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Developing a Perceived Social Media Literacy Scale: Evidence from Singapore

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Through a series of 4 studies (focus group discussions involving social media users and 3 nationally representative online surveys) conducted in Singapore, we identify 4 types of

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competencies in which social media literacy can manifest: technical, social, privacy related, and informational. Using a sequential, exploratory mixed-methods approach, we first identified literacy events and practices that were grounded in social media users' actual experiences through a series of focus group discussions. Then, based on the qualitative results, we developed and tested a perceived social media literacy (PSML) scale through a series of 3 national online surveys, where we found disparities in PSML based on socioeconomic factors.

Keywords: digital literacy, media literacy, mixed methods, social media

In April 2020, a member of a popular Korean boy band drew backlash after tweeting an April fool's joke that he was diagnosed with COVID-19 (Rodriguez, 2020). This was not the first nor the last example of high-profile social media blunders, many committed by otherwise highly educated and even technologically savvy individuals. Indeed, social media gaffes have become more common as social media became more and more deeply embedded in people's lives. For example, in the small but financially and technologically advanced nation of Singapore, a survey of about 2,000 participants found that about 73% use Facebook and about 86% use WhatsApp (Tandoc, 2020). But while basic literacy is almost universal in Singapore, with its education system considered among the best in the world (Coughlan, 2016), the country has not been exempted from high-profile social media gaffes. In January 2014, a banker had to relocate his family out of Singapore following a huge online backlash triggered by his Facebook posts ridiculing those who use public transport (Parry, 2014).

Social media have changed how individuals exchange information, communicate with one another, and even conduct business. But social media platforms have also become spaces for identity theft, cyberbullying, scams, and fake news. These problems are concerning, considering how ubiquitous social media have become. A crucial step to address these issues is for social media users to have adequate knowledge and skills to navigate the complex social-technological networks they put themselves in (Livingstone, 2014). Users need an adequate level of *social media literacy*. Guided by the social theory of literacy (Barton & Hamilton, 2000), this exploratory mixed-methods research employs focus group discussions (FGDs) involving 62 social media users followed by a series of three nationally representative surveys in Singapore (N = 3,092) to identify competencies that users perceive they need in order to be social media literate and, based on these, propose a perceived social media literacy (PSML) scale.

Literature Review

The concept of literacy has been closely linked to information (Bucher, Fieseler, & Suphan, 2013). From referring to the ability to read and write, the semantic meaning of literacy has extended to refer to the ability to understand and create information across media platforms (Lanham, 1989). Thus, a media literate person has been described as someone who possesses the abilities to read, evaluate, and create messages using the different forms of media (Ashley, Maksl, & Craft, 2013). The media ecosystem, however, is both complex and ever changing. Indeed, the concept of literacy has been reassessed with every generation of media (Bucher et al., 2013). For example, studies have conceptualized different forms of

media literacy, such as film literacy (Bucher et al., 2013), news literacy (Ashley et al., 2013), and digital literacy (Jones-Kavalier & Flannigan, 2008).

In an increasingly mediatized world, media literacy is particularly important as it can help "create the meaningful dialog, collaborations, and struggles that will hold our civic societies together" (Mihailidis, 2011, p. 5). This study is guided by the social theory of literacy, which argues that "literacy is best understood as a set of social practices; these are observable in events which are mediated by written texts" (Barton & Hamilton, 2000, p. 9). It argues that literacy is best understood based on three components. First, literacy *practices* refer to "the general cultural ways of utilizing written language which people draw upon in their lives" (Barton & Hamilton, 2000, p. 7). In other words, literacy practices are "what people do with literacy" (Barton & Hamilton, 2000, p. 7). Second, literacy *events* refer to activities and instances that require, if not demand, various types of literacies (Barton & Hamilton, 2000). Third, these events usually involve "a written text, or texts, central to the activity and there may be talk around the text" (Barton & Hamilton, 2000, p. 8). As social media platforms continue to increase in relevance and become more deeply embedded in people's daily lives, teeming with various types of texts that users produce, distribute, and consume, they also bring a host of new literacy events that require literacy practices. But what are these events, and what are the types of literacy practices that social media users need to navigate social media effectively and responsibly?

The Rise of Social Media

Social media refer to digital networks "that enable people to organize, socialize, learn, play, and participate in e-commerce transactions" (O'Neill, Zumwalt, & Bechman, 2011, p. 1). These digital networks "employ mobile and web-based technologies to create highly interactive platforms via which individuals and communities share, co-create, discuss, and modify user-generated content" (Kietzmann, Hermkens, McCarthy, & Silvestre, 2011, p. 241). Facebook, the biggest social media network, with about 1.52 billion daily active users as of December 2018 (Facebook, 2018), allows users to create personal accounts, connect with friends, post their own content, view their friends' posts, as well interact with one another via comments, among other things. Many users also use multiple social media platforms, routinely swinging from one platform to another (Tandoc, Lou, & Min, 2018).

Individuals use social media for various reasons. For example, users have been found to use social media for self-expression, communication, information sharing, friendship maintenance, and also as a pastime (Gleason, 2016). One of the reasons for the popularity of social media platforms as information source and venue for social interactions is the rise of the digital native generation—those who have spent their entire lives being consistently surrounded by digital technologies (Prensky, 2001).

Because of social media's omnipresence, research on social media is thriving in a number of disciplines. Studies have specifically looked into issues in the fields of media research, such as social presence and media richness, as well as social processes, such as self-disclosure and self-presentation (Kietzmann et al., 2011), impression management, and friendship performance (boyd & Ellison, 2007). But aside from bringing about significant changes to the way people stay connected, social media have also brought about challenges (Kim, Sin, & Lee, 2014).

