervenes at the intersection of psychiatry, general medicine, surgery, neurology, obstetrics/gynecology, and pediatrics. For several decades, liaison psychiatry programs have used traditional teaching methods: didactic lectures, article or journal reading, and textbooks. However, due to the advancement of technology, the available resources and styles of learning have changed. Indeed, a growing number of students take advantage of these new ways of learning and teaching. For this purpose, they use simulations, communication applications, and social media (Facebook, Twitter, YouTube, Instagram). Based on this observation, the objective of this study was to examine (a) how each of these pedagogical methodologies fits into the theory of adult learning and (b) how digital users can learn more about liaison psychiatry.

A 2017 study estimated that 88% of practitioners and nurses use social media. In addition, several studies highlight the fact that the use of social media requires the following:

- an ethically and professionally thoughtful approach in relation to the responsibility of the doctor and
- preservation of the private lives of patients (confidentiality) as well as their images in the event that videos are shared among practitioners.

Experiments have shown that Twitter and Facebook can be used for medical education. Twitter was linked mainly to newspaper articles and references that were tweeted. Facebook, on the other hand, receives more interest as it is possible to create closed groups on this medium. These online communities allow practitioners to interact with their peers in private virtual spaces. Based on these exchanges, they can discuss clinical subjects, learn from each other, and exchange documents (articles and presentations). More generally, these social media represent an opportunity to educate the general public regarding topics such as mental health. In addition to social media, mobile computing devices also allow practitioners to provide remote consultations to people with insufficient transportation. Specifically, in the context of liaison psychiatry, the acceptability of social media is clear even if the evidential foundation of its use in teaching the discipline remains lacking. A farmer who wishes to train in or learn more about agroecology can identify the closed Facebook groups that relate to this subject and request to be added to these groups. Once he or she becomes integrated into the community, it becomes possible to do the following:

- encourage exchanges with peers,
- share successful or unsuccessful experiences, and
- engage in an apprenticeship either in the role of an apprentice or in that of a learner.

According to the study conducted by Kite, Collins, and Freeman (2019):

Facebook is the largest social media platform, so it is unsurprising that public health groups are using Facebook to deliver campaigns. However, assessing the contribution of Facebook to campaign impact requires different approaches to traditional campaign evaluations.

[The paper therefore] report[s] on [the] use of Facebook as a recruitment tool for the evaluation of a public health campaign by the New South Wales (NSW) Government in Australia, the Make Healthy Normal (MHN) Facebook page. (page 1)

[In this study, the authors] recruited NSW adult Facebook users to complete an online survey about why users have “liked” the MHN Facebook page, how often they engage with MHN and other similar Facebook pages, and their opinions about the page. (page 1)

In the field of agroecology, stakeholders in the agricultural knowledge system could analyze (a) the reasons driving farmers who are involved or who wish to become involved in the agroecological transition to consult or like certain Facebook pages rather than others; (b) the frequency with which they consult these pages; (c) their feelings regarding these methods of awareness-raising/mobilization; and (d) the consequences of such consultation in practice. These online evaluations lead to the following difficulties:

- What should the participant selection criteria be (in terms of age, income, and type of farm)?
- What is the participants’ level of involvement in the agroecological transition?
- How can Facebook users be motivated to answer these questions?

Kite, Grunseit, and Li (2019) aimed to investigate usage of and engagement with the MHN [Make Healthy Normal] Facebook page and to identify influential factors in driving engagement with the page (e.g., likes, shares, and comments). The impact of posts was compared with the impact of follows. Posts reached a large audience via the MHN page; however, a follow causes the follower to become more involved with these pages and thus to become more engaged in promoting the campaign. A good communication strategy is based on advertising that is calibrated to reach the maximum number of people but also on-page content that is relevant and capable of prompting word-of-mouth marketing, thus increasing the level of engagement among internet users in support of the campaign. The MHN campaign provides knowledge concerning the benefits of physical activity, healthy eating, and weight management. Internet users can interact with this content in the ordinary ways offered by Facebook. With respect to the parallel between this study and agroecology, we could ask whether it is possible to take financial steps to boost information on Facebook pages promoting agroecology in the newsfeeds of farmers who are present online.

Zellner et al. (2019) discussed the promotion of a webinar by Twitter, following which the authors present statistics concerning the follow-up to this webinar. The webinar focused on information regarding new health regulations in the US and requests for feedback prior to their implementation. The people who registered for this seminar were mainly medical staff and academics. Interactions between these participants occurred during the webinar. As part of a citizen’s approach, the public can comment on new regulations before they are implemented. This approach could be applied in the context of new regulations related to agroecology.

Lam and Woo (2018) reported previous findings that:

Research in fall prevention programs has increased in recent years in response to the aging demographics of the United States. (section “Background”)

[It notes that] Facebook was able to directly target the advertisement to the desired older ethnic population at a low cost. Engagement was highest among females and among those aged³ 65 years. Hence, our results suggest that Facebook can serve as an alternative platform for dissemination of health information to geriatric patients in addition to print-based and face-to-face communication. (section “Conclusions”)

On a Facebook page published in Cantonese, an advertisement was shown to Internet users. This advertisement contained a hyperlink to a 37-minute-long YouTube video pertaining to fall prevention. The communication featured a top-down format, such that it was directed by the medical

profession to the community under study. No interaction regarding the video within the community was established. The advertisement was published on a Facebook page for 48 hours. The authors counted the number of clicks and measured the duration for which internet users viewed the video. Finally, they studied the profiles of the people in question, in particular with respect to their gender and age. For example, digital messages in the form of advertising can also convey messages intended to promote the greater good regarding the agroecological transition. Advertisements on social media can target population categories as necessary.

