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Empowering or backfiring? The paradoxical effects of digital media skills on depression through (mis)information sharing on social media

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Abstract

This study proposed and tested a novel theoretical framework of media empowerment regarding the relationship between digital media skills and mental health as well as the complex mechanism linking the two. This study utilized an online survey of a representative sample of Shanghai residents ($N = 916$) to examine the interconnections among digital media skills, (mis)information sharing, and mental health. The findings revealed that the empowerment mechanisms of digital media skills on depression were contradictory at the individual and community levels. For the two dimensions of digital media skills, information skills directly reduced levels of depression but indirectly aggravated depression by promoting misinformation sharing; in contrast, social skills alleviated depression by mitigating misinformation sharing. Furthermore, risk perception positively moderated the relationship between misinformation sharing and depression. This study contributes to the media empowerment literature by empirically demonstrating a linkage between developed digital media skills and media empowerment in the aspect of mental health in the digital age. This study also innovatively highlights specific psychosocial elements of the empowerment processes from a communication perspective.

Keywords Digital media skills · Empowerment · Backfire · (Mis)information sharing · Social media

Introduction

Mental illness is a global phenomenon; about one in eight people in the world reportedly suffers from a mental disorder (World Health Organization, 2022a). Although the prevalence of different mental disorders varies by gender and age, anxiety disorders and depression are the most common across gender and age groups (Daly & Robinson, 2022). Mental health is a fundamental component of both individual and collective health and well-being (WHO, 2022b). Nowadays, significant threats, including economic recession, social polarization, and public health emergencies exacerbate both short- and long-term stress and damage people's mental health (Kola et al., 2022). The COVID-19 pandemic brought about a global mental health crisis, with an estimated increase in incidences of anxiety and depression of more than 25% in the pandemic's first year (WHO, 2022b). Unprecedented stress caused by social distancing and quarantine has been a major reason for this increase.

Information and communication technologies (ICTs) have proven to be empowering and beneficial to users in a variety of ways and thus may also help improve mental health (Dasuki et al., 2014; Liang et al., 2023). Social

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media, for example, has played a critical role in activism, enabling the disadvantaged to express a wide range of ideas and voices and to organize unequally distributed resources (Liu, 2016). Within health communication, social media has shown the potential to facilitate the process of health empowerment by enabling seeking out as well as sharing health-related information (Zamora, 2022). Under the circumstances of a global pandemic such as COVID-19, digital media skills are an essential capability for everyday life and an important form of social capital with which to engage in the health, social, and educational life of the community. However, few studies to date have explored the specific empowerment mechanisms associated with digital media skills' effects on mental health in this context. In the current Information Age, the empowerment mechanism of digital media skills is significant and worthy of exploration, especially in utilizing ICTs (Scheerder et al., 2017). The digital media skill set includes the ability to use and understand digital information and technology as well as identify and apply information, create and re-create information in conjunction with digital technology, and use digital technology for emotional communication, social life, and values evaluation (Massey, 2016).

Differences in digital media skills are believed to affect ICT empowerment outcomes (Li & Hu, 2022). Evidence through a two-wave longitudinal online survey among 3,942 adolescents aged 12–17 in six European countries has shown that information navigation as well as communication and interaction were linked to lower depression, while frequently using the internet to look up information on physical or mental health issues was strongly linked to greater depression (De Coninck et al., 2023).

For example, mastering digital media skills helps people share and disseminate information online. Information sharing should ostensibly improve people's mental health due to its close association with factors such as emotional connection, social support, online social capital, and social inclusion (Luo & Hancock, 2020). Therefore, greater mastery of digital media skills should positively correlate with mental health. Although digital media skills may promote information sharing in general, a significant amount of misinformation also spreads via social media as a result of sharing information without proper verification (Sun & Lu, 2023). Some research has shown that sharing misinformation online may worsen an individual's mental health because it can increase anxiety, stress, and even suicidal thoughts (Jabbour et al., 2023; Verma et al., 2022). These contrasting findings regarding the potential effects of digital media skills on mental health invite more empirical research on the specific mechanisms involved.

To this end, we investigate the direct and indirect effects of digital media skills on mental health through a quantitative analysis of survey data. Specifically, we hypothesize that digital media skills as a form of technological empowerment can directly help alleviate depression at the individual level, but that information sharing acts as a mediator, leading to either higher or lower levels of depression for the communicator at the community level, depending on if the information is true or false. As mobility and social interactions were constrained during the pandemic from March 2020 to the present, augmented perceived risks emerged as a prominent factor influencing mental health. Therefore, risk perception is hypothesized to play a moderating role between information sharing and depression levels (see Fig. 1).

