Your Photo is so Funny that I don't Mind Violating Your Privacy by Sharing it: Effects of Individual Humor Styles on Online Photo-sharing Behaviors

Rakibul Hasan, Bennett I. Bertenthal, Kurt Hugenberg, and Apu Kapadia
{rakhasan,bbertent,khugenb,kapadia}@indiana.edu
Indiana University
Bloomington, IN, USA

ABSTRACT

We investigate how people's 'humor style' relates to their online photo-sharing behaviors and reactions to 'privacy primes'. In an online experiment, we queried 437 participants about their humor style, likelihood to share photo-memes, and history of sharing others' photos. In two treatment conditions, participants were either primed to imagine themselves as the photo-subjects or to consider the photo-subjects' privacy before sharing memes. We found that participants who frequently use aggressive and self-deprecating humor were more likely to violate others' privacy by sharing photos. We also replicated the interventions' paradoxical effects – *increasing* sharing likelihood – as reported in earlier work and identified the subgroups that demonstrated this behavior through interaction analyses. When primed to consider the subjects' privacy, only humor deniers (participants who use humor *infrequently*) demonstrated *increased* sharing. In contrast, when imagining themselves as the photo-subjects, humor deniers, unlike other participants, *did not increase* the sharing of photos.

CCS CONCEPTS

• **Security and privacy** → *Social aspects of security and privacy*; **Privacy protections**.

KEYWORDS

privacy, decision-making, intervention, humor, photo-sharing, online social media

1 INTRODUCTION

Sharing photos has become the dominant form of communication over online social media, as indicated by the unprecedented growth in the number of photos shared every day [69] as well as traditional social media (e.g., Facebook) being outpaced in popularity by photo-sharing applications (e.g., Instagram) [28, 47]. Online social media users not only post their photos but also engage in (re-)sharing photos posted by their contacts, often with a larger audience, sometimes posting photos publicly [20]. Resharing gave rise to the popularity of image 'macros' or 'memes', where photos of other people, most often strangers, are altered (e.g., by adding text) and shared. Such memes are used to communicate profound philosophical ideas, contemporary political issues, self-presentation [19], or are shared just for entertainment [52].

Photo-sharing activities pose privacy risks to the people appearing in those photos in many ways. Photos shared on social media can reach people outside of the initially 'imagined audience' [4, 44] and may lead to 'context collapse' [11, 12, 57]. Memes are typically made using humorous or embarrassing photos, possibly with further alterations such as adding text that is often derogatory to the photo-subjects [63]. The same photo may be used to create multiple memes, each time with a different caption that creates a story and presents the photo in a context that is completely different than originally intended [2]. There have been many occasions where people appearing in memes were maligned or embarrassed in front of a large audience, leading to psychological distress and disruption in their professional and personal lives [1, 8]. Rashidi et al. reported "workarounds" [63] and sanctioning strategies [64] when trying to avoid or cope with such photo-sharing, highlighting the lack of satisfactory technological solutions.

Although not adequate in practice, online platforms have implemented various mechanisms to limit the dissemination of a shared item among the intended audience. For example, Facebook allows users to specify who can view a shared photo [22]. But such mechanisms cannot prevent one from re-sharing an item with a larger audience. In the case of multiple people co-owning a photo (e.g., a group photo), researchers have proposed mechanisms to enable negotiations among the co-owners who differ in sharing or privacy preference [71]. Such solutions, however, are not applicable when sharing photos of strangers (e.g., memes) as they cannot easily exercise ownership even though they are the subjects in the shared photos. To prevent privacy violations by sharing people's photographs without their consent or knowledge on social media, a promising approach might be to raise awareness among the users of such platforms – people who create, propagate, and consume

content – regarding how their activities may harm others' privacy and encourage them to adopt privacy-respecting behaviors. For example, Amon et al. point to privacy related 'propriety' behaviors towards others [5] as has been observed in recent work on photo sharing [36] and has long been recognized by sociologists [6].

Behavioral interventions have been employed to help people make 'better' decisions regarding privacy and security in many contexts (Acquisti et al. provide a review [3]). But their success has been limited as the interventions were generic and designed without considering individual differences [41]. In the context of sharing photos of strangers, Amon et al. recently published some surprising findings – primes designed to reduce the sharing of photo-memes *amplified the unintended behavior*, i.e., participants who were primed to consider the privacy of photo subjects demonstrated *higher* sharing likelihood compared to the control group [5]. This work highlights the necessity of systematic studies to discover what photo-specific, personal, and contextual factors influence photo-sharing behaviors and how they interact with individual differences in personal characteristics so that more directed and personalized interventions can be invented.

As the next step in this line of research, we report herein the findings from a study we conducted to understand whether one's individual 'humor type' (i.e., how one uses humor to entertain the self or advance social relationships [49]) i) influences the sharing of others' photos on social media and ii) predicts how one would react to behavioral interventions designed to encourage privacy-respecting behaviors. In an online study (N=437), we asked participants to indicate the likelihood they would share a series of photo-memes (identified by Amon et al. [5]) on social media. In addition to the control condition, participants were primed by i) instructions to imagine themselves as the subjects in the memes and ii) explicit warnings about potential privacy violations. In each condition, a time-delay intervention was employed such that participants had to view the memes for eight seconds before they could indicate their likelihoods to share the memes. This was done to ensure that participants had enough time to examine the memes carefully and think along the line of the intervention (when present) rather than acting impulsively [3, 56]. We also collected data about participants' sharing of other people's (both familiar people and strangers) photos in real-life and their humor styles using the Humor Style Questionnaire (HSQ) [49]. Using data from the HSQ, scores along the four dimensions of humor styles, which jointly denote the 'humor type' of individuals [49], were computed. We used clustering to classify participants according to their humor type and then measured group differences in photo-sharing behaviors and reactions to interventions.

Our analyses identified 'humor type' as a significant predictor of photo-sharing behaviors, i.e., participants with different humor types exhibited different likelihoods of sharing memes. In particular, those with aggressive or self-deprecating humor styles were more likely to share offending memes. Moreover, humor type was significantly associated with past history of sharing embarrassing and privacy-violating photos of other people in real life. Finally, how the interventions influenced photo-sharing decisions depended on participants' humor types. Adding further insight to Amon et al.'s result, the paradoxical effect of increased likelihood of sharing photos when asked to consider the photo-subject's privacy

was observed only for those who used humor infrequently. These findings shed light on the important role one's humor style might play in understanding and predicting their photo-sharing behaviors. They also establish humor type as an important factor to consider when designing behavioral interventions because advancing social connections is among the most important motivations for sharing photos online [58], and how people use humor to initiate or strengthen social relationships partly depends on their style of humor [49].

2 BACKGROUND AND RELATED WORK

2.1 Individual humor style

There have been a number of attempts to measure individual differences in appreciating, enjoying, and using humor (Martin et al. provide a review [49]). We use the classification system proposed by Martin et al. for two reasons – i) this widely-used measure had been validated by several other studies [21] and ii) the focus of this work was discovering individual differences in how people *use* humor to entertain themselves and/or other people to advance social relationships, which is particularly pertinent to the online photo-sharing context. Martin and colleagues [49] identify four dimensions of humor style in their measure:

Affiliative humor: Individuals high in this dimension tend to use humor (e.g., jokes and spontaneous witty comments) to attract others' attention, to entertain other people with the goal of advancing social relationships, and to reduce interpersonal tensions. They are also likely to use light self-deprecating humor with a self-accepting tone to put others at ease, and may not use humor that is hostile to others.