Majmundar et al. (2019) highlighted the fact that vaping poses significant health risks. Can social networks be exploited to identify public places in which vaping is practiced? This study references discussions of this practice on Twitter during 2018. It thereby identifies several such spaces, including shops and modes of transportation. These locations, once known, are relevant for disseminating prevention messages. By focusing on keywords relevant to vaping, the initial sample includes over 11 million tweets. After cleaning the data to eliminate retweets, non-English tweets, promotional tweets, etc., the final sample includes 290,000 tweets from approximately 200,000 users. Using a list of keywords, the authors measure the public places that are most frequented by vapers. Eleven types of places are thus identified. The frequency of vaping in such places is calculated. Functions offered by Twitter allow its users to process a very large amount of data. These functions, such as filtering and sorting, make Twitter a potential tool for producing knowledge. Can this powerful social network be used to generate knowledge for agroecology pertaining to the tweets posted by farmers and agricultural advisers?

The goal of the study conducted by McElfish et al. (2019) was to contribute to the development of health education among people with diabetes living in the United States by determining the cultural appropriateness of a video posted on YouTube. The contents of this video convey a prophylactic message pertaining to best practices for diabetic patients. The video was created using a participatory approach involving this community of patients. Watching the video results in a positive impact on patients in terms of their levels of knowledge, everyday practices, and health. The content of the video consisted of a message describing the benefits for diabetic patients of good daily habits, such as regularly measuring blood glucose levels, the importance of maintaining an appropriate diet, and physical activity. The content of the video featured a top-down format, such that it was directed by members of the medical profession to patients. In surveys conducted via paper questionnaires and/or face-to-face communication, patients provided their opinions regarding the relevance of the video, its impact, and the resulting changes in their behavior. The authors thus measured changes in the behavior of diabetic patients before and after watching the video. As a result, health education concerning best practices for diabetic patients increased in patients who had watched the video. Improvements in health as a result of these behaviors were measured objectively using blood glucose levels. Since a message of this sort must use a vocabulary and cultural references that are familiar to its target audience to be effective, farmers involved in agroecology represent the best situation to co-construct, alongside other agricultural stakeholders, a positive message regarding their practices that can be directed at conventional farmers. A video message offers the advantage that it can be watched at any time and as many times as necessary (as long as the video remains available on social media). Thus, are videos an effective means of transferring knowledge regarding agroecology to promote behavioral changes?

Nikolaou et al. (2019) analyzed the use of lifestyle applications for young people. It specifically examines the use of smartphone applications to raise awareness among youth regarding issues of excessive weight. The young people included in the study were drawn from 6 different countries, and all participants spoke English. Participants were divided into two groups: Group 1 was composed of 610 teenagers aged 13–17, and Group 2 was composed of 1,675 young people aged 18–24. These volunteers were recruited via targeted advertising on Facebook and therefore did not know one another. The survey focused on their lifestyles, potential weight issues, and/or these same issues with respect to their family members; the study also collected their smartphone application preferences. Following the online survey, online interaction was encouraged in smaller groups, in which context participation remained voluntary and anonymous. Communication was not always instantaneous,

given the differences in time zone across the six countries. A moderator was present to moderate interactions. The intervention did not include videos. To compensate for the lack of in-person interaction and nonverbal communication, the users were allowed to include emoticons in their messages. All participants completed an online survey, and a subset of participants subsequently agreed to interact within a protected and moderated online space. The data were processed using typical statistical analysis tools. An analysis was conducted to investigate the content of interactions, in particular, the main topics of discussion. The types of emoticons associated with different texts were also analyzed. Smartphone use, as opposed to the use of computers, should be taken into account as a relevant factor, given that smartphones, unlike computers, are always accessible. In agroecology, smartphones allow users to optimize their available time, and levels of smartphone use among farmers are very high, as confirmed by a study associated with the AGOR@GRI project. An application developed for desktops should therefore always be adapted to a mobile format (i.e., in terms of responsive design). Moreover, as indicated by this article, an application containing written interactions must also feature emoticons, as they partially compensate for the absence of nonverbal information that is normally available during in-person meetings. Any application developed in this context should first address the preferences and needs of the target audience.

Pierbon et al. (2019) examined the state of health among men who have sex with men (MSM). The survey used in this study was voluntary and anonymous. Participants were recruited via Facebook or dating applications. The results show the need to implement global prevention strategies for sexually transmitted infections (STIs), which must include the development of applications intended to raise awareness of necessary STI screening and condom use. The tools regularly used by survey participants—Facebook and dating applications—were used to recruit them. The survey was conducted between June and August 2017. Anonymity was essential, as members of the LGBT community remain ostracized to some degree, and to avoid becoming embarrassed in front of a doctor or researcher, they often do not disclose all relevant information. The results were obtained using descriptive statistical and multinomial logistic regression tools. By advertising on platforms such as Facebook, online tools can allow specific audiences to be reached at a lower cost. In this study, no interaction took place among the members of the community under study; nevertheless, knowledge was produced, partially because the survey ensured the anonymity of the volunteers. Farmers do not necessarily wish to discuss the problems that they have faced, essentially due to a desire to preserve their digital image. However, this type of feedback can be very useful in advancing agronomic knowledge, for instance, by specifying the context in which certain agricultural practices should be used. Social media can thus be used to conduct surveys of agricultural practices targeting stakeholders who have implemented these practices successfully as well as those who have failed in this task. Anonymity may potentially be a requirement for success with respect to obtaining results that are as complete as possible.

Pretorius et al. (2018) analyzed communication pertaining to sudden infant death syndrome (SIDS) on Twitter in the United States. A semiautomated textual analysis of tweets was conducted to reveal the main topics of discussion in this context. The main influencers were listed in the article, which examined discussions of SIDS by the Twitter community. The study showed that the most important influencers of such discussions were news companies, universities, and large organizations. The authors criticized the lack of public health authorities on Twitter, even though the topics identified by the tweets referenced by the study (in theory, the topics that most interest people) could be very useful for them with respect to targeting their communication. Contradictory information was detected across various tweets (e.g., “vaccines cause SIDS” versus “vaccines do not cause SIDS”). This discussion also highlights the importance of promoting good baby sleep practices (such as with respect to the products sold, including bedding). In the context of agroecology, it would be interesting to study tweets produced by important influencers, who often—by definition—focus on subjects that interest target audiences to understand the subjects that are debated in this context. This approach can also be applied to other types of networks (forums, etc.). Public authorities could also intervene on social media to disseminate messages regarding agroecology.

