Linking good counter-knowledge with bad counter knowledge: the impact of evasive knowledge hiding and defensive reasoning

Juan-Gabriel Cegarra-Navarro, Ettore Bolisani and Gabriel Cepeda-Carrión

Abstract

Purpose – *Counter-knowledge is knowledge learned from unverified sources and can be classified as good (i.e. harmful, for instance, funny jokes) or bad (for example, lies to manipulate others' decisions). The purpose of this study is to analyse the relationship between these two elements and on the possible reactions they can induce on people and institutions.*

Design/methodology/approach – *The relationships between good and bad counter-knowledge and the induced reactions – namely, evasive knowledge hiding and defensive reasoning – are analysed through an empirical study among 151 Spanish citizens belonging to a knowledge-intensive organization during the COVID-19 pandemic. A two-step procedure has been established to assess a causal model with SmartPLS 3.2.9.*

Findings – *Results show that good counter-knowledge can lead to bad counter-knowledge. In addition, counter-knowledge can trigger evasive knowledge hiding, which, in turn, fosters defensive reasoning, in a vicious circle, which can negatively affect decision-making and also cause distrust in public institutions. This was evidenced during the covid-19 pandemic in relation to the measures taken by governments.*

Originality/value – *This study raises the awareness that counter-knowledge is a complex phenomenon, especially in a situation of serious crisis like a pandemic. In particular, it highlights that even good counter-knowledge can turn into bad and affect people's decisional capability negatively. In addition, it signals that not all reactions to the proliferation of counter-knowledge by public institutions are positive. For instance, censorship and lack of transparency (i.e. evasive knowledge hiding) can trigger defensive reasoning, which can, in turn, affect people's decisions and attitudes negatively.*

Keywords *PLS-SEM, Counter-knowledge, Defensive reasoning, Hiding knowledge, Unverified information, Evasive knowledge hiding*

Paper type *Research paper*

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1. Introduction

Counter-knowledge is defined as knowledge deriving from unverified sources of information (Thompson, 2008). A situation of stress or crisis, like we are experiencing in the case of the COVID-19 pandemic, can be accompanied by a huge wave of false and misleading information that is difficult for users to verify (Gosa, 2011; Singh *et al.*, 2021): in short, there is a proliferation of counter-knowledge (Bolisani and Cegarra-Navarro, 2021; Boullier *et al.*, 2021; Thompson, 2008). This can be a serious problem especially when people feel vulnerable and are more prone to believe in misleading messages (Van Beveren, 2003).

The production and dissemination of counter-knowledge can have different underlying motivations. Sometimes there can be innocent reasons, but in other cases, there are deliberately dark intentions such as online scams or political manipulations, with a negative

Received 27 May 2021
Revised 6 August 2021
24 September 2021
Accepted 4 October 2021

impact on people (Bolisani and Cegarra-Navarro, 2021; Lee, 2004). Drawing upon a reading of Yerkovich (1977) and Baumeister *et al.* (2004), Cegarra-Navarro *et al.* (2014) argue that even though counter-knowledge always embodies "knowledge" created from ambiguous or unverified sources of information, it is the people who embrace it who can make it bad (i.e. fully misleading and harmful) or good (i.e. harmless or even funny). For example, sayings, jokes or just innocent rumours may be used not for tricking others but just for triggering a reaction by conveying elements of information that are partly true and partly clearly invented or for gaining social influence, for appearing "nice" or just for entertainment.

Conversely, counter-knowledge can be really dangerous when it can lead to misleading health decisions, consumer scams, cybercrime or illegal hate speech (Sánchez-Casado *et al.*, 2015). Taking these contributions as a reference and considering the pandemic situation, counter-knowledge is here classified as good or bad depending on the use that people make of it. The spread of potentially harmful counter-knowledge can induce public authorities to adopt countermeasures. To avoid misinformation during the COVID-19 pandemic, governments have approved procedures against what is recognized as "fake news". Collaboration has been also requested to social media platforms to contrast the deliberate dissemination of misinformation at a large scale and the creation of a system of misinformation (Cegarra-Navarro *et al.*, 2020), which can influence the public society even with spurious purposes.

Government monitoring of social networks has been accompanied by messages indicating to citizens that they should only trust the information provided by official sources (Bhatia, 2020; Sevillano, 2020). Consequently, many citizens have accused their government of following an evasive knowledge-hiding (EKH) approach and of a lack of transparency (Cegarra-Navarro *et al.*, 2021). EKH is defined as deliberately concealing or making certain information inaccessible that may be necessary for people to make "informed" decisions (Hernaus *et al.*, 2019). Sometimes knowledge is not fully delivered because it is still incomplete and, for example, scientists or public authorities prefer to collect more evidence first or it is too complex to explain it in brief. In other cases, information is hidden to avoid information overload or to not compromise the sources (Cegarra-Navarro *et al.*, 2021). In other words, EKH can be based on good intentions.

However, this opacity and lack of transparency can induce citizens to defend themselves against this potential misinformation. They can also develop a critical sense about the source, the history or even the evidence with which the news is presented (Noonan, 2007, 2011). In this study, we will refer to this as defensive reasoning (DR), a behaviour to which individuals can turn to overcome the lack of transparency or the feelings of being manipulated. Not only can DR cause mistrust of public authorities (Boullier *et al.*, 2021; Buchanan, 2020) but it is also a source itself of empathy for people who find themselves in the same situation (Miller, 1987; Singh *et al.*, 2021). This, in turn, facilitates new interpretations that can circulate and add to counter-knowledge.

Managing counter-knowledge in an appropriate way is important and beneficial for the society in general and for public authorities in particular, as has already been underlined in the literature (Bolisani and Cegarra-Navarro, 2021; Bolisani *et al.*, 2021). However, there is still little research on some important issues. The previous studies have not considered that the presence of counter-knowledge even in its "good" form (i.e. good counter-knowledge) can induce an EKH approach in public administrators and governments, especially in critical situations like in the case of the pandemic. Neither has been DR considered as a further consequence of this EKH approach.

The present study addresses this gap by focusing on good counter-knowledge and examining how, thus, can be a potential cause of EKH and, in turn, of DR. Specifically, the main research question guiding the study is: what are the consequences of good counter-knowledge in terms of EKH and DR and what are the implications of these for bad

counter-knowledge? The study uses SmartPLS 3.2.9 to analyse the data provided by 151 Spanish citizens belonging to a knowledge-intensive organization. In Section 2, we contextualize the difference between good and bad counter-knowledge. In Section 3 we explain the methodology to contrast the proposed hypotheses and in Section 4 we describe the main results. In Section 5, we discuss the lessons learned from this study and in Section 6 we draw the main conclusions.