Self-enhancing humor: Individuals high in this dimension usually possess a positive outlook towards life even in the face of difficulty. They use humor to entertain the self, sometimes as a strategy to cope with adverse situations. Thus, compared to Affiliative humor, the use of self-enhancing humor has a more personal than social focus.

Self-defeating humor: This style of humor is socially-oriented, where individuals high on this dimension are likely to use self-disparaging humor (e.g., jokes about their weakness or funny things that make them look foolish) to gain approval from others and acceptance in a social circle. This dimension is also involved in the use of humor to hide underlying negative emotions.

Aggressive humor: This dimension of humor relates to the use of sarcastic, ridiculing, and disparaging humor without regard for its potential impact on others. Individuals high on this dimension are also likely to make impulsive 'jokes' or say 'funny' things that may hurt others.

Scholars have extensively studied and established links between the humor styles and inter-personal skills to create and maintain social relationships [23, 66, 81], aggressive behaviors such as online trolling and cyberbullying [50, 62], other personality traits such as empathy and narcissism [29, 49, 76, 82], and demographic variables [34, 66]. Below, we review prior works that investigated how individual differences in personality traits and demographic factors are associated with photo-sharing behaviors and privacy concerns as well as proposed technical means and/or behavioral interventions to reduce privacy risks in online photo-sharing contexts.

2.2 Effects of personality traits on photo-sharing behaviors

Prior research has shown that humor style predicts social competence [81], empathy towards other people [29], and pro-social behaviors [23]. These findings indicate that people who have high affiliative humor but low aggressive humor may be especially considerate of others' privacy. On the other hand, numerous studies have found that creating and maintaining social relationships are among the primary motivating factors to share photos [10, 16, 37, 38, 73]. Furthermore, focusing on memes, Preez and Lombard found that such photos partly shape the online persona one portrays on social platforms [19]. Related to this result, Hunt and Langstedt documented that self-expression and self-presentation motivations were influenced by personality traits [37], which are in turn associated with the styles of humor [49]. Finally, trolling and cyberbullying behaviors, which are sometimes accomplished by posting memes, were found to be significantly associated with *self-defeating* and *aggressive* dimensions of humor styles [50, 62], again suggesting a possible connection between humor styles and photo sharing. In this work, we study the direct link between individual humor style and photo-sharing behaviors.

2.3 Demographic differences in photo-sharing behaviors

Past research has also linked demographics (e.g., age and gender) to privacy and photo-sharing behaviors. For example, women spend more time on social media platforms than men [35, 55], even though women were also more concerned about their privacy [35, 67, 74]. Women are also identified to be more risk-averse [13, 15] and more likely to take privacy-protective measures such as activating privacy settings and un-tagging themselves from posts they did not want to be associated with [74] compared to men. Older people were found to be more concerned about privacy risks [83, 84] and they proactively protect their data more compared to younger adults [83]. Regarding education, the findings have been mixed – Zukowski and Brown reported that internet users with higher levels of education are less concerned about information privacy than internet users with lower levels of education [84]; but Sheehan reported the opposite findings [68]. Regarding sharing photographs in social media, several studies found that women post more photos than men [35, 51, 55]. Biolcati and Passini documented gender differences in selfie posting behaviors – women posted more group selfies than men did, but no difference was found for one's own selfies. Prior research is limited with respect to posting photos of strangers, except for the work of Amon et al., who reported that female participants were significantly less likely to share strangers' photos than male participants unless the photo represented the subjects *very positively* [5]. Critically, this last finding is inconsistent with women's social media usage and general posting activities. It is therefore important to replicate these findings. Additionally, we test whether humor styles moderate the gender difference in sharing strangers' photos that may violate their privacy. This is an interesting empirical question given that men were found to express aggressive humor more than women [34, 49].

2.4 Effect of time-delay on better decision making

Prior research suggests that people may make poor decisions under time constraints [3, 56]; forcing them to spend more time to think before acting yields better outcomes. For example, Moser imposed a 25-hour delay before study participants could make online purchases, which significantly reduced impulse-buying [56]. Focusing on decision-making related to security, Volkamer et al. reported that when people were forced to wait for three seconds before they could click on links from phishing emails, they were more likely to examine the link closely and less likely to click on it [77].

2.5 Personalized interventions

The second motivation for this research is to understand the interplay between humor styles and behavioral interventions to inform future research on developing personalized interventions. Many researchers have cited the limited effectiveness of generic interventions and advocated for more directed and personalized nudges [41, 80], which were found to be more effective in multiple domains. Wisniewski et al. reported that social media users vary in terms of how they manage their privacy and argued that behavioral interventions may be seen as hindrances if they are not aligned with the users' established privacy behaviors [80]. The authors empirically established six 'privacy profiles' of social media users that can be used to design personalized nudges to elicit privacy-protective behaviors from the users when they disclose information about themselves [80]. Misra and Such developed a personal agent using users' profile information, context, and network structure to help them decide whom to share information with [54]. In the context of IoT (Internet of Things) privacy, Bahirat et al. learned information-disclosing behaviors of IoT users and created privacy settings based on the frequently observed disclosing preferences [7]. These settings were recommended to new users as defaults, which were preferred to naive default settings by the study participants [7]. Researchers have also put these ideas into practice. For example, Liu et al. implemented a personalized app permission assistant that was well accepted by the study participants [45]. Our study will facilitate developing personalized interventions by taking into account how individuals differ in photo-sharing behaviors and how they react to interventions depending on their humor type.

2.6 Other-regarding behaviors and technical approaches to combat privacy violations

Prior research on how much people value others' privacy and technical solutions to help protect privacy has largely focused on the photo owners and people familiar to them. In contrast, the privacy issues related to sharing photos of unknown people have received much less scholarly attention. Hoyle et al. found that 'lifeloggers' (users of wearable cameras to record a photo-journal of their day/lives) were generally respectful to bystanders' (i.e., strangers who got captured in their photos by chance) privacy and chose to not share photos including them [36]. In terms of technical solutions, many researchers have proposed mechanisms to allow the photo owners and sharers to limit the audience who can view their photos [9, 40]. Other researchers have focused on identifying issues that arise when multiple people co-own a photo and have

different sharing and privacy preferences [72] and proposed solutions to address them [70]. Regarding the privacy of strangers, Hasan et al. proposed an automated method to detect bystanders in images [30] so that they can be appropriately obfuscated to protect their privacy while retaining the utility of the photos [31–33]. But the privacy-utility trade-offs of these technical solutions may prevent their wide adoption without external motivations (e.g., through nudges), especially when some stranger is the victim of the privacy violations and people's valuation of their friends' privacy is not very high [61]. This work further demonstrates the necessity of understanding individual differences that influence photo-sharing behaviors so that personalized interventions can be developed.