Woo et al. (2019) studied South Koreans who were assigned to three groups (68 people in total): (1) a group receiving education to improve their lifestyle (in terms of nutrition, physical activity, etc.) by using social media alongside health professionals and other people (e.g., other participants) to communicate on the subject of health and to create competition among participants with respect to best practices; (2) a group receiving an education but that did not use social media; and (3) a group that did not receive an education. The education took place over a period of several weeks. Participants were randomly assigned to a group. At the end of the study, the health of the first group (i.e., the group using social media) was better than that of the other groups (in terms of body mass, cholesterol, triglyceride, etc.). The data pertained to good behaviors from a medical perspective. Communication also took place in chat mode. A social media activity score was assigned to each participant based on the number of documents that he or she viewed and the number of photos and comments that he or she posted. The social media platforms used for chatting and posting messages and photos were those normally used in South Korea, namely, KakaoTalk, eMate ON, and Naver Band. A medical center intranet provided health information. It thus appears that social media fosters motivation in the people who use it (by way of scores, the sharing of information, competition, etc.) to follow a healthier lifestyle. The parallel with agroecology would therefore lead us to compare the differences in success among farmers engaging in an agroecological approach. Nonetheless, some farmers use social media, while others do not. Such a comparison would require a highly targeted experiment to be relevant. Moreover, in agroecology, indicators of success could be more complicated to determine, and the results obtained for two farmers could be more difficult to compare. Furthermore, farmers would need to find some degree of fundamental utility in this comparison, which cannot be taken for granted.

Ure et al. (2020) analyzed the use of social media to self-manage health care when living with and beyond breast cancer and its aftereffects. Breast cancer survival rates are improving, but simultaneously, structural health resources are facing increasing demand. As a result, health professionals expect people living with and beyond breast cancer (LwBBC) to manage certain aspects of their own care. This study aims to explore the ways in which women use social media to manage their own psychosocial needs and to support self-reliance across the breast cancer continuum. The experiences of 21 women (aged 27–64) were explored using an in-depth qualitative approach. The use of multiple social media platforms, such as YouTube, Facebook, WhatsApp, and Twitter, has enabled women to manage certain aspects of their care independently by allowing them to obtain timely, relevant, and appropriate support for their needs. They can engage in exchanges with people who have experienced the same diagnosis and treatment, thus allowing them to (re)gain a sense of control. The women referenced in this study describe the extension of their daily use of multiple platforms to the context of some aspects of their care. However, these women experience social media as both empowering and dislocating. They also develop strategies for using these social media platforms based on their usefulness and the well-being they facilitate. Health professionals (HCPs) must be more aware of and open to the possibility that women use multiple social media resources as self-management tools. It is important for health professionals to initiate discussions and create space for such woman-to-woman sharing. The agroecological transition is a professional challenge. It generates a large number of experiences, doubts, and successes, but it can also lead to failures. Messages are exchanged without filters among farmers who do not know one another. Unlike interactions with farmers who are located geographically close to one another, the fear of judgment is much less of a factor. Treatments for breast cancer patients may vary, and the same may be true of agricultural operations across different pedoclimatic contexts. These debates allow us to take a step back and promote a better understanding of the mechanisms underlying agricultural production as well as to produce new ideas. These exchanges also provide comfort to people who are professionally close to one another. Such exchanges also give meaning to their work, and positive or negative feedback can be shared usefully with other professionals.

As shown by De La Garza et al. (2021), despite the increasing use of social media in health care, the impact of such media impact on skin cancer prevention has not yet been sufficiently documented.

This publication is a scientific literature review on the subject. The platforms studied are Instagram, Twitter, Facebook, YouTube, and TikTok. These social networks vary not only in terms of their preferred targets and messaging strategies but also in the reliability of the information they transmit regarding skin cancer and the damage that can be caused by the sun and artificial tanning due to ultraviolet radiation. The results of the study demonstrate that social media interventions have shown promise with respect to the prevention of skin cancer. The number of such interventions continues to increase day by day. Dermatologists must be more adaptable and use social media to convey the right message to the right audience. However, further research is needed to assess the effectiveness and real impact of social media on skin cancer prevention by promoting meaningful and sustainable behavioral change in the target population. Social media has both a negative and a positive impact on farmers. This influence can be negative, such as when companies use social media to promote phytosanitary products without showing their toxic aspects. However, it can also be positive, such as when exchanges between farmers and agricultural advisers lead to new agroecological solutions to combat bioaggressors. However, the real issue pertains to the reliability of the source of such information. Exchanges are relevant only in the context of people and structures exhibiting trust toward one another. This trust is the foundation of the effective dissemination of knowledge that is relevant to the agroecological transition. Stakeholders in agroecology must therefore invest in social media to develop this climate of trust and promote the dissemination of messages promoting agroecology.

Dimanlig-Cruz et al. (2021) showed that messages related to physical distancing measures were posted on social media by Canadian public health entities during the COVID-19 pandemic. Some of these messages targeted youth aged 16–29. As indicated in the paper, this category of the population tends to engage in risky behaviors. Different metrics have been used to evaluate such interactions on social media quantitatively: for example, the number of reactions, shares, and comments on Facebook or the number of favorites, retweets, and replies on Twitter. Very few videos explicitly targeted youth (approximately 5% of the total). The explicit post with the highest number of interactions was a YouTube video (featuring 913 interactions, including views). The implicit post with the highest interactions was posted to the Toronto Public Health Instagram page. The authors highlight the importance of choosing a platform to support various types of posts (graphics, videos, and text). They also show that it is important to address the youth explicitly in such messages, since this population exhibits the highest level of behavioral risk. The parallel to agroecology is direct. It is also necessary to target such messages to high-risk populations to make these people aware of the problems (e.g., the danger of the intensive use of phytosanitary products). In this case, the target can be people who use the highest quantities of phytosanitary products. In addition, this message can also be spread widely throughout the population. Combining different types of posts is also important.