We tested our theoretical framework using a quota sample in Shanghai, China, during mandatory quarantines from March to May 2022 to contain the spread of COVID-19. During this period, online communication utilizing the internet and social media became a basic form of social

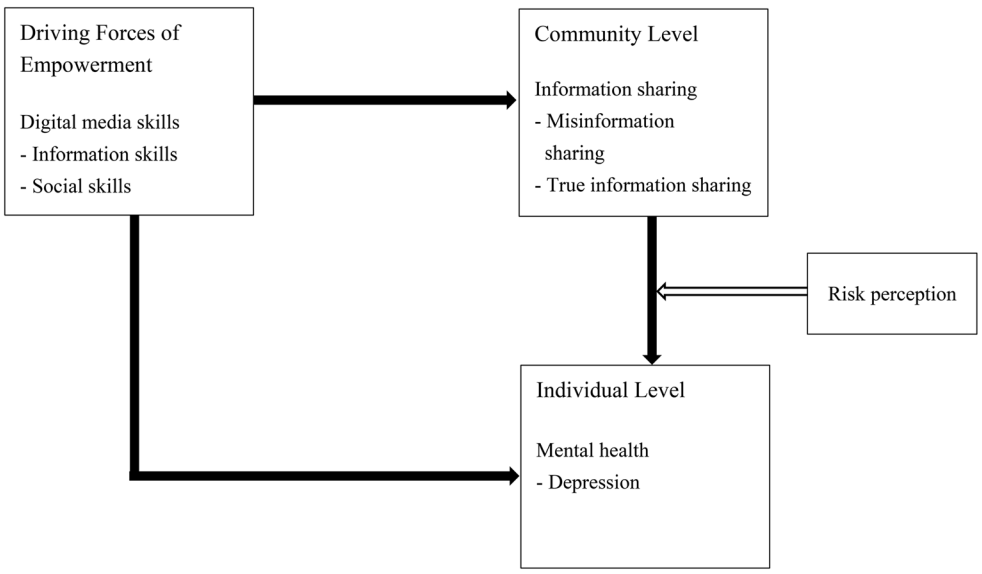

Fig. 1 The theoretical framework of media empowerment from communication perspective in the present study

interaction for Shanghai residents to connect and exchange information with the community. Hence, digital media skills formed a key part of digital inclusion and were regarded as survival skills for daily communication (Gupta & Dhamija, 2020). This study not only extends the application of media empowerment in the context of social media but also provides practical implications for effectively promoting media empowerment for mental health and reducing the spread of misinformation.

Literature review

Digital media skills as empowerment for mental health

ICTs are often seen as tools with the potential to empower their users. Empowerment can broadly refer to the ability to take control of one's personal affairs and political issues; the ability to "tell one's own stories and to act and change self-definition"; the ability to "access information and resources"; the ability to "make free and meaningful choices"; and the process of confidence and autonomy that translates choices into desired actions and outcomes (Ungar & Teram, 2000, p. 229). Empowerment usually means power for the powerless, as in the ability of social actors to resist and challenge institutionalized power relations. Communication studies may explore the role of ICTs in empowerment as facilitating collective or "connective" action (Leong et al., 2019). Empowerment research extends the concept of empowerment beyond the zero-sum power relations framework to look at the agencies and conditions of all people as individuals (Pratto, 2016). This includes components of empowerment that are especially pertinent to communication studies, for example, the ability to share knowledge and resources with others.

The empowerment process generally comprises both the individual level and the community level (Zimmerman, 2000). Individual empowerment refers to how individuals value themselves and their knowledge, skills, and abilities (Peterson, 2010). At the individual level, digital media empowerment is primarily defined as the process whereby new ICTs like social media enable individuals to make decisions by acquiring or enhancing necessary resources, thinking critically, mastering basic activities, and thereby achieving their goals (Dolničar & Fortunati, 2014). At the group, community, and class levels, researchers believe that ICTs can empower communities by achieving "collective participation, shared identity and collaboration in the community" (Sun et al., 2018, p. 415).

Research focusing on the process of digital media empowerment falls into three major categories: structural empowerment, psychological empowerment, and resource empowerment (Sun et al., 2018). More specifically, research associated with psychological empowerment has indicated that empowerment is "a motivational construct manifested in four cognitions, including meaning, competence, self-determination, and impact" (Dolničar & Fortunati, 2014, p. 166). In the Information Age, new media have become important tools for empowerment because they can enable disadvantaged groups to obtain more effective means and language for informing, communicating, working, and providing services (Sun et al., 2018). Relatedly, digital media empowerment has been considered "a multi-phased process to produce better networking, communication and cooperation opportunities and to increase the competence of individuals and communities to act as influential participants" (Mäkinen, 2006, p. 381).

Therefore, empowerment processes whereby digital media skills affect mental health may play out directly at the individual level as well as indirectly through information sharing at the community level. Most research on empowerment has emphasized motivating processes that lead to individual empowerment or its outcomes such as "enhanced competence, sense of control, self-esteem, self-confidence, self-efficacy, independence, and well-being" (Dolničar & Fortunati, 2014, p. 165). Similarly, empowerment processes at the community level may mediate these mechanisms such as "social cohesion, sense of community, community building, collective belonging, group support, community engagement, and involvement in and control over organization in the community" (Dolničar & Fortunati, 2014, p. 166).