3 METHOD

3.1 Data collection procedure

3.1.1 Stimuli and Experimental Manipulation. Through an online survey, we collected data about participants' likelihood to share memes under one of three experimental conditions. Data about participants' social media usage and photo-sharing habits in real life were also collected. The same 98 memes collected by Amon et al. [5] were used in our experiment. In a pre-test study, the memes were rated by 400 participants according to how *positively* or *negatively* they portrayed the people appearing in them [5]. Average ratings across the participants for each meme indicates its 'valence' score (min=-1.74, max=2.45). These memes were then ordered according to the valence score and divided into four quartiles: very negative (M=-1.15, SD=0.34, N=25), negative (M=-0.29, SD=0.17, N=24), positive (M=0.38, SD=0.23, N=24), or very positive (M=1.47, SD=0.49, N=25). Participants in the present study viewed these memes in random order and were asked to indicate their preference to share these photos on social media. Table 1 shows the questions that were asked in the three experimental conditions. Two of them included priming manipulations by instructing the participants to *imagine themselves as the photo-subjects* (Perspective taking) and to *consider the privacy of the people in the photos* (Privacy perspective). These interventions were taken from [5], but in our experiment, we introduced a delay of eight seconds between displaying the meme (and corresponding question) and providing response options. The delay was added as an intervention test to see if Amon et al.'s paradoxical finding would be reversed by allowing for more time in decision making. A 7-point Likert scale was used to solicit their sharing responses (-3 = Extremely unlikely to 3 = Extremely likely).

3.1.2 Questionnaires. Four questionnaires were included in the study:

Social Media Usage Questionnaire. It assessed participants' online social-media behavior including which social media platforms they had an account and how frequently they visited those accounts and shared photos. Participants who shared photos online were further queried about how often they shared photos that were taken by themselves or people they knew (e.g., friends and family members) and photos taken by strangers or that were found on the internet (see Appendix A for the complete questionnaire).

Social Media Privacy Questionnaire. This consists of 15 questions related to participants' online photo-sharing history and experiences related to privacy violations in real life. Eight questions

asked about whether participants had posted any photos of themselves and regretted afterwards (e.g., "Have you ever regretted posting a picture of yourself online?") or shared other people's (familiar or unknown) photos that may have violated their privacy (e.g., "Have you ever posted a picture of a stranger which may have violated his or her privacy?"). Four questions measured similar past behaviors of people known to the participants (e.g., "Has anyone you know posted a picture that may have violated someone's privacy?"). Finally, three questions asked whether participants have been victims of privacy violations as a result of other people sharing their photos (e.g., "Has anyone ever shared a picture of you online that you felt violated your privacy?"). Answers were recorded on a three-point scale: "no," "maybe," or "yes." Additionally, two attention check questions were included which instructed participants to provide a specific Likert-scale response (e.g., "Select the third option for this question.") or skip a question.

An additional Privacy Preference Question was administered, which asked participants, "Are you a private person who keeps to yourself or an open person who enjoys sharing with others (1 = very private, 7 = very open)?".

Humor Style Questionnaire. The *Humor Style Questionnaire* [49] was included to measure participants' humor styles. Each of the four dimensions of humor style was measured by eight questions, totaling to 32 questions. Participants responded using a 7-point Likert scale ('Totally disagree' = 1 to 'Totally agree' = 7).

3.1.3 Survey flow. First, the participants viewed the consent form containing study purpose, procedure, and payment information. After agreeing to participate, they completed the Social Media Usage Questionnaire. Next, they completed the experimental task, which required them to view all 98 photos one after another in a random order. Each photo was accompanied by a question asking about the likelihood of them sharing it on social media. In the perspective-taking and privacy-perspective conditions, a prime preceded the question. Unlike the study of Amon et al. [5], a delay of 8 seconds was introduced between the appearance of the photo (and accompanying question) and the appearance of the response options. We chose to delay the response by eight seconds based on an in-lab pilot study designed to determine the average amount of time necessary to decide on the likelihood of sharing the photo meme.

After answering questions for all photos, participants completed the other questionnaires in this order: Social Media Privacy Questionnaire, Humor Style Questionnaire [49], Privacy Preference Question, and demographic questions (age, gender, racial background, and education level). They were included at the end of the survey to avoid priming the participants to think about privacy other than by the privacy perspective intervention.

3.1.4 Participants. The surveys and questionnaires were implemented in Qualtrics[1] and participants were recruited through Amazon's Mechanical Turk.[2] Workers who were at least 18 years old and had been living in the United States for a minimum of five years were eligible to participate in the study. The study was further restricted to workers who had completed at least 1,000 HITs and had

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[1]https://www.qualtrics.com
[2]https://www.mturk.com

Table 1: Questions Presented for Each Condition

Condition	Photo questions
Baseline	How likely are you to share this photo on social media?
Perspective-taking condition (PT)	*If this was a photo of you*, how likely are you to share this photo on social media?
Privacy-perspective condition (PP)	*Taking into account the privacy of the person in the photo*, how likely are you to share this photo on social media?

at least 95% approval ratings to ensure data quality [46]. Workers who participated in the study conducted by Amon et al. [5] were prevented from participating in this study since we used the same set of memes. To ensure proper viewing of the photos, participants were required to use a laptop or desktop computer to answer the survey questions. Of the 556 respondents, 437 responded correctly to both attention checks and were retained for the final sample; responses from the remaining participants were discarded. Eighty-two (18.7%) participants were between the ages of 18–29 years, 278 (64%) were between 30–49 years, 70 (16.5%) were between 50–64 years, and seven (1.6%) were older than 65 years. One hundred and ninety-two participants (43.9%) identified as female and 244 (55.8%) identified as male. Three hundred and fifty-eight participants (76.99%) identified themselves as Caucasian, 41 (8.8%) as Black or African-American, 30 (6.5%) as Asian, 28 (6%) as Hispanic or Latino, seven (1.5%) as American Indian, and 1 (0.22%) as biracial or multiracial or "other,". Participants ranged in education from having some high school education (11.%) to having doctoral (0.23%) or professional degrees (1.1%). The mode for education level was a bachelor's degree (38.9%), followed by having completed some college (26.7%), followed by Associate's degree (13.8%), and then high school or GED (11%). Most of the participants (97%) reported having at least one social media account and the average number of accounts was 4.20. The majority of participants visited their accounts 'multiple times per week' ($n = 341$, 72.3%). On average, participants share photos on more than one social media account and almost one-third of them ($n = 129$, 29%) share photos 'multiple times per week'. A majority of participants (54%) share photos with familiar people while the rest share photos publicly. Participants were randomly assigned to one of the three experimental conditions: 150 participants were in the *Baseline* condition, 141 participants were in the *Perspective-taking* condition, and 144 participants were in the *Privacy-perspective* condition. The median completion time for the survey was 37 minutes while 75% of the participants completed it within 49 minutes. All participants who completed the survey were paid $5 regardless of whether their data was used for analysis or not. The payment amount was decided based on multiple pilot testings. First, we set the payment amount based on the calculated time to complete our survey, including delays between stimuli, consent and instructions. Our internal pilot testing indicated that participants reliably took less than 30 minutes to complete the study, and our payment targeted a rate of $10/hour. During pilot testing, we asked the participants whether the payment was fair, and participants consistently indicated that the amount was fair. In the final pilot test, we queried participants at the end of the survey for comments or feedback in a free-form text box. We did not receive any comments regarding the payment. The study protocol was reviewed and approved by our institution's ethics review board for the protection of human subjects.

Humor styles of the participants. In our sample of data, there were similar means and standard deviations for the four dimensions of humor style as reported in the original study by Martin et al. [49]: Affiliative (M=43.9, SD= 8.7), Self-enhancing (M=40.3, SD=9.2), Self-defeating (M=28.4, SD=9.7), and Aggressive (M=25.5, SD=9.1). There was no significant difference in scores along any of the dimensions among the three experimental conditions (all $p > 0.05$).