SUMMARIZED ANALYSIS OF RESULTS

By summarizing the general lessons learned in the field of preventive medicine and the analysis of these results, we show that the information of interest that we extracted from the 32 articles reviewed can be grouped into five main topics:

1. Building social media,
2. Using a social media page properly,
3. Building a digital image,
4. Sharing and building knowledge using a social media page,
5. Providing help and/or learning to users.

These subjects can be extrapolated to apply to stakeholders in the agricultural world and the agroecological transition. We detail these five topics below.

Building a Social Media Page

Collective Construction

Developing a social media page is a collective process. Multiple stakeholders must be involved, including potential end users (farmers, technicians, scientists, etc.) or one or multiple third parties specializing in the design of digital tools. By involving potential future users of this social media page in this process, designers can clearly identify the community that is to consume the information posted. Developing a social media page requires the developer to ensure that the community that is to consume the information published on a given communication channel is clearly identified and that the information that is published addresses the expectations and/or needs of this audience (Gatewood et al., 2019). According to Sharma et al. (2014), one recommendation to communicate more easily on social media is to not attempt to address too many topics in a single discussion group, instead creating as many pages/groups as there are topics. According to Young et al. (2013), the proper use of media is based both on the targeted content of the message and the personalities of the leaders of the community under study. According to Kite, Collins, and Freeman (2019) and Kite, Grunseit, and Li (2019), a good communication strategy is based not only on advertising that is targeted to reach the maximum number of people but also on relevant page content to trigger word-of-mouth marketing, thus promoting greater engagement in support of the campaign. Designing social media also requires receiving help from a third party specializing in the design of IT tools (Sharma et al., 2014) and/or agroecological skills. To ensure, on the one hand, the acceptability of one or more platforms by the end user and, on the other hand, that changes in behavior are initiated, it is necessary to include this end user in the design process (Fischer et al., 2019).

Adapting the Message Conveyed to the Community

This recommendation focuses on using the community's vocabulary and cultural references correctly. Wittenberg-Lyles et al. (2015) reported that people who are experiencing the same difficult situation simultaneously and who are members of the same community of interaction end up helping one another by exhibiting greater tolerance levels than would be exhibited by a third party not experiencing the same situation. McElfish et al. (2019) reported that developing education based on preventative actions requires the community to be included from the time at which the message is designed. Specifically, based on their study of Marshallese Americans, they report that creating a video featuring a participatory approach that is also recorded in the participants' native language can enable the dissemination of content adapted to this population, which can have a positive impact on patients in terms of their levels of knowledge, everyday practices, and health. Furthermore, Nikolaou et al. (2019) showed that developing a prevention-focused mobile application that uses reliable sources and protects personal data would be suitable for use with respect to the young population that they study. To accomplish this goal successfully, the application would need to be developed in partnership with these young people. Dimanlig-Cruz et al. (2021) also insisted on the adaptation of the content to the target audience.

Making a Message Understandable in Multiple Formats

McLoughlin et al. (2017) reported that, in addition to the fact that social networking websites provide a practical and innovative method of communication, they also have the advantage of being accessible from multiple devices, thus allowing users to work in a more flexible way. Partridge et al. (2017) reported moreover that users use multiple devices and have access to computers (laptops or desktops), tablets, and smartphones.

Using Social Media Properly

Incorporating Social Media Use Into Professional Organizations

Proper social media use requires a variety of parameters to be considered simultaneously. In particular, these parameters include users' ability to use social media properly and to incorporate the use of

such media into their professional organizations. According to Ponsford et al. (2017), users adopt a new online information tool if it offers competitive advantages. The tool must provide relevant, well-summarized, and easy-to-access knowledge. Users are constantly afraid of investing time in learning to use a tool when they already have functional tools; their professional time is limited, and they cannot allow themselves to waste it. If the social media market is saturated, a new tool may not necessarily find a user base.

Identifying the Reliability of the Content Published

Avery et al. (2016) showed that videos—particularly videos published on YouTube—may not provide a complete picture of a situation in its full context. Situations that may have potentially negative consequences are circulated or highlighted less frequently so real risks can be minimized. Langenfeld and Barta (2017) showed that the accuracy of knowledge reported by or regarding a source of information cannot always be guaranteed and that there is no good way of separating fact from opinion in this context. Unlike scientific journals, online content is not always subject to rigorous peer review. Nikolaou et al. (2019) reported that adolescents and young adults are occasionally reluctant to use certain mobile applications due to the limited reliability of the information shared in this way. Conversely, users can trust content when it is produced by their community, even if that content is not subject to rigorous validation. Internet users can also be affected by influencers who encourage them to develop bad habits, such as artificial tanning, without reporting the risks associated with those habits (De La Garza et al., 2021). These influencers are funded by private companies. Their message is thus tailored more to the interests of the company than to any public health policy.

Assessing the Level of Responsibility Borne by a Contributor Who Publishes Information

Questions that are asked online often differ from questions that are asked in person (Das et al., 2015). As a result, professionals are not always prepared for the questions that they receive and are therefore required to request the assistance of a specialist. This situation thus represents a noteworthy challenge with respect to the level of expertise that is required to provide an appropriate answer to patients. According to Ho et al. (2019), when a professional uses social media, this activity must be analyzed on both an ethical and a professional level (particularly with respect to the responsibility that this professional bears when publishing such information). This problem, of course, also pertains to the agricultural world.

Identifying the Level of Confidentiality of the Content Shared

Whether health professionals communicate via social media or simply discuss their habits and those of their peers offline with (future) professionals, it is easy to see that their communication concerning their healthcare experiences (Chretien & Kind, 2014) can occasionally be inappropriate even in cases in which these professionals are identifiable. Langenfeld and Batra (2017) noted that, to minimize the risk of privacy violations, all digital tools have confidentiality settings. However, these systems remain imperfect due to their design and improper use. Any identifiable information pertaining to a patient that is shared via social media, even in the context of a secret group, is a direct violation that could have serious consequences for physicians. Moreover, according to Nikolaou et al. (2019), young people are concerned about the safety of their data when posting information.