Literacy Events on Social Media

Numerous studies have documented different problems associated with social media use, ranging from cyberbullying (Livingstone, 2014), misunderstanding, and conflict (Kim et al., 2014), to the spread of fake news (Tandoc, Ling, et al., 2018), among many others. These can be considered as literacy events: By engaging in social media activities that expose them to different forms of texts, social media users also find themselves embroiled in events that require different forms of literacy practices.

While these literacy events have mostly been studied at the individual level (i.e., users), much of these issues stem from the affordances and structures put in place by social media companies, who are at the forefront of "informational capitalism" (Sevignani, 2015, p. 13). These companies' profit orientation may not necessarily align with fulfilling and protecting people's rights and needs—for example, we see a clash between individual privacy needs and technological companies' use of user data to sell space for targeted advertising (Fuchs, 2012; Sevignani, 2015). Social media companies also profit from the labor of their users, who populate these platforms with free content that sustains the attention economy that primarily benefits these tech companies (Elmer, 2018). It is within these important contexts that studies examining the issues that individual users face on social media should be understood. These individual-level issues can be classified into four main groups: privacy and safety issues, relational issues, psychological problems, and informational challenges.

Privacy and Safety Issues

Social media is inextricably linked to the problem of privacy, which refers to one's "ability to control and limit physical, interactional, psychological and information access to the self or one's group" (Burgoon et al., 1989, p. 132). Social media users willingly put up their personal information (e.g., name, photographs, date of birth) to construct their profile and display their social connections, to connect and communicate with people in their existing offline social networks (boyd & Ellison, 2007). The huge amount of personal data available online generates privacy concerns for users, including exploitation of personal data by third parties and exposure to online harassment and bullying (boyd & Ellison, 2007; Yar, 2012).

Relational Issues

Challenges related to interpersonal relationships encompass those that result in interpersonal problems. For example, studies have examined the effects of social media use on the fraying of off-line relationships due to the spread of rumors and gossips (Kim et al., 2014). Studies have also examined the link between social media use and relationship quality. For example, Valenzuela, Halpern, and Katz (2014) found in the United States that the use of social networking sites was negatively correlated with marriage quality and positively correlated with thinking about getting a divorce.

Psychological Problems

Social media can also result in intrapersonal issues. For example, social media have been implicated in contributing to increased rates of anxiety and depression among its users (Appel, Gerlach, & Crusius,

2016). Other studies also examined addictive behaviours in relation to social media use, often characterised by a neglect of personal or work life, preoccupation, mood alteration, withdrawal, inability to cut down, and relapse (Chakraborty, 2016; Ho, Lwin, & Lee, 2017).

Informational Challenges

Social media platforms also serve as information sources where people produce, share, and consume news and other types of information. However, content production online has also allowed disinformation to proliferate on social media (Tandoc, Ling, et al., 2018). For example, a study found that students' use of social media for self-expression and socializing has also led them to share misinformation (Chen, Sin, Theng, & Lee, 2015).

These challenges experienced by individual users and conceptualized as literacy events can be managed with literacy practices (Barton & Hamilton, 2000). However, while many studies have examined the link between social media use and a host of different issues at the individual level, there is a pressing need to understand the link between social media issues with the literacies that users need to possess to manage or avoid such problems.

Literacy Practices in Mass Communication

The definition of media literacy has gone through several modifications and expansions, but three types remain consistent: information literacy, digital literacy, and media literacy. First, the need for *information literacy* became more pronounced as information became more available and permanent in modern society. Information literacy involves the ability to carefully retrieve and select information in various domains, fields, and contexts (Koltay, 2011). A skill emphasized in information literacy is the ability to recognize message quality, veracity, and trustworthiness (Bawden, 2001). Second, *media literacy* was initially defined as possessing skills that allowed people to examine and understand written form of media, and by extension, to communicate to other people effectively through writing (Christ & Potter, 1998). But the meaning of media literacy has evolved to encompass the ability to understand information presented in various media platforms, such as print journalism, movies, radio, television, and computer-mediated interaction and discussions (Kellner & Share, 2005; Livingstone, 2014). Finally, *digital literacy* followed the rise of digital media (Jones-Kavalier & Flannigan, 2008). The digitization of daily life, particularly in personal and mass forms of communication, equipped people with technological devices that allowed them more than just communication affordances but also the ability to create, manipulate and design content that they can publish in the electronic space (Jones-Kavalier & Flannigan, 2008). Dutta and Bilbao-Osorio (2012) also argued that digital competence goes beyond just digital skills but involves certain socio-emotional aspects that help individuals to achieve goals and demands using digital resources.

Studies have also examined the positive effects of these various types of literacies, which in this study we conceptualize as constituting literacy practices. For example, those who joined a digital literacy program in Israel were found to not only have gained more knowledge but also more confidence and self-esteem in using technology (Lev-On, Steinfeld, Abu-Kishk, & Pearl Naim, 2020), while a survey of Internet users in the United States found that digital literacy in the context of privacy was significantly related to

information control behavior (Park, 2011). Information literacy was also found to be positively linked to class performance among college freshmen in the United States (Shao & Purpur, 2016), trust in website sources among users of e-government services in South Korea (Lee, Lee, & Lee-Geiller, 2020), and even to perceived quality of life among Internet users in Hong Kong (Leung, 2010). Given these positive consequences of the different types of literacy practices, it is equally important to map out literacy practices that are needed within social media spaces, or what would constitute as social media literacy.

