


# Effects of Cultural Tightness–Looseness and Social Network Density on Expression of Positive and Negative Emotions: A Large-Scale Study of Impression Management by Facebook Users

Personality and Social  
Psychology Bulletin  
2018, Vol. 44(11) 1567–1581  
© 2018 by the Society for Personality  
and Social Psychology, Inc  
Article reuse guidelines:  
sagepub.com/journals-permissions  
DOI: 10.1177/0146167218770999  
journals.sagepub.com/home/pspb  


Pan Liu<sup>1</sup> , David Chan<sup>1</sup>, Lin Qiu<sup>2</sup>, William Tov<sup>1</sup>,  
and Victor Joo Chuan Tong<sup>3</sup>

## Abstract

Using data from 13,789 Facebook users across U.S. states, this study examined the main effects of societal-level cultural tightness–looseness and its interaction effects with individuals' social network density on impression management (IM) in terms of online emotional expression. Results showed that individuals from culturally tight (vs. loose) states were more likely to express positive emotions and less likely to express negative emotions. Meanwhile, for positive emotional expression, there was a tightness–looseness by social network density interaction effect. In culturally tight states, individuals with dense (vs. sparse) networks were more likely to express positive emotions, while in culturally loose states this pattern was reversed. For negative emotional expression, however, no such interaction was observed. Our findings highlight the influence of cultural norms and social network structure on emotional expressions as IM strategies.

## Keywords

impression management, emotional expression, cultural tightness–looseness, social network density

Received March 13, 2017; revision accepted March 23, 2018

Research has shown that how people interact socially with others and maintain good relationships with others is important to their social well-being (Bloomberg, Meyers, & Braverman, 1994). During social interaction, individuals often adopt impression management (IM) strategies to establish and uphold a desired personal image based on their social roles, in accordance with social norms (Leary & Kowalski, 1990). In recent decades, as online interactions have become an important part of daily life, IM behaviors previously observed in face-to-face interaction have also manifested in computer-mediated communication (CMC; Walther, Van Der Heide, Kim, Westerman, & Tong, 2008).

The extant studies on IM are focused on how the deployment of IM strategies varies across persons (e.g., personality; Rosenberg & Egbert, 2011) or institutions (e.g., organizational culture; Bolino, Long, & Turnley, 2016), and relatively few studies have explored how IM behaviors may vary across societal cultures such as across nations or provinces within a nation (Bolino et al., 2016).

The prevalence of IM is likely to depend on social norms, which vary across societies. An important research question

that has not received sufficient attention is how IM strategies are adopted and used in different societal contexts with regard to cultural norms. Thus, the current research investigates how IM behaviors are influenced by cultural norms at the societal level. Specifically, we examined IM behaviors in the expression of emotion by Facebook users across states in the United States and how such expressions may be moderated by the level of cultural tightness–looseness in each state. Findings from this research may advance our knowledge of IM in social media and extend to a better cross-cultural understanding of individuals' daily communication in general.

<sup>1</sup>Singapore Management University, Singapore

<sup>2</sup>Nanyang Technological University, Singapore

<sup>3</sup>Agency for Science, Technology and Research, Singapore

## Corresponding Author:

Pan Liu, Behavioural Sciences Institute, Singapore Management University,  
81 Victoria Street, Level 9, Singapore 188065, Singapore.  
Email: pliu@smu.edu.sg

## IM and Online Emotional Expression

IM is a self-regulatory process in which a person adjusts his or her behavior or appearance to influence the perceptions of other people about him or her (Leary & Kowalski, 1990). Individuals use IM strategies to present themselves to others in a way that satisfies their needs and goals, which is usually based on their social roles, in accordance with social norms and what they perceive as others' preferences and values.

Past research has found that IM strategies may be acquisitive or protective (Arkin, 1981). Acquisitive IM aims to seek approval and promote a desirable image by presenting positive aspects of oneself, whereas protective IM aims to avoid disapproval and rejection from the audience by concealing negative aspects. IM behaviors are pervasive in everyday interactions and important in developing social relationships and gaining social support. Understanding how individuals adopt and apply IM strategies plays an important role in advancing our knowledge of the interpersonal processes (Leary & Kowalski, 1990).

With the rise of social media, online interactions have become an important part of daily life, and IM behaviors are pervasive in CMC. According to the hyperpersonal interaction model (Walther, 1996), CMC lacks nonverbal cues such as facial expressions and gestures available in face-to-face communication, and therefore it allows individuals to easily manipulate their self-presentation to create a desirable self-image. Users of social networking sites (SNSs), such as Facebook, have been found to selectively choose physically more attractive photos as their profile pictures (Walther et al., 2008) and use photos with others to create an active social image (Zhao, Grasmuck, & Martin, 2008).

Moreover, studies show that social media users selectively disclose their emotional experiences and that IM is a source of motivation for selective disclosure. In particular, users prefer to display significantly more positive relative to negative emotions on Facebook than in real life (Bazarova, Taft, Choi, & Cosley, 2013; Lin, Tov, & Qiu, 2014). This is consistent with findings that positive emotional expressions often yield a good impression of one's emotional well-being (Ekman & Friesen, 1975), while negative emotional expressions can lead to an impression of low self-control and weak emotion regulation capability (Gross, Richards, & John, 2006). The frequency of positive emotion words was about twice as much as that for negative emotion words (Liu, Tov, Kosinski, Stillwell, & Qiu, 2015). Importantly, it is found that positive emotional expression was related to users' IM concerns (Bazarova, 2012; Lin et al., 2014) rather than their actual well-being (Liu et al., 2015).

The research reviewed above suggests that Facebook users apply both acquisitive (i.e., expressing more positive emotions) and protective (i.e., expressing fewer negative emotions) IM strategies to enhance and optimize their self-representation. Therefore, in the current research, we examined individuals' online IM in terms of the frequency of

positive and negative emotional expression in Facebook status updates.

## Culture, Tightness–Looseness, and Emotional Expression

Culture is one of the most important but complex concepts in the social sciences. Decades of culture studies have given hundreds of definitions to this concept. Hofstede, Hofstede, and Minkov (2010) defined culture as “the collective programming of the mind that distinguishes the members of one group or category of people from others” (p. 6). Triandis (1994) defined culture as a system of shared practices, beliefs, norms, and values that are socially transmitted. Scholars have proposed various cultural dimensions that differentiate human societies, such as individualism–collectivism in Hofstede's six-dimension model of national culture (Hofstede et al., 2010).

The complexity of the culture concept stems from the fact that culture itself has many layers. For example, Hofstede and colleagues contend that there are six layers of culture, including nation/country, regional/ethnic/religious/linguistic affiliation, gender, generation, social class, and organization/corporation (Hofstede et al., 2010). Among them, the national, or more aptly, the societal level of culture refers to the set of knowledge, beliefs, customs, and norms shared among a population of a sovereign nation or a district within a nation, for example, provinces in China (Talhelm et al., 2014) or states in the United States (Harrington & Gelfand, 2014; Vandello & Cohen, 1999). For example, individualism–collectivism varies across countries (Hofstede et al., 2010), with China being recognized as a typical collectivistic culture and the United States a typical individualistic culture. However, there are often important cultural differences within nations. Talhelm et al. (2014) found that southern China is more collectivistic and northern China is more individualistic. Vandello and Cohen (1999) also reported prominent differences in individualism–collectivism across U.S. states. Societal culture is probably the most prevalent level in popular lay perceptions and empirical academic studies of cultural differences. Note that the current research also focuses on societal culture as we attempt to examine the role of cultural variation across U.S. states in IM.

Culture has a powerful influence on behavioral patterns and thinking styles. One important influence of culture on daily life is on the display rules that guide emotional expressions. For example, Japanese smiled more than Americans did in front of experimenters after viewing stressful films even though they expressed similar negative emotions when they were alone (Friesen, 1972). Olympic athletes from Eastern cultures expressed their emotions less than those from Western cultures after their matches (Matsumoto, Willingham, & Olide, 2009). These display rules are part of social norms that help people manage their self-expression in

specific situational contexts and in accordance with their social roles (Hwang & Matsumoto, 2012).

Tightness–looseness is a cultural dimension that measures the strength of social norms in a society and the degree to which deviations from these norms are tolerated. Pelto (1968) introduced cultural tightness as an emphasis on the adherence to social norms among traditional societies. According to Pelto (1968), tight societies like the Pueblo Indians and Japanese have clearly articulated norms and impose severe sanctions on deviants, whereas loose societies such as the Thais lack formality and order in general and have high tolerance of deviant behaviors. Triandis (1989, 1994) proposed three conditions critical for the development of cultural tightness: geographic isolation, dense population, and cultural homogeneity. In particular, first, geographic isolation decreases people's exposure to other cultures and thus helps to reinforce the existing norms within their own culture, leading to enhanced cultural tightness. Second, when a given residential area is more crowded, the need for behavioral regulation increases to reduce friction and avoid conflict. Therefore, dense population is likely to be associated with high cultural tightness. Third, in a society where people are more similar in ethnicity, language, and religion, it is easier to reach agreement on social norms. On the contrary, societies that are more diverse and heterogeneous tend to tolerate deviations and dissimilarities.