2. Theoretical background

2.1 Good and bad counter-knowledge

The term "counter-knowledge" is a complex phenomenon that can have various manifestations, sources, effects and underlying actions (Thompson, 2008). The term itself is not only associated with the knowledge that is extracted and learned from unverified sources of information such as sayings or gossip that circulate on the internet or intentional fakes and lies that are disseminated among the people and are especially boosted by the use of the internet and social media. It can also be associated with half-truths and pious truths that some media use to justify "unrelated events to evidence" as "true facts" (Bolisani and Cegarra-Navarro, 2021). Furthermore, it can come from distortions of reality in the form of jokes and parodies that are spread just for fun but, eventually, are interpreted as a sort of "fact". Those that acquire this (mis)information, think that they have acquired some kind of "knowledge" that they believe is true and this can, eventually, lead to a change in their mental models (Martínez-Ortiz *et al.*, 2017). Therefore, false beliefs or misunderstandings, created via gossip, lies or only partial truths can make people accept this biased perception of reality as true (Lee and Pistole, 2014).

The reasons that drive people to generate or share counter-knowledge can be very different. Sometimes, the motivation is, in itself, not malicious. It can be due to the need to share impulsive emotions such as happiness or anxiety (Bratianu, 2015; Bratianu and Orzea, 2013; Paradiso, 2014) or to achieve the approval and acceptance of a social group by telling funny jokes and mockeries (Taylor and Bright, 2011). In some other cases, there are more perverse reasons to share counter-knowledge such as personal enrichment (Bolisani and Cegarra-Navarro, 2021), political manipulation (Allcott and Gentzkow, 2017), discrediting others or fostering institutional attrition (Arif *et al.*, 2018; Brashier and Schacter, 2020). Although the media and other public messengers have a great fault in the dissemination of counter-knowledge, we must not forget that ultimately those who have the power to give credibility or utility to it, are the individuals as final recipients (i.e. readers or watchers of the vehiculated messages) (Lin *et al.*, 2016).

Individuals apply ideological bias that makes them share counter-knowledge that agrees with their ideas (Lin *et al.*, 2016) and they may tend to create a (un)real image by following people and media who think like them (Viviani and Pasi, 2017). However, the cognitive process regarding counter-knowledge is a complex phenomenon with many implications. For example, counter-knowledge may not necessarily result in frustrations and misunderstandings being adopted at the individual level. At the same time, not all the information provided by public authorities is necessarily complete, true and useful. As some studies report, paradoxically, sometimes the "common sense" appears to be more correct than official sources like public authorities. For example, women who refused to give birth in hospitals by the mid-nineteenth century as a result of sayings saved many children's lives, because nineteenth-century medical practices did not include handwashing, and thus it was often genuinely more dangerous for mothers to give birth in hospitals than at home (Ataman *et al.*, 2013). So, it is true that women did not decide based on "facts" but on "un-verified elements" (i.e. counter-knowledge), however, they were right to do so. Consequently, we may say that the knowledge provided by hospitals (where handwashing was not really considered important) was also incomplete and not based on sufficient "evidence". Was this also counter-knowledge? Of course, the process of science is

complex and made of trials and errors, but if it is not transparently explained or applied with due care, it can eventually lead to mistakes, can undermine the credibility of scientists as well and can induce the people to build their own counter-knowledge.

Taking into account the content and characteristics of the messages that allow the activation of potentially both positive and negative emotions (Berger and Milkman, 2012; Dwyer and Martin, 2017), this study classifies counter-knowledge as good and bad. While "good counter-knowledge" is intended as harmless, not leading to incorrect decisions and is not used for malicious purposes (i.e. it may be created and shared just for telling jokes, improving the mood or for entertainment), "bad counter-knowledge" can drive unmotivated disobedience against public authorities, frustration or misunderstandings and bad decisions (Bolisani and Cegarra-Navarro, 2021; Hargreaves, 2005). Here, these concepts will be applied to the proliferation of counter-knowledge within the context of the COVID-19 pandemic, where the two types can be singled out.

2.2 Evasive knowledge hiding

Knowledge hiding is the intentional concealment of knowledge requested by another individual (Connelly *et al.*, 2012). Deliberately hiding information is often an effort to protect individuals' reputation, when they feel exposed to the risk of "bullying" actions, intentional distortions and spurious interpretations by others of the information they shared (Yao *et al.*, 2020) or they feel too weak to risk negative feedbacks or even jokes or sharp barbs about their performance in the workplace or life (Taylor and Bright, 2011).

Most previous definitions of knowledge hiding have focused on the behaviour of individuals. For example, Chatterjee *et al.* (2021) define it as "a person's attempt to conceal or withhold knowledge that another person wants". As noted by Connelly *et al.* (2012: p. 66), they focus on situations in which a specific request for knowledge has been made by one employee to another. In their study, 95 randomly chosen employees responded to a series of questions pertaining to a specific incident and whether their co-workers shared or hid the knowledge in response to a request. Based on their reactions, Connelly *et al.* (2012) classify knowledge hiding into three dimensions (i.e. evasive hiding, lack of sharing and playing dumb).

The current study contributes to previous studies of "evasive knowledge hiding" by institutions caused by the great amount of disinformation about COVID-19 during the first semester of 2020 (Zięba, 2021). When authorities do not share their knowledge, no matter how noble the reasons are, this can also cause reactions by the public (Caputo *et al.*, 2021), as will be discussed below.

2.3 Defensive reasoning

DR, defined as "actions or policies that prevent individuals or segments of the organization from experiencing embarrassment or threat" (Argyris, 1990: p. 25), has become a classic topic of management research (Argyris, 1986; Taylor and Bright, 2011; Yang *et al.*, 2018). As studies have indicated that DR is guided by principles such as achieving the intended purpose, maximizing winning and minimize losing, suppressing negative feelings and behaviours (Diamond and Argyris, 1987; Noonan, 2007), this reasoning may prevent people from negative emotional responses to potentially traumatic events by preparing them (Argyris, 1992). DR represents not only a repeated behaviour to avoid issues related to embarrassment and threat (Noonan, 2007) but it may also represent a solution to handle the issue of unverified or missing information (Wolverton and Stevens, 2019). DR is not only a behaviour of isolated individuals but it also involves interactions with others. For example, for a principle of reciprocity, the embarrassment for others is based on empathy; so, the greater the empathy, the more likely is that people will make effort to avoid embarrassment (Miller, 1987; Santoro *et al.*, 2021).

DR represents not only a way to avoid embarrassment and threat (Noonan, 2007) but also a solution to handle negative issues of unverified information or missing information (Wolverton and Stevens, 2019). In a recent study Bridgman *et al.* (2020) showed that, during the data collection period (April 2020), much of the information on social networks about the management of the pandemic was subjective, inaccurate and generated by users themselves. Response to misinformation and conspiracy theories about COVID-19 was simply not paying attention to social media (Pennycook *et al.*, 2021). There is evidence of many people who logged off social media due to anxiety and concerns about hoaxes (Ahmad and Murad, 2020; Jorge, 2019).