Social Media Literacy

Conceptualizing literacy in the context of social media is challenging, because unlike in the use of traditional media, social media use involves social interactions among users (Livingstone, 2014) as well as content creation (Vanwynsberghe, Vanderlinde, Georges, & Verdegem, 2014). Scholars have started referring to *social media literacy* as the use of social media as a platform to educate individuals on various media-related issues, such as social media as a platform for literacy interventions to prevent the risk of eating disorder among adolescent girls (McLean, Wertheim, Masters, & Paxton, 2017). Other studies use the term to refer to a specific form of media literacy. For example, Vanwynsberghe et al. (2014) defines social media literacy as "not only the practical and cognitive competencies possessed by users of social media but also the motivation to employ these media effectively and appropriately for social interaction and communication on the web" (p. 284).

A survey of librarians in Belgium proposed that social media literacy involves three competencies: practical, cognitive, and affective (Vanwynsberghe et al., 2014). Practical competencies refer to the ability to access and operate social media. Cognitive competencies refer to "the critical analysis and evaluation of motives and goals shaping the consumed content, the language of messages and the context in which content is produced" (Vanwynsberghe et al., 2014, p. 289). Affective competencies include "the attitudes towards or evaluation of social media characteristics and social media behavior" (Vanwynsberghe et al., 2014, p. 289).

Guided by this large body of work on different forms of literacy in mass communication and the framework of social theory of literacy (Barton & Hamilton, 2000), this study adopts an exploratory mixed-methods sequential design to propose a typology of competencies that constitute social media literacy that is grounded in the experience and perspectives of social media users themselves, rather than imposed on them. Such bottom-up process ensures that measures of social media literacy are rooted in users' actual experiences. Through a series of FGDs followed by a series of national surveys, this current study seeks to answer the following questions:

RQ1: What areas of competencies do users in Singapore perceive they need to navigate social media?

RQ2: How do users in Singapore vary on their perceived social media literacy?

Overall Approach

This study is based on four sequentially conducted studies. It uses an exploratory sequential mixed-methods approach (Creswell & Plano Clark, 2011) that starts with a qualitative approach (Study 1) followed by a quantitative approach (Studies 2–4). This design allows general themes to emerge from a qualitative

approach, such as through FGDs, and guide the design of a quantitative study, such as a survey. Thus, we started by conducting FGDs across different age groups to determine what issues social media users experience and what literacies they think they should possess to resolve or avoid these issues. We then developed a list of 32 statements that describe different forms of literacies that inductively emerged from the FGDs.

Next, we conducted three national online surveys to (1) explore the factor structure of those items, (2) confirm the factor structure found in (1), and (3) examine the validity of a proposed PSML scale. In total, 3,154 participants took part in the entire process, from item pool development to examining scale validity. Throughout the process, we tapped on recommended best practices for scale development for communication researchers (Carpenter, 2018).

Study 1: Identifying Literacy Practices

Study 1 is based on FGDs conducted in May–June 2016 with 62 social media users in Singapore, recruited through online advertisements, and who received $50 each for participating in a 90-minute FGD. Only users of at least one social media platform were selected to participate (i.e., Facebook, Twitter, Instagram, WhatsApp, and WeChat). The participants were grouped based on age (as of 2016), with two groups each for Millennials (18–32 years old; 18 participants), Generation X (33–47 years old; 14 participants), and Baby Boomers (48–66 years old; 12 participants). Two additional groups were interviewed to include foreign nationals working in Singapore as permanent residents or employment pass holders (18 participants). The FGDs, all conducted in English, were held and recorded in an FGD facility at a large Singapore university. An experienced moderator was hired to facilitate the session, guided by an FGD guide that asked questions about social media use in Singapore. A student assistant helped in recording the sessions, while the main researcher observed all the FGDs from the control room (behind a one-way glass window, unseen by the participants).

Analytical Approach

Some 270 pages of transcribed data were analyzed using the constant comparative approach, an analytical strategy associated with grounded theory (Glaser, 1965). The researchers conducted a three-step analysis. In the open-coding stage, four research assistants, supervised and trained by the main researcher, independently coded all transcripts. The coders examined each line of data and coded them freely. The emerging codes were constantly compared with the preceding one, to determine if the next line merits the same code, or if a new code is required, or if the previous code has to be revised accordingly (Saldaña, 2009). This process was repeated until all the transcripts have been coded. The second stage involved axial coding, where the coders individually grouped their codes into conceptual bins, beginning the process of categorization (Lindlof & Taylor, 2011). Finally, the coders and the main researcher met and discussed the categories that emerged from initial coding and grouped them into emerging themes. Following this, six graduate students, trained in qualitative data analysis by the main researcher, also analyzed the transcripts. This additional process allowed the main researcher to compare categories and themes across two rounds of data analysis as a form of validation.

Study 1 Results

RQ1 asked about competencies users perceive they need to navigate social media. The participants were first asked about the problems they face on social media, and then about the skills and knowledge they think they should possess to avoid such issues. Four areas of literacy practices emerged from the analysis: technical competency, social literacy, privacy protection, and informational awareness. The exemplars included below all came from the FGDs.

Technical Competency

This refers to knowing how to navigate social media affordances, such as knowing how to create or delete an account, how to add friends, and post information. Some middle-aged and older participants felt their technical skills were inadequate. A 56-year-old female participant said she does not have many friends on her social media account "because I don't even know how to add them." A 68-year-old female participant, who uses WhatsApp after her friends added her as a contact, said she knows about other social media platforms like Facebook, but does not really know how to navigate them: "I just know what it is, but I don't know how to use [it]." They addressed this problem by relying on someone else, such as their children, spouses, or even friends, who they consider more tech-savvy. A 49-year-old female participant asked her college-age children to help her create Facebook and WhatsApp accounts. "Everything they set up for me because my computer skill, my IT skill is really zero." In contrast, younger participants consider themselves more tech-savvy and use their technical competencies in tandem with other literacy practices.