3.2 Methods of data analysis

3.2.1 Validating HSQ and clustering participants based on humor styles. First, we validated the Humor Style Questionnaire using confirmatory factor analysis. Our experimental data supported the four-factor structure representing four dimensions of individual humor styles. While each of these dimensions indicates a single aspect of how one expresses humor, all four dimensions have to be considered simultaneously to get the full picture of one's 'humor type'. Recently, researchers have been critical of the practice of measuring how each of these dimensions independently correlates with other personality traits and behaviors [21, 43]. They advocated for grouping people by simultaneously considering all four dimensions of humor, and then assessing group differences [21, 43]. This approach has been adopted by more contemporary studies [21, 25, 43]. In particular, Evans and Steptoe-Warren reported that humor clusters are better predictors of individual differences in communication, stress level, and creativity, than the humor styles [21]. We followed this recommendation and used K-Means [60] to cluster the participants based on their scores along the four dimensions of humor style. The number of clusters (K) were determined experimentally by examining the error in the model for different values of K. The sum-of-squared distances among the data samples and their closest cluster center were computed for different values of K ranging from one to 20. Based on the 'elbow-method' [27], we identified a three cluster configuration as the best configuration. This is what was also reported by several prior studies [21, 43], providing further evidence in support of this cluster structure.

In our case, there were 176, 113, and 148, people in the three clusters, respectively. To interpret these clusters based on the four dimensions of humor, the z-scores of the cluster means along those dimensions are shown in Table 2. Cluster 1 has an above-average amount of all four humor styles, while Cluster 2 has below average scores in all humor styles. The third cluster has above-average scores for the 'Affiliative' and 'Self-enhancing' sub-scales but below-average scores for the 'Self-defeating' and 'Aggressive' sub-scales.

Notably, the properties of these three clusters are strikingly similar to those discovered in prior works [21, 43]. We therefore followed Leist and 'Müller [43] and labeled the three clusters: *humor endorsers* (female=27%), *humor deniers* (female=43%), and *self-enhancers* (female=64%).

Table 2: Z-scores of the cluster means for the four dimensions of humor.

	Humor endorsers	Humor deniers	Self-enhancers
Affiliative	0.31	-1.16	0.52
Self-enhancing	0.25	-1.12	0.55
Self-defeating	0.75	-0.40	-0.59
Aggressive	0.74	-0.17	-0.75

3.2.2 Statistical analyses. Different statistical models were utilized to answer different research questions. To analyze data about meme-sharing likelihood under different experimental conditions, a mixed linear model was built where the likelihood to share a meme was the dependent variable and *experimental condition*, *photo valence*, *humor types*, and interaction terms involving them were used as the predictors. We controlled for *gender*, *education*, and *age*. All pairwise comparisons (with appropriate method for p-value correction) were performed using the estimated means obtained from this model.

To examine the extent to which meme-sharing behaviors under the controlled experimental setup is associated with the *real life* photo-sharing behaviors, we performed correlational analyses using average meme-sharing likelihood of a person and their responses to the questions asking about incidents of sharing privacy-sensitive photos (*Social Media Privacy Questionnaire*). Additionally, we tested whether real-life photo-sharing habits vary as a function of humor type by conducting a chi square test-of-independence using responses to *Social Media Privacy Questionnaire*. In all cases, responses to the questions were binary coded ('Yes' = 1, 'No' = 0) after removing the uncertain ('Maybe') responses.

Finally, linear regression models were built to analyze the effect of humor type in social media usage and *generic* photo-sharing behaviors (i.e., not restricted to privacy-sensitive photos). More specifically, separate models were built with *number of social media accounts*, *frequency of sharing own photos*, and *frequency of sharing other people's photos* as the outcome variables and 'humor type' as the predictor. In each case, we controlled for *age* and *gender*.

4 FINDINGS

4.1 Relation between humor type and photo-sharing behaviors

Table 3 shows the results from the omnibus test involving the mixed effect model: all of the predictors of primary interest – *humor cluster*, *experimental condition*, and *photo valence* – and some interaction terms involving them had significant effects on photo-sharing likelihood. We note that, all the effect sizes are small (Table 3), which should be taken into account when interpreting the findings. Furthermore, while the main and interaction effects of 'humor type' on sharing memes are at the central to our research question, photo-valence had a slightly larger main effect than the main
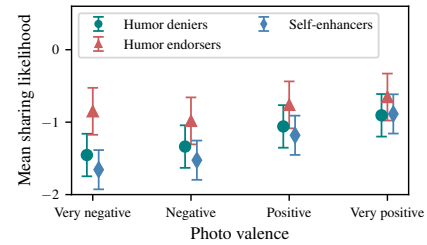

Figure 1: Mean (with 95% CI) sharing likelihood by humor type and photo-valence in the *baseline* condition.

(and interaction) effects of 'humor type' (Table 3). In the following sections, we state key takeaways from the findings, backed up by statistical evidence from Table 3 and results from additional pairwise comparisons.

Finding 1. Without any behavioral manipulations, *humor endorsers* were significantly *more likely* to share *very negative* memes than *humor deniers* and *self-enhancers*. As shown in Table 3, *humor cluster* significantly predicts meme-sharing likelihood ($F(2, 436) = 8.68$, $p < 0.001$), but this effect is qualified by a higher order interaction effect involving *condition* and *valence* ($F(12, 42292) = 2.97$, $p < 0.001$). This finding indicates that people in different humor clusters differ in meme-sharing likelihood depending on the valence of the meme and the experimental condition. Doing pairwise comparisons across the valence groups in the *Baseline* condition, we found that, for *very negative* photos, *humor endorsers* demonstrated significantly higher sharing likelihood ($M = -0.85$, $SE = 0.165$) than both *self-enhancers* ($M = -1.66$, $SE = 0.14$), $d = 0.44$,[3] $p = 0.03$ and *humor deniers* ($M = -1.45$, $SE = 0.150$), $d = 0.45$, $p < 0.0001$ (Fig. 1). All other comparisons were non-significant (all $p > 0.05$). In summary, people who frequently make use of humor either to enhance themselves or entertain others are also more likely to share memes that negatively portray other people and thus may violating the photo-subjects' privacy.

Finding 2a. Participants' meme-sharing likelihood during the experiment was significantly correlated with their past history of photo-sharing behaviors on social media. We found a significant correlation between average sharing likelihoods (across all the memes) and overall photo-sharing frequencies on social media ($r = 0.27$, $p < .0001$). Table 4 reveals significant correlations between the average sharing likelihood of a participant and their responses to the questions that asked whether they have shared embarrassing or privacy-violating photos of themselves or others. These findings suggest that participants' meme-sharing behaviors in the experimental settings may generalize to their *real life photo-sharing behaviors*.