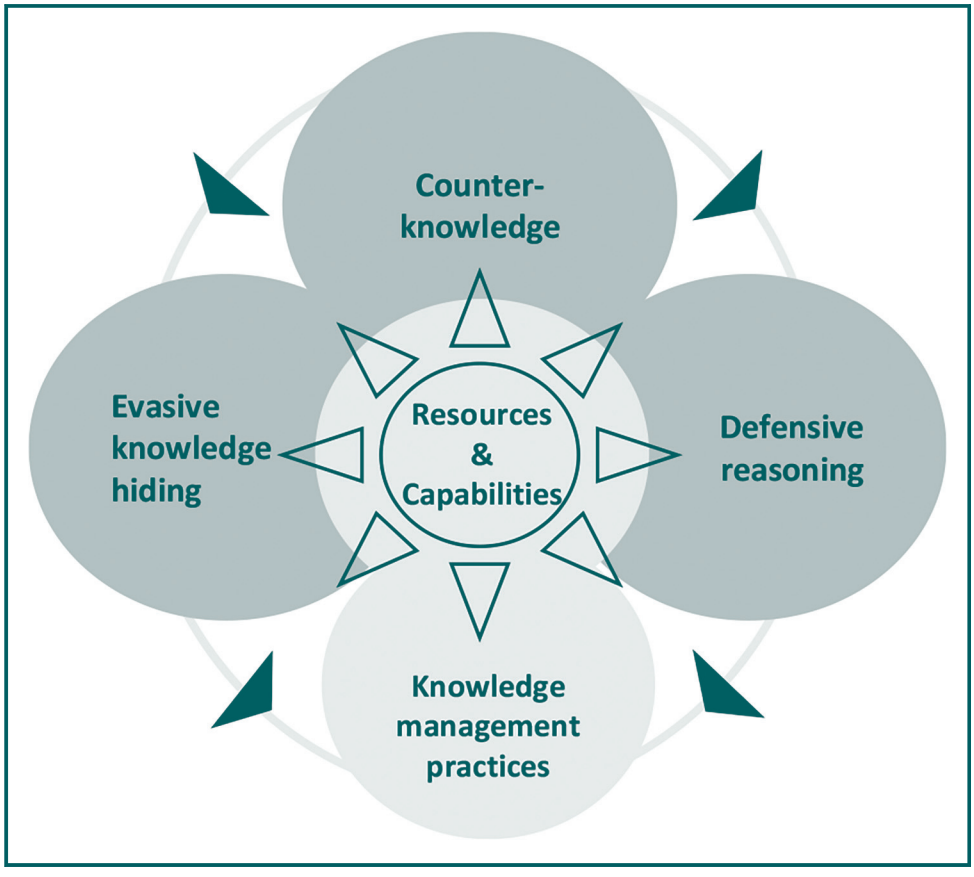
2.4 Linking good with bad counter-knowledge through hiding knowledge and defensive reasoning

To explore the connection between good and bad counter-knowledge, EKH and DR, this study adopts one of the main theoretical perspectives adopted in knowledge management (KM), namely, the resource-based view (for a reference, Barney *et al.*, 2001). According to this perspective, for organizations and individuals, the decision-making process and the strategic decisions that are taken depend on the available resources and capabilities (Leonidou *et al.*, 2013). A fundamental resource is knowledge possessed by individuals (Cohen and Bacdayan, 1994; Nonaka and Takeuchi, 1995; Grant, 1996). In addition, the resource-based view teaches us that the availability of knowledge alone does not guarantee appropriate and successful decisions (Guerras and Navas, 2015): it is the capacity to use that resource that can generate appropriate and successful decisions (Guerras and Navas, 2015). Key KM authors in the 1990s (Nonaka and Takeuchi, 1995; Grant, 1996) further developed the notion of "knowledge as a resource" and the processes through which people and organizations can use it. Individuals are committed to learning and sharing what they know (Nonaka, 1991; Nonaka and Konno, 1998; Nonaka and Takeuchi, 1995; Nonaka *et al.*, 2000) and these processes shape the real capability to exploit knowledge as a resource. Learning and knowledge sharing are, however, social processes (Lundvall, 2006) whose effectiveness is influenced by individual and collective characteristics, attitudes and behaviours. In other words, an important point is that the development and exploitation of knowledge as a resource for decision-making is not purely a process of a single individual, but it must be framed in a complex network of interactions where individuals share elements of knowledge of various quality, learn from one another and are affected by the reactions of others.

Based on these elements (Figure 1), the starting point adopted in this paper is that knowledge is a resource for decision-making, but the "quality" of this resource can be affected by the presence of counter-knowledge (Caputo *et al.*, 2021; Thompson, 2008; Yang *et al.*, 2018), which can be "good" or "bad". Considering that KM seeks to create, share, use and manage knowledge and information (Nonaka, 1991; Nonaka and Konno, 1998; Nonaka and Takeuchi, 1995; Nonaka *et al.*, 2000), in an effort to reduce the negative effects of the proliferation of counter-knowledge on the decision-making capability, it is assumed that people and organizations can react in many ways and adopt various KM practices. Here, we focus on the mechanism of EKH. However, in turn, this behaviour can induce further KM actions, for example, DR.

Within the conceptual framework previously described, this study aims to examine the complex impact of counter-knowledge on people's behaviour and the possible reactions that can derive from this. This complex mechanism raises a number of important KM-related questions. What happens when people develop their knowledge based on what they learn from uncertain sources? When this happens, what is the best action for other people and institutions to reduce the negative effects of counter-knowledge on the capability to take decisions? And what reactions can this, in turn, trigger? The purpose is to draw useful lessons not only for shedding light on these complex mechanisms but also for reflecting on

Figure 1 Theoretical framework on counter-knowledge as a resource



the really appropriate KM countermeasures to limit the negative effects of counter-knowledge.

A first question to address concerns the fact that the proliferation of good counter-knowledge can, nonetheless, lead to a proliferation of bad counter-knowledge. As mentioned, counter-knowledge implies both positive reactions (e.g. entertainment and mood enhancement) and hostile feelings (e.g. anger, anxiety or frustration) (Castelfranchi and Miceli, 2009). Just as in the case of emotions like envy, where there may be a relationship between "envy" and "malicious envy" (Zeigler-Hill and Shackelford, 2018), there may be a direct relationship between good and bad counter knowledge (Thompson, 2008). In other words, despite the fact that a part of the counter-knowledge could be harmless in the short term, it may nonetheless have negative repercussions in the medium and long term (Machackova and Smahel, 2018). It is somewhat similar to what happens when someone spreads rumours about your possible promotion and then you discover that it was not you but someone else who got promoted: the initial good mood turns into greater frustration later (or vice versa). Although the source of rumours may have had just good intentions (for example, a person is just trying to look smart at a business meeting), these initially ingenuous claims can lead to a chain of other rumours that become bad counter-knowledge (Thompson, 2008).