Privacy Protection

Some participants stressed the need for privacy protection. Many parents recalled reminding their children about online privacy. But what many of them did was to also follow their children on social media. A 55-year-old father said when his son got into secondary school and started a Facebook account, he also started his own account so he could become Facebook friends with his son "so I get to follow what he posts in there." Ironically, this was an issue that younger participants raised, with many of them wary of having their parents see what they share on social media. Some college students said they refused to add their parents as Facebook friends, while others became more conscious of what they post after they accepted friend requests from their parents.

Some participants referred to identity theft as a serious problem. This occurred when an individual's identity, which included personal information and photos, was taken and used without consent to falsely pose as that person. A 40-year-old finance officer said, "There are some people, they use your friend's photo, and they claim they are that person and try to be your friend you know. You can unknowingly fall into that kind of trick." Thus, some shared various ways they manage their privacy settings on social media, from changing passwords regularly, using two-factor authentication, to being selective with the friends they add. Privacy management also includes limiting what users post on their accounts. Some Generation X participants indicated that they never put personal information online, or just not write anything at all and just read others' posts and news. A 21-year-old female participant said social media users should not reveal

personal information such as "where you are at now, or which school you're studying" to protect oneself from stalkers.

Social Relationships

Competencies related to managing relationships were prominent in the discussions. A 40-year-old female participant said some of her colleagues at work had posted about their complaints against other employees. "It ended up very, very hostile." It turned bad that one of those involved deactivated her Facebook account. A 20-year-old female participant also shared how her friend got offended after seeing photos of an event to which she was not invited. Some technical competencies were mentioned in relation to relationship management, such as being able to segment one's network of friends so certain posts can be hidden from others. Some participants go to the extent of creating a second account. A 34-year-old female participant maintained two Facebook accounts. "One is a personal one, and one is meant for corporate that I have made [for] my bosses and colleagues." Some participants also referred to relationship management strategies related to communication, such as being careful not to offend others. A 20-year-old male participant said, "I think the thing is to respect other opinions, don't be aggressive and be too fixated about what you think." Others even exercise some form of self-censorship. A 39-year-old male participant said, "For me, you don't post your political information or whatever, you don't post, even you have some opinions about certain races or immigrants or whatever, you don't post them."

Knowing the line between what is acceptable and what is not acceptable when it comes to information shared on social media is particularly salient among those who work full-time. A 32-year-old female government employee said,

> I've been told on my first day of work that we're not supposed to post like nasty comments on Facebook and things like that. Even though they did not say that they would stalk us, but then after the HR [human resources department] informed us, then I actually, I don't post—actually in fact I will only stalk people. I will just read the news, and I will not post anything.

Informational Awareness

Some participants also emphasized the importance of being able to distinguish between truthful and false accounts on social media, especially with the rise of fake news. Some participants recognized the benefits of social media when it comes to information, such as getting quick information about MRT (train) breakdowns. But others also provided examples of falsehoods on social media, such as the rumor that former Prime Minister Lee Kuan Yew had passed away when he was still in the hospital. Older participants shared seeing confusing posts about health claims while some also recounted seeing radicalized news.

When trying to ascertain whether a post or even an offer, such as a lucky draw, is real or not, respondents would look out for indicators, like the number of likes the page has, whether the offer seems too good to be true, and if the company sponsoring the offer is a reputable one. Such reliance on a trustworthy source is a common response, especially as some participants acknowledged encountering fake

news on social media. "I think you have to assess the source," a 42-year-old female participant said. "If the source is from reputable [one], like Channel News Asia or *Straits Times*, [it's] probably believable." Others reported crosschecking with other sources, mostly by doing a Google search.

Study 1 Discussion

In identifying literacy practices based on social media users' actual experience and categorizing them into four areas (i.e., technical competency, social literacy, privacy protection, and informational awareness), Study 1 also noted differences between older and younger participants, with the latter having higher confidence in their capability to navigate social media platforms, altering privacy settings, and in discerning the credibility of information they received. Some older participants rely on their children to help them with social media. In helping us broadly typologize social media literacy practices, Study 1 also allowed us to start developing a PSML scale that can be tested and validated quantitatively.

Study 2: Developing a Perceived Social Media Literacy Scale

Based on qualitative data generated in Study 1, we deduced 32 statements that describe specific types of social media literacy practices (see Figure 1). Study 2 determines whether these items, each rated by a respondent on a 5-point Likert scale, constitute a PSML scale.