In 2006, Gelfand and colleagues advanced the theory of tightness–looseness and argued for the utility of the construct for explaining societal variation at multiple levels. According to Gelfand, Nishii, and Raver (2006), cultural tightness–looseness consists of two key components: the strength of social norms (number and clarity) and the degree of sanctioning (intolerance for deviance from norms). This cultural dimension emphasizes how the external influence of norms and constraints accounts for cross-cultural differences in behaviors, making it theoretically distinct from the more common cultural dimensions (e.g., individualism–collectivism) that focus mainly on variation in personal characteristics and internal values.<sup>1</sup>

During the past decade, Gelfand and colleagues have conducted a series of empirical studies using multiple approaches to show that tightness–looseness is a critical cultural dimension that may account for differences across societies in various fields (Gelfand et al., 2006; Gelfand et al., 2011; Harrington & Gelfand, 2014; Li, Gordon, & Gelfand, 2017). For example, societies that are vulnerable to ecological and man-made threats, such as natural disasters, diseases, and territorial conflicts, tend to have tight cultures with strong norms to coordinate social actions for survival (Gelfand et al., 2011). Cultural tightness–looseness is also reflected in prevailing institutional practices, everyday situational constraints, and individual psychological processes. Tight cultures tend to have more media restrictions, fewer civil and political rights, and more severe punishment in the justice system compared with loose cultures (Harrington & Gelfand, 2014). In everyday social situations (e.g., job interview,

movies, workplace), tight (vs. loose) cultures have clearer rules and a narrower range of behaviors (e.g., eat, laugh, argue) that are considered appropriate. Individuals in tight cultures have higher self-regulatory strength including cautiousness, impulse control, and self-monitoring compared with those in loose cultures (Gelfand et al., 2011).

Given that tight cultures tend to punish deviations from social norms, we predicted that individuals from tight cultures tend to exhibit a higher degree of IM during social interactions compared with those from loose cultures. Based on this prediction and previous research findings that expressing more positive emotions and fewer negative emotions are common IM strategies on Facebook (Bazarova et al., 2013), we hypothesized the following:

**Hypothesis 1:** Individuals in tight cultures will be more likely than those in loose cultures to express positive emotions.

**Hypothesis 2:** Individuals in tight cultures will be less likely than those in loose cultures to express negative emotions.

### Tightness–Looseness, Social Network Density, and Emotional Expression

Existing IM research has shown that individuals' use of IM strategies depends on the partners with whom they interact. In particular, individuals exhibit more IM when their interaction partners are more valuable to them. For example, people are highly motivated to manage their self-image when interacting with someone who is powerful or of high status (Swencionis & Fiske, 2016), and they may also tend to ingratiate themselves with their bosses and teachers rather than with their friends (Kowalski & Leary, 1990). In SNSs like Facebook, users' interaction partners consist of many types, such as family, friends, and acquaintances. Users often do not direct their messages to a particular group of individuals, making their postings available to their whole social network. The publicness, nondirectness, and mixture of social circles involved in the communication process make Facebook a complex environment for social interaction (Bazarova et al., 2013).

An important characteristic of social networks, including those on Facebook, is social network density. It represents how closely members in a social network are connected to each other (Burt, 2000) and indicates the quality of interpersonal relations in the network (Hogan, 2009). In a dense social network, members tend to have close relationships and be highly familiar with each other (Burt, 2000; Hogan, 2009); they are also more likely to receive social support (Skowronski, Gibbons, Vogl, & Walker, 2004) and long-term assistance from each other (Walker, Wasserman, & Wellman, 1993). In contrast, members in a sparse social network tend to be mere acquaintances from diverse social circles, often embodying distinct social roles (Burt, 2000).

Previous studies have suggested that people from different cultures value network density to varying degrees. For example, individuals who have a large and sparse social network are considered “foolish” or “naïve” in Ghana (Adams & Plaut, 2003). One explanation is that, in a crisis-prone society like Ghana, a small but dense social network with close friends is more useful than a large sparse network with mere acquaintances given that close friends are more reliable than mere acquaintances in fighting threats for survival (Oishi & Kesebir, 2012).

As societies with high probability of threats tend to have tight cultures to coordinate social actions for survival (Gelfand et al., 2011), it is likely that individuals in tight cultures value dense social networks more than sparse ones. In contrast, individuals in loose cultures may value sparse networks (with mere acquaintances) more than dense networks (with close friends) because of the “strength of weak ties” (Granovetter, 1973, 1974). For example, Granovetter (1974) found that most individuals obtained a job through someone who they had known for less than 1 year, and those who got their job through weak ties were paid more and more satisfied with their job than those who got a job through close friends. This suggests that weak ties can be more valuable than close friends when facing less threatening problems because the information and support they provide have a broader range. As individuals in loose cultures have a low probability of fighting threats and crisis (Gelfand et al., 2011), they are likely to favor sparse social networks to provide them with diverse information and resources that may be helpful in highly specific, nonthreatening situations. Therefore, we expected that individuals from loose (tight) cultures would tend to value their sparse (dense) social networks more.

Given that individuals exhibit a higher degree of IM when facing more valuable interaction partners (Kowalski & Leary, 1990), Facebook users from tight (vs. loose) cultures should exhibit a higher degree of IM (i.e., expressing more positive and fewer negative emotions) in dense (vs. sparse) social networks. Therefore, we predicted that for positive as well as negative emotions, the direction of the relationship between social network density and frequency of emotional expression is dependent on cultural tightness–looseness according to the following nature of interaction.

**Hypothesis 3:** There will be a cultural tightness–looseness by social network density interaction effect on positive emotional expression such that:

**Hypothesis 3a:** In tight cultures, individuals with *dense* social networks will be more likely than those with sparse social networks to express positive emotions; whereas

**Hypothesis 3b:** In loose cultures, individuals with *sparse* social networks will be more likely than those with dense social networks to express positive emotions.

**Hypothesis 4:** There will be a cultural tightness–looseness by social network density interaction effect on negative emotional expression such that:

**Hypothesis 4a:** In tight cultures, individuals with *dense* social networks will be less likely than those with sparse social networks to express negative emotions; whereas

**Hypothesis 4b:** In loose cultures, individuals with *sparse* social networks will be less likely than those with dense social networks to express negative emotions.

## The Current Research

To summarize, this study investigates the main effects of societal-level cultural tightness–looseness as well as its interaction effects with individuals’ social network density on IM (as reflected in their emotional expression on Facebook).

First, our hypotheses regarding the main effects of cultural tightness–looseness on IM are based on two lines of research in literature. On one hand, past research has indicated that expressing positive emotions more frequently and negative emotions less frequently are found to be common IM strategies on Facebook and the adoption and application of IM strategies conform to social norms in social media (Bazarova, 2012; Bazarova et al., 2013); on the other hand, according to the theory of cultural tightness–looseness, tight (vs. loose) cultures encompass stronger social norms and greater intolerance of deviance from these norms (Gelfand et al., 2006). Therefore, we expected that compared with those from loose cultures, individuals from tight cultures would adopt and apply more IM strategies on Facebook, that is, to express positive emotions more frequently (Hypothesis 1) and negative emotions less frequently (Hypothesis 2).

Second, our hypotheses regarding the interaction effects between cultural tightness–looseness and social network density on IM are also based on previous IM research findings and the theory of cultural tightness–looseness. On one hand, it has been shown that IM strategies tend to be used in social interaction with partners that are considered more valuable (Kowalski & Leary, 1990). On the other hand, how valuable a certain type of interaction partners is (e.g., strong ties vs. weak ties) may vary across cultures. Specifically, a dense social network that consists of strong ties (e.g., family and close friends) is more likely to provide mutual social support (Skowronski et al., 2004) and long-term assistance (Walker et al., 1993), which is particularly important in tight cultures that value homogeneity in a society and cooperation to fight threats and crisis (Gelfand et al., 2011); in contrast, weak ties in a sparse social network that consists of mere acquaintances or even strangers tend to provide more information and more diverse resources (Granovetter, 1973), which may be critical to those in loose cultures who value heterogeneity and tolerate deviant ideas and behaviors (Gelfand et al., 2011). Therefore, we expected that in tight cultures, individuals with dense social networks would employ more IM strategies on Facebook than those with sparse social networks. Specifically, those in tight cultures would express positive emotions more frequently

(Hypothesis 3a) and negative emotions less frequently (Hypothesis 4a). In contrast, in loose cultures, individuals with sparse social networks would be more likely to employ IM strategies on Facebook than those with dense social networks. Again, the greater deployment of IM would manifest in more frequent expressions of positive emotions (Hypothesis 3b) and less frequent expressions of negative emotions (Hypothesis 4b)—primarily among those with sparse (rather than dense) networks.

We tested our hypotheses in a large-scale study with 13,789 Facebook users from different U.S. states. Through such a large sample, we were able to offer strong tests of the role of cultural tightness–looseness in online IM. Emotional expressions and social network density were measured with Facebook status updates and users' existing friend list, thereby serving as natural records of individuals' daily expressions and social media profile. State-level cultural tightness scores were obtained from Harrington and Gelfand (2014, p. 2), which were previously shown to be a valid and reliable index that predicted variation across U.S. states in various variables such as substance abuse, discrimination, and resistance toward immigration. It is noteworthy that the measurements in our current study were not based on self-report data from respondents and therefore did not have the potential problems of social desirability responding, demand characteristics, and common method variance.