Finding 2b. Participants differed in how they shared *privacy-sensitive* photos in real life as a function of their humor type and *humor endorsers* were more likely to share embarrassing and privacy-violating photos of others. Table 4 also shows

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[3]standardized effect size *Cohen's d*: 0.2=small effect, 0.5=medium effect, and 0.8=large effect [17]

	Sum Sq	Mean Sq	DoF	Den DoF	F statistic	η_p^2
Gender	20.21	20.21	1.00	436.00	6.91**	< 0.01
Age	0.54	0.54	1.00	436.00	0.19	< 0.01
Others' photo sharing frequency	98.45	98.45	1.00	436.00	33.64***	< 0.01
Privacy perception	82.79	82.79	1.00	436.00	28.29***	< 0.01
Education	19	3	7	436	0.92	< 0.001
Condition	29.61	14.81	2.00	436.00	5.06**	< 0.01
Valence-group	3776.53	1258.84	3.00	42292.00	430.06***	0.03
Humor cluster	50.82	25.41	2.00	436.00	8.68***	< 0.01
Gender : Condition	0.60	0.30	2.00	436.00	0.10	< 0.01
Gender : Valence-group	469.84	156.61	3.00	42292.00	53.50***	< 0.01
Gender : Humor-cluster	10.07	5.04	2.00	436.00	1.72	< 0.01
Condition : Humor-cluster	24.27	6.07	4.00	436.00	2.07	< 0.01
Condition : Valence-group	721.83	120.31	6.00	42292.00	41.10***	< 0.01
Valence-group : Humor-cluster	81.42	13.57	6.00	42292.00	4.64**	< 0.01
Condition : Valence-group : Humor-cluster	104.36	8.70	12.00	42292.00	2.97**	< 0.01

Table 3: Type II ANOVA Table (with Satterthwaite's method). ($* = p < 0.05$, $** = p < 0.01$, $*** = p < 0.001$). The effect size η_p^2 (partial η^2) can be interpreted as small if $\eta_p^2 = 0.01$, medium if $\eta_p^2 = 0.06$, and large if $\eta_p^2 = 0.14$ [42].

#	Question	r	χ^2
1	Have you ever regretted posting a picture of yourself online?	0.11*	0.40
2	Have you ever accidentally posted a picture of yourself online that you did not want to share?	0.19**	4.80
3	Have you ever shared an embarrassing picture online of someone else you know?	0.16**	18.12***
4	Have you ever regretted posting a picture online of someone else you know?	0.14**	0.61
5	Have you ever posted a picture online of someone else you know, which may have violated his or her privacy?	0.11*	13.47***
6	Have you ever shared an embarrassing picture online of a stranger (someone that you do not personally know)?	0.23***	1.48
7	Have you ever regretted posting a picture online of a stranger (i.e., someone you do not personally know?	0.14**	0.40
8	Have you ever posted a picture of a stranger (i.e., someone you do not personally know), which may have violated his or her privacy)?	0.10*	7.30*

Table 4: Humor styles predict history about posting own and other people's photo online. In all cases, *overall photo-sharing frequency* and *other people's photo sharing frequency* were used as covariates ($* = p < 0.05$, $** = p < 0.01$, $*** = p < 0.001$).

results of the Chi-square tests testing whether there was an association between the *humor cluster* and history of sharing privacy-sensitive photos on social media. As evident from the results, membership in a *humor cluster* is significantly associated with past behavior of *sharing embarrassing photos of familiar people*, *sharing privacy-sensitive photos of familiar people*, and *sharing privacy-sensitive photos of strangers*. To examine how people with different humor types shared privacy-sensitive photos in the past, the *observed* frequencies of sharing such photos are plotted, alongside with the expected frequencies[4] in Fig. 2.

In all cases, *humor endorsers* shared photos that portrayed other people in embarrassing ways or violated their privacy more than expected. These results are consistent with their meme-sharing behaviors during the experiment: *humor endorsers* chose to share

memes that portray others in negative ways (and hence privacy-sensitive) significantly more than *self-enhancers* and *humor deniers* (Finding 1).

Finding 2c. Participants differed in terms of social media usage and the sharing of *generic* photos depending on their humor type; *self-enhancers* and *humor endorsers* were more engaged in social media usage and photo-sharing activities. Humor type was a significant predictor for how many social media accounts participants had ($F(2) = 3.53$, $p < 0.05$), how frequently participants visited those accounts ($F(2) = 4.52$, $p < 0.05$), how frequently they shared photos of themselves ($F(2) = 7.81$, $p < 0.001$), and how frequently they shared photos of other people ($F(2) = 4.59$, $p < 0.05$). Pairwise tests controlling for multiple comparisons with Dunnet's method for p-value adjustment revealed that *self-enhancers* ($M = 4$, $SE = 0.14$) had more social media accounts than *humor deniers* ($M = 3.6$, $SE = 0.17$), $d = 0.38$, $p < 0.05$. Self-enhancers also visited their accounts more frequently ($M = 6.6$, $SE = 0.12$ than *humor deniers* ($M = 6.1$, $SE = 0.15$),

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[4]The expected 'Yes' indicates the expected number of 'Yes' responses under the null hypothesis (i.e., no association between humor cluster and photo-sharing history) and comes from chi-square test-of-independence.
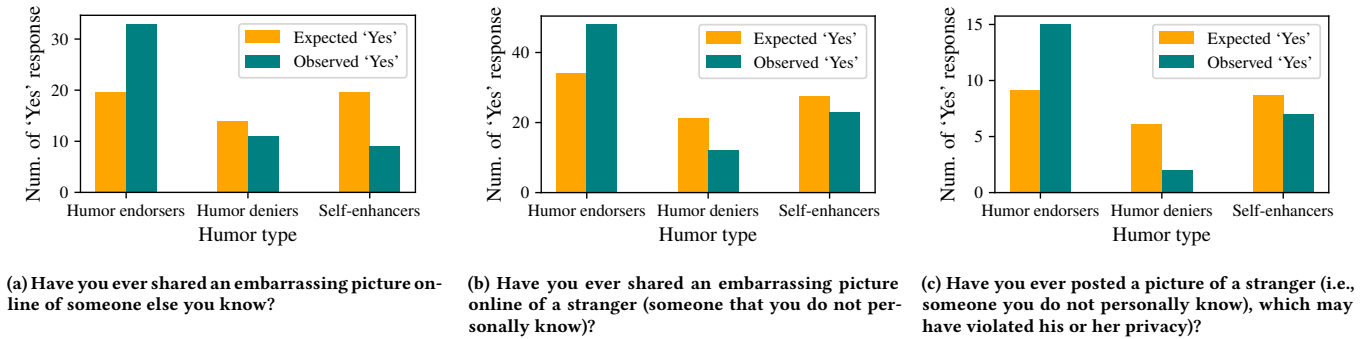
(a) Have you ever shared an embarrassing picture online of someone else you know?

(b) Have you ever shared an embarrassing picture online of a stranger (someone that you do not personally know)?

(c) Have you ever posted a picture of a stranger (i.e., someone you do not personally know), which may have violated his or her privacy)?

Figure 2: Expected and observed number of 'Yes' response when study participants with different humor types were asked questions about their past photo-sharing history.

$d = 0.38$, $p < 0.05$. Both *humor endorsers* ($M = 3.1$, $SE = 0.20$) and *self-enhancers* ($M = 3.5$, $SE = 0.18$) shared photos of themselves more frequently than *humor deniers* ($M = 2.5$, $SE = 0.23$), $d = 0.27$ and $p < 0.05$, $d = 0.50$ and $p < .0001$, respectively. But only *humor endorsers* ($M = .4$, $SE = 0.24$) shared photos of other people more than *humor deniers* ($M = 2.6$, $SE = 0.25$), $d = 0.31$, $p < 0.05$. All other comparisons were non-significant at the 95% significance level.

4.2 Intervention effects on photo sharing

In this section we present results related to the effects of behavioral interventions on the participants and whether they differed depending on their humor cluster classification.

Finding 3a. Both behavioral interventions resulted in a *higher* rather than *lower* likelihood of meme-sharing. In other words, people were more likely to share *more* when they imagined themselves as the photo subjects (PT condition) and when they were reminded about others' right to privacy (PP condition). We found a significant main effect of *condition* ($F(2, 436) = 5.06$, $p = 0.00674$), indicating that the interventions influenced meme-sharing behavior (Table 3). Pairwise comparisons among the conditions (using Dunnett's method for p-value correction) revealed that participants in the *Privacy perspective* ($M = -0.80$, $SE = 0.090$) and *Perspective taking* ($M = -0.76$, $SE = 0.096$) conditions shared significantly more than participants in the *Baseline* condition ($M = -1.10$, $SE = 0.089$) ($d = 0.13, 0.16$, $p < 0.05$ in all cases), replicating the paradoxical effect of the interventions observed by Amon et al. [5] even with the 8-second time delay.

