



Motivational duality and fake news reporting behavior: a polynomial regression with response surface analysis

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Abstract

Context. Promoting social media users to report fake news is a crucial for curbing its spread, yet active reporters remain limited compared to those contributing to its proliferation.

Purpose. This study examines how users' moral motivations affect their fake news reporting behavior. Specifically, it investigates how the dual dimensions of moral motivation (i.e., agency and communion), both in congruence or incongruence, affect reporting behavior.

Method. Grounded in the reconciliation model of moral centrality, this study develops research hypotheses and tests them using over 13,000 reports and more than 4 million posts from 15,256 social media users. Empirical analysis employs dictionary-based text analysis method, and polynomial regression with response surface analysis.

Findings. Users with congruent agency and communion motivations are more likely to report fake news, and this likelihood increases as the strength of these motivations grows. User heterogeneity analysis shows that unverified users report more when communion exceeds agency, while verified users report more when agency exceeds communion.

Originality. This study presents a novel perspective on fake news reporting behavior by linking it to moral motivation and examining how the congruence or incongruence between agency and communion shapes reporting behavior, with distinct effects for verified and unverified social media users.

Introduction

The proliferation of fake news on social media platforms has caused numerous harms and has become an urgent issue requiring immediate attention (Kankanamge et al., 2025; Liu et al., 2023; Wang et al., 2021). Particularly with the development of artificial intelligence and deepfake technologies, public concerns about fake news have intensified (Gupta et al., 2024; Jiang et al., 2024). In response, internet giants such as Facebook, TikTok, and X have gradually implemented systems for users to report fake news. These reporting systems aim to harness the ‘wisdom of the crowd,’ encouraging the public to take a more active role in detecting and reporting fake news (Shen and Wu, 2024; Wang et al., 2022; Wu et al., 2023). However, the reality is that the number of users who actively report fake news is limited, especially when compared to the vast number of users contributing to its spread. Existing research calls for the adoption of more effective intervention strategies to curb the spread of fake news (Kim et al., 2019; Li et al., 2022). In response to these calls, this study seeks to explore how to encourage fake news reporting behaviors from the perspective of moral motivation.

Moral motivation refers to the process by which individuals make moral judgments and are motivated to act in accordance with their moral perspective, often characterized as the willingness to do what is right (Sun et al., 2024). Given that reporting fake news is a prosocial behavior that reflects an individual’s sense of social responsibility and moral duty, moral motivation may offer an explanation for users’ more proactive engagement in such actions. It could serve as a key factor driving social media users to report fake news. However, to the best of our knowledge, our current understanding of whether and how moral motivation influences social media users to report fake news remains very limited.

Existing research in social psychology posits that moral motivation comprises two dimensions: agency and communion (Walker and Frimer, 2007). Agency refers to self-enhancing motives, characterized by the pursuit of power, status, achievement, or dominance. Communion, on the other hand, refers to other-enhancing motives, manifested in a universal concern for the disadvantaged, strangers, or the ecological environment (Frimer et al., 2012). It is commonly believed that self-interested agency motivation is immoral, as it hinders moral behavior, while other-oriented communion motivation is viewed as moral as it promotes moral behavior (Zhao et al., 2020). However, recent studies challenge this view, suggesting that agency is morally neutral, with its effect on moral behavior contingent upon whether the agency motives align with communal goals (Bell, 2024). Therefore, there remains controversy regarding how agency and communion influence individual behavior. This paper seeks to address the existing conflict in moral decision-making and explore how the agency and communion dimensions of moral motivation shape the behavior of reporting fake news. In line with this, our study proposes the following research question: How do agency and communion dimensions of moral motivation jointly influence social media users’ fake news reporting behaviors?

Another limitation of existing research lies in the simplistic approach of measuring moral motivation through subtractive terms (*communion – agency*) or divisive terms (*communion / agency*), without treating agency and communion as independent variables (Zhang and Yu, 2018). These approaches exhibit the following flaws: combining agency and communion into a single score implicitly assumes that both agency and communion contribute equally to the positive and negative aspects of behavior. Notably, such practices fail to reveal the distinct effects of agency and communion on user behavior, thereby undermining the prerequisite for elucidating the mechanisms of influence, that is, maintaining the independence of agency and communion. Furthermore, the existing analyses cannot determine whether the outcome variable is related to both factors or just one of them. From a methodological perspective, it is necessary to treat agency and communion as two independent variables for measurement and analysis. Polynomial regression with response surface analysis (PR-RSA) offers a promising solution by allowing the

independent examination of agency and communion within the data analysis process (Li et al., 2024; Liang et al., 2022). This method overcomes the operational limitations inherent in prior studies and provides an opportunity to reveal the mechanisms through which the dimensions of moral motives, agency and communion, influence the behavior of reporting fake news.

This study explores how the moral motivational duality affects fake news reporting behavior using PR-RSA. Drawing on the reconciliation model of moral centrality, we propose three hypotheses regarding the impact of agency and communion on fake news reporting behavior. We collected field data from Weibo, including over 13,000 reports from 15,256 reporters and more than 4 million posts from their homepages. As a major social media platform in China, Weibo is similar to X platform in terms of its widespread use and influence. Using PR-RSA method, we examine how the changes in fake news reporting behavior—whether increasing, decreasing, or remains unchanged—are influenced by the congruence or incongruence between agency and communion. Additionally, we explore the distinct roles that agency and communion play in promoting fake news reporting behavior for verified versus unverified social media users.

