The Effect of Anonymity on Conformity
to Group Norms in Online Contexts:
A Meta-Analysis

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This research meta-analyzed 13 journal articles regarding anonymity and conformity to group norms. Results showed that there was a positive relationship between anonymity and conformity, with a weighted mean effect size $\bar{r}$ = 0.16, which was in line with the social identity model of deindividuation effects. This study also investigated the differences between different types of anonymity and found that visual anonymity had a medium magnitude of effect size on conformity ($\bar{r}$ = 0.33), whereas evidence was lacking in terms of the significant effects of physical anonymity and personal information anonymity. In addition, the presence of an outgroup was also a moderator of the effect of anonymity on conformity. Studies in which participants were aware of the existence of an outgroup ($\bar{r}$ = 0.22) had larger effect sizes than those with no outgroup ($\bar{r}$ = 0.10).

*Keyword*s: depersonalization, group identification, anonymity, conformity, meta-analysis

Normative social influence associated with group membership has been well studied in social psychology and group communication. Since the early days of this research stream, it has been demonstrated that anonymity has different impacts on individual judgments, depending on whether individuals are immersed in a group or not (Deusch & Gerard, 1955). Specifically, among individuals who do not compose a group, their judgments are influenced more by other people's opinions in the identifiable setting than in the anonymous setting. However, when individuals form a group, they conform to the majority's opinions in the anonymous situation. In other words, the impact of anonymity on individual perceptions and judgments is contingent on the availability of a prevalent group identity. Over the past few decades, scholars have conducted extensive research concerning the role of anonymity in group communication in various settings, especially since the advent of the computer-mediated communication (CMC) technology. In light of the affordances of online communication that enable users to remain anonymous in diverse ways, this issue has received substantial academic attention in the era of the Internet, investigated with respect to quite a few online phenomena, such as online communities (e.g., Ren, Kraut, & Kiesler, 2007; Ren et al., 2012), collective action (e.g., Spears & Postmes, 2015), and online collaboration (e.g., McLeod, 2011; Pissarra & Jesuino, 2005).

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One of the most significant theoretical fruits in this area is the social identity model of deindividuation effects (SIDE), which explains the relationship between anonymity and conformity to ingroup norms through depersonalization. From a social identity perspective, the SIDE model suggests that a person's identity is a complex entity composed of perception of identity as a unique individual and identity based on a variety of group memberships and social identities, such as gender, race, school, and organization (Tajfel & Turner, 1986; Turner, 1985). Depersonalization refers to the process through which individuals perceive that their certain group identity is more salient than other identities in a particular context, termed as "the emergence of group in the self" (Spears & Postmes, 2015, p. 27). Accompanied by this process is that individuals within the group are more sensitive to norms associated with the salient group membership, and as such, they act accordingly. Given that depersonalization is an inner psychological state that is hard to measure or manipulate directly, researchers manipulate mostly its antecedents to induce this state in their experimental studies. Anonymity has been established as an important antecedent of depersonalization, in that the lack of personal cues accentuates the salience of a group identity (Lea, Spears, & de Groot, 2001; Postmes & Spears, 1998). Hence, guided by the SIDE framework, the present study seeks to explore the magnitude and direction of the relationship between anonymity and conformity to group norms with the premise of a prevalent social identity.

Meta-analysis, which can correct for such statistical artifacts as sampling error, is used both to assess the average effect size, and to identify potential moderators. Postmes and Spears (1998) performed a meta-analysis on the effect of deindividuation on antinormative behavior, finding that "deindividuated" individuals complied with situation-specific norms, which was in support of the SIDE model. Most of the studies included in Postmes and Spears' (1998) analysis were conducted in the offline environment; to date, no meta-analytic study has investigated this issue in the online context. The present research serves to fill this gap by incorporating studies conducted in the online setting, assuming that online effects are not systematically different from offline effects, although this assumption has yet been tested. The SIDE model was originally developed in the context of text-based CMC, though its scope is much broader than that. As put by Spears and Postmes, the key issue of the SIDE model is "how technological features (e.g., visibility vs. anonymity) will interact with social features (e.g., group identities) to affect social psychological processes and outcomes" (2015, p. 34). Hence, as a general model of human behavior and technology affordances, the SIDE model can be generalized to a wide range of online and offline phenomena, with the potential of also covering technologies that have yet to be invented. For an evolving theoretical model, there is a natural desire to synthesize existing research and identify research gaps from time to time on its path to maturity. This meta-analysis serves this purpose by assessing the effect size of anonymity on conformity. Moreover, this research seeks to detect potential factors that moderate the effect of anonymity on conformity to group norms. Specifically, we look at the roles of anonymity type and the presence of an outgroup in the relationship between anonymity and conformity to group norms. The revelation of moderating variables helps to enrich our understanding of group communication in online contexts.