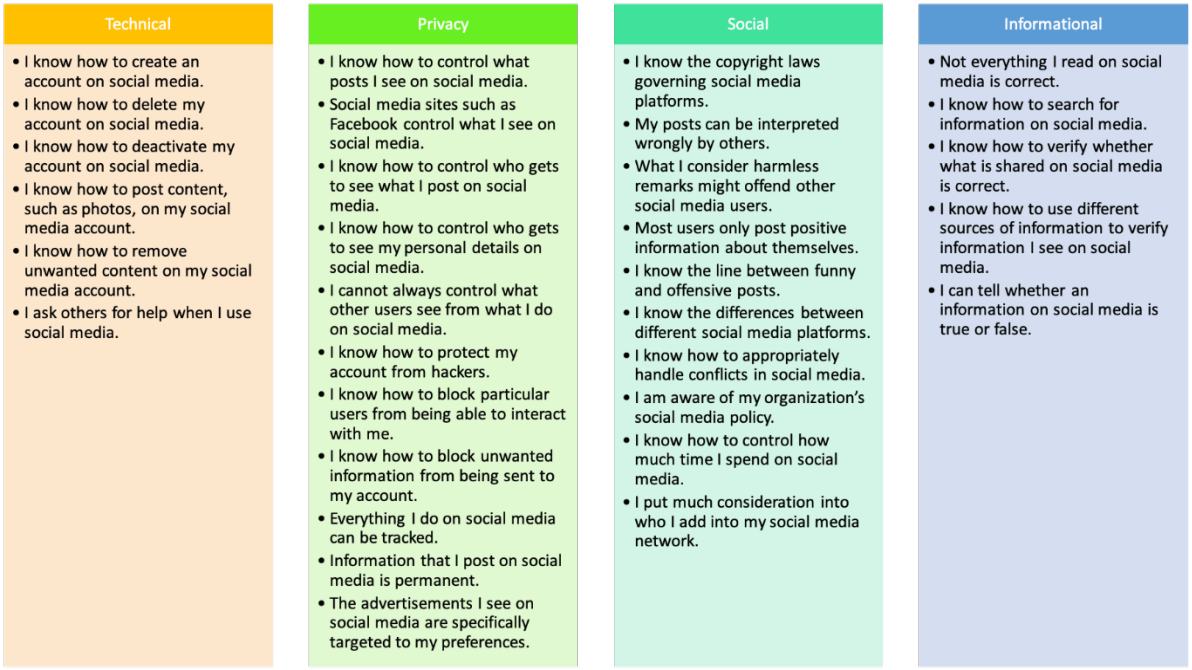

Figure 1. PSML items developed from focus group discussions.

To develop and test this scale, we commissioned an online survey in June 2017 involving a national quota sample of adult residents (n = 1,021, ages 18 and above). The survey participants were recruited by a commercial polling company based in Singapore. The average age is 34.98 years (SD = 11.26), and 50% of the sample is female. The distribution based on ethnicity was 71.5% Chinese, 14.5% Malay, 9.6% Indian, and 4.4% other races, which approximately reflected the population distribution (Department of Statistics, 2010).

Analytical Approach

We conducted exploratory factor analysis (EFA) on SPSS 22 to test the factor structure of the proposed items. First, we ran Little's Missing Completely at Random (MCAR) test to examine if missing values were completely unrelated to other responses among the 32 items. Since the number of missing items were small (<2%), and Little's MCAR test was not significant, $\chi^2(1204) = 1{,}239.08$, $p = .24$, we replaced missing data using the expectation-maximization (EM) algorithm. EM, unlike other methods of treating missing data (such as mean substitution or listwise deletion), relies on maximum likelihood estimation to replace missing values. In the iterative EM procedure, estimated values are imputed for the missing responses based on the values of other responses within a data set. This helps researchers replace missing data without compromising on statistical power (Dong & Peng, 2013).

Next, we used both the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity to examine data factorability. For the EFA, we used principal axis factoring (PAF) to extract latent variables from the 32 items (Carpenter, 2018). Next, we identified the number of factors to be extracted using parallel analysis (O'Connor, 2000). Following that, we fixed the number of factors according to the parallel analysis results and conducted PAF using an oblique (Promax) rotation, as we expected some correlations between the latent variables (Costello & Osborne, 2009). To select and retain items, we adopted four recommendations (Carpenter, 2018; Comrey, 1988). First, we retained items with factors loadings more than .40. Second, we removed items that cross-loaded with a difference equal to or more than .10. Third, we retained items that were conceptually consistent with the other items on the factor. Finally, we removed factors that had fewer than three items loading above .40. The entire process from parallel analysis to EFA was repeated until we found clean factors with items that had loadings above .40 for each factor, had no cross loadings, had theoretical consistency, and had a minimum of three salient items.

Study 2 Results

According to the Kaiser–Meyer–Olkin measure of sampling adequacy (.95) and Bartlett's test of sphericity, $\chi^2(496) = 15{,}059.14$, $p < .001$, the data was suitable for EFA. The initial parallel analysis showed eight factors underlying the 32 items. Following the initial EFA with factors extracted fixed to eight, nine items were removed due to low factor loadings and cross loadings. The entire procedure was repeated seven times before a clean factor solution of four factors explaining 68% of the variance was found. Figure 2 shows the final factor solution of the 14-item PSML scale, with all items indicating factor loadings above .50. Factor 1 consists of five items indicating technical competency (α = .89). Factor 2 consists of three items focusing on social relationships (α = .71). Factor 3 consists of three items that reflect informational awareness (α = .83), while Factor 4 consists of three items indicating privacy and algorithmic awareness on social media (α = .66).