Finding 3b. *Humor deniers* in the PP condition (i.e., they were reminded about photo-subjects' privacy) demonstrated a *higher* likelihood to share memes compared to the *humor deniers* in the *Baseline* condition. People in other humor clusters did not exhibit this paradoxical behavior. Following the significant three-way interaction involving humor, condition, and valence (Table 3), we conducted pairwise comparisons (using Dunnett's method for p-value correction) to further investigate how the *Privacy Perspective* intervention affected members of different humor clusters for photos across the valence groups. Analyses

revealed that only *humor deniers*, who use humor *infrequently*, demonstrated a *higher* likelihood of sharing memes in response to the Perspective-taking intervention across all valence groups ($M_{very\_neg} = -0.89$, $SE_{very\_neg} = 0.15$, $M_{neg} = -0.71$, $SE_{neg} = 0.15$, $M_{pos} = -0.35$, $SE_{pos} = 0.15$, $M_{very\_pos} = -0.17$, $SE_{very\_pos} = 0.154$) compared to the *humor deniers* in the *Baseline* condition ($M_{very\_neg} - 1.45$, $SE_{very\_neg} = 0.15$, $M_{neg} = -1.34$, $SE_{neg} = 0.15$, $M_{pos} = -1.06$, $SE_{pos} 0.15$, $M_{very\_pos} = -0.91$, $SE_{very\_pos} = 0.15$), $d = 0.31, 0.33, 0.36, 0.35$, all $p < 0.05$ (Fig. 3a). There was no significant effect of this intervention on the *humor endorsers* and *self-enhancers*.

Finding 3c. Both *humor endorsers* and *self-enhancers* demonstrated *higher* sharing likelihoods in the *Perspective taking* condition (i.e., when they imagined themselves as the photo-subjects) compared to the *humor endorsers* and *self-enhancers* in the *Baseline* condition, but only when the photos portrayed the subjects *positively* (i.e., positive valence). *Humor endorsers* demonstrated a *higher* sharing likelihood for *positive* ($M = -0.08$, $SE = 0.15$) and *very positive* ($M = 0.23$, $SE = 0.15$) photos in the *Perspective taking* condition compared to *humor endorsers* in the *Baseline* condition ($M_{pos} = -0.76$, $SE_{pos} = 0.17$, $M_{very\_pos} = -0.65$, $SE_{very\_pos} = 0.17$), $d = 0.29, 0.39$, $p < 0.0001$ in both cases (see Fig. 3b). On the other hand, *self-enhancers* increased sharing likelihood for only *very positive* photos in the *Perspective taking* condition ($M = 0.77$, $SE = 0.14$) compared to *self-enhancers* in the *Baseline* condition ($M = -0.89$, $SE = 0.14$), $d = 0.35$ and $p < 0.0001$ (Fig. 3c).

4.3 Effect of gender

Finding 4. Female participants demonstrated *higher* sharing likelihood than male participants for *positive* and *very positive* photos regardless of humor group and experimental condition. Gender was significantly associated with photo-sharing likelihood ($F(1, 436) = 6.91$, $p = 0.009$), but this effect was moderated by photo-valence ($F(3, 42292) = 53.5$, $p < 0.0001$) (Table 3). Pairwise comparisons revealed that female identifying participants were significantly more likely to share *positive* and *very positive* ($M_{pos} = -0.55$, $SE_{pos} = 0.13$, $M_{very\_pos} = -0.15$, $SE_{very\_pos} = 0.13$) photos compared to male identifying participants ($M_{pos} = -0.90$, $SE_{pos} = 0.13$, $M_{very\_pos} = -0.79$, $SE_{very\_pos} = 0.13$), $d = 0.12, 0.28$,

(a) Humor deniers

(b) Humor endorsers
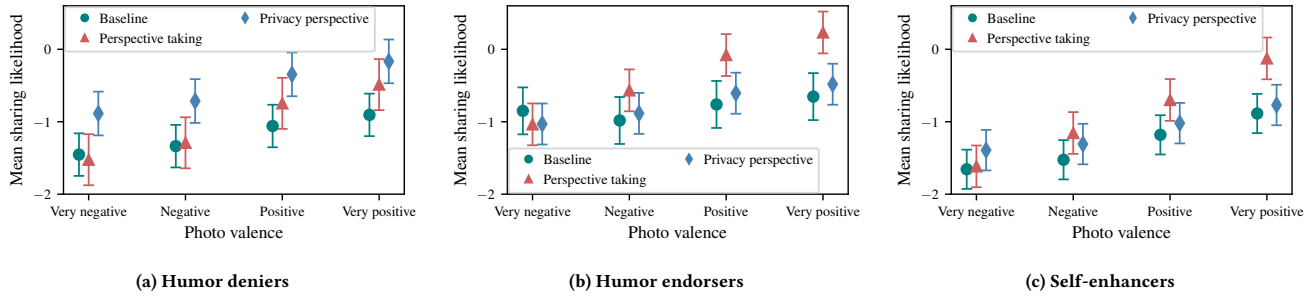
(c) Self-enhancers

Figure 3: Mean (with 95% CI) photo sharing likelihood of participants with different 'humor type'.
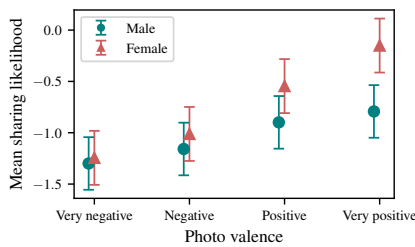

Figure 4: Mean likelihood (with 95% CI) to share photos by Female and Male participants across valence levels.

$p < 0.0001$ in both cases (also see Fig. 4). All other comparisons were non-significant ($p > 0.05$).

5 DISCUSSION

One of the primary goals of this research was to assess the effects of individual differences in humor style on making decisions to share others' privacy-sensitive photos online. Our findings provide considerable evidence that humor style is an important predictor of photo-sharing behaviors in real life. Another primary focus of this work was to investigate whether people with different humor types react differently to behavioral interventions that were designed to discourage the sharing of privacy-sensitive photos. We reproduced the paradoxical result reported by Amon et al. [5] – the privacy interventions resulted in a higher sharing likelihood – and we could also pinpoint the sub-population that is more likely to exhibit this unexpected behavior. Finally, we investigated how humor type interacted with gender, but the interaction effect was not significant and our result on the effect of gender was not aligned with what was reported by Amon et al. [5]. We interpret these findings below.

5.1 *Humor endorsers* are more likely to share memes with *very-negative* valence and privacy-sensitive photos of other people

Humor endorsers have above average scores along all dimensions of humor styles and are characterized by frequent use of humorous content to entertain themselves or other people. But why did they differ from other humor groups for only the *very-negative* memes?