Literature Review

Deindividuation Theories and SIDE

The construct of deindividuation has its roots in the concept of "submergence" in crowd psychology. Le Bon (1947) noted that, when submerged in a crowd, individuals were undistinguished from others, so they lost the sense of individuality. Consequently, rational control of behaviors accompanied by individuality was replaced by collective frenzy, so people in a crowd had a high possibility of violating social norms and engaging in anti-normative behavior. The term "deindividuation" was later introduced to social psychology to describe loss of the sense of self in a crowd by Festinger and his colleagues (Festinger, Pepitone, & Newcomb, 1952), who also endorsed Le Bon's view that individual identity was associated with rationality and inner control of behavior. Zimbardo (1969) developed a fuller articulation of deindividuation and proposed that there were a number of variables that operated to induce deindividuation, including anonymity, arousal, sensory input overload, novel or unstructured situations, and physical involvement in the act. In line with his predecessors, Zimbardo addressed the notion that deindividuation led to "behaviors in a violation of established norms of appropriateness" (1969, p. 251), due to reduced self evaluation and a minimized concern for social evaluation. In sum, classical deindividuation theories focused on the negative consequences of deindividuation effects, positing that deindividuated people were more likely to act aggressively and engage in deviant behaviors.

However, empirical research regarding this thesis has found inconsistent results in varying groups of people. In Zimbardo's experiments (1969), deindividuated participants were instructed to wear oversized hoods and coats, while individuated ones wore normal clothes and name tags. Their task was to deliver an electric shock to confederates in order to become actively involved with them. Female students were recruited for his first experiment, and it revealed that deindividuated participants shocked their confederates longer than their identifiable counterparts did. Conversely, in a second study, identifiable soldiers in uniforms showed higher levels of aggression and shocked their confederates longer. However, in a similar study done by Johnson and Downing (1979), participants dressed in nurse uniforms administered fewer shocks than those dressed in Ku Klux Klan robes. The aforementioned three studies did not reach agreement on whether deindividuation resulted in greater aggression. Rather, the results showed that the level of aggression was more likely to depend on the specific situation and the normative cues associated with their groups.

Hence, following this line of thought, social psychologists started to seek explanations for deindividuation effects from the social identity approach. Deeply rooted in the social identity theory (Tajfel & Turner, 1986) and the self-categorization theory (Turner, 1985), the SIDE model asserts that the prevalent identity (social or personal) is accentuated in certain contexts. Thus, when placed in a group, people with obscure personal cues are more likely to identify themselves as part of a group, rather than as a unique individual (Lea, Spears, & de Groot, 2001; Reicher, Spears, & Postmes, 1995). As a result, they will conform to group norms accordingly (Turner et al., 1987).

Although the two constructs of deindividuation and depersonalization describe seemingly similar psychological states, actually, they refer to completely different processes. Classical deindividuation

theories associate deindividuation with the loss of rationality; therefore, the consequences are considered to be negative, in that people with no inner control engage in antisocial behaviors. In this sense, individuals in a deindividuated state lose all behavioral constraints imposed by social norms. Conversely, the SIDE model prefers to use the term depersonalization to describe the process through which individuals identify themselves as part of a group, so that the group norms associated with their salient identities serve as a set of behavioral standards and rituals to regulate their actions. In a recent account on SIDE, Spears and Postmes write that, "whereas deindividuation implies reduced self-regulation, depersonalization implies heightened social or group-level self-regulation" (2015, p. 27).

The SIDE model also has implications for increasing group attraction and ingroup solidarity (Lea, Spears, & Watt, 2007), and has been utilized in website design. A recent field study (Ren et al., 2012) found that, provided with information about group activities (group names and icons), along with communication tools at group level, online community users were more likely to develop identity-based attachment, perceiving themselves as part of the community. In contrast, information about individual members (user names and pictures), together with communication tools at interpersonal level, fostered bond-based attachment, in that people were connected via interpersonal bonds. The design features for fostering identity-based attachment had stronger effects in terms of enhancing the attraction of online communities, with users visiting the sites more frequently. Hence, it implies that the lack of individuating cues in online communities, coupled with a salient group identity, is useful in making the community "sticky." Likewise, the SIDE model can also be applied to other real-world phenomena, such as collective action (e.g., Chan, 2010; Spears & Postmes, 2015), online collaboration (e.g., Ren et al., 2007; Ren et al., 2012), and online collaboration (e.g., McLeod, 2011; Pissarra & Jesuino, 2005).

Anonymity in Online Contexts

Given that depersonalization refers to an inner psychological state, researchers manipulate mostly its antecedents to induce this state in their experimental studies. Anonymity has been established as a critical antecedent of depersonalization, in that the loss of personal cues attenuates personal identity while simultaneously enhancing the salience of group identity (Lea et al., 2001; Postmes & Spears, 1998). Since the outset of this line of research, scholars have manipulated anonymity to study depersonalization. In early studies, they instructed participants to wear overalls and masks to cover up their personal identities in face-to-face communication (e.g., Zimbardo, 1969). Nevertheless, online communication enables users to obscure personal cues in various ways; hence it provides an ideal arena to investigate small group behaviors.