Within the context of empowerment in the Information Age, digital media skills play a significant role in the empowerment process for mental health. Digital media skills are defined as "one's ability to search, select, evaluate, create, and exchange information by safely using digital devices" (Li & Hu, 2022, p. 1367) for basic social needs in daily life. Digital media skills are multidimensional, comprising informational skills, or "the ability to seek, choose, and evaluate information using digital media," and social skills, or "the ability to communicate clearly and effectively with others and cooperate using digital media" (Li & Hu, 2022, p. 1368). Given that empowerment is about increasing individuals' perceived level of self-efficacy or the belief that they can take control of their social actions, the relationship between digital media skills and mental health can become clear through two different lenses.

First, according to social cognitive theory, self-efficacy is individuals' "perceived operative capability in possessing the skills," which can contribute to mental health by affording individuals more psychological resources and assistance seeking social support to cope with stress (Bandura, 2007, p.

646). Second, as suggested by self-determination theory, the sense of autonomy in taking action could fulfill basic psychological needs, often accompanied by an optimistic experience and freedom, and thus may positively relate to mental health (Deci & Ryan, 2012). Empirical studies have shown that digital skills were positively associated with mental well-being while negatively related with severe mental illness (Dinu et al., 2022; Spanakis et al., 2022). Research has also shown that "differences in resources and exposures in public health and community settings" as well as "differences in access and quality in clinical settings" foster worse health outcomes and health disparities (Schillinger, 2020, p. 7). These consequences of the higher probability of mental health problems require a deeper understanding of the conceptual foundations of critical skills (i.e., digital media skills; Schillinger, 2020).

Previous literature has documented the psychosocial impact on individuals and increased incidence of mental health disorders from disasters and disease outbreaks. For example, the mental health of populations has been affected by the pandemic, including the doubly detrimental impact of "the incidence of new-onset mental health disorders and the deterioration of those with existing mental health disorders" (Torjesen, 2020, p. 369). Individuals mainly rely on available digital media tools to diminish the impact of social isolation and maintain their social, educational, and health activities, especially those individuals under quarantine (Leung et al., 2022). Additionally, research has indicated that digital media skills can benefit people by protecting them from the negative influence of media content, reducing information inequality (Robinson et al., 2015). When it comes to mental issues, digital media skills can help people better master health resources, understand health issues, participate in community health activities, and remove sources of worry (Schillinger, 2020). During the pandemic and beyond, there has been a paradigm shift that face-to-face care visits may be transformed and delivered via electronic health resources that connect to providers through digital media (Brørs et al., 2020).

Hypothesis 1: Both dimensions of digital media skills (information skills and social skills) relate negatively to depression levels.

The mediating role of information sharing in media empowerment

Although digital media skills can facilitate individual participation in public and everyday life (Radovanović et al., 2020), it is regarded as critical to survival and using social capital effectively in today's information society (Correa, 2016). At the community level, it is more important that digital media skills can transcend gaps in the exercise of power and expression at the group, community, and class levels. Studies have indicated that people with more digital skills benefit more from opportunities in the online environment (Bastick & Mallet-Garcia, 2022). Empirical studies have also found that communicative interaction at the community level have played a mediating role in the relationship between driving forces of empowerment and individual empowerment outcomes at the individual level (Petrič & Petrovčič, 2014).

ICTs have transformed the way consumers and patients receive and process health information. Whereas empowerment is related to intrinsic motivation, digital media tools enable users to more clearly perceive their skills and participate in fully communicative interactions during creative and social activities. Previous studies have found that digital media skills are a key factor in predicting users' digital behavior such as privacy behavior and fake news sharing (Park, 2013; Wei et al., 2023). In the health communication domain, empowerment of community-focused care has changed from "artificial psychiatric settings into more natural community settings" by "facilitating the development of relationships with people in one's community, enhancing their valued roles in the communities, and helping people work with members of the general community to combat misperception and increase access to resources" (Reis et al., 2022, p. 540). This approach is consistent with the empowerment process associated with mental illness, which comprises regaining goals, meaning, and pleasure in life, which in turn requires social inclusion and participation in the community (Rowe & Davidson, 2016).

More specifically, research has found that digital media skills can enable people to perform behaviors such as exchanging information and sharing experiences. For example, people with strong digital media skills can join or start online health communities and exchange information by posting, sharing, and commenting on health-related issues (Karnowski et al., 2021). Social reinforcement increases access to information and social progress and facilitates the process of "health empowerment" (Mano, 2014). During the pandemic, people with intellectual disabilities used the internet for online social connections and shared health information with others (Caton et al., 2022). Social media users with better digital media skills would be more likely to connect and communicate by sharing information with others through online interactive health communication platforms.