Referring back to Fig. 1, it can be seen that, the difference was created because *self-enhancers* and *humor deniers* displayed a lower likelihood of sharing *very negative* memes, and not because *humor endorsers* shared *very negative* memes at a higher rate than other memes. This was expected since *humor endorsers* frequently use both positive and negative humor. In fact, as shown in Table 2, *humor endorsers* are further from the mean along the *self-defeating* and *aggressive* dimensions compared to the other two dimensions of humor style. These two dimensions (i.e., *self-defeating* and *aggressive*) are related to the usage of *negative* or *disparaging* humor [49]. Thus, *humor endorsers* concentrated on the humorous aspects of the memes even if the photo-subjects were portrayed negatively by those memes, and expressed their intention of sharing them at the same level as *positive* memes. On the other hand, *humor deniers* and *self-enhancers* are less likely to use negative humor (Table 2) and thus they lowered their sharing likelihood for *very-negative* memes. This also explains why *self-enhancers* and *humor deniers* reported sharing privacy-sensitive photos of other people *less* than expected while *humor endorsers* shared photos *more* than expected (see Fig. 2).

5.2 Reactions to the *Perspective Taking* intervention

When *humor endorsers* and *self-enhancers* took the perspectives of the photo-subjects, they exhibited higher sharing likelihoods (compared to the *humor endorsers* and *self-enhancers* in the *Baseline* condition), but only for photos that portrayed the subjects in a positive light (Fig. 3b and Fig. 3c). The type of online persona one tries to portray informs their selection of memes to share on social platforms [19]; thus it is not surprising that participants shared more when they imagined themselves as the positively-portrayed photo-subjects. But this effect was observed for *humor endorsers* and *self-enhancers* and not for *humor deniers*. One possible explanation is that *humor endorsers* and *self-enhancers* have above average scores on the affiliative dimension of humor, which is correlated with high levels of narcissism or an overly positive self-view [48, 76], which in turn is associated with presenting the self in a positive light [14, 59]. Furthermore, narcissistic people are more likely to share selfies (i.e., photos containing themselves) on social media [78] to gain others' attention [10]; thus imagining themselves in the memes resulted in a higher sharing-likelihood. It

is worth noting that the *Perspective Taking* intervention was originally intended to *lower* the sharing of memes by increasing empathy towards the photo-subjects, but this surprising effect of *increasing* the sharing likelihood was also observed in that study [5] (but only for the *very positive* memes). The authors explained this phenomenon as a form of pro-social behavior by the participants, inspired by self-reflection and putting themselves in another's place, where they helped the photo-subjects to create a positive online persona by sharing their photos that were portrayed positively. Looking at this phenomenon through the lens of humor style, self-presentation, and advancing social relationships provide an alternative explanation. Participants who are interested in positive self-presentation and enhancing social relationships increased sharing of photos that they imagined presented themselves in a 'good' way to their social connections, rather than treating it as a pro-social act (e.g., helping others to build positive persona) or an anti-social act (e.g., violating others' privacy by sharing their photos without their consent). This explains why *humor deniers*, who are less interested in advancing social connections, did not increase sharing of memes in the PT condition.

5.3 Reactions to the *Privacy Perspective* intervention

Humor deniers in the PP condition (i.e., after they were reminded about the photo-subjects' privacy) were more likely to share photos compared to the humor deniers in the control group; but *self-enhancers* and *humor endorsers* did not demonstrate this pattern. This paradoxical effect was also reported by Amon et al. and the authors provided some hypotheses as to why that happened, including i) feeling more in control and thus more comfortable to share others' personal information [26], ii) explicitly rejecting the values of the intervention [75] and, iii) reactance or the tendency for apparently unnecessary rules to elicit the opposite effect as intended [53]. These hypotheses are not supported by our findings, since we saw the paradoxical effects only for one group of the participants. Why is it that only *humor deniers* behaved paradoxically? One plausible explanation may be narrowing decision criteria through priming. There are many reasons to (not) share memes online, including funniness, appropriateness, relating to the self, and eliciting social interactions [5, 52], e.g., likes and comments. Thus, one might consider multiple reasons before deciding to share a meme, or not share when one or more of the conditions were not satisfied (e.g., a meme may be funny but not appropriate [5]). Since *humor deniers* are neither very appreciative of humorous content nor very interested in using humor to advance social relationships – not satisfying many of the reasons to share memes – they are less likely to share memes in the control condition. But when they were warned about possible privacy implications of the sharing act, their decision to share the meme was perhaps narrowed to only whether it would violate the photo-subjects' privacy.

As reported by Amon et al., participants did not consider sharing the memes will violate the subjects' privacy for many reasons, including *the memes were already public* and *the subjects would not take the photos if they did not want them to be shared* [5]. Thus, deciding based on only this criterion, it seems reasonable that the sharing would increase. In other words, the priming likely narrowed the

participants' attention and, in turn, they did not explore all the reasons to (not) share the meme. Past psychological research supports the above hypothesis. For example, Friedman et al. showed that a narrow (broad) scope of perceptual attention results in an analogously narrow (broad) focus of conceptual attention [24], which in turn restricts (expands) the diversity of thoughts. A great deal of research has shown that deliberation can result in poorer judgment and decision-making compared to using intuition (Dijkstra et al. provide a review [18]). In our case, with the priming, the *humor deniers* were forced to think about privacy, hindering their spontaneous reaction about whether to share a meme (which is most often *not sharing*).

Why didn't self-enhancers and humor endorsers exhibit this paradoxical behavior after the same intervention? One possible reason is that both *self-enhancers* and *humor endorsers* are more appreciative of the humorous and social aspects of sharing photos and thus the priming had a smaller impact on narrowing their thoughts. Alternatively, both *self-enhancers* and *humor endorsers* score high along the affiliative and self-enhancing dimensions of humor, which are correlated with social competence [81] and pro-social behaviors [23]. Thus, *self-enhancers* and *humor endorsers* are more likely to consider the negative impact of violating someone's privacy (pro-social behavior) and how the memes will be received by their connections on the online platforms where often the photo-subjects are portrayed in embarrassing manners (social competence).

Why didn't the perspective-taking intervention similarly affect the humor deniers (i.e., narrowing their focus)? One possible reason is that PT encourages one to relate to the photo-subject or the story depicted by the meme, and present oneself in an entertaining way to their social connections. But *humor deniers* are less likely to exhibit empathetic behaviors [29] and by definition, they are not interested in using (self-referential) humor to entertain others.

5.4 Effects of gender

Our results suggest that women as opposed to men tend to share more when the memes portray the subjects as *very positive*. This result deviates from what Amon et al. [5] reported: women demonstrated *lower* likelihood of sharing *negative* memes than men but no difference was found for other valence groups. Our result is consistent with prior research demonstrating that women engage more with online social media [35, 35, 51, 55, 55] and post photos more frequently than males. It is also in line with the heightened concerns about self-privacy [35, 67, 74] and risk-averse behaviors [13, 15] of women: memes that portray the photo-subjects in a positive light and sometimes offer constructive messages of social interest may enhance their online reputation rather than harming their privacy and social impression. We did not find any significant interaction effect involving humor and gender, suggesting that people in the same humor group exhibit similar photo-sharing patterns regardless of their gender.

5.5 Effect of time delay

We modified the study methodology followed by Amon et al. [5] and included a time delay of eight seconds. But providing more time to think before acting did not reverse the overall paradoxical behaviors of the participants in this photo-sharing context.

5.6 Implications for designing privacy nudges

Findings from this study may guide developing personalized interventions based on people's humor type. For example, we demonstrated associations between humor type and photo-sharing behaviors in real life; future research could infer individuals' humor types based on historical data on online photo-sharing activities over a long period of time and then devise personalized nudges. A promising personalized privacy nudge could be story-based interventions (e.g., showing real-life harmful consequences of sharing memes [1, 8]) to *humor endorsers* and *self-enhancers*, as they are more likely to possess greater empathy.