The above discussion suggests that "good counter-knowledge" can convert into "bad counter-knowledge". Why can this happen? A possible reason is that just like knowledge depends on the context, by extension the same can be said for counter-knowledge. The COVID-19 pandemic is, again, exemplary. The context of April 2020, with overflowing

intensive care units, doctors and nurses without resources, separated families or people suffering from covid (Cegarra-Navarro *et al.*, 2021; Sevillano, 2020), was not the best one for jokes, with much that they were intended to improve the mood. In the same way that a joke at an inappropriate time or context becomes a joke in bad taste, good counter-knowledge got transformed into bad counter-knowledge because of the context. This relationship is well explained by Del Giudice (2012): misunderstanding what happens in a new context can cause discomfort, especially when the norms of behaviour differ from the usual ones, running the risk of repudiating ideas that have always been considered true.

With regard to "how" the conversion of counter-knowledge can happen, confusion in media or digital illiteracy largely motivated people to share wrong information in the wrong context during the first half of 2020 (Pennycook *et al.*, 2020). Overwhelmed by so much misinformation, many of the recipients of these messages could misinterpret them or share them without questioning their veracity (Pennycook *et al.*, 2021). In both situations, expectations, emotions and unrealistic assumptions not corresponding to reality were generated and triggered a greater frustration and got finally manipulated in social networks (Pennycook *et al.*, 2020).

In short, it can be said that good counter-knowledge, in principle used "just for fun", can also be misused and, especially when shared with more unprotected citizens or the wrong context (Cegarra-Sánchez *et al.*, 2018). Even when these discovers the non-veracity of the content of the message, they may feel manipulated and tricked and frustration, discouragement and anxiety can result (Cegarra-Navarro *et al.*, 2015)

Based on these reflections, a first hypothesis was investigated, as follows:

H1. The proliferation of good counter-knowledge positively influences the proliferation of bad counter-knowledge.

The second point of our analysis is regarding EKH. A recent bibliometric study highlights the importance of knowing when and why people hide knowledge (Di Vaio *et al.*, 2021). Under the above scenario and faced with the COVID-19 pandemic, a typical attitude of many governments in a time of crisis is to adopt a defensive reaction of "keeping the silence" by means of media blackout (if not censorship) – in other words, "evasive knowledge hiding". Public authorities have often found themselves in competition with popular tabloids and conspiracy story-tellers (just like, for example, how COVID emerged) who generally try to be accredited as proposers of an "alternative view" of reality (Thompson, 2008). By adopting the resource-based perspective, EKH may be intended as a way to protect the quality of knowledge, which is the main resource on which proper decisions can be taken. However, governments, scientists and institutions generally do not discriminate between good and bad counter-knowledge and they simply try to fight it in the same way, regardless of the form in this counter-knowledge appears (Cegarra-Navarro *et al.*, 2021).

Many governments have chosen the EKH path, by appealing to the concept of "useful ignorance" (Haynes, 2019), just as a father tells his son not to be distracted by rumours and on some occasions hides his cell phone so that the child can focus. So, the problem is that censorship and media silence has been applied not only to avoid the propagation of bad counter knowledge but also as a reaction to the proliferation of any kind of counter-knowledge, including jokes and emotional statements, in the belief that it is better to speak less about a problem so that the frustration and anguish that can derive from the reality – as in the case of the pandemic – can be mitigated (Cegarra-Navarro *et al.*, 2020; Cegarra-Navarro *et al.*, 2021).

Thus, the following hypothesis is investigated:

H2. Good counter-knowledge positively influences EKH.

As mentioned, EKH can, in turn, trigger other behaviours and can finally lead to different KM approaches. For example, when discovering, in the international press, that the Spanish Government was also hiding certain information on the management of the pandemic (e.g. presence of the disease in Spain before March 2020, the real number of deaths, lack of medical resources, etc.), the reactions were variegated (Moreno-Luna *et al.*, 2021; Tiefenhäler, 2020; Molina *et al.*, 2020). Many citizens had reactions such as sadness, pain, distrust, shame and loneliness (Sevillano, 2020) and, according to some studies, this led to forms of DR aimed at either avoiding the embarrassment or disapproval of being accused to share fake news or empathizing with others (Buchanan, 2020; Boullier *et al.*, 2021; Singh *et al.*, 2021),

Thus, the following hypothesis was tested:

H3. EKH positively influences DR.

DR has an effect on knowledge as a resource for decision-making, because it may lead to personal interpretations, changes or additions to counter-knowledge (Escribano *et al.*, 2009; Riley and Cudney, 2015). Indeed, due to the lack of transparency or the lack of information (caused by knowledge hiding by authorities), people who are afraid of ridicule may tend to reduce the sharing of hoaxes or potentially false news with their contacts and friends (Riley and Cudney, 2015), feeling that this might avoid embarrassment and reduce the concerns of governmental agents (Cegarra-Navarro *et al.*, 2020; Cegarra-Navarro *et al.*, 2021). In this view, DR can make people distrust the elements of bad counter-knowledge that can break social cohesion (Argyris, 2001).

Therefore, the following hypothesis was investigated:

H4. DR is negatively associated with the existence of bad counter-knowledge.

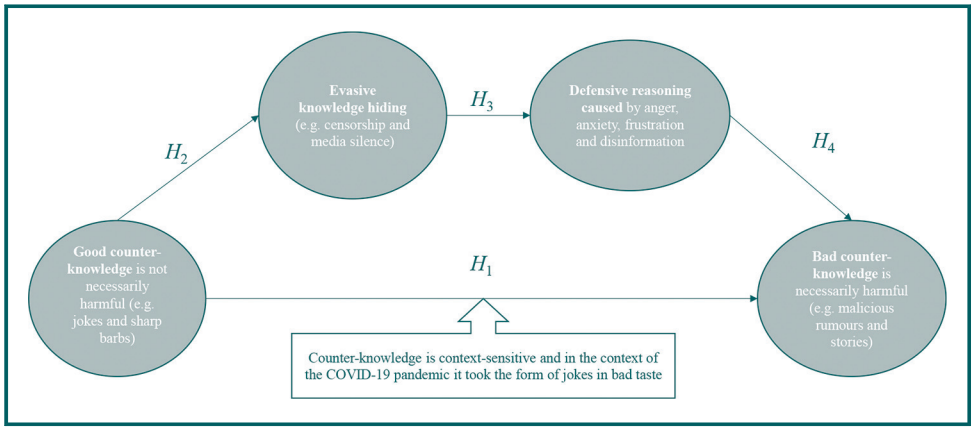
Figure 2 provides an overview of what was described above. While the upper part of the model represents the links of good counter-knowledge with bad counter-knowledge through EKH and DR, the lower part represents the hypothesis under examination that good counter-knowledge, in principle used just for fun, can also be misused and can lead to bad counter-knowledge.