On the premise of immersing participants in a group, scholars have utilized a variety of methods to operationalize anonymity and induce depersonalization in online settings. The first such study in a CMC setting was done by Spears, Lea, and Lee (1990). They investigated how anonymity and group salience impacted group polarization. Participants were instructed to discuss some topics within small groups via text-based CMC. Anonymity was operationalized as physical isolation, such that in the anonymous condition, participants were located in separate rooms; in contrast, participants in the identifiable condition stayed in the same room during the course of the study. In addition, either group identity or individual identity was highlighted to provide norm reference. As Spears et al. noted, "operationalizing de-

individuation as isolation and anonymity provided an effective manipulation in terms of its predicted consequences for group polarization" (1990, p. 132). The results indicated that deindividuation, coupled with a salient group identity, had the strongest effects, such that participants were in favor of a pre-established group norm, which was consistent with social identity theory.

Likewise, Lea, Spears, and de Groot (2001) examined the role of visual anonymity in small group communication within the SIDE framework. Similar to Spears et al. (1990), all communication was text-based via CMC in the experiment. The difference between visual anonymity and visual identifiability was that, in the latter condition, communication was supplemented by two-way, real-time silent video. This study found that visual anonymity enhanced both group-based self categorization and group attraction, which were two components of group identification: Self categorization dealt with the cognitive aspect, while group attraction involved the affective aspect (Ellemers, Kortekaas, & Ouwerkerk, 1999). Thus, via the two components, visual anonymity effectively induced depersonalization and hence increased group identification.

Lee (2007) manipulated the availability of personal information to induce depersonalization. Before the discussion task, participants in the non-anonymous condition introduced themselves to their partners and exchanged information about their major, age, hobby, favorite color, favorite music genre, and favorite TV show or movie, all without disclosing their personal identities. In the anonymous condition, participants did not have any information about their partners. As a result, the post-discussion attitudes were shifted in the direction of group norms and showed greater group polarization in the anonymous condition than in the non-anonymous condition.

The studies reviewed above reveal that the SIDE model provides adequate explanations for social influence and attitude shift in online contexts. However, some additional studies found more complex results. For instance, Postmes, Spears, Lee, and Novak (2005) further investigated how the manner of identity formation affected the effects of depersonalization that was induced by anonymity. In the identifiable condition, participants were shown portrait pictures of their group members, while in the anonymous condition, no pictures were shown. They found that, when group identity had been achieved through an inductive procedure, depersonalization decreased adherence to group norms, whereas in deductive identity groups, depersonalization increased social influence. This study suggests that the effect of anonymity on conformity may be contingent on some other factors. Hence, in order to synthesize existing research and correct for statistical artifacts, a meta-analysis is needed to assess the weighted mean effect size of anonymity on conformity in online contexts. Thus, we raise the following research question:

RQ1:   What is the weighted mean effect size of anonymity on conformity in online contexts?

Another point worth pondering is that the above-mentioned studies used different means to manipulate anonymity in order to induce depersonalization, such as physical isolation, visual anonymity, and absence of personal cues. As Reicher et al. argue, "deindividuation manipulations may work through their effects upon the level of self-categorization and the salience of particular social identities. These effects will be complex, depending both upon the manipulation that is used and the context in which it is

used" (1995, p. 178). Therefore, it is of significance to compare effect sizes across different types of anonymity in order to demystify the problem. It has implications for improving future research design, as well as shedding light on website design for the sake of increasing group cohesiveness. Hence, we raise the second research question as follows:

RQ2:   *Do effect sizes differ across studies with different types of anonymity ? If so, how?*

Presence of an Outgroup

In addition to types of anonymity, we also propose that the presence of an outgroup might play a role in the relationship between anonymity and conformity. From the social identity approach, an ingroup refers to a social category that an individual psychologically identifies with, in terms of being a member. In contrast, an outgroup is a social group to which an individual does not belong (Tajfel, Billig, Bundy, & Flament, 1971). In a sense, "the group only had [sic] meaning in terms of how it relates to other groups" (Reicher et al., 1995, p. 176). This intergroup nature has been neglected by classical deindividuation theories, in that they focus on one single, mass crowd full of deindividuated, irrational individuals, failing to define the concept on a social comparative basis (Lea et al., 2001; Postmes & Spears, 1998). However, the social identity approach clearly illustrates the critical role of a relevant outgroup in the formation of group identity. The presence of an outgroup makes individuals more attentive to cues that are different across groups and hence facilitates their group identification. They tend to favor their ingroup members more than they favor outgroup members; they are also more likely to shift their attitudes in line with the ingroup norms (Brewer, 1999; Galinsky & Moskowitz, 2000). As group identification is enhanced with the presence of an explicit outgroup, it is expected that people will show greater conformity to group norms when they are depersonalized by obscuring individuating cues. Lee (2004) tested this proposition in an experimental study. Students were told they were either interacting with students from their own university or other universities; in doing so, either an interpersonal or intergroup context was created. The results confirmed that the group identity became more salient in the intergroup context, so depersonalization induced by uniform visual representations was enhanced, and so was the extent of conformity to group norms.