5.7 Limitations

There were some limitations to this study that we discuss here. First, we collected data from workers on Amazon's Mechanical Turk (MTurk) platform, who have been shown to be more privacy-concerned than the general US population [39]. Still, a recent study has shown that, in the context of conducting surveys concerning security and privacy, MTurk participants resemble the US population fairly well and better than other web panels [65]. In this experiment, participants' scores along the four dimensions of humor style were comparable to the results reported by Martin et al. [49], who administered this questionnaire on a sample of undergraduate students in Canada. The clusters (denoting humor types) identified from this data were similar to prior studies conducted on participants from Germany [43] and United Kingdom [21] who were recruited through multiple methods including in-person, e-mail, and social media, providing further assurance regarding the generalizability of our findings. To reduce noise and maintain data-quality, we removed responses from participants who provided wrong answers to any of the two attention check questions.

Second, in our study, we collected data about sharing preferences of image macros or memes. Preference to share such photos may differ from sharing photos without captions or any other type of alteration. Further, participants viewed and made sharing decisions for 98 photos in a row, which is not usual when people view and share memes. Fatigue from making so many decisions at once might have been the reason for so many participants (almost 22%) to fail attention check questions. But many participants, when asked to comment about the study, mentioned that they enjoyed the memes they saw and we did not find any indication of fatigue or boredom. Further, Amon et al. found no order effect in their data (that was collected in a similar experimental setting using the same set of memes), i.e., participants were engaged in the study from beginning till the end and consistently answered all questions. Similar to previous works (e.g., [5, 72]), we relied on self-reported, memory-based data to understand photo-sharing behaviors in real life. Such data may contain biased responses [79] (i.e., *confirmation bias* and *consistency bias*) and may not be reliable. However, data about participants' past history of social media usage and photos-sharing frequency, and meme-sharing preferences during the experiment were in agreement with each other and were consistent with expected behaviors according to their humor types.

6 CONCLUSIONS

We investigated how individual humor style, which has been linked to many personal characteristics relevant to social media usage (e.g., social competence), affects photo-sharing behaviors on online platforms. We found that, humor style not only predicted participants' likelihood to share memes during our study but also was associated with their usage of social media in real life and past history of sharing privacy-sensitive photos of other people. In particular, participants who frequently use aggressive and self-disparaging humor were more likely to share memes and have shared photos in the past that may have violated others' privacy. Moreover, participants who infrequently use humor demonstrated the paradoxical behavior of sharing memes at a higher rate after they were primed to consider the photo-subjects' privacy. We discussed possible reasons behind this phenomenon, which may help to guide future research on photo sharing. In particular, our findings underscore the importance of developing effective and personalized behavioral interventions based on the humor style of the recipients to discourage them from sharing photos that may threaten others' privacy.

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A QUESTIONNAIRES

Social Media Usage Questionnaire

- Which social media platforms do you have an account for? (Select all that apply.)
  1. Facebook, 2. Instagram 3. Pinterest 4. Snapchat 5. Twitter 6. Myspace 7. Flicker 8. Other (Please describe)
- How often you visit social media?
  1. Never, 2. Less than once in a month, 3. Once in a month, 4. Multiple times in a month, 5. Once in a week, 6. Multiple times in a week, 7. Once in a day, 8. Multiple times in a day
- What social media platform do you use to share photos online the most? (Select all that apply.)
  1. Facebook, 2. Instagram 3. Pinterest 4. Snapchat 5. Twitter 6. Myspace 7. Flicker 8. Other (Please describe)
- When you share photos online, who do you typically share them with?
  1. Friends/connections, 2. General viewers/public, 3. Both
- How often do you share photos on social media?
  1. Never, 2. Less than once in a month, 3. Once in a month, 4. Multiple times in a month, 5. Once in a week, 6. Multiple times in a week, 7. Once in a day, 8. Multiple times in a day
- How often do you share pictures taken by you, your friends, or your family on social media?
  1. Never, 2. Less than once in a month, 3. Once in a month, 4. Multiple times in a month, 5. Once in a week, 6. Multiple times in a week, 7. Once in a day, 8. Multiple times in a day
- How often do you share pictures on social media that you found on the internet or that other people took (not including your friends, family or other people you personally know.)? 1. Never, 2. Less than once in a month, 3. Once in a month, 4. Multiple times in a month, 5. Once in a week, 6. Multiple times in a week, 7. Once in a day, 8. Multiple times in a day

Experimental Manipulation

- (Baseline condition) How likely are you to share this photo on social media?
  1.Extremely unlikely, 2. Moderately unlikely, 3. Slightly unlikely, 4. Neither unlikely nor likely, 5. Slightly likely, 6. Moderately likely, 7. Extremely likely
- (Perspective taking condition) If this was a photo of you, how likely are you to share this photo on social media?
  1.Extremely unlikely, 2. Moderately unlikely, 3. Slightly unlikely, 4. Neither unlikely nor likely, 5. Slightly likely, 6. Moderately likely, 7. Extremely likely
- (Privacy perspective condition) Taking into account the privacy of the person in the photo, how likely are you to share this photo on social media?
  1.Extremely unlikely, 2. Moderately unlikely, 3. Slightly unlikely, 4. Neither unlikely nor likely, 5. Slightly likely, 6. Moderately likely, 7. Extremely likely

Social Media Privacy Questionnaire

: Answer each of the questions below with options: i) Yes ii) Maybe iii) No

(1) Has anyone ever shared a picture of you online that you did not want them to share?

(2) Has anyone ever shared a picture of you online that you felt violated your privacy?

(3) Have you ever been embarrassed by a picture of yourself that has been posted online?

(4) Have you ever regretted posting a picture of yourself online?

(5) Have you ever accidentally posted a picture of yourself online that you did not want to share?

(6) Have you ever shared an embarrassing picture online of someone else you know?

(7) Have you ever regretted posting a picture online of someone else you know?

(8) Have you ever posted a picture online of someone else you know, which may have violated his or her privacy?

(9) Have you ever shared an embarrassing picture online of a stranger (someone that you do not personally know)?

(10) Have you ever regretted posting a picture online of a stranger (i.e., someone you do not personally know)?

(11) Have you ever posted a picture of a stranger (i.e., someone you do not personally know), which may have violated his or her privacy?

(12) Do people you know post pictures that might be embarrassing to other people?

(13) Has anyone you know regretted posting a picture of another person?

(14) Has anyone you know regretted posting a picture of themselves?

(15) Has anyone you know posted a picture that may have violated someone's privacy?

Humor style questionnaire

A 32-item inventory by Martin et al. [49].

Privacy Preference Question

Are you a private person who keeps to yourself or an open person who enjoys sharing with others? 1) Very private . . . 7) Very open

Demographic Questions

(1) Please select your gender i) Male ii) Female iii) Would prefer not to answer iv) Other (text input).

(2) Please select the highest level of education that you have achieved i) None ii) 1st-4th grade iii) 5th-8th grade iv) 9th-12th grade v) High school graduate or GED vi) Some college, no degree vii) Associate's degree viii) Bachelor's degree ix) Master's degree x) Professional (e.g., MD, JD) degree xi) Doctoral degree.

(3) What is your primary racial or ethnic background? Please select all that apply. i) Hispanic or Latino ii) American Indian or Alaskan Native iii) Asian iv) Black or African American v) Native Hawaiian or Other Pacific Islander vi) White vii) Other (text input).