Furthermore, numerous studies have indicated that sharing and self-disclosure behaviors on social media can promote mental health. Sharing information on social media might include not only tangible rewards from the

interactions but also intangible rewards such as social status and reputation, respect from others, compliance with recommendations, and obligations arising from social status (Hefler et al., 2019; Oh & Syn, 2015). Information sharing can be viewed as a coping strategy that helps mitigate mental health problems from stress and negative life events (Wolfers & Schneider, 2021). More specifically, information sharing or self-disclosure about events that provoke depression and anxiety or about one's own health status can reduce burdens and provide cathartic and therapeutic relief (Zhang, 2017). In addition, information sharing or venting negative emotions on social media often garners emotional and informational social support from online social networks, and these psychological resources also mitigate depression and anxiety (Marzouki et al., 2021).

In contrast, the empowerment effects of digital media skills may be adverse when the information shared is misinformation. Research has suggested that information and messages provide valuable sources of direction and guidance in uncertain times such as during a pandemic, enhancing the credibility of and trust in such information (Li et al., 2016). However, studies have demonstrated that the spread of misinformation, rumors, and conspiracies quickly grow into "infodemics" that accompany the spread of the disease itself (Zarocostas, 2020). People with better digital media skills may gain greater control and gatekeeping capacity during such crises. Such people may potentially spread misinformation inadvertently on social media to the community. There are several types of misinformation (e.g., political misinformation and health misinformation), and the internet and social media were awash with misinformation related to COVID-19 during the pandemic in China regarding topics such as the severity of infection and "wonder drugs."

In addition, users who shared misinformation about COVID-19 experienced a roughly twofold growth in anxiety compared to those who did not share misinformation about COVID-19 (Verma et al., 2022). Whereas most studies have focused on factors that influence individual misinformation sharing on social media, empirical research on the effects of such misinformation sharing on the communicator's mental health is lacking. Existing studies have indicated that misinformation sharing is associated with negative emotional states such as anxiety (Freiling et al., 2023). Because digital misinformation has become prevalent on the internet and social media, the effects of misinformation on the mental health of communicators after dissemination has also become an important topic.

Whereas most health communication research emphasizes health information seeking, we focus on health information sharing in the present study as an outcome measure of empowerment and digital media skills. The lack of information sharing regarding treatment has been one of the most prominent barriers to patient empowerment for mental health professionals, service users, and caregivers (Gondek et al., 2017). Meanwhile, compared to information seeking, information sharing is a bidirectional voluntary behavior in which individuals not only share experiences, opinions, and suggestions but also answer questions raised by others in an exchange of information (Lee & Ha, 2018). Health information sharing is more about shared activities in individuals' interpersonal or social networks than information seeking, which serves as a coping strategy for mental health symptoms (Akhther & Sopory, 2022). Therefore, we focus on the underlying dynamics of digital media skills at both the individual and community levels to illustrate the complexities of empowerment through the mediating role of (mis) information sharing.

Hypothesis 2: Misinformation sharing on social media will positively mediate the relationship between digital media skills (information skills and social skills) and depression levels.

Hypothesis 3: Sharing true information on social media will negatively mediate the relationship between digital media skills (information skills and social skills) and depression levels.

The moderating role of risk perception in the process of empowerment

Research has found that the risk perception of infection can affect a person's mental health even more than actually contracting a disease or virus, especially when the person already suffers from a disease (Yıldırım et al., 2020). When there is limited access to virus detection or when people are uncertain about test accuracy, individuals often use heuristics to assess their own infection and disease status, resulting in undue worry and fear (Yıldırım & Güler, 2022). In other words, risk perception of uncertainty and fear of developing an illness can increase levels of negative emotion (Han et al., 2021). If a disease is incurable, at-risk individuals may have to cope with negative feelings (i.e., fear of death), which may increase their levels of anxiety and depression (Kim et al., 2022).

Research has also found that when people perceive more risk, they take a range of measures to reduce this uncertainty, including seeking and sharing relevant information (Quinlan & Deane, 2021). The complexity of the "facts" during rapidly changing crises such as pandemics further prompts people to share more information in search of a sense of certainty (Prasad, 2022). However, information shared due to increased risk perception may also be more likely to be misinformation because the information is

usually not verified (Freiling et al., 2023). At the same time, the sharing of such misinformation may also exacerbate feelings of weakness and anxiety, so greater risk perception may amplify the relationship between misinformation sharing and negative mental states. During data collection for this study, Shanghai authorities enforced a strict mandatory lockdown to contain the outbreak of COVID-19. Residents in Shanghai faced not only physical isolation but also a lack of medical care and food, thus likely suffering from greater mental pressure related to risk perception. Therefore, risk perception became a highly salient influence on the mental health of Shanghai residents. In this context, risk perception may worsen the negative mental health effects of misinformation sharing.