3. Method

3.1 Data collection

The present study used, as population, the distribution list of the Technical University of Cartagena (Spain). A university is a knowledge-intensive organization, basically, because

Figure 2 Conceptual model



its raw material and its main output is "knowledge" (Bratianu, 2011). The list included knowledge workers with different profiles such as professors, students, scholars, researchers and administrative staff. The respondents were asked to respond as citizens to the survey and not as professionals of an educational centre. To increase the interest of the study and increase the number of responses we include a short note saying that:

> Doctors and nurses are in the front line and are the true heroes of this pandemic, they do need the engagement of citizens. Therefore, this study is an opportunity to help these people, in our view at least. There are no right or wrong answers, we only want to know your opinion about COVID-19. Thank you very much for your help.

The questionnaire was distributed in April 2020 to 500 people, of whom 155 finally responded.

Of these, four surveys with the highest score in all questions were eliminated. Consequently, 151 responses have been used. 60.9% of the respondents were men and the average age of the participants was 41.7 years. To minimize data bias, a comparison between the first responses of the first fortnight and the second fortnight was made in terms of bad counter-knowledge. An independent sample *t*-test did not reveal significant differences between the two groups, so we concluded that non-response bias was not a problem in this study (Armstrong and Overton, 1977).

3.2 Measures

All constructs were self-reported and measured using a Likert scale of five-points rating (1 = "high disagreement" to 5 "high agreement" (see Appendix for a list of items). All these measures were operationalized as composites.

Previous studies by Bolisani and Cegarra-Navarro (2021) provided guidance in developing items in terms of good and bad counter-knowledge (i.e. GCK and BCK). Three items assessed the importance of "good counter-knowledge" for entertainment and social integration, while the other three items assessed the presence of "bad counter-knowledge" that leads to misunderstandings and mistrust. EKH was assessed with a four-item scale developed by Connelly *et al.* (2012). These items focused on the perception of citizens regarding the information offered by the government regarding the pandemic, the concealment of information responded to the information not provided or partially supplied. Five items measured DR and assessed the extent to which people were able to avoid embarrassment or uncomfortable feelings about information disorders and the consequences of fake news for other citizens (Yang *et al.*, 2018).

3.3 Data analysis

According to Cepeda-Carrion *et al.* (2019), we decided to use partial least squares structural equation modelling (PLS-SEM) as a data analysis technique, because all measures of our conceptual model were designed as composites. This is the main reason to use PLS-SEM (Richter *et al.*, 2016; Rigdon *et al.*, 2017). The goal of PLS-SEM is, therefore, to investigate the relations between directly latent variables, acting as proxies measured by indicators (i.e. items) (Hair *et al.*, 2019). Based on Sarstedt *et al.* (2017), all composites were modelled in a reflective manner (i.e. indicators that compound the latent variable are correlated). Following Henseler's (2018) and Cepeda-Carrion *et al.*'s (2019) classification of PLS-SEM purposes, our PLS-SEM analysis is causal; it implies the hypothesis testing of a particular research model, maximizing the explained variance of our dependent variable and considering the fit indices in our model. Following Hair *et al.* (2019), endogeneity is an issue to be tested.

A two-step procedure has been established to assess a causal model with PLS-SEM (Hair *et al.*, 2019):

- assessment of the measurement model; and
- assessment of the structural model.

We followed a bootstrap procedure to find the significance of indices (Chin, 1998). Bootstrapping is a resampling procedure that allows assessing the significance of fit indices, path coefficients, weights and loadings of each composite's indicators. We used SmartPLS 3.3.3 as a software package for our data analysis (Ringle *et al.*, 2005).

To detect potential problems of common method variance (CMV), we applied the procedural remedies proposed by Podsakoff *et al.* (2012) and Podsakoff *et al.* (2003) when we collected our data. We also used a statistical method to detect and control for different sources of CMV, namely, the measured latent marker variable (MLMV) approach (Chin *et al.*, 2013) – a method suggested for handling CMV in PLS-SEM models. MLMV must not belong to the same domain of the variables included in the proposed model and must be taken from a different unit of analysis. We included measures of use of technology at the employee level in our questionnaire, a different level of analysis. The results show that the model with MLMV had worse fit indices, no significance of coefficients paths from MLMV and there are not significant differences between them. These additional tests reinforce our argument that our model is free of CMV issues. Finally, a full collinearity test based on variance inflation factors (VIFs) was carried out. According to Kock and Lynn (2012), when a VIF achieves a value greater than 3.3, there would be an indication of collinearity problems. This would warn if a model may be contaminated by CMV. The present model, with a maximum VIF of 1.22, maybe considered free of CMV problems.

4. Results

4.1 Measurement model

Considering the causal (e.g. confirmatory) nature of our PLS-SEM analysis, we calculated the fit indices for the saturated model from our proposed model as a measure of confirmatory composite analyses (Henseler and Schuberth, 2020). As shown in Table 3, all fit indices meet the requirements to confirm the proposed measurement model.

Following Hair *et al.* (2019), we assessed the measurement model. Results exhibit that it meets all the commonly designated measures of reliability and validity. Firstly, individual reliability is sufficient because all standardized loadings are larger than 0.7 in all constructs, except for three items of the "defensive reasoning" composite (i.e. DR1, DR2 and DR5). The first and the third of these were cleansed while DR4 was retained because the rest of the indices assessing the measurement model surpassed the established thresholds (Hair *et al.*, 2019). Secondly, all measures of composite reliability are larger than 0.8. The values for average variance extracted (AVE) exceed the threshold of 0.5 for convergent validity. Finally, all the constructs show discriminant validity, as all HTMT indices are below 0.85 (Table 2) (Table 1).

Table 2 shows two methods to assess the discriminant validity of reflective constructs. According to both criteria – the Fornell and Larcker's (1981) criterium and the heterotrait-monotrait ratio of correlations (HTMT) – there is evidence of discriminant validity (Henseler *et al.*, 2015).