In our analyses below, we controlled for the potential confounding factors that are conceptually distinct from cultural tightness–looseness but may be empirically related to IM and emotional expression. First, we controlled for social network size, which is distinct from social network density (Borgatti, Jones, & Everett, 1998) and is closely related to emotional sharing on social media (Lin et al., 2014).

Cultural tightness–looseness is just one aspect of complex social systems, which encompass a variety of characteristics at the societal level. Therefore, we also controlled for a set of state-level socio-demographic variables, including racial minority percentage, educational attainment, personal income level, and homicide rate per state. In addition, state-level residential mobility, that is, the extent to which individuals change their residence (Oishi, 2010), was also tested as a control variable given its close relationship with social networking strategies (Oishi & Kesebir, 2012).

Political conservatism (vs. liberalism)—a political philosophy that emphasizes traditional institutions and maintenance of the existing order in a society—is closely related to the enforcement of social norms and thus the deployment of IM strategies in social interactions (Heywood, 2017). Similarly, collectivism (vs. individualism)—the extent to which individuals in a society define themselves as interdependent with each other (de-emphasizing the independence of the self)—is related to emotional expressivity (Matsumoto, Yoo, & Fontaine, 2008). Therefore, we also controlled for state-level political conservatism and collectivism in the current study. It is noteworthy that although cultural tightness is

conceptually distinct from political conservatism (Harrington & Gelfand, 2014) and collectivism (Gelfand et al., 2011), the former construct is empirically correlated with the latter two such that many tight cultures tend to be more politically conservative and/or collectivistic (e.g., Mississippi), while many loose cultures tend to be less conservative and/or more individualistic (e.g., Oregon; Harrington & Gelfand, 2014; Vandello & Cohen, 1999).

## Method

### Participants

Data for this study were obtained from the myPersonality project (<http://mypersonality.org>). This project involved a Facebook application that offered to its users psychometric tests and feedback on their scores and the data were collected from 2007 to 2012 (Kosinski, Matz, Gosling, Popov, & Stillwell, 2015). As the original data in the myPersonality project were gathered with an explicit opt-in consent for reuse for research purposes beyond the original project and the data used in this study were secondary, anonymized, and available in the public domain, there was no need for institutional review board (IRB) approval. We confirmed this with our IRB in the Singapore Management University before beginning any analysis on the data. Publications by other authors using data from the myPersonality project also indicated that their university confirmed that no IRB approval was needed (e.g., Youyou, Kosinski, & Stillwell, 2015). However, in our review process, one reviewer was of the view that an IRB approval from our university was needed for this study. Therefore, we submitted an application to our university IRB, which confirmed again that our study was considered approved and exempt from further review.

In this study, we first selected participants who had granted access to their status updates and social network information (i.e., the friend list and connections between friends) and also provided U.S. location information in their profile. Next, we selected U.S. states with at least 100 participants each to ensure the representativeness of the sample for each state.<sup>2</sup> This resulted in a total of 13,789 Facebook users (5,394 male, 8,334 female, and 61 with no gender indicated) from 37 states in the final analysis. A total of 13,511 users indicated their age ( $M = 26.7$ ,  $SD = 10.0$ ).

### Focal Study Variables

**Emotional expression.** Emotional expression was quantified as a percentage score, from the frequency of positive (or negative) emotional words in Facebook users' status updates using the Linguistic Inquiry and Word Count (LIWC) software (Pennebaker, Booth, & Francis, 2007). LIWC counts the frequency of words in predefined categories that have been validated by independent judges (Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007) and has been shown to be

a valid text analysis tool to assess psychological attributes, behavioral activities, and emotional experiences (Tov, Ng, Lin, & Qiu, 2013). For a sample of text such as “I am happy today,” LIWC will output a positive emotion score of 25% (one of four words expressed positive emotion) and a negative emotion score of 0%. In the current sample of status updates, the average frequencies of positive and negative emotion words were 4.1% ( $SD = 1.4\%$ ) and 1.9% ( $SD = 0.9\%$ ), respectively. These frequencies were in the same range as those reported in previous studies (Liu et al., 2015).

**Social network density.** Social network density was calculated by dividing the total number of existing connections between friends in one’s friend list over the maximum number of all possible connections between these friends (Borgatti et al., 1998). The value of network density approaches “0” in extremely sparse networks where no members are connected and “1” in extremely dense networks where everyone is connected to one another. In this study, social network density per user ranged from .001 to .907 ( $M = 0.064$ ,  $SD = 0.121$ ).

**Cultural tightness.** We obtained cultural tightness scores for U.S. states from Harrington and Gelfand (2014, p. 2), where the scores were calculated from a composite index consisting of nine items of state statistics such as “the legality of corporal punishment in schools” and “the severity of punishment for violating laws” (Cronbach’s  $\alpha = .84$ ). For the 37 states in this study, cultural tightness scores ranged from 27.37 to 78.86 ( $M = 52.21$ ,  $SD = 13.53$ ), with higher scores representing higher cultural tightness.

### Control Variables

**Social network size.** Social network size was defined as the number of members in an egocentric network, that is, the number of Facebook “friends” that each user has plus the user himself or herself. In this study, social network size per user ranged from 22 to 1,988 ( $M = 316.7$ ,  $SD = 286.0$ ).

**Racial minority percentage.** State-level racial minority percentage was indexed by the percentage of non-“White Alone” residents per state. The data were obtained from the American Community Survey 1-Year Estimates datasets from U.S. Census Bureau and were averaged across years from 2007 to 2012.<sup>3</sup> In this study, racial minority percentage per state ranged from 8.0% to 40.5% ( $M = 22.8\%$ ,  $SD = 9.4\%$ ).

**Educational attainment.** State-level educational attainment was indexed by the percentage of high school graduates or higher degree holders among residents aged 25 years or over per state. The data were also obtained from the American Community Survey 1-Year Estimates datasets from U.S. Census Bureau and were averaged across years from 2007 to 2012. In this study, educational attainment per state ranged from 80.3% to 91.7% ( $M = 86.4\%$ ,  $SD = 3.3\%$ ).

**Personal income.** State-level real per capita personal income (i.e., personal income after taking into account the effects of inflation on purchasing power) was obtained from Bureau of Economic Analysis, U.S. Department of Commerce (averaged data across years from 2008 to 2012). In this study, personal income per state ranged from US\$33,539.60 to US\$55,787.20 ( $M = 40,671.43$ ,  $SD = 4,308.67$ ).

**Homicide rate.** State-level homicide rate (i.e., number of murder and nonnegligent manslaughter crimes per 100,000 total population) was obtained from Federal Bureau of Investigation (FBI) Uniform Crime Reporting (averaged data across years from 2007 to 2012). In this study, homicide rate ranged from 1.5 to 11.9 ( $M = 4.9$ ,  $SD = 2.1$ ).

**Residential mobility.** State-level residential mobility was indexed by the percentage of residents aged 1 year or over whose place of residence was not the same as that in the previous year per state. The data were obtained from the American Community Survey 1-Year Estimates datasets from U.S. Census Bureau and were averaged across years from 2007 to 2012. In this study, residential mobility per state ranged from 10.2% to 22.0% ( $M = 15.8\%$ ,  $SD = 2.4\%$ ).

**Political conservatism.** State-level political conservatism was calculated by subtracting the percentage of self-identified liberals from the percentage of self-identified conservatives in a state (Harrington & Gelfand, 2014). The data were obtained from the Gallup U.S. Daily survey results (www.gallup.com) and were averaged across years from 2009 to 2012. For the 37 states in this study, political conservatism ranged from -0.1% to 36.6% ( $M = 19.8\%$ ,  $SD = 9.1\%$ ).

**Collectivism.** State-level collectivism scores were obtained from Vandello and Cohen (1999), where collectivism was measured with eight indicators such as “Ratio of people carpooling to work to driving alone” and “Percentage of households with grandchildren in them” (Cronbach’s  $\alpha = .71$ ). For the 37 states in this study, collectivism ranged from 31 to 72 ( $M = 50.9$ ,  $SD = 10.2$ ).

## Results

Table 1 below summarizes the state-level data on the variables in our study.

We first examined the zero-order correlations among all variables in this study (Table 2). Results showed that cultural tightness score was significantly and positively correlated with positive emotional expression at the state level,  $r(37) = .496$ ,  $p = .002$ . There was also a significant negative correlation between cultural tightness score and negative emotional expression at the state level,  $r(37) = -.498$ ,  $p = .002$ .