The use of an intergroup context has been incorporated into some empirical studies regarding SIDE. In Postmes, Spears, Sakhel, and de Groot's 2001 study, participants were assigned to either Group A or Group B. Participants were aware that the two groups were doing the experiment simultaneously in the laboratory. As Postmes et al. noted, "an intergroup context enhances the salience of group identity" (2001, p. 1246). Results of their study were consistent with the SIDE model, such that deindividuated groups adhered to the primed strategies in their task solutions, while individuated groups did not. Another example of creating an intergroup context can be found in a study by Robertson (2006). Undergraduate psychology students were recruited for his experiment. Upon arrival at the laboratory, they were seated in separated rooms, each with a computer. Then they were told that they were doing a study with other psychology group members at the same time, and a group of law students would be doing the same study simultaneously in another location. In addition, it was made clear to participants that the study they would be doing involved intergroup comparison and competition. Although there was no direct interaction between the groups, the mere perception of an existing outgroup was sufficient to create an intergroup

context, which enhanced the salience of group identity and reinforced the effect of anonymity (Robertson, 2006). Therefore, this meta-analysis intends to investigate whether the presence of an outgroup in experimental studies accounts for variances in effect sizes. We expect that studies in which participants were aware of the presence of an outgroup will have larger effect sizes of anonymity on conformity than those in which there was no outgroup. Hence, we raise the following research question:

RQ3:   Do effect sizes differ across studies with and without an explicit outgroup? If so, how?

Method

Literature Search

We conducted a literature search in three academic databases: Communication and Mass Media Complete, ProQuest, and Web of Science. We searched for the keywords *anonymity*, *deindividuation*, or *depersonalization* in combination with any of the keywords *norm*, *polarization*, or *conformity*. The searches yielded 1,089 articles (including duplicates). We then selected articles from the pool based on the following criteria: The studies (a) investigated the relationship between anonymity and conformity, (b) were conducted in online contexts, (c) were quantitative studies, (d) reported sufficient information for extracting effect sizes (i.e., mean, standard deviation, sample size, or correlation coefficient), and (e) included only peer-reviewed journal articles in English. After screening, 13 articles were selected for the meta-analysis.

Among the 13 articles that comprised the study pool, the earliest one was published in 1990, and the most recent one in 2013. Based on the location where the data were collected, eight articles reported studies done in Europe, while the rest were conducted in the United States. In terms of research outlets, all the articles were published in major communication and psychology journals.

Coding Scheme

Two authors coded the 13 articles based on the following attributes: study characteristics, sample size, research method, reliability coefficients, and information needed for effect size estimation. In addition, two potential moderators—the type of anonymity and the presence of an outgroup—were coded.

After examining all 13 articles, three categories of anonymity were identified: (1) visual anonymity—in the non-anonymous condition, participants could see their partners' visual images on a screen, while in the anonymous condition, no pictures were shown (e.g., Postmes et al., 2001); (2) physical anonymity—in the non-anonymous condition, participants were placed in the same room so they could see each other physically, while in the anonymous condition, participants were separated from each other (e.g., Sassenberg & Boos, 2003); and (3) personal information anonymity—in the non-anonymous condition, participants were introduced to each other and exchanged personal information, such as hobbies and favorite movies, at the beginning of the experiment, while in the anonymous condition, participants did not know any personal background information about each other (e.g., Lee, 2006; 2008). This variable was coded as a categorical variable by numbering the three types of anonymity.

The presence of an outgroup refers to whether participants were aware of the existence of an outgroup. Some studies arranged only one group in each experimental session, while others managed to have two or more groups belonging to different social categories do the experiment simultaneously. This variable was coded as "1" if there was no outgroup in a single study, or as "2" if participants were aware of one or more outgroups.

Effect Size Extraction

The zero-order Pearson's correlation coefficient (r) was extracted as the index of effect size, representing the magnitude of association between anonymity and conformity. Most studies reported in the 13 articles were between-subject experimental studies. We reconstructed the ANOVA table to calculate Pearson's r. As $|r| = \eta$, the corresponding eta-squares were calculated with the following formula:

$$\eta^2 = SS_A/(SS_{between} + SS_{within})$$

where SS_A denotes the sum of squares for the effect of anonymity; $SS_{between}$ denotes the sum of squares for all effects, including the main effects and interaction effects of all independent variables involved; and SS_{within} denotes the sum of squares for the effects of errors. All the sums of squares statistics could be calculated with the mean, standard deviation, and cell size information provided in the articles. Then, the absolute value of r was obtained by taking the square root of η^2, and the sign of r was determined by comparing the means of all cells involved. A positive sign indicates that there was a positive association between anonymity and conformity, while a negative sign indicates the opposite.