4.2 Structural model

According to Benitez *et al.* (2020), we report the fit indices for our model at the beginning of the assessment of the structural model. The provided model has a good fit (Table 3). We also report the three fit indices suggested by Henseler *et al.* (2016) values and their confidence intervals (95% and 99%) for an exact test. Therefore, there is a good adjustment between the empirical data matrix and the theoretical model matrix. Table 2 exhibits the

Table 1 Measurement model

Construct	*Indicator*	*Loadings*	*Composite reliability*	*Rho A*[a]	*AVE*[b]
Good counter-knowledge	GCK1	0.866	0.880	0.806	0.710
	GCK2	0.827			
	GCK3	0.835			
Evasive knowledge hiding	EKH1	0.861	0.900	0.891	0.693
	EKH2	0.859			
	EKH3	0.838			
	EKH4	0.770			
Defensive reasoning	DR2	0.412	0.756	0.704	0.529
	DR3	0.897			
	DR4	0.782			
Bad counter-knowledge	BCK1	0.922	0.940	0.910	0.840
	BCK2	0.913			
	BCK3	0.914			

Notes: [a]Dijkstra-Henseler's rho → (Rho A); [b]Average variance extracted → (AVE)

Table 2 Discriminant validity (Fornell and Larcker's criterium[a] and HTMT[b])

Construct	*GCK*	*EKH*	*DR*	*BCK*
GCK	0.843	0.285	0.213	0.411
EKH	0.234	0.833	0.277	0.089
DR	−0.097	0.206	0.727	0.271
BCK	0.359	−0.027	−0.206	0.917

Notes: GCK: good counter-knowledge, EKH: evasive knowledge hiding, DR: defensive reasoning and BCK: bad counter-knowledge. [a]Diagonal value (square root of AVE and in bold) should be higher than off-diagonal values (correlations). [b]Threshold value should be below 0.85 (Henseler *et al.*, 2015) and located above diagonal values

Table 3 Global goodness of fit, confirmatory composite analysis and bootstrap-based 95% and 99% quantiles

Goodness of fit measure	*Estimated model*	*Hi95*	*Hi99*	*Saturated model*	*Hi95*	*Hi99*
SRMR	0.073	0.069	0.076	0.052	0.058	0.065
d_{ULS}	0.642	0.569	0.696	0.327	0.405	0.508
d_G	0.196	0.177	0.204	0.163	0.168	0.194

Notes: The figure in bold indicates the level of compliance with the index of adjustment. SRMR: standardized root mean square residual, d_{ULS}: unweighted least squares discrepancy, d_G: geodesic discrepancy

model fits and three parameters associated with it. The estimated model fit indices refer to the global model. This is a requirement for confirmatory analysis with PLS-SEM (Henseler, 2018).

Following Hair *et al.* (2019), the next step of assessing the structural model is examining collinearity among the latent constructs. No VIF value is above the suggested threshold value of 3.0, so we found no collinearity issues. Next, we assessed the sign, magnitude and significance of path coefficients, which are the most important result of the structural model. Likewise, the aim of the PLS-SEM algorithm maximizes the explained variance of the dependent variables represented by the determination coefficient (i.e. R^2). As Hair *et al.* (2019) argue, the use of bootstrapping (5,000 resamples) produces confident intervals to assess the statistical significance of the path coefficients. Thus, the consideration of bootstrap percentile confidence intervals provides greater assurance than merely relying on

null hypothesis significance testing. Additionally, we included two control variables (i.e. age and gender) to test if some context variables influence the path-coefficient estimations.

All the hypotheses in the model are supported. We found age as a control variable that influences our model (see percentile bootstraps at the 95% confidence interval – Table 4). Also, we report the effect size f^2, which shows the change in R^2 if a specified construct is omitted from the model. A guideline of 0.02, 0.15 and 0.35 represent, respectively, small, medium and large effects (Cohen, 1977). In Figure 3, a graphical representation of the results of the model is shown.

4.3 Endogeneity

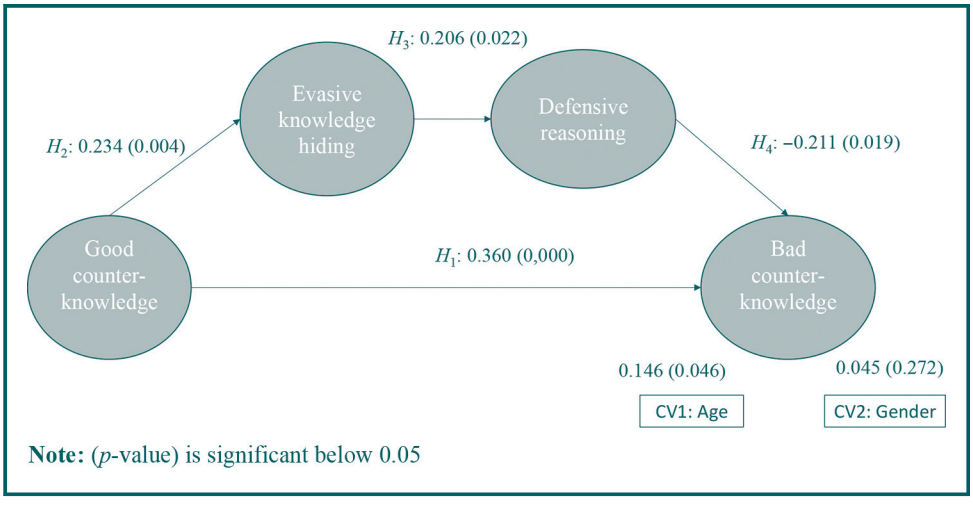
All these results are considered enough for most of the PLS-SEM works. However, it is additionally important to consider endogeneity in explanatory studies using ordinary least squares (OLS) algorithms, because it is necessary to demonstrate that PLS-SEM results are robust. Endogeneity arises when non-random samples are selected and/or some important variables are omitted in the model (Antonakis *et al.*, 2010): the OLS estimations generated by PLS-SEM may be biased, and therefore the soundness of results is ultimately questioned. The main point then is whether all variables have been fixed and/or considered; these would be the estimated parameters. When the answer is no, the endogeneity could be a serious problem.

Table 4 Structural model

		Confidence intervals				
Hypotheses	Path coefficient	5% CI_{lo}	95% CI_{hi}	Significance (*p*-value)	Cohen's f-square	R^2 of dependent construct
H1: GCK → BCK	0.360	0.215	0.488	0.000	0.151	0.176
H2: GCK → EKH	0.234	0.089	0.372	0.004	0.058	0.055
H3: EKH → DR	0.206	0.045	0.369	0.022	0.044	0.042
H4: DR → BCK	−0.211	−0.364	−0.037	0.019	0.049	0.176
Age → BCK	0.146	0.002	0.283	0.046	0.021	0.176
Gender → BCK	0.045	−0.082	0.166	0.272 ^{ns}	0.002	0.176

Notes: GCK: good counter-knowledge, EKH: evasive knowledge hiding, DR: defensive reasoning and BCK: bad counter-knowledge; ns: no significant; confidence intervals must be merged with 5% CI and 95% CI

Figure 3 Structural model results



Our endogeneity test is based on Huit *et al.* (2018): we included instrumental variables (e.g. control variables) in our model (i.e. age and gender), pointing to dependent variables of bad counter-knowledge and the Gaussian copula estimated proposed by Park and Gupta (2012) and described by Huit *et al.* (2018).