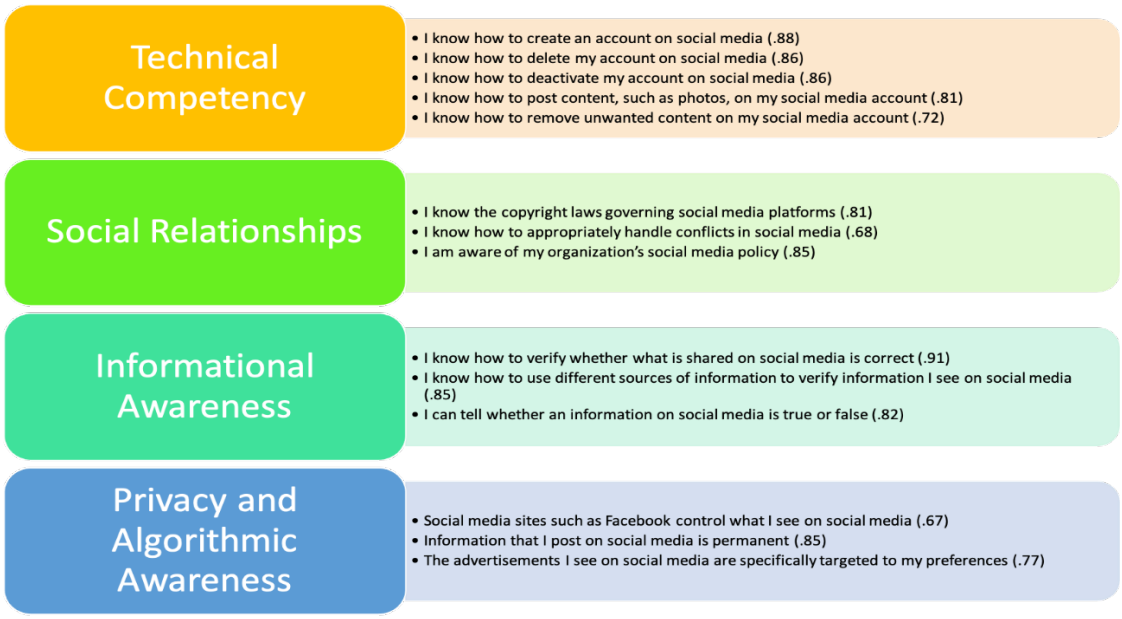

Figure 2. 14-Item PSML: Items and factor loadings.

This four-factor PSML scale found in Study 2 closely mirrors the broad categories that emerged from Study 1. To give us more confidence in the validity of our proposed scale, we subjected it to another round of confirmatory testing in Study 3.

Study 3: Confirmatory Testing

Study 3 sought to validate the 14-item PSML scale found in Study 2. Thus, we worked with the same commercial polling company to commission another national online survey involving 1,000 adult respondents in May 2019. The average age is 40.83 years (*SD* = 15.07). Some 52% the respondents were female, while the ethnic distribution was 77.6% Chinese, 14.1% Malay, 5.4% Indian, and 2.6% other races. The questionnaire included the 14-item PSML scale developed and tested in Study 2 (see Figure 2).

Analytical Approach

To confirm the factor structure identified in Study 2, we conducted confirmatory factor analysis (CFA) using the R package lavaan (Rosseel, 2012). As CFA assumes multivariate normality in the data, we ran Mardia's test using the R package MVN and found that Mardia skewness and kurtosis was 5271.58 ($p < .001$) and 80.73 ($p < .001$), respectively, indicating nonnormal data. As such, the maximum likelihood estimator "MLM" was used to estimate the unknown parameters in the model. The estimator "MLM" was defined to correct for biased estimates among the fit indices, resulting in a mean-adjusted chi-square test statistic that is robust to nonnormal data (Satorra & Bentler, 1994). Finally, the goodness of fit was evaluated using the following cutoffs: comparative fit index (CFI) of .95 or greater, non-normed fit index

(NNFI) of .95 or greater, root mean square error of approximation (RMSEA) equal to or less than .06, and standardized root mean square residual (SRMR) equal to or less than .08 (Hu & Bentler, 1999).

Study 3 Results

The specified four-factor 14-item PSML scale was found to have good fit for the data, Satorra-Bentler $\chi^2(71) = 249.504$, $p < .001$; CFI = .96; NNFI = .95; RMSEA = .06, SRMR = .04. All factor loadings on latent variables were above .40, indicating unidimensionality for each factor. Figure 3 illustrates the CFA results conducted with the 14-item four-factor model of the PSML scale. This provides evidence that the factor structure identified in Study 2 was robust across a separate sample.

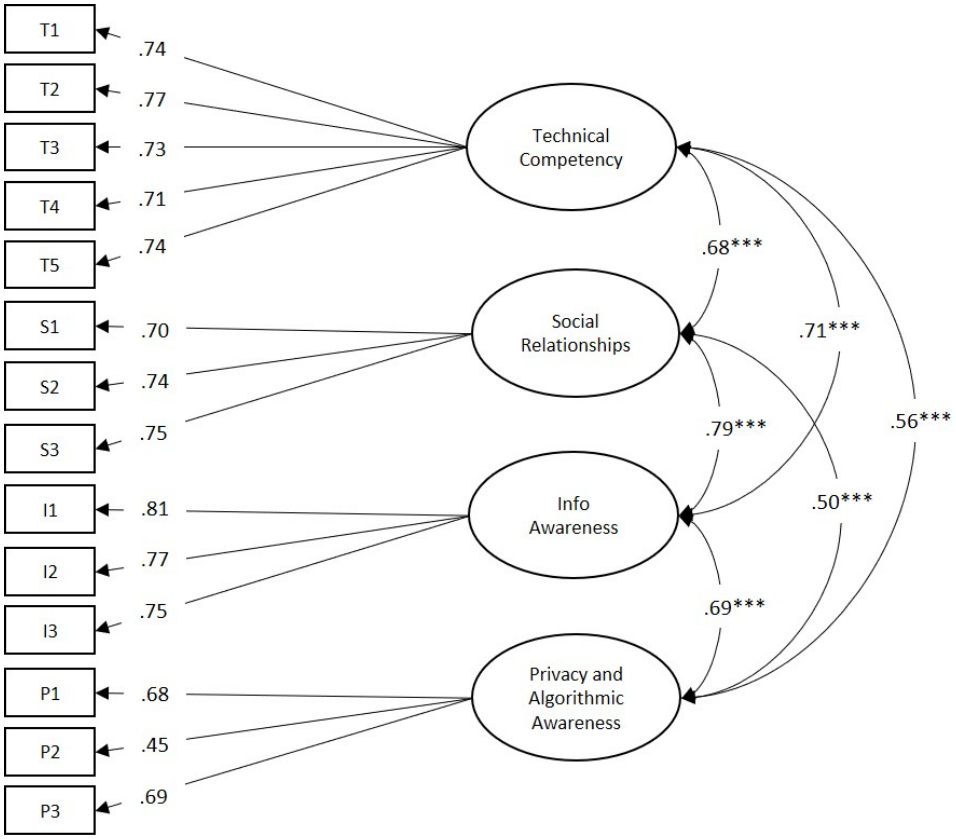

Figure 3. Confirmatory factor analysis of the 14-item PSML scale.