Hypothesis 4a: Risk perception will positively moderate the relationship between misinformation sharing on social media and depression.

Hypothesis 4a: Risk perception will negatively moderate the relationship between true information sharing on social media and depression.

Method

Participants and procedures

We used the survey method to explore the impact of digital media skills on mental health, a psychosocial mechanism that can best be understood through valid survey research. During the period of this study, normal social interaction was interrupted and some information was blocked, wherein other methods of data collection were difficult. Thus online survey method of data collection could advances computational information science research (Gu et al., 2023). We employed the international survey company Dynata to collect the data for the present study. The institutional review board of the corresponding author's university reviewed and approved the study design prior to its implementation. The survey was conducted in June 2022 in Shanghai, China, during the city's mandatory lockdown using quota sampling based on current demographic data. Respondents who did not pass the attention check or completed the survey in less than 4 min were excluded. There were 916 valid cases for analysis. Focusing on internet users, the study utilized quota sampling based on the distribution of age and gender among Shanghai residents aged 18–65. An attention-check question was inserted into the questionnaire, and the survey was terminated if respondents did not pass the attention check. This study's findings may be generalizable to Shanghai's online population because the similarities among the demographic breakdowns provided in the study with an independent statistical profile of Shanghai's residents was high.

Among the 916 participants, 262 were 18–30 years old (28.6%), 249 were 31–40 years old (27.2%), 208 were 51–65 years old (22.7%), and 195 were 41–50 years old (21.3%). Most of the participants were men (53.1%, $n=486$). In terms of education, most participants held a bachelor's degree (76.5%, $n=701$), and 19% had a high school or lower education ($n=174$). For monthly income, 38.9% of the participants held less than 20,000 CNY ($n=356$), 59.1% held between 20,000 and 50,000 CNY ($n=541$), and 2.1% held more than 50,000 CNY ($n=19$). For ethnicity, most of the participants were of Han Chinese ethnicity (98.7%, $n=904$), whereas only 12 participants were of minority ethnicity.

Measurement

Digital media skills We measured digital media skills adapted from Li and Hu's (2022) Digital Skills Scale. The Digital Skills Scale comprised several sub-dimensions, whereby information skills and social skills were more related to information sharing behaviors. A seven-point scale with seven items measured information skills. A representative item was "I know how to use more than one search keyword to search for the information I want": $M=5.31$, $SD=0.80$, Cronbach's alpha $=0.83$. The same scale measured social skills. A representative item was "I know how to use a webcam to have face time with friends or parents": $M=5.54$, $SD=0.79$, Cronbach's alpha $=0.84$.

Information sharing We measured information sharing along two dimensions: misinformation sharing and true information sharing on social media (Lu & Zhong, 2022). We modified and contextualized the items with actual prevalent information spread during the pandemic. We adapted four statements that were verified to be misinformation and true information. Those two subdimensions were both evaluated on a seven-point scale. We asked participants, "When you see the following information, how likely are you to share it publicly with others on social media?" Misinformation sharing on social media was measured through two false statements (e.g., "The injection booster is completely ineffective against the Omicron strain"): $M=3.74$, $SD=1.59$, Spearman-Brown $alpha=0.74$. True information sharing on social media was measured through two true statements (e.g., "To prevent COVID-19, residents should keep their homes ventilated"): $M=5.16$, $SD=1.06$, Spearman-Brown $alpha=0.55$.

Depression levels We measured depression levels with the short version of the Beck Depression Inventory (BDI)

adapted from Osman et al. (2004). We asked participants to answer five items on a seven-point scale. A representative item was "I feel that my grief is not relieved, even with the help of family and friends": $M = 3.51$, $SD = 1.62$, Cronbach's alpha = 0.93.

Risk perception We measured risk perception adapted from Trumbo et al. (2016). We asked participants to answer four items on a five-point scale ("How likely do you think you are to be infected with COVID-19?"): $M = 4.69$, $SD = 1.01$, Cronbach's alpha = 0.68.

Data analysis

All the variables in the present study have adequate reliability and validity. We tested Hypotheses 1–3 with structural equation modeling (SEM) using AMOS 24.0. We tested Hypothesis 4 using the PROCESS package in SPSS 25.0 (Model 1). The model fit of the measurement was good for the confirmatory factor analysis (Klem, 2000): $\chi^2 = 497.355$ $\chi^2(242) = 2.055$, $p = .000$, $CFI = 0.973$, $GFI = 0.954$, $IFI = 0.973$, $TLI = 0.969$, $RMSEA = 0.034$, $AIC = 613.355$, $BIC = 616.614$.