Two control variables were used to measure endogeneity potential: age and gender. We take these two variables and they were related to the dependent variable (bad counter-knowledge). After running a 5,000-bootstrapping routine, we found the link with age was significant, but it was not significant for gender.

Next, we ran the Gaussian copula procedure, following Isabel *et al.* (2021), i.e. the recommendation to check the requirements before running the analysis with the Gaussian copula.

Firstly, we checked if the variables, which potentially have endogeneity, are distributed in a non-normal way. We did this by running the Kolmogorov–Smirnov test with Lilliefors correction on the standardized composite scores of "Good counter-knowledge" (Mooi and Sarstedt, 2011), "Defensive reasoning" and "Evasive knowledge hiding", which provides the estimation of the PLS-SEM model. If the p-value is less than 0.05, the variable does not follow a normal distribution. The results indicate (p= 0.024) that none of the constructs have normal-distributed scores, which allows us to analyse endogeneity with Gaussian copulation analysis.

Secondly, we ran the Gaussian copula analysis adding a copula for each independent variable for each dependent variable. There are three independent variables (i.e. GCK, DR and EKH) and two dependent variables (BCK). None of the copulas introduced in our model were significant. Therefore, endogeneity is not an issue for the estimation of the relationships in our proposed model.

5. Discussion

This study has introduced and conceptualized the notion of the EKH approach and if and how this mechanism is useful to cope with good counter-knowledge. This issue was examined in relation to the COVID-19 pandemic, which provided an important case of analysis. The resource-based theory and its application to KM proved to be useful for interpreting the nature of the described phenomena. Knowledge is the key resource for decision-making, but its "quality" is affected by the possible presence of counter-knowledge that can influence people's learning, can be shared with others and can also induce reactive ways to manage knowledge, which, in turn, affect the capability to use that knowledge to make appropriate decisions.

First and foremost, as affirmed in the literature, counter-knowledge can be of different kinds. While bad counter-knowledge (e.g. intentional fakes and lies) is generally related to misuse and negative decisions, "good" counter-knowledge (i.e. innocent jokes, emotional comments, etc.) may be apparently harmless and with no negative effect on people's capability to take an appropriate decision. Previous studies have defended that counter-knowledge can be "good" when it spreads for reasons of social integration or simply for fun (Cegarra-Navarro *et al.*, 2014; Martínez-Ortiz *et al.*, 2017). Since early 2020, when China first alerted the world about the COVID-19, jokes, sharp barbs and memes about the virus have spread even faster than the virus itself. Rumours, gossip or jokes are a very powerful resource that human beings have to integrate themselves socially and that in the case of the pandemic has helped us go through difficult times and smooth out distressing events. This so-called good counter-knowledge has traditionally allowed us to face difficult moments from a different perspective, less dramatic and more playful. Despite the potentially positive effects of the good counter-knowledge, citizens can (inadvertently or not) spread misinformation about public institutions, scientists and/or the measures taken by

governments to combat the pandemic. This can ultimately generate misinformation, mistrust and political or even racial tensions (i.e. bad counter-knowledge).

As was confirmed by the first hypothesis, good counter-knowledge can directly or indirectly generate bad counter-knowledge as well. Therefore, the normalization and legitimation of certain jokes – only because they are funny and popular – can be very dangerous because they can start a thread of subsequent messages and manipulations, as confirmed in other studies (Boukes, 2019). In other words, the results show that innocent jokes and comments can, at the end of the day, fuel stigma and discrimination (Polk *et al.*, 2009) and lead to negative effects on people's behaviour. Under a resource-based KM perspective, it can be said that even good counter-knowledge can trigger negative behaviours, which affect the quality of knowledge as a resource for decision-making. Under a resource-based perspective, therefore, it can be said that the quality of knowledge as a resource can be affected by the presence not only of bad counter-knowledge but also of good counter-knowledge.

This study also makes a significant contribution to the link between good counter-knowledge and the EKH approach during the COVID-19 pandemic. As for hypothesis *H2*, the results show a significant positive relationship between these two variables. A possible explanation is that the proliferation of jokes or sharp barbs on social networks, even though they may not be malicious, motivates certain censorship or silencing action by the governments, who can view them with some suspicion and concern (Cegarra-Navarro *et al.*, 2020; Cegarra-Navarro *et al.*, 2021). These results confirm that the awareness of a proliferation of counter-knowledge in any form (bad or good) can trigger KM actions by public authorities. These counter-measures are taken by public authorities to combat the loss of confidence, misinformation and misunderstandings about the measures to combat the pandemic (i.e. bad counter-knowledge) – i.e. our rulers try to act as protective parents in the belief that this helps avoid greater evils. Under a resource-based perspective, these actions are intended as a way to protect the "true" knowledge, which should be the real resource for taking proper decisions.

Regarding hypothesis *H3*, the results show that there is a positive relationship between EKH and DR. Defensive reactions arise as part of a process of adaptation and survival of the human being. Although previous studies have shown that feeling ashamed or being inattentive can be negative factors for organizational learning (Argyris, 1992; Noonan, 2011; Noonan, 2007), this study shows that defensive reactions are also a counter-measure against the lack of transparency. In times of uncertainty such as the current one, where misleading texts (counter-knowledge) are much more popular than those that disseminate rigorous information on public health, governments have tried to avoid "infodemic" i.e. an overabundance of information (some rigorous and some false). Faced with this situation, many individuals (unfortunately not all) have tried to be more careful, exhaustive and meticulous. This is another important point to consider under a resource-based perspective: although some actions by governments (i.e. EKH) may be taken to protect knowledge resources from the negative effects of counter-knowledge, this behaviour can also lead to consequential KM actions by the public and especially DR.

The results also show that there is a negative relationship between DR and bad counter-knowledge (hypothesis *H4*). A great risk in our knowledge society is that falsehood can gain strength over truthfulness (Martelo-Landroguez *et al.*, 2019). When misinformation, even in the form of not malevolent jokes, is repeated and amplified, there is a danger that evidence and true facts end up having a marginal place (Allcott *et al.*, 2019; Andrei *et al.*, 2019). For this reason, it is everyone's responsibility to prevent the spread and disclosure of any type of unverified information. Paradoxically, our results show that when, at the collective level, the government tries to silence, hide and reduce the circulation of certain (mis)information and this leads, at the individual level, to the use of DR (Boullier *et al.*, 2021; Singh *et al.*, 2021),

this unintended effect can, in turn, counterbalance the potentially negative effects of counter-knowledge.