As for the rest of the studies, a variety of ways were used to calculate effect sizes, such as conversion from t-tests or from d (Hunter & Schmidt, 2004). In total, 23 correlations were assessed from the studies. Table 1 summarizes the descriptive information of the studies included in the meta-analysis, as well as the effect sizes.

Table 1. Studies Included in the Meta-Analysis.

Author	Year	Journal	Region[1]	Type of Anonymity	Presence of an Outgroup	Effect Size (r)	Sample Size (N)
Spears, Lea, & Lee	1990	British Journal of Social Psychology	Europe	Physical	No	0.23	48
Postmes, Spears, Sakhel, & de Groot	2001	Personality and Social Psychology Bulletin	Europe	Visual	Yes	0.76 0.43	74
						0.44	64
Sassenberg & Postmes	2002	British Journal of Social Psychology	Europe	Visual	No	0.36 0 0 -0.41	40
						0.14 0.17	96
Sassenberg & Boos	2003	Group Processes & Intergroup Relations	Europe	Physical	No	0.11	69
						0.16	76
Lee	2004	Human Communication Research	North America	Visual	NA[2]	0.36	60
Postmes, Spears, Lee, & Novak	2005	Journal of Personality and Social Psychology	Europe	Visual	Yes	0.08	72
						-0.07	90
Lee	2006	Communication Research	North America	Personal information	No	0.14	217
Robertson	2006	British Journal of Social Psychology	Europe	Visual	Yes	0.56	39
Lee	2007	Journal of Communication	North America	Personal information	No	0.26	104
Cinnirella & Green	2007	Computers in Human Behavior	Europe	Physical	No	0.08	54
Lee	2008	Communication Research	North America	Personal information	No	-0.03	95
Kahai	2009	Group & Organization Management	North America	Personal information	Yes	0.23 -0.02	220
Tsikerdekis	2013	Journal of The American Society for Information Science and Technology	Europe	Personal information	NA[3]	0.10	114

[1] Region indicates where the data were collected.

[2] Intergroup vs. interpersonal was examined as an independent variable in the study, so this study was excluded from the moderator analysis regarding intergroup context.

[3] This study was not an experimental study, so no such information was provided.

Meta-Analytic Procedure

Meta-analysis is a statistical method that synthesizes findings across different primary research and examines the patterns of effects across studies. Through a series of procedures that transform and combine outcomes across studies, it allows researchers to investigate average effects and explore possible moderators. This meta-analysis was conducted according to the procedures developed by Hunter and Schmidt (2004). They suggest that meta-analysis of correlation coefficients is useful in correcting for some statistical artifacts which may inflate or attenuate the coefficients. Three statistical artifacts that have received the most attention from meta-analytic researchers are sampling error, measurement error, and restriction in range (Hunter & Schmidt, 2004). Sampling error is incurred when the sample is drawn from a subset of the population; therefore, there is some difference between the parameters obtained from the sample and the population parameter. It can be corrected by taking into account the sample size of every single study. Measurement error is caused by unreliable measures of both the independent and dependent variables. It can be corrected with sufficient information about the reliability coefficients. However, as depersonalization was a manipulated factor in most studies included in this meta-analysis, no reliability coefficients were provided. As for conformity, in some studies it was operationalized by the attitude change before and after the treatment, so a difference score was used as the index of conformity, with no reliability coefficients. Thus, measurement errors are not addressed in the present research. Likewise, restriction in range is not addressed, due to lack of information. Restriction in range derives from the difference in the sample variance and the population variance. Given the nature of the two variables—deindividuation and conformity—their standard deviations in the general reference population are not available. Therefore, the present study is a bare-bones meta-analysis, correcting for sampling error only. The effect sizes were meta-analyzed at three steps. First, calculate the total sample size and the weighted average effect size. Second, calculate both the variance among estimates and the variance accounted by sampling error to determine if there is significant heterogeneity of effect sizes. Third, do moderator analysis by splitting the dataset into subsets based on categories of potential moderators and calculating the weighted average effect sizes within each subset. All calculations were performed with the aid of Excel 2007. (For more detailed procedures, please see Hunter & Schmidt, 2004.)