Identifying Commonalities

Das et al. (2015) noted that in the context of online communication, nonverbal attitudes such as intonation and eye contact—i.e., body language—are not perceived in the same manner as during a face-to-face conversation. Both physicians and patients must therefore take care to ensure that the person with whom they are communicating comprehends what they would like to say to avoid misunderstandings. In addition to knowledge translation, a real demand for a combination of social

media use and physical contact has been identified (Holt et al., 2017). Moreover, McLoughlin et al. noted that:

While it is important to note that membership of a VCoP can overcome barriers of time/space, relationships are strengthened through the use of face-to-face meetings. Indeed, blending the virtual and real environments has been reported as highly desirable for creating and sustaining effective professional and interprofessional relationships. (McLoughlin et al., 2017, page 11).

These requests for face-to-face meetings are not always desirable. Fischer et al. (2019) argued that acquiring information is not based exclusively on a single method of transmission and that social media can be combined with traditional means of dissemination, such as television, radio, and the press. Woo et al. (2019) reported that communication via social media appears to be capable of providing motivation for its users to change their habits. These authors report that group competition with respect to best practices can emerge in addition to information sharing. Tests of the effectiveness of one method of transmission over another can thus be conducted (Prybutok, 2013).

Building a Digital Image

Developing Sound Knowledge of the Social Media Platform to Be Used

When a person contributes to one or multiple social media platforms, he or she must construct a digital image. To accomplish this task, he or she must ensure that he or she has sound knowledge of the social media platform(s) that he or she plans to use. Researchers have found that both these platforms and online media are constantly and rapidly evolving (Garett et al., 2016). It is therefore possible that users may not be familiar with all of the tools that exist and, as a result, have not yet identified the most appropriate/relevant platform for constructing such an image. Even though social media can be viewed as a medium for knowledge translation, not everybody has access to such a process due to obstacles related to digital tool use (Holt et al., 2017). Gatewood et al. (2019) argued (and I agree) that to convey content most effectively, it is important to identify the most appropriate channels and to understand them before using them. This task requires the possession of the technical skills that are necessary to use the targeted tool. A digital footprint is a sensitive subject of which one must be aware before starting to use a social media platform actively (Nikolaou et al., 2019).

Making a Profile Appear Credible

Since any internet user can create a profile and choose a name and photo (Langenfeld & Batra, 2017), professional or organizational identities can be stolen, and their image can potentially be tarnished. In the context of social media, judgments are made quickly, and this situation can have serious consequences for people's reputations. In the case of agriculture, a social media profile must define the identity of the internet user in question as well as, if this user is a farmer, his farm in its context. Such a profile can enrich social media while maintaining a certain level of protective anonymity.

Analyzing the Information Posted on Social Media

Any professional using social media should remember that once content has been uploaded, a permanent digital footprint is created (Langenfeld & Barta, 2017). As a result, old indiscretions can remain unnoticed for a long time, only to resurface when the individual's professionalism is called into question.

Separating One's Professional Environment and Private Life on the Same Platform

Low levels of social media use among professionals may be related both to their hesitancy to participate in social media for these reasons and to their lack of free time (Adilman et al., 2016). Professionals do not want to be notified of information outside of their working hours. Moreover, professionals

receive little or no training concerning ways of maintaining their professionalism online (Langenfeld & Batra, 2017).

Sharing and Producing Knowledge Using a Social Media Page

Communication and/or information shared via social media can lead to knowledge production and/or translation. Certain requirements must be met if this process is to be successful. Because messages based on scientific content are often transmitted to target communities ineffectively (Holt et al., 2017), social media offers a possibility for knowledge translation. Discussion forums are another format used by communities of practice (McLoughlin et al., 2017; Ure et al., 2020). These technologies involve participants in a dialog featuring asynchronous knowledge transfer, in which both explicit and experience-based knowledge can be disseminated. This knowledge sharing thus makes it possible to determine how such knowledge can be applied in other clinical settings, facilitate collaborative reflection, and be discussed and debated openly. The computing capacities of computer tools also facilitate the creation of knowledge based on a large mass of data (Majmundar et al., 2019; Charles-Smith et al., 2015).

Creating Studies Based on Participants' Anonymity

Conducting online studies via social media (e.g., Facebook) is feasible, especially considering the fact that this process is inexpensive (Kite, Collins, & Freeman, 2019; Kite, Grunseit, & Li, 2019). Special attention must nevertheless be given to the task of ensuring the representativeness of the sample, since the results of this process do not indicate whether social media allows the individual to recruit a sample that is comparable to the samples that can be obtained using other methods. Being able to remain anonymous when volunteering to participate in a survey is an advantage for people who are afraid of leaving a bad impression on a doctor or interviewer in a face-to-face situation (Pierbon et al., 2019). In these cases, the topics addressed are often sensitive, and this research therefore also serves to raise respondents' levels of awareness. This claim holds true for all types of investigations and all types of professionals.

Identifying Potentially Interesting and Useful Influencers for the Target Audience

Major influencers are not always representative of the complete diversity of stakeholders who are affected by a given topic (Pretorius et al., 2018). Moreover, influencers may contradict one another. It is therefore essential to disseminate more factual content on social media.

Providing Supervision and/or Learning

Establishing Multidirectional Communication

When designing a social media page, it is necessary to offer the different parties involved the ability to post information, comments, questions, or answers (Das, 2015; Wittenberg-Lyles, 2015). The goal is not to view the page as a substitute for agricultural advisers but rather to position it as a means of gathering more information, playing a more active role, and improving communication substantially. The acquisition of information is not exclusively based on a single method of transmission (Fischer et al., 2019), as traditional methods of dissemination (e.g., television, radio, or the press) can be complementary to social media.