Results

Hypotheses testing

Demographic variables such as age, gender, family income, education, and ethnicity were controlled as covariates in the SEM model. Overall, the mediation model showed a good fit for the empirical data (Klem, 2000), with $\chi^2 = 611.986$, $\chi^2(321) = 1.906$, $p = .000$, $CFI = 0.969$, $GFI = 0.953$, $IFI = 0.969$, $TLI = 0.963$, $RMSEA = 0.031$, $AIC = 781.986$, $BIC = 787.550$ (see Fig. 2).

Hypothesis 1 posited that digital media skills (information and social skills) were negatively related to depression levels. We found that information skills were negatively related to depression ($\beta = -0.34$, $p < .001$). However, social skills were not significantly related to depression ($\beta = 0.10$, $p > .05$). Thus, Hypothesis 1 was partially supported.

Hypothesis 2 posited that misinformation sharing positively mediated the relationship between digital media skills (information and social skills) and depression levels. We found that information skills were positively related to misinformation sharing on social media ($\beta = 0.31$, $p < .01$); however, social skills were negatively related to misinformation sharing on social media ($\beta = -0.34$, $p < .01$). In addition, misinformation sharing on social media was positively related to depression ($\beta = 0.42$, $p < .001$). Furthermore, the effect size of the positive mediation of misinformation sharing in the relationship between information skills and depression was 0.12; the effect size of the negative mediation of misinformation sharing in the relationship between social skills and depression was–0.12. Thus, Hypothesis 2 was partially supported.

Hypothesis 3 posited that true information sharing negatively mediated the relationship between digital media skills (information and social skills) and depression. We found that information skills were positively related to true information sharing on social media ($\beta = 0.52$, $p < .001$); however, social skills were not related to true information sharing on social media ($\beta = 0.12$, $p > .05$). In addition, true information sharing on social media was not related to depression ($\beta = -0.04$, $p > .05$). Thus, Hypothesis 3 was rejected.

Hypothesis 4 posited that risk perception moderated the relationship between information sharing and depression levels. We found that risk perception positively moderated the relationship between misinformation sharing and depression ($\beta = 0.18$, $p < .001$). However, risk perception did not significantly positively moderate the relationship between true information sharing and depression ($\beta = 0.03$,

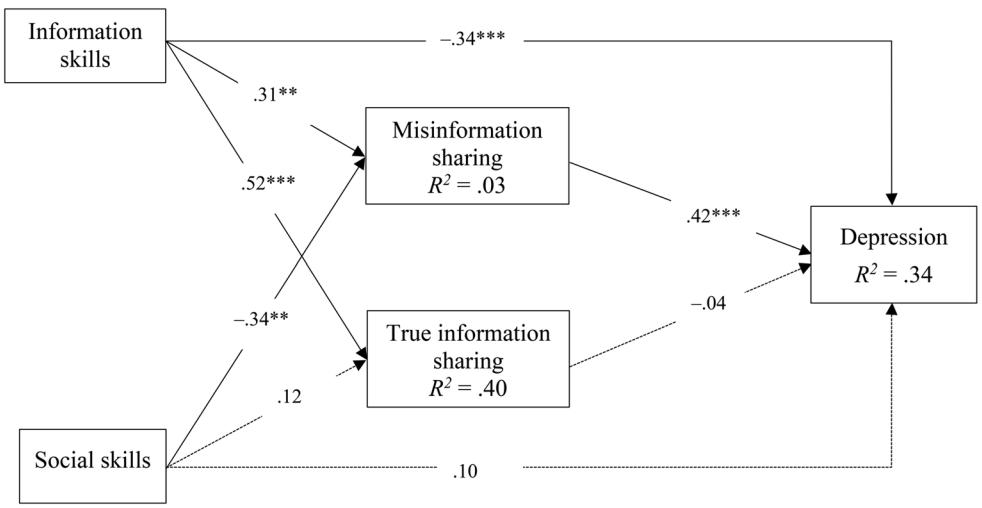

Fig. 2 The results of the hypothetical model in the present study. Note. ** $p < .01$, *** $p < .001$

$p > .05$). Thus, Hypothesis 4 was partially supported (see Fig. 3).

Discussion

The present study empirically tests the proposed theoretical model for empowerment mechanisms of digital media skills through a survey of a representative sample in China. This study examined empowerment outcomes of digital media skills at both the individual and community levels to investigate the contradictory effects of digital media skills on depression. It articulated the complex interdependencies emerging between the two levels of digital media empowerment and the ways in which the process has led to opposite outcomes. We found that digital media skills had direct and indirect effects on depression levels through information sharing and that risk perception moderated the indirect effects. These represent widely used variables in both health and mass communication literature regarding social media. Our findings show disparate effects of digital media skills (both information and social skills) on depression levels. Whereas information skills were directly and negatively associated with depression levels, social skills were not associated with depression levels. Similarly, misinformation sharing on social media played both positive and negative mediating roles in the relationship between digital media skills and depression. Surprisingly, true information did not significantly mediate the relationship between digital media skills and depression levels. In addition, risk perception positively moderated the relationship between misinformation sharing on social media and depression levels.