Results

Average Effect Size

The effect sizes (r) of anonymity on conformity in online contexts from the sample pool ranged from -0.41 to 0.76. The number of correlation coefficients was $k = 23$, and the total sample size across studies was $N = 2,042$. In order to correct for sampling error, we calculated the weighted average effect size based on the following equation: $\bar{r} = \frac{\sum [N_i r_i]}{\sum N_i} = 0.16$. It had a 95% confidence interval ranging from 0.08 to 0.24. The variance in the effect sizes and the variance due to sampling error were also calculated: σ_r^2 =0.04 and σ_e^2 =0.01. A chi-square analysis was used to determine whether there was significant heterogeneity of the effect sizes, $\chi^2 (22) = 85.98$, $p < .05$. The null hypothesis of significant heterogeneity was rejected, and the variance expected from sampling error only accounted for about 25% of the

variance in the corrected effect sizes. This indicated the existence of other factors, apart from sampling error, that affected the relationship between anonymity and conformity in online contexts.

Moderator Analysis

For moderator analysis, data were split into subsets based on the categories of the potential moderators, and the above-mentioned parameters were obtained for each subset. For visual anonymity conditions, the weighted average effect size was $\bar{r}$ = 0.33 (k = 13, N = 825), with a 95% confidence interval ranging from 0.18 to 0.48. The weighted variance was .08, and the variance due to sampling error was .01. Within this subset, there was significant heterogeneity of the effect sizes, χ^2 (12) = 83.53, p < .05. Only 12.5% of the variance in corrected correlation coefficients was explained by sampling error. However, for physical anonymity conditions, the weighted average effect size was $\bar{r}$ = 0.05 (k = 4, N = 247), with a 95% confidence interval ranging from -0.19 to 0.29. The weighted variance was 0.06, and the variance due to sampling error was 0.02. The chi-square test of heterogeneity was significant, χ^2 (3) = 14.82, p < .05. About 33% of the variance in the subset could be explained by sampling error. As for personal information anonymity conditions, the weighted average effect size was $\bar{r}$ = 0.04 (k = 6, N = 970), with a 95% confidence interval ranging from -0.04 to 0.12. The weighted variance was 0.01, and the variance due to sampling error was 0.01. The chi-square test of homogeneity were not significant, χ^2 (5) = 9.76, p > .05. The variance in the effect sizes was equal to the variance expected from sampling error. In other words, all the variance in the effect sizes could be accounted for by sampling error.

With regard to the presence of an outgroup, the same analysis was conducted. The mean of corrected correlation coefficients for studies with no outgroup was 0.10 (k = 13, N = 1,015), with a 95% confidence interval ranging from 0.02 to 0.18. The weighted variance was .02, and the variance due to sampling error was 0.01. One-half of the variance in corrected correlation coefficients was explained by sampling error. The chi-square test of homogeneity for studies with no outgroup was non-significant, χ^2 (12) = 20.71, p > .05. As for studies with an outgroup, the weighted mean correlation coefficient was 0.22 (k = 8, N = 853), with a 95% confidence interval ranging from 0.04 to 0.40. The weighted variance was 0.07, and the variance due to sampling error was 0.01. Only 14% of the variance in corrected correlation coefficients was explained by sampling error. The chi-square test of homogeneity was significant, χ^2 (7) = 65.62, p < .05.

Taken together, the type of anonymity explains some heterogeneity of the effect sizes. The weighted effect size of visual anonymity with conformity ($\bar{r}$ = 0.33) was larger than that of either physical anonymity ($\bar{r}$ = 0.05) or personal information anonymity ($\bar{r}$ = 0.04). In light of the 95% confidence interval, the correlation between physical anonymity and conformity was not significantly different from zero, nor was the correlation between personal information anonymity and conformity. Therefore, there is evidence that the effect of visual anonymity on conformity is greater than that of physical anonymity and personal information anonymity. Likewise, the corrected mean correlation coefficient of studies with an outgroup ($\bar{r}$ = 0.22) was greater than that of studies with no outgroup ($\bar{r}$ = 0.10). It suggests that the presence of an outgroup may enhance the effect of anonymity on conformity. Table 2 presents the results of the subset meta-analyses.

Table 2. Summary Statistics of the Moderator Analysis.

	$\bar{r}$	95% CI	k	N	σ_r^2	σ_e^2	χ^2 (k-1)
Visual anonymity	.33	.18~.48	13	825	.08	.01	83.53*
Physical anonymity	.05	.19~.29	4	247	.06	.02	3.88
Personal information anonymity	.04	.04~.12	6	970	.01	.01	9.76
With no outgroup	.10	.02~.18	13	1015	.02	.01	19.41
With an outgroup	.22	.04~.40	8	853	.07	.01	53.78*

Note: * indicates $p < .05$.

Discussion

The present research investigated the relationship between anonymity and conformity in online contexts from a meta-analytic approach. By doing so, we revisited the long-lasting debate between classical deindividuation theories and the SIDE model. Classical deindividuation theories define self as a composition of individual characteristics that makes a unique individual regardless of the context, whereas the SIDE model posits that self is grounded on the basis of one's unique individual characteristics, as well as one's social roles and group memberships. This view takes the social context into account and further asserts that a person's identity changes along with the context: One identity could be more salient than others with regard to the perception of identity structure in a particular context.