Encouraging Constructive and Positive Interaction

On a social network, a community directly and openly exchanges emotions and feelings regarding a disease and its treatment. These exchanges are helpful for sick people. It would be difficult to engage in these same exchanges with family and friends because of their emotional impact. Such exchanges would also be difficult for health professionals because they lack sufficient time to respond to these types of patient interactions (Ure et al., 2020). Encouraging constructive interactions within a

community could require a focus on the proper choice of platform moderator (Partridge et al., 2017), as these figures play a central role in the context of social media.

Enabling the Creation of Online Communities/Private Groups

Tools such as discussion forums and social networks have been reported to offer virtual environments where VCoPs can take place, allowing members from different geographical locations, different professions and different levels of experience to collaborate within a community. (McLoughlin et al., 2017, section “Results”, paragraph “Technological infrastructure”)

Social networking sites have been reported to provide an innovative and convenient way for users to communicate, establish and maintain connections with others based on their interests. (Carneiro et al., 2020)

These private online communities enable interaction with peers within a private virtual space (Ho et al., 2019), thus allowing people to discuss technical subjects, learn from one another, and share documents (articles, presentations, etc.).

Establishing a Climate of Greater Trust and Confidentiality

McLoughlin et al. (2017) noted that many of the included papers (in their study) report that a large proportion of VCoP members function in the role of ‘lurkers’ (members who do not actively participate). These discreet participants participate only very rarely for various reasons, such as due to a lack of trust in other members, a lack of experience, or a lack of legitimacy. Solutions must therefore be found to increase the involvement of these lurkers. To accomplish this goal, trust must be fostered among members or certain topics must be addressed so that lurkers feel more involved and able to participate. When adopting one or multiple social media pages as a platform for VCoPs, one must be aware of ethical considerations and concerns regarding trust among members (Charles-Smith et al., 2015), confidentiality, and the security of the content to be shared.

Encouraging Reciprocal Learner-Apprentice Interaction as Much as Possible

According to Ho. et al. (2019), “adult learning theory is based on several underlying assumptions”, in which context they note that “adults have a bevy of learning experiences on which to draw” and that “they have a readiness to learn as they understand the value of education.” At present, driven by their desire to “take part in directing their own learning”, adults tend to make more use of learning technologies/methodologies. It is therefore important to implement training based on real-life scenarios in which these learner-apprentices can interact with one another.

Participating in Citizen Exchanges

In Zellner et al. (2019), participants provide their opinions concerning a piece of draft medical regulations presented by the public authorities during a webinar. Social media can help implement regulations and take into account the critical perspectives of field professionals. The latter can apply their professional knowledge and contribute to the pragmatic enrichment of these texts.

CONCLUSION

In this article, we reference a bibliography consisting of articles pertaining to social media in the context of preventive medicine to identify the commonalities between this field and agroecology. First, we discuss articles describing the latest research and the lessons they offer for agroecology individually. We then conduct an analysis by grouping information extracted from the articles according to the main ideas they convey. Our analyses highlight the points drawn from the field of preventive

medicine that seem to be fruitful for the agroecological transition. It is interesting to examine the ways in which ideas presented in one domain can be applied to another.

We also uncover certain discrepancies. Social media are often used in medicine to prompt changes in behavior, such as a shift to a healthy lifestyle. These health policies occasionally even go so far as to employ advertising messages (Lam & Woo, 2018). Such a top-down approach is impossible in agriculture. If a farmer engages in the agroecological transition, he or she must change his or her cropping system while taking into account the technical details of each crop. This process therefore requires an overall reflection on the farm's operation that goes well beyond a few occasional changes in attitude.

This discussion highlights multiple avenues for future research. First, it would be useful to produce a fuller picture of the latest research concerning social media use in agroecology to supplement the present study. For example, the papers presented here are written in English, but approaches to preventive medicine can vary greatly across countries and continents. Papers written in other languages can enrich our analysis. Moreover, given the ongoing evolution of technologies and practices, our research must be updated on a regular basis. It would be useful to complete a large-scale survey of social media use across different domains. This approach would allow us to collect information concerning practices and to identify the extant ties among different fields. Comparing these different domains highlights interesting avenues for future research. This approach should allow different fields of application to provide valuable information to one another.

ACKNOWLEDGMENT

This work is part of the AGOR@GRI project funded by CASDAR (Compte d'Affectation Spécial Développement Agricole et Rural) of the French Ministry of Agriculture and Food. The AGOR@GRI stakeholders are ACTA, Idele, INRAE LISIS, INRAE TSCF, ITAB, CDA Dordogne, CRA Bretagne, CRA Normandie, Pôle AB Massif-Central, and Université de Bretagne Occidentale.