To further examine the main effects of cultural tightness and its interaction effects with social network density on emotional expression, we tested two multilevel models for

**Table 1.** Characteristics of the 37 U.S. States in the Study.

State	<i>n</i>	Age	Female %	NS <sup>a</sup>	ND <sup>a</sup>	PE <sup>a</sup>	NE <sup>a</sup>	MP <sup>b</sup>	EA <sup>b</sup>	PI <sup>b</sup>	HR <sup>b</sup>	RM <sup>b</sup>	PC <sup>b</sup>	CO <sup>b</sup>	CT <sup>b</sup>
Alabama	193	27.8	62.3	397.1	.057	4.5	1.8	30.3	82.2	37,925.0	7.1	15.6	34.7	57.0	75.5
Arizona	256	25.2	62.0	259.7	.053	4.2	2.0	21.0	84.8	34,464.2	6.2	19.9	20.0	49.0	47.6
Arkansas	171	25.7	64.1	368.6	.065	4.3	1.8	21.6	82.8	37,023.2	5.8	17.4	29.3	54.0	75.0
California	1,610	25.9	61.1	285.5	.059	4.1	1.9	37.9	80.7	38,725.2	5.3	15.9	8.3	60.0	27.4
Colorado	257	25.7	59.1	249.4	.064	4.4	2.0	15.8	89.6	40,790.2	3.0	19.4	15.0	36.0	42.9
Connecticut	146	26.5	52.8	351.2	.046	3.8	1.9	21.2	88.8	55,787.2	3.5	12.2	5.8	50.0	36.4
Florida	613	26.6	61.6	293.4	.049	4.2	1.9	23.4	85.6	38,671.4	5.7	16.5	19.3	54.0	49.3
Georgia	394	26.6	61.5	382.2	.061	4.3	1.8	38.7	84.0	37,598.8	6.2	16.9	25.8	60.0	60.3
Illinois	675	27.4	59.3	330.0	.061	4.0	1.9	27.8	86.6	41,859.4	5.8	13.4	13.0	52.0	46.0
Indiana	409	25.6	63.5	342.5	.058	4.3	1.9	14.8	86.8	38,612.8	4.9	15.6	24.0	57.0	54.6
Iowa	233	27.7	59.2	317.4	.072	4.0	2.0	8.0	90.5	43,226.6	1.5	15.6	21.7	39.0	49.0
Kansas	241	26.6	61.1	331.0	.079	4.3	2.0	14.3	89.6	44,974.2	3.7	17.4	24.4	38.0	60.4
Kentucky	214	26.6	61.0	321.2	.081	4.2	1.9	11.5	82.0	37,144.4	4.3	15.4	23.0	53.0	63.9
Louisiana	217	28.6	64.4	374.1	.048	4.5	1.7	36.6	81.8	40,702.8	11.9	14.8	32.4	72.0	65.9
Maryland	252	26.1	57.4	360.5	.062	3.9	1.9	40.4	88.3	44,823.8	7.8	13.6	8.6	63.0	45.5
Massachusetts	251	26.6	54.8	373.2	.055	3.6	2.1	18.4	89.0	48,914.0	2.6	13.4	-0.1	46.0	35.1
Michigan	648	27.1	59.2	308.0	.063	4.1	1.8	20.5	88.3	37,322.0	6.2	14.8	16.1	46.0	48.9
Minnesota	440	26.3	58.3	286.7	.130	3.9	1.8	13.2	91.7	43,728.6	1.8	14.4	14.7	41.0	47.8
Mississippi	141	27.5	58.3	480.2	.068	4.4	1.8	40.5	80.5	35,233.4	7.3	14.8	36.6	64.0	78.9
Missouri	329	26.3	64.6	291.3	.058	4.2	2.0	16.5	86.9	41,686.8	6.7	16.5	23.0	46.0	59.6
Montana	108	26.9	62.0	271.9	.091	4.3	1.9	10.5	91.4	37,975.4	2.5	16.7	24.8	31.0	46.1
Nebraska	178	27.0	64.0	333.4	.075	3.8	1.9	11.4	90.2	45,791.6	3.2	17.0	24.8	35.0	49.6
Nevada	101	24.9	65.3	262.0	.047	4.2	2.0	26.4	84.1	37,043.0	5.9	22.0	16.4	52.0	33.6
New Jersey	333	27.1	54.4	343.8	.061	3.9	2.0	30.3	87.7	45,241.6	4.2	10.2	7.8	59.0	39.5
New York	764	27.3	57.7	341.2	.064	4.1	1.9	33.8	84.7	42,092.2	4.1	11.4	4.9	53.0	39.4
North Carolina	302	26.6	57.5	327.8	.072	4.3	1.8	29.9	84.2	39,297.2	5.6	16.1	23.1	56.0	60.7
Ohio	648	26.6	63.7	315.9	.061	4.1	1.9	16.6	87.9	40,995.2	4.4	14.8	20.5	45.0	52.3
Oklahoma	215	28.8	62.1	300.0	.070	4.5	1.8	25.5	85.9	41,359.4	5.7	18.4	30.6	42.0	75.0
Oregon	193	27.5	68.2	231.1	.058	4.4	1.9	14.5	89.0	36,690.4	2.2	18.2	7.3	33.0	30.1
Pennsylvania	549	28.2	59.9	328.6	.048	3.9	1.9	17.0	88.0	42,686.4	5.4	12.3	17.8	52.0	52.8
South Carolina	222	27.1	64.7	394.1	.080	4.5	1.7	32.7	83.7	35,677.8	6.8	15.4	28.2	70.0	61.4
Tennessee	289	28.6	59.0	318.8	.061	4.3	1.8	21.3	83.4	39,347.4	6.3	15.9	27.4	56.0	68.8
Texas	931	27.3	60.0	306.6	.059	4.1	1.9	26.4	80.3	40,250.6	5.1	17.9	26.1	58.0	67.5
Utah	187	25.0	65.2	285.3	.053	4.6	1.8	10.7	90.5	33,539.6	1.8	17.8	31.9	61.0	49.7
Virginia	332	26.6	61.8	344.8	.059	4.0	1.8	30.1	86.8	44,078.4	4.4	15.7	19.9	60.0	57.4
Washington	383	26.0	63.4	249.9	.072	4.2	1.8	20.6	89.8	41,775.4	2.7	17.7	7.1	37.0	31.1
Wisconsin	364	25.9	62.0	283.7	.076	4.1	1.9	12.5	89.9	41,787.4	2.8	14.5	18.9	46.0	46.9

Note. NS = social network size; ND = social network density; PE = positive emotional expression (%); NE = negative emotional expression (%); MP = racial minority percentage (%); EA = educational attainment (%); PI = personal income (in dollars); HR = homicide rate (per 100,000); RM = residential mobility (%); PC = political conservatism (%); CO = collectivism; CT = cultural tightness score.  
<sup>a</sup>Individual-level variables (values presented are the mean score of individuals in the corresponding state).  
<sup>b</sup>State-level variables (values presented are state statistics obtained from U.S. government websites or published academic articles).

positive and negative emotions, respectively. In each model, the two focal study predictors (i.e., social network density at the individual level and cultural tightness at the state level) and the cross-level interaction term between the two predictors were entered.

Multilevel analysis requires a sample of at least 20 groups with at least 30 individuals each to achieve an acceptable level of power (Heck & Thomas, 2000). In this study, there were 13,789 individuals nested in 37 groups with 101 to

1,610 individuals per group thereby providing sufficient statistical power for the analysis. Following previous research (Hox, 2010), the individual-level predictor (i.e., social network density) was group-mean centered, while the state-level predictor (i.e., cultural tightness score) was grand-mean centered.

In the following analysis, multilevel models were tested using the Linear Mixed Models function in SPSS (IBM Corporation, New York). Note that the covariance structure

**Table 2.** Zero-Order Correlation Between Key Variables in the Study.

	PE <sup>a</sup>	NE <sup>a</sup>	NS <sup>a</sup>	ND <sup>a</sup>	MP <sup>b</sup>	EA <sup>b</sup>	PI <sup>b</sup>	HR <sup>b</sup>	RM <sup>b</sup>	PC <sup>b</sup>	CO <sup>b</sup>	CT <sup>b</sup>
PE	—											
NE	-.218***	—										
NS	.003	-.072***	—									
ND	-.002	.001	-.365***	—								
MP	.084	-.335*	.544***	-.290	—							
EA	-.346*	.288	-.431**	.324	-.657***	—						
PI	-.730***	.345*	.100	.006	-.095	.422***	—					
HR	.299	-.422**	.479**	-.384*	.695***	-.695***	-.252	—				
RM	.516***	-.010	-.478**	-.043	-.205	-.093	-.507**	-.037	—			
PC	.694***	-.531***	.350*	.076	.023	-.381*	-.527***	.395*	.344*	—		
CO	.198	-.437**	.608***	-.358*	.721***	-.684***	-.232	.682***	-.274	.289	—	
CT	.496**	-.498**	.554***	.091	.177	-.498**	-.307	.499**	.085	.862***	.361*	—
M	4.1	1.9	316.7	.064	22.8	86.4	40,671.4	4.9	15.8	19.8	50.9	52.2
SD	1.4	0.9	286.0	.121	9.4	3.3	4,308.7	2.1	2.4	9.1	10.2	13.5
n	13,789	13,789	13,789	13,789	37	37	37	37	37	37	37	37

Note. Correlation between individual-level variables was performed at the individual level ( $N = 13,789$ ); Correlation between state-level variables or between an individual-level variable and a state-level variable was performed at the state level ( $N = 37$ ). PE = positive emotional expression (%); NE = negative emotional expression (%); NS = social network size; ND = social network density; MP = racial minority percentage (%); EA = educational attainment (%); PI = personal income (in dollars); HR = homicide rate (per 100,000); RM = residential mobility (%); PC = political conservatism (%); CO = collectivism; CT = cultural tightness score.

<sup>a</sup>Individual-level variables.

<sup>b</sup>State-level variables.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

was specified as “Unstructured” for maximal estimation of the random effects, and maximum step-halvings was set as 100 to ensure model convergence (more details of model specifications can be found in the Table S1 in Supplemental Material). The intraclass correlation coefficients (ICC) for positive and negative emotional expression were .021 and .005, respectively.