To adopt this line of reasoning, we note that the difference in the definition of self dictates the divergence in the consequences of depersonalization. From the view of classical deindividuation theories, the loss of self brings with it the loss of rationality and hence lifts all constraints imposed by social norms. Therefore, deindividuation increases the likelihood of deviant, antisocial behaviors. The SIDE model, however, redefines self on the basis of group membership when a person loses his or her identity as a unique individual while immersed in a group. Accordingly, the group norms associated with the salient group membership guide the person's behaviors.

The effect sizes (*r*) of anonymity on conformity in online contexts from the sample pool ranged from -0.41 to 0.76, suggesting that these primary research studies found conflicting results. The variances in effect sizes may be accounted for by some moderators, as well as statistical artifacts. This meta-analysis assessed the weighted mean effect size by correcting for statistical artifacts and further explored moderators. According to Cohen's (1992) cutoffs for effect size values, the magnitude of the effect size of anonymity with conformity was small ($\bar{r}$ = 0.16), with a 95% confidence interval ranging from 0.08 to 0.24. In other words, at a 95% confidence interval, the correlation coefficient between anonymity and

conformity is significantly different from zero, and the direction of the relationship is positive. This meta-analytic result serves as evidence supporting the SIDE model, such that anonymity, coupled with a salient group identity, in online contexts results in adherence to group norms. The finding is in line with a previous meta-analytic study done by Postmes and Spears (1998), the sample of which consisted of studies conducted in offline environments. Therefore, the consistent findings have confirmed that the SIDE model is supported in both offline and online contexts with meta-analytic evidence. It is further demonstrated that the SIDE model is not confined to a specific type of medium or a specific form of communication channel; instead, it is a general theoretical model dealing with the interaction between human behaviors and technological features (Spears & Postmes, 2015). Therefore, we anticipate that the SIDE model will be tested with more emerging technologies and new social phenomena. In the meantime, the model will improve by incorporating the latest development and expanding the boundary.

In addition, this research also sought to identify potential moderators that help to explain the conflicting results in previous research: in particular, the type of anonymity and the presence of an outgroup. Through our literature review, we found that empirical studies utilized a variety of means to induce depersonalization in experiments, including letting participants see their partners' images on a computer screen (individuated condition), placing participants and their partners in the same room (individuated condition), and having participants exchange personal information with their partners at the beginning of the experiment (individuated condition). The results show that visual anonymity had the largest effect size ($\bar{r}$ = 0.33), with a 95% confidence interval ranging from 0.18 to 0.48. In contrast, the weighted mean effect size for physical anonymity was 0.05, with a 95% confidence interval ranging from -0.19 to 0.29. As zero is within the effect size range, there is a lack of evidence from this meta-analysis showing a significant relationship between physical anonymity and conformity at a 95% confidence interval. The same applies to personal information anonymity, with a weighted mean effect size of 0.04 and a 95% confidence interval ranging from -0.04 to 0.12. Therefore, this meta-analysis concludes that visual anonymity has a medium effect size with conformity to group norms. However, as for the effects of physical anonymity and personal information anonymity, we need to interpret with caution. As the number of studies included in these two conditions was relatively small (physical anonymity k = 4, personal information anonymity k = 6), it would be arbitrary to make a verdict on the population effect sizes of physical anonymity and personal information anonymity. It is expected that more empirical studies will be conducted using these two means of manipulation, so that meta-analytic researchers will be able to cumulate enough studies in order to provide a more accurate assessment of effect sizes. Besides, a close look at the effect sizes of physical anonymity and personal information anonymity shows that in some studies they were positively related to conformity, while in others they were negatively associated with conformity. Thus, we speculate that the effects of physical anonymity and personal information are conditional, depending on other contextual variables. This might be one reason why the weighted mean effect sizes of physical anonymity and personal information anonymity are not significantly different from zero at a 95% confidence interval, as positive and negative correlation coefficients canceled out in the calculation. Hence, future research may follow this path to explore possible moderators that condition the effects of physical anonymity and personal information anonymity, thus further demystifying the theoretical enigma.

The second moderator under study was the presence of an outgroup. In some laboratory experiments, participants were assigned to two groups and were aware of the existence of an outgroup (e.g., Postmes et al., 2001). This awareness of an intergroup context increases the salience of the participants' group identity and further enhances their conformity to group norms (Postmes et al., 2001; Turner et al., 1987). Therefore, it was expected that studies in which participants were aware of the presence of an outgroup would find larger effect size of anonymity on conformity than those in which there was no outgroup after correcting for sampling error. The meta-analytic results were consistent with the theoretical proposition: The weighted mean effect size of deindividuation on conformity in studies with no outgroup was 0.10, with a 95% confidence interval ranging from 0.02 to 0.18; whereas for studies with an outgroup, the weighted mean effect size was 0.22, with a 95% confidence interval ranging from 0.04 to 0.40. It is worth noting that the outgroup does not have to be physically present; the awareness of its existence is sufficient to create an intergroup context so as to exert influence on group identification. This is in line with self categorization theory, in that it is an individual's perception that defines his or her identity (Turner et al., 1987). Turner describes self categorization theory as "a social cognitive theory of group behavior" (1985, p. 77), which means that the cognitive component dominates the formation of group identity. Therefore, merely letting participants know about the existence of an outgroup enhances group identification. Future SIDE studies may need to take this factor into consideration when designing experimental settings and use this factor to explain residue variance. However, it is still not clear whether there is a difference in group identification between groups knowing about the existence of an outgroup and those seeing an outgroup in person. We suggest that future research examine this issue and further contribute to intergroup communication literature.