REFERENCES

- Adilman, R., Rajmohan, Y., Brooks, E., Urgoiti, G. R., Chung, C., Hammad, N., Trinkaus, M., Naseem, M., Simmons, C., Adilman, R., Rajmohan, Y., Brooks, E., Roldan Urgoiti, G., Chung, C., Hammad, N., Trinkaus, M., Naseem, M., & Simmons, C. (2016). Social media use among physicians and trainees: Results of a national medical oncology physician survey. *Journal of Oncology Practice / American Society of Clinical Oncology*, *1*(1), 79–80. doi:10.1200/JOP.2015.006429 PMID:26443837
- Avery, A., Rae, L., Summitt, J. B., & Kahn, S. A. (2016). The fire challenge: A case report and analysis of self-inflicted flame injury posted on social media. *Journal of Burn Care & Research; Official Publication of the American Burn Association*, *37*(2), e161–e165. doi:10.1097/BCR.0000000000000324 PMID:26862698
- Carneiro, M. M., Farace, B. L., Ribeiro, L. S. C., Silverio, R. C. C. C., Moreira, T., Filho, A. L. D. S., Baroni, A. L. L. R., & Ferreira, M. C. F. (2020). Using social media to educate women and healthcare providers on endometriosis: Preliminary results. *JBRA Assisted Reproduction*, *24*(1), 9–12. PMID:31361436
- Charles-Smith, L. E., Reynolds, T. L., Cameron, M. A., Conway, M., Lau, E. H. Y., Olsen, J. M., Pavlin, J. A., Shigematsu, M., Streichert, L. C., Suda, K. J., & Corley, C. D. (2015). Using social media for actionable disease surveillance and outbreak management: A systematic literature review. *PLoS One*, *10*(10), e0139701. doi:10.1371/journal.pone.0139701 PMID:26437454
- Chretien, K. C., & Kind, T. (2014). Climbing social media in medicine's hierarchy of needs. *Journal. Association of American Medical Colleges*, *89*(10), 1318–1320. doi:10.1097/ACM.0000000000000430 PMID:25076202
- Das, A., Faxvaag, A., & Svanaes, D. (2015). The impact of an eHealth portal on health care professionals' interaction with patients: Qualitative study. *Journal of Medical Internet Research*, *17*(1), e267. doi:10.2196/jmir.4950 PMID:26601678
- De La Garza, H., Maymone, M. B. C., & Vashi, N. A. (2021). Impact of social media on skin cancer prevention. *International Journal of Environmental Research and Public Health*, *18*(9), 18. doi:10.3390/ijerph18095002 PMID:34065061
- Debray, R. (1991). *Cours de médiologie générale*. Gallimard.
- Dimanlig-Cruz, S., Han, A., Lancione, S., Dewidar, O., Podinic, I., Haqani, B., Haug, J., Leonard, L., Medline, E., Patey, A., Presseau, J., Thompson, E., Kent, M. P., & Brouwers, M. (2021). Physical distancing messages targeting youth on the social media accounts of Canadian public health entities and the use of behavioral change techniques. *BMC Public Health*, *21*(1), 1634. doi:10.1186/s12889-021-11659-y PMID:34493258
- Fischer, A., Chadyiwa, M., Tshuma, N., & Nkosi, V. (2019). Acceptability of mobile health interventions to increase diabetic risk factor awareness among the commuter population in Johannesburg: Descriptive cross-sectional study. *Journal of Medical Internet Research: Diabetes*, *4*(3). PMID:31586363
- Gatewood, J., Monks, S. L., Singletary, C. R., Vidrascu, E., & Moore, J. B. (2019). Social media in public health: Strategies to distill, package, and disseminate public health research. *Journal of Public Health Management and Practice*. PMID:32732723
- Guyot, B. (2002). *Mettre en ordre les activités d'information, nouvelle forme de rationalisation organisationnelle*. In *Les enjeux, revue électronique du gresec*. Université Stendhal.
- Hirschy, M., Guichard, L., Quinio, M., Soullignac, V., Bodelet, M., & Voisin, A.-S. (2018). GECO: Outil de gestion et partage de connaissances utiles à la conception et au repérage de solutions innovantes [Poster presentation]. Journée d'échanges conception de systèmes de culture pour et par les agriculteurs du RMT Systèmes de Culture Innovants, Paris.
- Ho, P. A., Girgis, C., Rustad, J. K., Noordsy, D., & Stern, T. A. (2019). Advancing the mission of consultation-liaison psychiatry through innovation in teaching. *Psychosomatics*, *60*(6), 539–548. doi:10.1016/j.psych.2019.07.007 PMID:31493903
- Holt, C. L., Graham-Phillips, A. L., Daniel Mullins, C., Slade, J. L., Savoy, A., & Carter, R. (2017). Health ministry and activities in African American faith-based organizations: A qualitative examination of facilitators, barriers, and use of technology. *Journal of Health Care for the Poor and Underserved*, *28*(1), 378–388. doi:10.1353/hpu.2017.0029 PMID:28239008