A further result of our analysis is the fact that contrarily to common sense, age is not necessarily a sign of wisdom. There is a correlation between age and proliferation of counter-knowledge. These results confirm the previous results of other studies. According to Brashier and Schacter (2020), a lower familiarity with social networks, the social changes one experiences when he/she gets older and the lower attention to precision in communications may explain why older people are more prone to spreading false news. Another explanation can be that the ability to distinguish good from bad counter-knowledge decreases with age (Brashier and Schacter, 2020). The bottom line of these findings would be that in the same way that older people are more vulnerable to covid-19, they are also the most vulnerable to false news about COVID-19.

5.1 Policy implications

Although generally speaking it may be considered preferable that governments be transparent and frank regarding the circulation of information and do not hide knowledge to the public, our findings appear to legitimize the strategy of censoring and silencing certain messages to counteract the presence of counter-knowledge. Either we like it or not, EKH can be useful to avoid the free circulation of disinformation when there is a risk that this is highly harmful. We saw that individuals may respond to the silencing actions with greater awareness and social empathy (i.e. DR), so the proliferation of counter-knowledge is, eventually, reduced. Clearly, this result needs confirmations and, especially, a clearer understanding of the conditions where it can be applied. As a matter of fact, it is hard to affirm that censorship and lack of transparency are "always justified": rather, this study shows that EKH can have a positive effect in some cases where it can help to generate collective awareness around the need to avoid propagation and defamation of hoaxes and lies (i.e. bad counter-knowledge). In addition, the study shows that the public needs to be aware that jokes and sharp barbs about the government – even though we consider these as "good counter-knowledge" can also lead to conflict, disaster or risk of misunderstanding the measures taken especially to face a crisis. Although spreading good counter-knowledge can come from positive intentions, it is likely that it can also negatively affect the perceptions regarding the measures of authorities against the pandemic, even when these are made for the benefit of the society.

6. Conclusions

The mechanism of counter-knowledge generation, dissemination and (mis)use is a complex but increasingly important phenomenon in our "always online" societies. This study contributed to analyse it by focusing on the specific connections between counter-knowledge and approaches of EKH and DR. This was done by means of an empirical analysis of data regarding the COVID-19 pandemic crisis. During the past months, citizens had to accept and comply with the regulations imposed by governments regarding health. Unfortunately, due to the complex circumstances, the circulating information was often incomplete and even the official sources themselves were not always consistent with their own decisions and scientists often changed their minds or provided contrasting messages. In this confusing situation, it was not always easy for the people to develop a sound opinion and find motivated reasons to support the government's actions. In addition, some people exploited this case of disorder to circulate hoaxes and lies (i.e. bad counter-knowledge) that may have caused more damage than the virus itself. Even the proliferation of the so-called good counter-knowledge (i.e. jokes and emotional comments) finally pushed the proliferation of bad counter-knowledge, as our study shows. In fact, the results confirm that, in the end, there is no "purely good" counter-knowledge and that sooner or later even this one becomes perverse and has negative effects.

EKH and DR are behaviours that may characterize public authorities and common people as reactions to counter-knowledge in a time of crisis (Argyris, 1992; Noonan, 2007). As our case shows, if the reasons for which certain information is hidden by authorities are explained in an appropriate coherent way, people can understand the need for this EKH approach. In other words, the population may have a greater awareness of the risk of fake news and the need for tools to combat them. The consequent DR attitude by citizens that is caused by EKH can even contribute to a reduction of counter-knowledge proliferation. As is also suggested in the literature, DR can take different forms (Noonan, 2007). Nevertheless, our study shows that, in the considered case of emergency of COVID-19, people increased awareness and developed empathy for the more affected people. Knowing how to stand with the people, assuming their problems, responding to them, paying close attention to their needs without doing any harm may be translated into positive intentions to attain shared goals through constructive empathy rather than engaging in unnecessary chatter. This means that DR can help here to improve the general resilience of societies.

6.1 Limitations

This study has limitations regarding the transversality of data, the selected sample and the cause-and-effect relationship between the variables analysed. Based on these limitations, it would be interesting to expand the sample or even ratify the results at different times. However, despite its limitations, the paper studied relationships between variables that, due to their incipient effect on society, have never been previously studied. Of course, results can also be affected by the sample analysed, only knowledge workers have participated in this study and it would be interesting to replicate the study in other samples and extend the model to the so-called blue-collar workers.

Another important conclusion is that given the artificial and latent nature of the studied variables, the measurement instruments need to be modified, adapted and operationalized when used in a different context or situation. Counter-knowledge, knowledge hiding or DR may not have the same meaning when considering the perspective of a manager or a client. Indeed, we used scales adapted from the business context, so a reflection on how to measure these constructs in different scenarios was needed. The item itself "knowledge hiding" used internally among colleagues can be intended as an attempt to assess whether they are hiding information, so it is problematic because their responses can be conditioned by moods, envy or internal quarrels. So, an approach that considered the same perspective that should be used by considering outside agents (namely, the viewpoint of external agents such as clients and suppliers would be the most indicated to assess knowledge hiding in an organization's processes). Although we believe that this way of measuring these variables provides greater rigor to validate the previous scales assessed from an internal perspective, these findings should be evaluated further.

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Appendix. Questionnaire items

Counter-knowledge:

- BCK1: There is gossip that thrives on lies, exaggerations and partial truths about COVID-19.
- BCK 2: There are malicious rumours about COVID-19, which support mistrust.
- BCK 3: There are malicious stories about COVID-19 that often lead to misunderstandings.
- GCK1: There are jokes and sharp barbs about the government that help lighten your mood.
- GCK2: There are jokes and sharp barbs about the government that may be useful for social integration.
- GCK3: There are jokes and sharp barbs about the government that may be useful for entertainment.

Source: Adapted from (Bolisani and Cegarra-Navarro, 2021).

Evasive knowledge hiding:

- EKH1: Agreed to help citizens take charge of their own health but never really intended to.
- EKH2: Agreed to help citizens but instead gave them information different from what they wanted.
- EKH3: Told citizens that it would help them out later but stalled as much as possible.
- EKH4: Offered citizens some other information instead of what they really wanted.

Source: Adapted from (Connelly *et al.*, 2012).

Defensive reasoning:

- DR1: I usually do not change the way I do things. I only change the way of doing things under pressure from my own relatives.
- DR2: I avoid speaking or writing on subjects falling outside my personal expertise on the point if this would embarrass other people.
- DR3: I feel embarrassed if my opinions are challenged by other people.
- DR4: I feel uncomfortable about challenging other people's opinions.
- DR5: I usually do not pay attention to social networks.

Source: Adapted from (Yang *et al.*, 2018).

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