This meta-analysis is the first to summarize existing research and quantitatively analyze the effect sizes across studies regarding anonymity and conformity in online contexts. As mentioned previously, anonymity has been found to have different impacts on an individual's attitudes and behaviors, depending on whether or not the individual was placed in a group (Deutsch & Gerard, 1955). The present study fits nicely into this stream of research and contributes in terms of providing meta-analytic evidence to the depersonalization effect in a group context. Moreover, this study further investigated both the variance in different types of anonymity and the variance related to whether it is an intergroup context or not. According to our findings, visual anonymity has a medium magnitude of effect on group conformity, and an intergroup context may induce an even stronger effect. Visual anonymity is operationalized as seeing or not seeing a partner's picture on a screen while using text-based communication. Compared to physical anonymity and personal information anonymity, it most resembles the real-life Internet context— for instance, when strangers meet in an online chat room and see each other's profile pictures. An example of nice application of the SIDE model to website design would be Ren et al. (2012), in which visually anonymous users of an online community developed stronger attachment to the community, and that visual anonymity could be achieved by designing specific features of the website. Thus, we expect the results of this study will have practical implications for web application developers, in that they may utilize anonymity elements to enhance collaboration and efficiency. Future studies are encouraged to investigate the underlying mechanisms of different means of anonymity on conformity, seeking to reveal how visual anonymity, physical anonymity, and personal information anonymity affect group identification differently in online contexts.

Nevertheless, this study has some limitations that we need to take into account when interpreting the results. First, the sample size of this meta-analysis was limited. As mentioned in the Method section, although the initial search yielded a large number of articles, after careful screening, only 13 articles were eligible according to the following criteria: (a) they investigated the relationship between anonymity and conformity, (b) they were conducted in online contexts, (c) they were quantitative studies, (d) they reported sufficient information for extracting effect sizes, and (e) they were peer-reviewed journal articles in English. Hence, conference papers, dissertations, and theses were excluded, as were qualitative studies. In addition, some articles were screened out because they did not provide enough information for us to assess effect sizes. For example, in some experimental studies, the means and standard deviations for each cell were not reported. Likewise, in some correlational studies, correlation matrices were not provided. Therefore, we were only able to locate a small number of articles to constitute the sample pool. The conclusions we drew were based on this sample pool, so we are reluctant to argue that the findings are an accurate assessment of the population effect sizes. However, the 13 articles included in the analysis were published in distinguished psychology and communication journals. According to the criteria for judging the quality of primary research (Valentine, 2009), we consider all 13 articles to have reported high-quality empirical studies in terms of internal validity, construct validity, external validity, and statistical conclusion validity. A high-quality study sample helps to establish the validity of this research synthesis, which addresses both theoretical debates and methodological issues in the literature.

The second limitation of this study is related to the inherent weakness of meta-analysis—in particular, the publication bias against nonsignificant findings (Matt & Cook, 2009). Studies with significant findings and in support of their hypotheses are more likely both to be submitted for publication and to get accepted. As a result, studies included in meta-analyses constitute a much smaller number than the total number of studies conducted on a particular topic. Due to the publication bias, effect sizes reported by meta-analyses may be overestimated compared to population effect sizes (Levine, Asada, & Carpenter, 2009). Therefore, given the aforementioned two reasons, the findings of this study should be interpreted with caution.

In conclusion, this meta-analysis finds that there is a positive relationship between anonymity and conformity, with a weighted mean effect size $\bar{r} = 0.16$. This result supports the SIDE model, such that anonymous individuals define their identities on a group level, and their behaviors are guided by the norms associated with their salient group memberships. In addition, the current research further investigates the differences between various types of anonymity and finds that visual anonymity has a medium magnitude of effect size on conformity ($\bar{r} = 0.33$), whereas evidence is lacking for significant effects of physical anonymity and personal information anonymity. The presence of an outgroup is also a moderator of the effect of anonymity on conformity. Studies in which participants were aware of the existence of an outgroup ($\bar{r} = 0.22$) had larger effect sizes than those with no outgroup ($\bar{r} = 0.10$). These findings contribute to the group communication literature and have implications for web application developers.

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