- Kite, J., Collins, M., & Freeman, B. (2019). Using Facebook to recruit for a public health campaign evaluation. *Public Health Research & Practice, 29*(2). Advance online publication. doi:10.17061/phrp29011901 PMID:31384891
- Kite, J., Grunseit, A., & Li, V. (2019). Generating engagement on the make healthy normal campaign Facebook page: Analysis of Facebook analytics. *Journal of Medical Internet Research, 5*(1). PMID:31344679
- Lam, N. H. T., & Woo, B. K. P. (2018). Digital media recruitment for fall prevention among older Chinese-American individuals: Observational, cross-sectional study. *Journal of Medical Internet Research. Aging (Albany NY), 1*(2).
- Langenfeld, S. J., & Batra, R. (2017). How can social media get us in trouble? *Clinics in Colon and Rectal Surgery, 30*(4), 264–269. doi:10.1055/s-0037-1604255 PMID:28924400
- Le Boterf, G. (2008). *Travailler efficacement en réseau une compétence collective*. Eyrolles Editions d'organisation.
- Majmundar, A., Allem, J. P., Cruz, T. B., & Unger, J. B. (2019). Where do people vape? Insights from Twitter data. *International Journal of Environmental Research and Public Health, 16*(17), 3056. doi:10.3390/ijerph16173056 PMID:31443591
- McElfish, P. A., Rowland, B., Riklon, S., Aitaoto, N., Sinclair, K. A., Ima, S., Kadlubar, S. A., Goulden, P. A., Hudson, J. S., Mamis, S., & Long, C. R. (2019). Development and evaluation of a blood glucose monitoring YouTube video for Marshallese patients using a community-based participatory research approach. *Policy, Politics & Nursing Practice, 20*(4), 205–215. doi:10.1177/1527154419872834 PMID:31537196
- McLoughlin, C., Patel, K. D., O'Callaghan, T., & Reeves, S. (2017). The use of virtual communities of practice to improve interprofessional collaboration and education: Findings from an integrated review. *Journal of Interprofessional Care, 32*(2), 136–142. doi:10.1080/13561820.2017.1377692 PMID:29161155
- McLuhan, M. (1964). *Pour comprendre les médias*. Edition Mame/Seuil.
- Nikolaou, C. K., Tay, Z., Leu, J., Rebello, S. A., Te Morenga, L., Van Dam, R. M., & Lean, M. E. J. (2019). Young people's attitudes and motivations toward social media and mobile apps for weight control: Mixed methods study. *Journal of Medical Internet Research: Mhealth Uhealth, 7*(10). PMID:31603431
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creation company: How Japanese companies create the dynamics of innovation*. Oxford University Press.
- Organisation des Nations Unies pour l'alimentation et l'agriculture. (2020). *FAO en situations d'urgence: de la prévention à une meilleure reconstruction*. Retrieved February 7, 2020, from <https://www.fao.org/emergencies/comment-nous-travaillons/resilience/fr/>
- Partridge, S. R., Grunseit, A. C., Gallagher, P., Freeman, B., O'Hara, B. J., Neubeck, L., Due, S., Paull, G., Ding, D., Bauman, A., Phongsavan, P., Roach, K., Sadler, L., Glinatsis, H., & Gallagher, R. (2017). Cardiac patients' experiences and perceptions of social media: Mixed-methods study. *Journal of Medical Internet Research, 19*(9), e323. doi:10.2196/jmir.8081 PMID:28916507
- Pierbon, M., Cocchio, S., Russo, C., Bonamin, M. A., & Baldo, V. (2019). Sexually-transmitted infections: What is the true prevalence? A cross-sectional online survey of men who have sex with men in the Veneto region of Italy. *Journal of Preventive Medicine and Hygiene, 60*(3), 197–202. PMID:31650054
- Ponsford, R., Ford, J., Korjonen, H., Hughes, E., Keswani, A., Pliakas, T., & Egan, M. (2017). Competing for space in an already crowded market: A mixed methods study of why an online community of practice (CoP) for alcohol harm reduction failed to generate interest amongst the group of public health professionals at which it was aimed. *Implementation Science: IS, 12*(1), 12. doi:10.1186/s13012-017-0622-8 PMID:28732513
- Pretorius, K. A., Mackert, M., & Wilcox, G. B. (2018). Sudden infant death syndrome and safe sleep on Twitter: Analysis of influences and Themes to Guide Health Promotion Efforts. *Journal of Medical Internet Research: Pediatric and Parenting, 1*(2). <https://pediatrics.jmir.org/2018/2/e10435> PMID:31518314
- Prybutok, G. (2013). YouTube: An effective Web 2.0 informing channel for health education to prevent STDs. *Informing Science: The International Journal of an Emerging Transdiscipline, 16*.

Sharma, S., Kilian, R., & Leung, F.-H. (2014). Health 2.0: Lessons learned—Social networking with patients for health promotion. *Journal of Primary Care & Community Health*, 5(3), 208–210. doi:10.1177/2150131914522061 PMID:24522931

Solidaire, F. T. (2019, May 27). *Qu'est-ce que l'agroécologie?* Garrett, R., Smith, J., & Young, S. D. (2016). A Review of social media technologies across the global HIV care continuum. *Current Opinion in Psychology*.

Soullignac, V. (2012). *Un système informatique de capitalisation de connaissances et d'innovation pour la conception et le pilotage de systèmes de culture durables* [Doctoral thesis]. École Doctorale Sciences pour l'Ingénieur de Clermont-Ferrand.

Soullignac, V., Pinet, F., Lambert, E., Guichard, L., Trouche, L., & Aubin, S. (2019). GECCO, the French Web-based application for knowledge management in agroecology. *Computers and Electronics in Agriculture*, 162, 1050–1056. doi:10.1016/j.compag.2017.10.028

Ure, C., Cooper-Ryan, A. M., Condie, J., & Galpin, A. (2020). Exploring strategies for using social media to self-manage health care when living with and beyond breast cancer: In-depth qualitative study. *Journal of Medical Internet Research*, 22(5), e16902. doi:10.2196/16902 PMID:32364510

Wittenberg-Lyles, E., Washington, K., Oliver, D., Shaunfield, S., Gage, A., Mooney, M., & Lewis, A. (2015). It is the “starting over” part that is so hard: Using an online group to support hospice bereavement. *Palliative & Supportive Care*, 13(2), 351–357. doi:10.1017/S1478951513001235 PMID:24559689

Woo, S. H., Oh, E. G., Kim, K. S., Chu, S. H., Kim, G. S., & Nam, C. M. (2019). Development and assessment of a social network service-based lifestyle-modification program for workers at high risk of developing cardiovascular disease. *Workplace Health & Safety*, 68(3), 109–120. doi:10.1177/2165079919864976 PMID:31434552

Young, S. D., Cumberland, W. G., Lee, S. J., Jaganath, D., Szekeres, G., & Coates, T. (2013). Social networking technologies as an emerging tool for HIV prevention. *Annals of Internal Medicine*, 159(5), 318. doi:10.7326/0003-4819-159-5-201309030-00005 PMID:24026317

Zellner Lawrence, T., Douglas, M. D., Rollins, L., Josiah Willock, R., Cooper, D. L., Gooden, R. A., Francis, S., & Mack, D. H. (2019). Health policy engagement strategy for the health information technology policy project of the transdisciplinary collaborative center for health disparities research. *Ethnicity & Disease*, 29(Supplement 2), 377–384. doi:10.18865/ed.29.S2.377 PMID:31308609

Vincent Soullignac is a researcher at the French Research Institute for Agriculture, Food and Environment (Clermont Ferrand, France). His field of research is in knowledge management and sharing.

François Pinet is a research director at the French Research Institute for Agriculture, Food and Environment (Clermont Ferrand, France). His field of research is in agricultural and environmental information systems. He belongs to several scientific committees of different conferences and journals in these fields.

Mathilde Bodelet was an engineer in agronomy working on projects on knowledge sharing at researcher at the French Research Institute for Agriculture, Food and Environment (Clermont Ferrand, France).

Hélène Gross is in charge of biodiversity and agroecology projects at ACTA, France. She is at the head of the impact and open innovation department.