Gamma ( $\gamma$ ) was used as the regression coefficient symbol to represent the standardized effect size in multilevel modeling tests, which was calculated using Hox’s (2010) method. Meanwhile, we also calculated and reported the percentage of variance accounted for by the multilevel regression models, as compared with “null” models (i.e., intercept-only models), according to Snijders and Bosker’s (1999) method using pooled variances (also see Hox, 2010, pp. 75-76).

For the analysis of positive emotional expression, the model explained 0.8% of the total variance at the individual level and 22.8% of the total variance at the state level. Cultural tightness score significantly and positively predicted positive emotional expression,  $\gamma = .079$ , 95% confidence interval (CI) = [.032, .126],  $p = .002$ , indicating that individuals from culturally tight states were more likely to express positive emotions online than those from culturally loose states (see Table 3 below). Therefore, Hypothesis 1 was supported.

For the analysis of negative emotional expression, the model explained 0.3% of the total variance at the individual level and 20.6% of the total variance at the state level.

Cultural tightness score significantly and negatively predicted negative emotional expression ( $\gamma = -.045$ , 95% CI = [-.072, -.017],  $p = .003$ ), indicating that individuals were less likely to express negative emotions online in culturally tight than loose states (see Table 3). Therefore, Hypothesis 2 was also supported.

Table 3 also showed that social network density was not significantly associated with positive emotional expression ( $\gamma = .005$ , 95% CI = [-.017, .028],  $p > .50$ ). However, the effect of social network density was moderated by cultural tightness score ( $\gamma = .036$ , 95% CI = [.013, .059],  $p = .004$ ).<sup>4</sup> The interaction effect was plotted to understand its nature, as shown in Figure 1a.

Specifically, for culturally tight states, social network density was positively correlated with positive emotional expression. Simple slopes analysis showed that the standardized slope for culturally tight states (1 *SD* above the mean of the cultural tightness scores among the 37 states) was .044 (95% CI = [.011, .076],  $p = .008$ ). This indicated that in culturally tight states, individuals with dense social networks were more likely than those with sparse social networks to express positive emotions. Thus, Hypothesis 3a was supported.

In contrast, for culturally loose states, social network density was negatively correlated with positive emotional expression. Simple slopes analysis showed that the standardized slope for culturally loose states (1 *SD* below the mean) was  $-.033$  (95% CI = [-.063, -.002],  $p = .035$ ). This



**Table 3.** Summary of Multilevel Model Analyses of Cultural Tightness and Social Network Density Effects on Positive and Negative Emotional Expressions.

Fixed part	Positive emotional expression		Negative emotional expression	
	$\gamma$	$p$	$\gamma$	$p$
ND	.005	.624	.006	.608
CT	.079	.002	-.045	.003
ND $\times$ CT	.036	.004	-.006	.573

Random part	Estimate	$p$	Estimate	$p$
$\delta_e^2$	1.850	.000	0.730	.000
$\delta_{\mu 0}^2$	0.029	.001	0.002	.068
$\delta_{\mu 1}^2$	0.174	.251	0.070	.302

Note. ND = Social Network Density (individual level); CT = Cultural Tightness Score (state level);  $\delta_e^2$  = Residual at the individual level;  $\delta_{\mu 0}^2$  = Random intercept variance;  $\delta_{\mu 1}^2$  = Random slope variance of social network density; Gamma ( $\gamma$ ) coefficients represent standardized multilevel regression coefficients.

indicated that in culturally loose states, individuals with sparse social networks were more likely than those with dense social networks to express positive emotions. Thus, Hypothesis 3b was also supported.

Social network density was not significantly associated with negative emotional expression ( $\gamma = .006$ , 95% CI =  $[-.018, .029]$ ,  $p > .50$ ). Furthermore, the interaction between cultural tightness score and social network density was not significant ( $\gamma = -.006$ , 95% CI =  $[-.030, .017]$ ,  $p > .50$ ). Therefore, Hypothesis 4 was not supported.

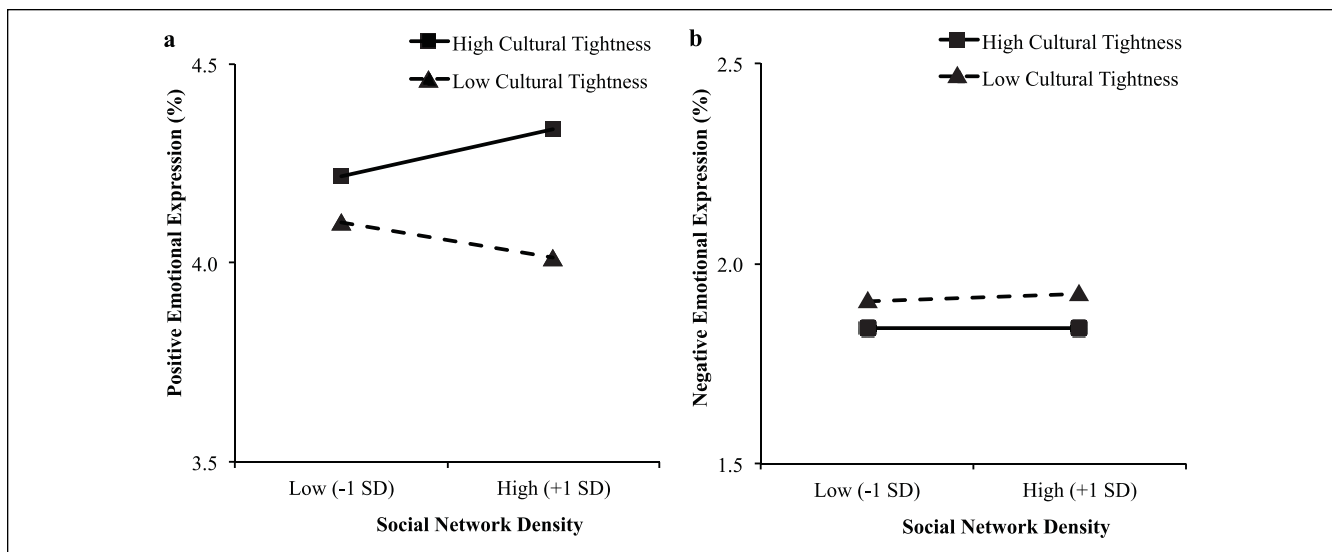
To rule out the potential influence of confounding factors (individual-level social network size and state-level racial minority, educational attainment, personal income, homicide rate, residential mobility, political conservatism, and collectivism), we also tested 16 pairs of extended multilevel models, with each pair, respectively, predicting positive and negative emotional expression after controlling for one of the eight confounding variables.

Results showed that after controlling for social network size, racial minority, educational attainment, personal income, homicide rate, residential mobility, or collectivism, cultural tightness score was still associated with higher levels of positive emotional expression (all  $ps < .015$ ) and lower levels of negative emotional expression (all  $ps < .022$ ), again supporting Hypotheses 1 and 2. However, after controlling for political conservatism, cultural tightness score was not significantly associated with either positive emotional expression ( $p = .086$ ) or negative emotional expression ( $p > .50$ ). In contrast, political conservatism was positively associated with positive emotional expression ( $\gamma = .155$ ,  $p < .001$ ) but was unrelated to negative emotional expression ( $p = .170$ ). We discussed this result in detail in the Discussion (also see Table S8 in Supplemental Material).

The interaction effect between cultural tightness score and social network density on positive emotional expression remained significant (all  $ps < .023$ ) after controlling for the eight confounding variables, respectively. In particular, for culturally tight states (1 *SD* above the mean), social network density was positively correlated with positive emotional expression (all  $ps < .036$  after controlling for social network size, racial minority percentage, homicide rate, residential mobility, collectivism, and political conservatism, respectively;  $ps = .073$  and  $.056$  after controlling for educational attainment and personal income, respectively). Thus, Hypothesis 3a was still supported generally. In contrast, for culturally loose states (1 *SD* below the mean), the association between social network density and positive emotional expression was negative (all  $ps < .045$ ). Thus, Hypothesis 3b was also supported. Finally, the interaction effect of cultural tightness score by social network density on negative emotional expression was not significant. Therefore, Hypothesis 4 was not supported as previously.

To further verify the robustness of our findings, we conducted a supplementary analysis using ordinary least squares (OLS) regression models in SPSS with the PROCESS macro, which is a well-established and widely used method to test moderator effects (Hayes, 2013). The 50 U.S. states measured in Harrington and Gelfand (2014, p. 2) had a median cultural tightness score of 49.15, ranging from 27.37 (California) to 78.86 (Mississippi). Therefore, we defined tight states as those with a cultural tightness score in the top 50% (above 49.15) and loose states in the bottom 50% (below 49.15). For the 37 states in our study, this resulted 7,014 users from 17 loose states (Arizona, California, Colorado, Connecticut, Illinois, Iowa, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nevada, New Jersey, New York, Oregon, Washington, and Wisconsin) and 6,775 users from 20 tight states (Alabama, Arkansas, Florida, Georgia, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Nebraska, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Utah, and Virginia). Accordingly, cultural tightness score was converted into a dichotomized variable (loose culture vs. tight culture). We then conducted separate OLS hierarchical multiple regression analyses to test the moderator hypotheses for predicting positive and negative emotional expressions, respectively. All variables were standardized before entering the regression models.