Preliminary Discussion

Using an initial pool of 32 items developed from the FGDs in Study 1, Studies 2 and 3 developed and validated a 14-item PSML scale. Study 2 found, which Study 3 validated, that four dimensions undergird the concept of PSML: technical competency, social relationship, informational awareness, and

privacy and algorithmic awareness. These four factors were consistently robust across separate samples used in Studies 2 and 3.

Technical and social competencies, along with informational awareness, aligned well with Study 1. However, instead of privacy management, the fourth factor that emerged in Study 2 and was validated in Study 3 appears to reflect critical awareness of how information is presented and remain on social media, which we henceforth broadly term as privacy and algorithmic awareness. This fourth dimension reflects awareness of how information on social media is permanent and curated for each user. This also reflects an underlying understanding of the nature of how private data on social media platforms are used to modify one's user experience.

Study 4: Demographic Predictors of PSML

Having confirmed the factor structure of our PSML scale in Study 3, we can now attempt to answer RQ2. For this, we worked with the same polling company to conduct a third national online survey in December 2019, involving a nationally drawn sample of 1,071 adult residents. Around 50% were male, and the average age was 40.39 years (*SD* = 12.26). The ethnic distribution was 77.5% Chinese, 12.2% Malay, 6.1% Indian, and 3.4% selecting the "Others" category. The questionnaire included the 14-item PSML scale as well as demographic measures, including age, gender, one's highest educational level measured on a 6-point scale from 1 (*primary school*) to 6 (*doctorate*), income, and frequency of social media use. We measured social media use frequency by averaging the scores of participants' responses to their self-reported frequency of using Facebook, WhatsApp, YouTube, Twitter, Instagram, WeChat, Telegram, Snapchat, TikTok, and Facebook Messenger, each measured on a 5-point scale, from 1 (*never*) to 5 (*very frequently*). The scale was found to be reliable (α = .89).

RQ2 was presented based on existing research on digital inequalities and sought to examine whether social media literacy levels differ across gender, age, and socioeconomic status (for a review, see Robinson et al., 2015). Specifically, a gender difference in self-perceptions had been found, where women perceive their online skills as significantly poorer than men, even if their actual ability might not be significantly different (Hargittai & Shafer, 2006). This negative self-perception could potentially be reflected between people of different ages as well, as older adults have been portrayed as technologically less capable than the young (Neves, Waycott, & Malta, 2018). Finally, the impact of socioeconomic status on digital literacy and competency has been well established, with a recent meta-analysis on the effects of socioeconomic status on ICT literacy among students concluding that a small-to-medium-sized effect exists (Scherer & Siddiq, 2019). We expect these inequalities of perceived and actual digital competencies to persist in our sample of participants across all four facets of PSML, which can lend further support to the validity of our scale.

Study 4 Results

Confirmatory Factor Analysis

The specified four-factor 14-item PSML scale was found to have an even better fit for the data compared with Study 3, Satorra-Bentler $\chi^2(71) = 179.94$, $p < .001$; CFI = .97; NNFI = .97; RMSEA = .05,

SRMR = .03, providing further evidence that the factor structure identified in Study 2 and confirmed in Study 3 was robust even across a third unique sample. Our sample scored the highest in technical competency (M = 3.87, SD = .72), followed by privacy and algorithmic awareness (M = 3.58, SD = .69), informational awareness (M = 3.56, SD = .73), and social relationships (M = 3.52, SD = .77).

Differences Based on Demographics

In response to RQ2, we conducted regression analysis to determine the relationship that each of the four factors have with demographic variables (see Table 1). When it comes to technical competency, $F(5, 1004) = 34.99$, $p < .001$, we found that age (β = −.17) and surprisingly education (β = −.08) were negatively related, while income (β = .12) and social media use frequency (β = .29) were positively related. When it comes to social relationship, $F(5, 1004) = 45.82$, $p < .001$, we found that males tend to report higher scores (β = −.07) while income (β = .09) and social media use frequency (β = .38) were also positively related. When it comes to informational awareness, $F(5, 1004) = 46.96$, $p < .001$, we found that males tend to report higher scores (β = −.07), and that age was also negatively related (β = −.13); social media use frequency (β = .35) was positively related. Finally, when it comes to privacy and algorithmic awareness, $F(5, 1004) = 40.58$, $p < .001$, we found that age (β = −.19) was negatively associated, while education (β = .09), income (β = .09), and social media use frequency (β = .24) were all positively related.

Table 1. Regression Analysis: PSML and Demographics.

	PSML Components							
	Technical		Social		Informational		Privacy	
	β	*t*	β	*t*	β	*t*	β	*t*
Age	−.17*	−5.36	−.04	−1.29	−.13*	−4.36	−.19*	−6.25
Gender	−.01	−.33	−.07**	−2.44	−.08**	−2.74	−.04	−1.24
Education	−.08**	−2.29	.02	.45	.02	.64	.09**	2.72
Income	.12*	3.51	.09**	2.77	.05	1.45	.09**	2.70
SM use	.29*	9.11	.38*	12.32	.35*	11.25	.24*	7.54
F	34.99*		45.82*		46.96*		40.58*	
Adjusted R^2	.14		.19		.19		.17	

*$p < .001$. **$p < .05$.