Theoretical implications

This study has found empirical evidence to support the theoretical underpinnings and it serves as a helpful first step to create future research agenda and implement subsequent research. To our knowledge, this research is one of the first studies to show a direct relationship between digital media skills and mental health as well as the complex mechanism linking the two. More specifically, the only dimension of digital media skills that had a direct ameliorating effect on depression was information skills, whereas the direct relationship between social skills and depression was not statistically significant. Although most of the previous literature has been conceptual (Fitzsimons & Fuller, 2002), this study contributes to media empowerment literature by empirically demonstrating a linkage between empowerment and developed digital media skills.

The findings from our study can provide some important insights for future studies. First, our study can provide a broad theoretical foundation in the literature review and thus expand the interpretation of the study's immediate findings within a framework including two levels of empowerment processes. Research related to empowerment requires shifting attention from debating the merits of certain levels of empowerment processes (i.e., individual or community level) to incorporating various levels of those processes. We also suggest that further research can integrate current outcome variables with more foundational constructs. In turn, highlighting specific psychosocial elements of empowerment processes from a communications perspective reinforces the value of these findings for a broader range of health and mass communication researchers.

This study's findings demonstrate the partially positive impact of digital media skills on mental health, the mediating effects of information sharing, and the moderating role of risk perception, illuminating the complex relationship

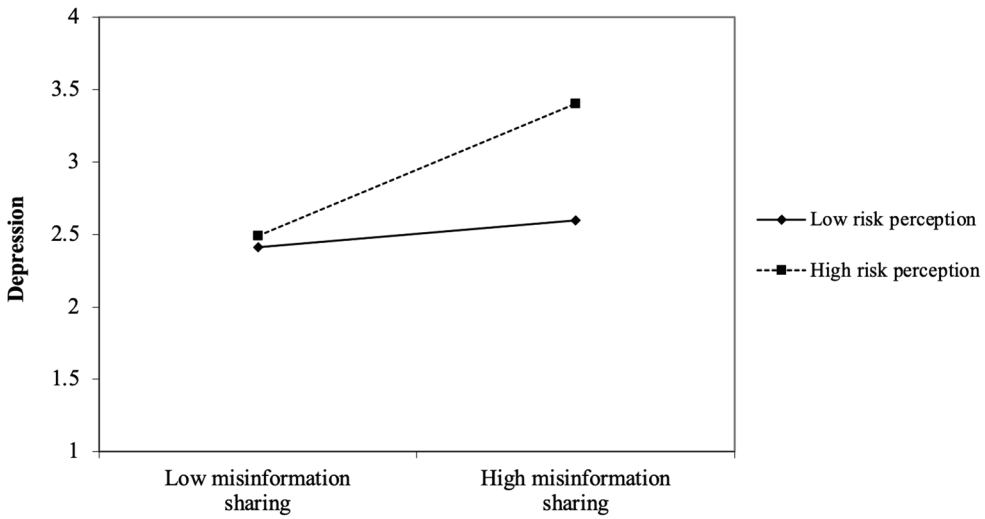

Fig. 3 The positive moderating effect of risk perception in the relationship between misinformation sharing and depression

between the two levels of empowerment. More specifically, studies have shown that digital media empowerment has had a positive effect on mental health (Leung et al., 2022). The present study expanded the conceptual and dimensional boundaries of digital media empowerment. We therefore call for future research to explore further the role of other dimensions of digital media skills on mental health in various contexts.

It is worth noting that related concepts such as health literacy, health disparities, and self-efficacy are all associated with depression among an array of other mental health outcomes, including most major diseases and conditions as well as consumer, patient, and caregiver empowerment and media skills. Therefore, health literacy, digital health literacy, health disparities, and self-efficacy represent enduring, evidence-based constructs that also function as intermediate variables within a multidimensional health communication theoretical model (Schillinger, 2020). While this study's core importance is that it provides preliminary evidence of these statistical relationships, we suggest that further research is also needed regarding the same or highly similar variables.

Our study also found that information sharing on social media played a mediating role between digital media skills and depression levels. Our research contributes to expanding the mechanisms involved in the relationship between digital media skills and mental health. We characterize the disparate effects of different types of information sharing on mental health. More specifically, only misinformation sharing played this mediating role, whereas true information sharing did not. Misinformation positively mediated the relationship between information skills and depression but negatively mediated the relationship between social skills and depression. Furthermore, only information skills positively correlated with true information sharing, whereas social skills did not. Previous research has either focused on the positive effects of information sharing on mental health or on the negative effects of misinformation sharing (Loeb et al., 2021). Therefore, we call for more studies to explore the effects of information sharing on different types of mental health. More importantly, future research could explore other empowerment mechanisms of digital information skills in terms of mental health.