Results showed that cultural tightness significantly and positively predicted positive emotional expression ( $\beta = .057$ , 95% CI =  $[.040, .074]$ ,  $p < .001$ ) and also provided negative prediction for negative emotional expression ( $\beta = -.034$ , 95% CI =  $[-.050, -.017]$ ,  $p < .001$ ), indicating that compared with those in culturally loose states, individuals in culturally tight states were more likely to express positive emotions and less likely to express negative emotions. Thus, these results from the OLS regression analysis replicated the



**Figure 1.** Positive and negative emotional expression as a function of cultural tightness and social network density.

support for Hypotheses 1 and 2 in the previous multilevel model analysis.

Meanwhile, a significant interaction effect of cultural tightness by social network density was found on positive emotional expression ( $\beta = .027$ , 95% CI = [.010, .043],  $p = .002$ ). Simple slopes analysis showed that social network density was positively correlated with positive emotional expression for culturally tight states (simple slope  $\beta = .028$ , 95% CI = [.003, .053],  $p = .026$ ), but it was negatively correlated with positive emotional expression for culturally loose states (simple slope  $\beta = -.025$ , 95% CI = [-.048, -.003],  $p = .030$ ). This result replicated the findings from the previous multilevel model analysis, which again supported Hypothesis 3. In contrast, the interaction effect of cultural tightness by social network density on negative emotional expression was not significant ( $\beta = .005$ ,  $p > .50$ ). Thus, Hypothesis 4 was not supported as previously.

To sum up, results from the OLS regression analysis where cultural tightness–looseness was treated as a dichotomous variable at the individual level replicated the findings from the previous multilevel model analysis in which cultural tightness–looseness was operationalized as a continuous variable at the state level.

## Discussion

In this study, we examined the effects of state-level cultural tightness–looseness and individual-level social network density on individuals' IM using large-scale data on emotional expressions on Facebook. As predicted in Hypotheses 1 and 2, our results showed that individuals from culturally tight (vs. loose) states in the United States were more likely to express positive emotions and less likely to express negative emotions. Our prediction of a cultural tightness–looseness by

social network density interaction effect on positive emotional expression (as specified in Hypothesis 3) was also supported. In particular, individuals from culturally tight states were more likely to express positive emotions in dense social networks (supporting Hypothesis 3a), whereas individuals from culturally loose states were more likely to express positive emotions in sparse social networks (supporting Hypothesis 3b). However, contrary to our prediction in Hypothesis 4, we did not find a cultural tightness–looseness by social network density interaction effect on negative emotional expression. Specifically, social network density was not significantly related to negative emotional expression in either tight or loose states.

The present findings provide several theoretical contributions and practical implications for cross-cultural studies on emotional expression and IM in social media.

### Cultural Influence of Tightness–Looseness on Emotional Expressions

First, the current research provides fairly robust evidence that cultural tightness–looseness may influence how individuals express emotions in their online communications in social media. Although individuals may manage impressions by expressing positive emotions rather than negative emotions on Facebook, those from tight (vs. loose) states in the United States were more likely to express positive emotions and less likely to express negative emotions in social media. This suggests that individuals from tight (vs. loose) cultures may use more IM strategies to project and maintain a positive image in their online social communities.

Previous research has suggested that social media users tend to adopt IM strategies to establish and uphold a positive self-image online (e.g., Cunningham, 2013). This includes

the usage of acquisitive and protective IM strategies (Arkin, 1981; Leary & Kowalski, 1990), by overexpressing positive emotions and refraining from disclosing negative emotions, respectively (Bazarova et al., 2013). Facebook, unlike many traditional online discussion boards, is a semipublic communication platform where users often use their authentic identity and their connections on Facebook may include family, friends, colleagues, and other individuals in their social network. Therefore, the posting of status updates is to be viewed by the users' contacts in real life, which may further motivate users to maintain a positive self-image on Facebook. Past studies have shown that Facebook users tend to selectively disclose more positive than negative emotions (Bazarova et al., 2013; Lin et al., 2014). In an auxiliary analysis, the present study found that the usage frequency of positive emotional words (4.1%) was about twice as that of negative emotional words (1.9%).

Taken together, overexpressing positive emotions but concealing negative emotions is a prevalent IM strategy for presenting and maintaining a positive self-image among Facebook users. Such prevalence has become a social norm on online communication platforms (Bazarova et al., 2013; Lin et al., 2014). According to the theory of cultural tightness–looseness (Gelfand et al., 2006), tight (vs. loose) cultures emphasize explicit and stringently enforced social norms and have less tolerance for deviant behaviors. Consequently, individuals from tight cultures are more likely to regulate their behaviors in compliance with social norms and, in the case of emotional expressions on social media, more heavily adopt IM strategies such as disclosing more positive emotions and fewer negative emotions than individuals from loose cultures. Therefore, the current findings provide empirical evidence for the effects of cultural tightness–looseness on IM.

### *Moderator Effects of Tightness–Looseness on Emotional Expressions*

The current research reveals the pattern of IM in social media in terms of online emotional expression as a function of both cultural tightness–looseness and social network density. The precise nature of the effect of social network density on emotional expression is dependent on cultural tightness–looseness and the valence of the emotion.

Specifically, in culturally tight states, individuals with dense social networks tended to express positive emotions more frequently than those with sparse social networks (solid line in Figure 1a); in culturally loose states, this pattern was reversed such that individuals with dense social networks tended to express positive emotions less frequently than those with sparse social networks (dashed line in Figure 1a). In contrast, the expression of negative emotion did not covary with network density in either tight or loose states.

Previous research has shown that emotional displays depend on both cultural environment (e.g.,

individualism–collectivism) and social context (e.g., interpersonal relationship). For example, members of collectivistic cultures tend to express more positive emotions and fewer negative emotions to in-group (versus out-group) members. In contrast, members of individualistic cultures tend to express more negative emotions and fewer positive emotions to in-group members than out-group members or strangers (Matsumoto, 1990). Researchers have argued that in-group and out-group social networks may have different meanings to individuals from individualistic versus collectivistic cultures.

Similarly, in the current study, individuals from tight versus loose cultures may adopt different IM strategies to maintain their self-image online because they have different concerns when expressing emotions in different social networks. On one hand, tight cultures highly value the compliance of social norms and have low tolerance of deviant behaviors (Gelfand et al., 2006; Pelto, 1968). In addition, violation of social norms may bring more severe consequences in a dense than sparse social network, given that close contacts in dense social networks are likely to be viewed as more valuable than acquaintances in tight cultures. Therefore, for individuals from tight cultures, maintaining a positive image within a dense social network is a key concern.

On the other hand, loose cultures define wider latitude for proper behavior and are more permissive of deviations from social norms (Gelfand et al., 2006; Pelto, 1968). Therefore, unlike those from tight cultures, individuals from loose cultures may not only focus on whether their behaviors are violating the social norm such as maintaining a positive self-image online. Instead, they may also value what they can get from disclosing emotions to an audience. According to previous findings on the strength of weak ties (Granovetter, 1973, 1974), contacts in a sparse social network tend to be acquaintances with diverse social roles and resources and may be more likely to provide social support that one needs to solve minor problems.

Negative emotional expression was not related to social network density in either tight or loose cultures. This may be related to the nature of the two types of emotions. Disclosing positive emotions generally helps to establish a good impression. In contrast, disclosing negative emotion can be damaging to one's self-image in some instances (Gross et al., 2006), but may also help one attract attention and receive social support (Skowronski et al., 2004). Perhaps the social consequences of negative emotional expression differ in tight versus loose cultures. Although tight cultures tend to *punish* deviations from social norms, they do not necessarily *reward* compliance. Thus, in such a cultural context, protective IM strategies (e.g., avoiding disapproval) may be deployed more uniformly across social contexts. As a result, whether social networks are dense or sparse, negative emotional expression is less frequent compared with loose cultures. In contrast, the consequences of negative emotional expression may be more varied in loose cultures. People may be harmed or helped

when they expressed negative emotion regardless of social network density.

### *Implications for Making Better Use of Social Media in Psychological Studies*

The present findings on emotional expressions have high ecological validity. Using social media data, the current study involves a large-scale dataset where emotional expressions through actual daily communications were retrieved from a sample of more than 13,000 participants in a natural setting (i.e., coded from everyday status updates on Facebook). Hence, this study may offer greater generalizability than studies of emotional expression in laboratory experiments or survey questionnaires.

Over the past decade, social media have not only become an important part in daily life but also a powerful research tool for the social sciences (Kosinski et al., 2015). Previous research has shown that activities in social media serve as effective markers of individuals' personality traits, psychological states, and behaviors in real life. For example, Facebook likes predicted a variety of users' private attributes such as gender, race, religion, and personality (Kosinski, Stillwell, & Graepel, 2013), and the prediction of personality was even more accurate than human judgments (Youyou et al., 2015). Here, we presented an initial attempt to study IM through online emotional expressions and the findings argued for the importance of jointly considering both culture (i.e., cultural tightness) and social network structure (i.e., network density).