Overall Discussion

Guided by the social theory of literacy (Barton & Hamilton, 2000), this article sought to examine what competencies social media users in Singapore perceive they need to avoid problems on social media. Using an exploratory sequential mixed-methods approach, combining FGDs and three national online surveys, this article found that perceived competencies (which we conceptualized as literacy practices) can be grouped into four areas: technical competency, social relationships, informational awareness, and privacy and algorithmic awareness. Based on this, we developed, tested, and validated a 14-item PSML scale, and found that it varies across different individuals, based on sociodemographic factors. The results also show

how social media literacy cannot be conceived of as a singular area of competency, given social media's complexity and multidimensional uses.

The typology of literacy practices that emerged in our study echoes earlier work on social media literacy. For example, Vanwynsberghe and colleagues (2014) conceptualized and tested a social media literacy framework with librarians, which included three core competencies—technical, cognitive, and affective. Our findings provide support for this conceptualization, with some differences. First, similar to Vanwynsberghe and associates' (2014) conceptualization, our findings support the idea that social media literacy involves a set of technical competencies. Second, we found support for a social aspect of social media literacy, also reflected in Vanwynsberghe and colleagues' (2014) affective competency, or the ability to understand and manage social interactions on social media. Third, our findings suggest cognitive or critical thinking aspects, or the ability to assess information presented on social media and verify its authenticity and motives (Vanwynsberghe et al., 2014). However, we identified two facets of cognitive competency. Specifically, social media literacy appears to have an informational component that reflects individuals' ability to verify and substantiate information presented on social media; beyond this, we also identified the dimension of critical awareness of how information is presented and curated on social media, which we broadly term as privacy and algorithmic awareness. This is increasingly important in light of concerns about algorithmic curation and echo chambers that can lead to ideological polarization (Spohr, 2017). This metacognitive aspect of social media literacy could be crucial to educational efforts, and future research and interventions on social media literacy ought to take algorithmic curation into account.

We also found that social media users vary in these different perceived competencies based on age, gender, education, income, and frequency of social media use. Not surprisingly, frequency of social media use is positively associated with all four competencies. This supports the idea that social media literacy is potentially developed in informal learning contexts (Meyers, Erickson, & Small, 2013). While formal teaching of digital literacies such as social media literacy can be useful, our findings suggest a need to further understand what aspects of the informal learning contexts can best promote social media literacy.

Our analysis also found that females were more likely to report lower social and informational competencies. This could indicate ingrained self-perceptions that subconsciously subscribe to gender stereotypes, which previous research on self-reported measures of competencies have found (Lopez-Zafra & Gartzia, 2014). Women are likely to underestimate their digital competencies (Hargittai & Shafer, 2006), something that future studies should explore, especially whether these perceptions also affect behavioral outcomes on social media.

Income was positively related with technical competency, social competency, and privacy and algorithmic awareness, while age was negatively associated with technical, informational, and privacy and algorithmic awareness, but not social competency. This suggests that while older users might have confidence in their ability to navigate social relationships online, they might not view themselves as highly competent in the technical, informational, and privacy aspects of social media use. Finally, education was positively associated with privacy and algorithmic awareness, suggesting that individuals who are less educated might be less aware of how their data affect the way information is presented to them.

Our findings have practical implications for interventions aiming to reduce disparity in social media literacy. For instance, interventions targeting specific groups of people could focus on aspects of social media literacy in which that group feels they are most lacking. Methodologically, our study developed and validated a short 14-item PSML scale that can be useful for researchers interested in this area of research. It can be used in survey studies that examine antecedents or consequents of PSML, or intervention studies that want to assess the impact of educational interventions on social media literacy. Educational efforts should also take extra care to discuss privacy and algorithmic awareness, as this was found to be a unique dimension of literacy not discussed in previous studies on social media literacy.

Some limitations that constrained our findings need to be considered. First, when asked about how to solve or avoid social media problems, the participants talked about what they can do as individual users. None of them referred to organizational or institutional interventions. Such focus on individual responses is important, and indeed forms a core part of social media literacy. But literacy is also "a set of social practices" (Barton & Hamilton, 2000, p. 9), which means that not only are literacy practices best understood as collective efforts but they are also shaped by the social contexts they are in. Indeed, the prevalence of references of this study's participants to relationship management competencies can be explained not only by the nature of social media as a communication and information platform, but also by the social context of Singapore, a small Asian nation marked by strong family and community ties.

Second, our studies were conducted in a small nation with high levels of Internet and social media access and use. Thus, future studies can build on what we have found so far and test our proposed PSML scale in other countries. Third, we focused on individual-level perceptions, when issues encountered on social media can also be explained by the larger economic and technological structures within which these digital platforms operate. Thus, future studies can build on and expand our findings by also accounting for the ways the political economy of how technological platforms operate affect the literacy events and the literacy practices of their users. Finally, our proposed PSML scale measures self-perceptions rather than actual competency. It is possible that what individuals think they know differs from what they actually know. Thus, future studies should validate this scale by comparing it with other literacy measures. Still, we argue that understanding what and how much individuals think they know is crucial, as such self-perceptions can affect decisions and behavior. In developing and testing the PSML scale through a series of four studies spanning three years, combining FGDs and three national surveys, we hope to contribute to the growing literature on social media literacy.

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