Finally, this study provides evidence for the moderating role of risk perception in the relationship between information sharing and depression. Interestingly, this moderating effect appeared only in the relationship between misinformation sharing and mental health but not between true information sharing and mental health. Previous studies found that when access to disease or virus testing is limited or when testing accuracy is doubtful, individuals assess their risk by looking at mortality rates (Liu & Yang, 2023). However, such subjective assessments are often biased, especially when a person does not actually have a disease and tends to overestimate the likelihood of infection risk (Anglewicz & Kohler, 2009). Our research also found that this risk perception exacerbates the negative mental health effects of misinformation sharing. It is worth noting that the present study was conducted in 2022 during Shanghai's lockdown period, and the risk perception of COVID-19 might have been heightened and the public's mental health state might have worsened. The findings highlight the interaction between two levels of empowerment and conditional effects of risk perception and offer unique insight into the relationships among risk perception, (mis)information sharing, and mental health during a public health crisis. Future studies could further investigate the role of perceptions of different risks and their relationships with mental health in different contexts.

Practical implications

This research has both theoretical and practical implications. First, the present research demonstrates the partially positive effect of digital media skills on empowerment and mental health. Health practitioners can enhance the digital media skills of social media users as a way of improving their mental health, paying particular attention to the positive relationship between information skills and misinformation sharing. Second, social skills have a significant negative effect on misinformation sharing; therefore, practitioners can improve social skills of social media users by educating them to communicate actively with others as well as establish and maintain relationships to reduce their misinformation sharing. Third, our research finds that digital media skills facilitate not only true information sharing but also misinformation sharing, although the relationship between digital media skills and true information sharing is more pronounced. Therefore, health and education practitioners need to improve further the ability of social media users to recognize misinformation and reduce sharing that misinformation. For example, social media users could exercise critical thinking to discern irrelevant and untrustworthy information through media literacy programs. Finally, our research finds that perceived risk exacerbates the negative relationship between misinformation sharing and depression. Therefore, health practitioners can help social media users form a correct risk perception and reduce their excessive fear and worry about risks.

Limitations and future directions

This study has the following limitations, which researchers should consider when evaluating its findings. First, this

study used a cross-sectional questionnaire, so a causal relationship between digital media empowerment and mental health cannot thus be proven. Future research could use experimental or longitudinal studies to examine this effect further.

Second, because we focus on the community level of empowerment, and information diffusion is of critical significance during a public health crisis, this study is limited to information sharing. We suggest that future research examine the comprehensive mediating role of information seeking as well as information sharing in the relationship between digital media skills and mental health. Furthermore, despite the positive impacts of ICTs on mental health shown in the present study, many studies have demonstrated the negative impacts of social media on individuals' mental health such as social media fatigue and information overload (Fu et al., 2020). More investigation is needed to form a comprehensive understanding of the impact of social media use on people's mental well-being.

Finally, there may be room to expand on the theoretical underpinnings guiding the research. We propose a novel framework of media empowerment regarding the two levels of empowerment processes from a communication perspective. Future study could examine whether general or specific media use, other types of emerging media (e.g., games, artificial intelligence, digital humans), social media fatigue, and information overload could influence mental health through the two levels of empowerment processes. Meanwhile, this study specifically explores the relationship between digital media skills and depression through information sharing. There are likely important factors other than digital media skills that could affect individuals' true and false information sharing. Although this study shows that digital media skills influence individuals' mental health, there are other potential mediating or moderating variables (e.g., perceived threat, self-efficacy, certain technology use, and related behaviors) that could enrich the understanding of the phenomenon.

Conclusion

This research proposes and tests a theoretical framework for psychological processes of empowerment in terms of the contradictory effects of digital media skills on mental health. We reveal the underlying dynamics of the interaction between individual and community levels of empowerment processes of digital media skills, thus providing a more nuanced understanding of the complexities of empowerment. Our findings support both direct and indirect relationships between digital media skills and depression levels at both the community and individual levels. Research has found disparate effects of digital media skills (both information and social skills) on depression levels. Similarly, although misinformation sharing on social media play both positive and negative mediating roles in the relationship between digital media skills and depression levels, true information do not. More specifically, digital media skills have both positive and negative effects on mental health. The information skills dimension of digital media skills can directly and negatively affect depression. Although misinformation sharing on social media plays a positive mediating role between information skills and depression, it plays a negative mediating role between social skills and depression. Risk perception positively moderates the relationship between misinformation sharing and depression levels. This study highlights the theoretical implications for the complicated role of digital media skills in both empowering mental health and their potential to backfire, leading to practical applications for improving mental health.

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Data availability The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical approval The procedures for human participants involved in this study are consistent with the ethical standards of the authors' institution.

Informed consent Informed consent was obtained from all participants included in the study.

Conflict of interest The authors have no conflicts of interest to declare that are relevant to the content of this article.

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