The present study sheds some light on the characteristics of CMC and provides practical implications on how user-generated content on social media can be utilized for studying individuals' behavioral patterns. Given the increasing importance of social media in people's daily life, it is hoped that, beyond the specific findings on IM and emotions, the research methods used in this study and the findings obtained will help open up new and fruitful avenues of research on individual and cultural variables that may influence other attitudes and behaviors expressed in social media communications.

### *Robustness of the Current Findings*

We highlight that the present findings were replicated after controlling for the potential confounding effects of individual's social network size and various state-level factors including racial minority percentage, educational attainment, personal income, homicide rate, residential mobility, and collectivism. Although the main effects of cultural tightness disappeared after controlling for political conservatism, the cultural tightness by social network density interaction effect on positive emotional expression remained significant. In addition, the findings were replicated in OLS regression models where cultural tightness was dichotomized and treated as an individual-level characteristic instead of being

operationalized as a state-level context variable in the multi-level models. Taken together, these replicated results demonstrated the robustness of our findings regarding the main effects of cultural tightness on both positive and negative emotional expression as well as its interaction effects with social network density on positive emotional expression.

### *Limitations and Future Directions*

The main effects of cultural tightness on emotional expression were no longer significant after controlling for political conservatism. In addition, cultural tightness was highly correlated with political conservatism among the 37 U.S. states in our study,  $r(37) = .862, p < .001$ , which is consistent with Harrington and Gelfand's (2014) study,  $r(50) = .720, p < .001$ . From the perspective of statistical analysis, a high correlation between two predictor variables in the regression analysis runs the risk of multicollinearity and undermining the statistical significance of a predictor variable (Allen, 1997), which might apply to our analyses when both cultural tightness and political conservatism were included in the same regression analysis.

However, despite the high correlation between cultural tightness and conservatism and the high likelihood that the two are mutually reinforcing (Harrington & Gelfand, 2014), the two constructs differ in important ways. Tightness–looseness refers to an external social reality and is independent of any single individual. It reflects the relative strength of social norms and degree of behavioral constraint versus latitude in a social system as a whole (Gelfand et al., 2006). In contrast, conservatism is an individual-level set of beliefs consisting of personal attitudes and values such as preserving social institutions, and emphasizing stability and continuity (Heywood, 2017). Moreover, tightness–looseness and conservatism correlate differently with other constructs. For example, as shown in Table 2, cultural tightness was not correlated with residential mobility,  $r(37) = .085, p > .50$ , whereas there was a significant positive correlation between conservatism and residential mobility,  $r(37) = .344, p = .037$ . These results provided discriminant validity evidence that the two constructs are distinct although correlated.

The analysis of positive emotional expression provides additional discriminant validity evidence for conservatism and cultural tightness. Conservatism, but not cultural tightness, was associated with higher levels of positive emotional expression. In contrast, cultural tightness, but not conservatism, moderated the effects of network density on positive emotional expression (see Table S8). Past research suggests that political conservatism (at the individual level) is associated with traits indicative of politeness (Hirsh, DeYoung, Xu, & Peterson, 2010). Such traits include pleasantness and nurturance—which are concerned with respecting and pleasing others. Such traits may be more directly related to positive emotional expression than cultural tightness—which refers more to a cultural system in which norms are strongly

enforced. However, nothing in the concept of politeness implies *to whom* one should be polite—which may explain why cultural tightness and not conservatism moderates the relation between social network density and positive emotional expression. The distinction between conservatism and cultural tightness deserves more attention—preferably in a wider sample of societies outside of the United States.

Another limitation of this study is its correlational design precluded a rigorous test of possible causal mechanisms that may underlie the effects of cultural tightness and social network density. Future research including experimental design studies could test these potential causal mechanisms.

Finally, in our study, LIWC coding of emotional expressions from Facebook status updates is unable to distinguish between emotional expressions in the private sphere (e.g., “I’m lonely and bored”) and those about subjects in the public sphere (e.g., “I hate the President of my university, cause he is an embezzler”).<sup>5</sup> The two types of emotional expressions may reflect different psychological meanings (e.g., reflecting individual differences in personality) and indicate different behavioral outputs (e.g., drinking problems vs. street protests), which could be distinctively influenced by cultural tightness. With more advanced text analysis tool or method that can differentiate between emotional expressions in the private sphere and those in the public sphere, future studies could examine the boundary conditions or moderators for the effects of cultural tightness on people’s emotional expression and IM.

### Acknowledgment

The authors thank David Stillwell and Michal Kosinski for providing the Facebook users’ data.

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was partially supported by joint funding from the Agency for Science, Technology and Research and the Singapore Management University, Singapore. The views expressed in this article are those of the authors and do not necessarily represent the official positions of the institutions to which the authors are affiliated.

### Notes

1. We note that cultural tightness is a distinct construct from authoritarianism. According to Adorno, Frenkel-Brunswik, Levinson, and Sanford (1950), authoritarianism (or called the authoritarian personality) is considered a complex culmination of several attitudes, consisting of nine traits such as conventionalism and authoritarian submission. Feldman and Stenner (1997) developed a four-item scale of the authoritarianism emphasizing values such as respect for elders, obedience, good manners, and being well-behaved. From the definition and measurement of

authoritarianism, it can be seen that authoritarianism tends to focus on individual-level values and thus is theoretically distinct from cultural tightness, which “describes an external social reality that exists independent of any one individual and reflects the relative strength of norms and degree of behavioral constraint versus latitude in a social system as a whole” (Harrington & Gelfand, 2014, p. 3). We thank the anonymous reviewer for raising this important issue.

2. We first identified 14,702 U.S. Facebook users who indicated their hometown country as the United States or, if hometown country was not provided, indicated their current country as the United States. Among these U.S. users, we used their hometown state as the cultural background or their current state if hometown state was not available. After excluding the states that have fewer than 100 users each, a final sample of 13,789 users from 37 U.S. states was included in the current study.
3. As the Facebook data from the myPersonality database were collected from 2007 to 2012 (<http://mypersonality.org>), we made efforts to locate all data collected in that period and used average data across years between 2007 and 2012 whenever available.
4. Following the equation in Hox (2010), the standardized regression coefficient of the cross-level interaction term was calculated by multiplying the unstandardized regression coefficient with the *SD* of the interaction term divided by the *SD* of the outcome variable (i.e., positive emotional expression). This standardized regression coefficient ( $\gamma = .036$ ) points to the change of positive emotional expression per *SD* change in the interaction term. We also tested the interaction effect by first standardizing the predictors (i.e., group-mean centered social network density and grand-mean centered cultural tightness) before they were entered into the multilevel models and obtained the standardized regression coefficient for the cross-level interaction term,  $\gamma = .052$ , 95% confidence interval (CI) = [.019, .085],  $p = .004$ . This points to how much the effect of social network density on positive emotional expression changes per *SD* change in cultural tightness.
5. We thank the anonymous reviewer for raising this important point.

### Supplemental Material

Supplementary material is available online with this article.

### ORCID iD

Pan Liu  <https://orcid.org/0000-0001-5411-4191>

### References

- Adams, G., & Plaut, V. C. (2003). The cultural grounding of personal relationship: Friendship in North American and West African worlds. *Personal Relationships, 10*, 333-347. doi:10.1111/1475-6811.00053
- Adorno, T. W., Frenkel-Brunswik, E., Levinson, D. J., & Sanford, R. N. (1950). *The authoritarian personality*. Oxford, UK: Harpers.
- Allen, M. P. (1997). The problem of multicollinearity. In M. P. Allen (Ed.), *Understanding regression analysis* (pp. 176-180). Boston, MA: Springer.
- Arkin, R. M. (1981). Self-presentation styles. In J. T. Tedeschi (Ed.), *Impression management theory and social psychological research* (pp. 311-333). New York, NY: Academic Press.

- Bazarova, N. N. (2012). Public intimacy: Disclosure interpretation and social judgments on Facebook. *Journal of Communication, 62*, 815-832. doi:10.1111/j.1460-2466.2012.01664.x
- Bazarova, N. N., Taft, J. G., Choi, Y. H., & Cosley, D. (2013). Managing impressions and relationships on Facebook: Self-presentational and relational concerns revealed through the analysis of language style. *Journal of Language and Social Psychology, 32*(2), 121-141. doi:10.1177/0261927X12456384
- Bloomberg, L., Meyers, J., & Braverman, M. T. (1994). The importance of social interaction: A new perspective on social epidemiology, social risk factors, and health. *Health Education Quarterly, 21*, 447-463. doi:10.1177/109019819402100407
- Bolino, M., Long, D., & Turnley, W. (2016). Impression management in organizations: Critical questions, answers, and areas for future research. *Annual Review of Organizational Psychology and Organizational Behavior, 3*, 377-406. doi:10.1146/annurev-orgpsych-041015-062337
- Borgatti, S. P., Jones, C., & Everett, M. G. (1998). Network measures of social capital. *Connections, 21*(2), 27-36.
- Burt, R. S. (2000). The network structure of social capital. *Research in Organizational Behavior, 22*, 345-423. doi:10.1016/S0191-3085(00)22009-1
- Cunningham, C. (2013). *Social networking and impression management: Self-presentation in the digital age*. Lanham, MD: Rowman & Littlefield.
- Ekman, P., & Friesen, W. V. (1975). *Unmasking the face: A guide to recognizing emotions from facial clues*. Oxford, England: Prentice-Hall.
- Feldman, S., & Stenner, K. (1997). Perceived threat and authoritarianism. *Political Psychology, 18*, 741-770. doi:10.1111/0162-895X.00077
- Friesen, W. V. (1972). *Cultural differences in facial expression a social situation: An experimental test of the concept of display rules* (Unpublished doctoral dissertation). University of California, San Francisco.
- Gelfand, M. J., Nishii, L. H., & Raver, J. L. (2006). On the nature and importance of cultural tightness-looseness. *Journal of Applied Psychology, 91*, 1225-1244. doi:10.1037/0021-9010.91.6.1225
- Gelfand, M. J., Raver, J. L., Nishii, L. H., Leslie, L. M., Lun, J., Lim, B. C., & Yamaguchi, S. (2011). Differences between tight and loose cultures: A 33-nation study. *Science, 332*, 1100-1104. doi:10.1126/science.1197754
- Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology, 78*, 1360-1380.
- Granovetter, M. S. (1974). *Getting a job*. Chicago, IL: The University of Chicago Press.
- Gross, J. J., Richards, J. M., & John, O. P. (2006). Emotion regulation in everyday life. In D. K. Snyder, J. Simpson, & J. N. Hughes (Eds.), *Emotion regulation in couples and families: Pathways to dysfunction and health* (pp. 13-35). Washington, DC: American Psychological Association.
- Harrington, J. R., & Gelfand, M. J. (2014). Tightness-looseness across the 50 united states. *Proceedings of the National Academy of Sciences, 111*, 7990-7995. doi:10.1073/pnas.1317937111
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford Press.
- Heck, R. H., & Thomas, S. L. (2000). *An introduction to multilevel models in organizational and educational research*. Mahwah, NJ: Lawrence Erlbaum.
- Heywood, A. (2017). *Political ideologies: An introduction* (6th ed.). London, England: Palgrave Macmillan.
- Hirsh, J. B., DeYoung, C. G., Xu, X., & Peterson, J. B. (2010). Compassionate liberals and polite conservatives: Associations of agreeableness with political ideology and moral values. *Personality and Social Psychology Bulletin, 36*, 655-664. doi:10.1177/0146167210366854
- Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). *Cultures and organizations: Software of the mind* (3rd ed.). New York, NY: McGrawHill.
- Hogan, B. J. (2009). *Networking in everyday life* (Doctoral thesis). University of Toronto, Ontario, Canada.
- Hox, J. (2010). *Multilevel analysis: Techniques and applications* (2nd ed.). New York, NY: Routledge.
- Hwang, H. S., & Matsumoto, D. (2012). Ethnic differences in display rules are mediated by perceived relationship commitment. *Asian American Journal of Psychology, 3*, 254-262. doi:10.1037/a0026627
- Kosinski, M., Matz, S. C., Gosling, S. D., Popov, V., & Stillwell, D. (2015). Facebook as a research tool for the social sciences: Opportunities, challenges, ethical considerations, and practical guidelines. *American Psychologist, 70*, 543-556. doi:10.1037/a0039210
- Kosinski, M., Stillwell, D. J., & Graepel, T. (2013). Private traits and attributes are predictable from digital records of human behavior. *Proceedings of the National Academy of Sciences, 110*, 5802-5805. doi:10.1073/pnas.1218772110
- Kowalski, R. M., & Leary, M. R. (1990). Strategic self-presentation and the avoidance of aversive events: Antecedents and consequences of self-enhancement and self-depreciation. *Journal of Experimental Social Psychology, 26*, 322-336. doi:10.1016/0022-1031(90)90042-K
- Leary, M. R., & Kowalski, R. M. (1990). Impression management: A literature review and two-component model. *Psychological Bulletin, 107*, 34-47. doi:10.1037/0033-2909.107.1.34
- Li, R., Gordon, S., & Gelfand, M. J. (2017). Tightness-looseness: A new framework to understand consumer behavior. *Journal of Consumer Psychology, 27*, 377-391. doi:10.1016/j.jcps.2017.04.001
- Lin, H., Tov, W., & Qiu, L. (2014). Emotional disclosure on social networking sites: The role of network structure and psychological needs. *Computers in Human Behavior, 41*, 342-350. doi:10.1016/j.chb.2014.09.045
- Liu, P., Tov, W., Kosinski, M., Stillwell, D. J., & Qiu, L. (2015). Do Facebook status updates reflect subjective well-being? *Cyberpsychology, Behavior, and Social Networking, 18*, 373-379. doi:10.1089/cyber.2015.0022
- Matsumoto, D. (1990). Cultural similarities and differences in display rules. *Motivation and Emotion, 14*, 195-214. doi:10.1007/BF00995569
- Matsumoto, D., Willingham, B., & Ollide, A. (2009). Sequential dynamics of culturally moderated facial expressions of emotion. *Psychological Science, 20*, 1269-1274. doi:10.1111/j.1467-9280.2009.02438.x
- Matsumoto, D., Yoo, S. H., & Fontaine, J. (2008). Mapping expressive differences around the world the relationship between emotional display rules and individualism versus collectivism. *Journal of Cross-Cultural Psychology, 39*, 55-74. doi:10.1177/0022022107311854

- Oishi, S. (2010). The psychology of residential mobility: Implications for the self, social relationships, and well-being. *Perspectives on Psychological Science*, 5, 5-21. doi:10.1177/1745691609356781
- Oishi, S., & Kesebir, S. (2012). Optimal social-networking strategy is a function of socioeconomic conditions. *Psychological Science*, 23, 1542-1548. doi:10.1177/0956797612446708
- Pelto, P. J. (1968). The differences between "tight" and "loose" societies. *Trans-action*, 5(5), 37-40. doi:10.1007/BF03180447
- Pennebaker, J. W., Booth, R. J., & Francis, M. E. (2007). *Linguistic Inquiry and Word Count (LIWC2007)*. Austin, TX. Available from <http://www.liwc.net>
- Pennebaker, J. W., Chung, C. K., Ireland, M., Gonzales, A., & Booth, R. J. (2007). *The development and psychometric properties of LIWC2007*. Austin, TX. Available from <http://www.liwc.net>
- Rosenberg, J., & Egbert, N. (2011). Online impression management: Personality traits and concerns for secondary goals as predictors of self-presentation tactics on Facebook. *Journal of Computer-mediated Communication*, 17, 1-18. doi:10.1111/j.1083-6101.2011.01560.x
- Skowronski, J., Gibbons, J., Vogl, R., & Walker, W. R. (2004). The effect of social disclosure on the intensity of affect provoked by autobiographical memories. *Self and Identity*, 3, 285-309. doi:10.1080/13576500444000065
- Snijders, T. A. B., & Bosker, R. J. (1999). *Multilevel analysis: An introduction to basic and applied multilevel analysis* (1st ed.). London, England: SAGE.
- Swencionis, J. K., & Fiske, S. T. (2016). Promote up, ingratiate down: Status comparisons drive warmth-competence tradeoffs in impression management. *Journal of Experimental Social Psychology*, 64, 27-34. doi:10.1016/j.jesp.2016.01.004
- Talhelm, T., Zhang, X., Oishi, S., Shimin, C., Duan, D., Lan, X., & Kitayama, S. (2014). Large-scale psychological differences within China explained by rice versus wheat agriculture. *Science*, 344, 603-608. doi:10.1126/science.1246850
- Tov, W., Ng, K. L., Lin, H., & Qiu, L. (2013). Detecting well-being via computerized content analysis of brief diary entries. *Psychological Assessment*, 25, 1069-1078. doi:10.1037/a0033007
- Triandis, H. C. (1989). The self and social behavior in differing cultural contexts. *Psychological Review*, 96, 506-520. doi:10.1037/0033-295X.96.3.506
- Triandis, H. C. (1994). Major cultural syndromes and emotion. In S. Kitayama & H. R. Markus (Eds.), *Emotion and culture: Empirical studies of mutual influence*. Washington, DC: American Psychological Association.
- Vandello, J. A., & Cohen, D. (1999). Patterns of individualism and collectivism across the United States. *Journal of Personality and Social Psychology*, 77, 279. doi:10.1037/0022-3514.77.2.279
- Walker, M. E., Wasserman, S., & Wellman, B. (1993). Statistical models for social support networks. *Sociological Methods & Research*, 22, 71-98. doi:10.1177/0049124193022001004
- Walther, J. B. (1996). Computer-mediated communication: impersonal, interpersonal, and hyperpersonal interaction. *Communication Research*, 23, 3-43. doi:10.1177/009365096023001001
- Walther, J. B., Van Der Heide, B., Kim, S. Y., Westerman, D., & Tong, S. T. (2008). The role of friends' appearance and behavior on evaluations of individuals on Facebook: Are we known by the company we keep? *Human Communication Research*, 34, 28-49. doi:10.1111/j.1468-2958.2007.00312.x
- Youyou, W., Kosinski, M., & Stillwell, D. J. (2015). Computer-based personality judgments are more accurate than those made by humans. *Proceedings of the National Academy of Sciences*, 112, 1036-1040. doi:10.1073/pnas.1418680112
- Zhao, S., Grasmuck, S., & Martin, J. (2008). Identity construction on Facebook: Digital empowerment in anchored relationships. *Computers in Human Behavior*, 24, 1816-1836. doi:10.1016/j.chb.2008.02.012