Literature review and theoretical background

Antecedents of online reporting behavior

Existing studies have examined online reporting behaviors across various contexts, including fake news (Wang et al., 2022), hate speech (Kim et al., 2023), and online harassment (Wong et al., 2021). These studies primarily examined social, platform, content, or individual-level antecedents of online reporting behavior. At the social level, existing literature focuses on how the user's reporting behavior is affected by the gender of users who post counterspeech and the popularity of these counterspeech in the social environment (Kim et al., 2023; Wu, 2024). At the platform level, researchers have studied how the design of the interfaces or reporting systems affects user reporting behaviors (Gimpel et al., 2021; Wilhelm et al., 2020; Zhou et al., 2023). For instance, Gimpel et al. (2021) observed that the combined application of injunctive and descriptive social norms within the user interface leads to the most substantial improvements in fake news reporting behavior. At the content level, reporting behavior varies when encountering different online content formats and characteristics (Wang et al., 2022; Wilhelm et al., 2020). For example, Wang et al. (2022) proposed that the presence of videos in fake news posts can increase the number of social media users reporting them to social media platforms. At the individual level, existing literature primarily focuses on how users' perceptions influence reporting behavior from the perspective of individual cognition (Naderer et al., 2023; Rodriguez Müller et al., 2024; Wong et al., 2021). For example, Wong et al. (2021) found that factors such as perceived responsibility, perceived emergency, perceived self-efficacy, perceived anonymity, and perceived outcome effectiveness significantly impact users' willingness to report social media harassment. However, prior studies have greatly overlooked the perspective of moral motivation, which is crucial for a deeper understanding of online reporting behavior.

Considering that online reporting behavior is a form of prosocial behavior reflecting individuals' judgments of 'right' and 'wrong', individuals with strong moral motivations are more likely to engage in such behaviors. From this perspective, our research differs from prior studies in that it seeks to understand how social media users' moral motivations influence fake news reporting behavior. Investigating the underlying moral motivation can help uncover the deeper reasons behind users' online reporting behaviors.

The reconciliation model of moral centrality

Early research on how the agency and communion dimensions of moral motives influence moral behavior has presented two competing viewpoints: the interference hypothesis (Bellah et al., 2007) and the synergy hypothesis (Lapsley, 2004). Both perspectives agree that communion is moral, but they differ their views on agency. The interference hypothesis posits that agency is anti-moral,

while the synergy hypothesis views agency as morally neutral. To address the above academic debate, Frimer and Walker (2009) integrated both the interference and synergy hypothesis concerning the psychological functions of moral exemplars and proposed a reconciliation model of moral centrality. This model hypothesizes that the relationship between moral concerns and self-interest (i.e., communion and agency) can transform from one of mutual competition to one of reconciling.

The key to understanding the reconciliation model lies in the concept of moral centrality, which refers to the extent to which morality is central to an individual's identity (Frimer and Walker, 2009). Identity does not pertain to an individual's intrinsic nature, but rather to an external orientation (Taylor, 1989). This orientation includes the things and activities that an individual considers 'good, worthwhile, admirable, or valuable', and thus identifies with. In other words, identity represents the image an individual seeks to project to others and be recognized for, and it is inherently malleable (Flanagan, 2009).

Research indicates that identity often involves the pursuit of one's self-interests, which can out-compete other motives, such as concern for the plight of others (Bauer and Wayment, 2008). In this sense, when an individual's behavior is aimed at shaping their own image, with a focus on how others perceive their actions and how these actions contribute to the evaluation of their identity, the underlying motivation is centred on personal benefit. Therefore, if an individual's behavior is contingent on their identity, it can be considered motivated by agency. The idea provides a framework for integrating identity (agency) and morality (communion). When morality becomes central to an individual's identity (i.e., when engaging in moral behaviors contributes to shaping one's identity), there is an opportunity for the effective integration of communion and agency. Consequently, moral behavior can be seen as driven by enlightened self-interest (Frimer and Walker, 2009). The reconciliation model of moral centrality challenges the dichotomy between agency and communion, bridging the gap between moral judgment and moral behavior, known as the judgment-behavior gap. It also suggests that coordinating agency motivation and communion motivation will maximize the occurrence of moral behavior.

Hypotheses development

Previous studies suggest that even when individuals judge an action to be morally right, the motivational power of this judgment to spur action is relatively weak, illustrating a judgment-action gap (Walker and Frimer, 2007). Adhering to ethical norms alone is insufficient to motivate individuals to take action. From a developmental perspective, the reconciliation of agency and communion signifies moral maturity, gradually evolving towards a motivational system that closely aligns with moral exemplars (Frimer and Walker, 2009). In other words, only when social media users integrate self-interests with the public good—viewing the achievement of communal goals as beneficial to personal values—it greatly enhances their fake news reporting behaviors. Sanders et al. (2018) also point out that,

when being a moral person is not important to the sense of self, moral drivers are less likely to translate into heightened motivation to act selflessly and into actual ethical behavior (p. 633).

Therefore, the driving force behind moral behavior is not merely about others. It can and should also involve self-concern (Walker, 2013). On social media platforms, reporting fake news can curtail its spread, thereby protecting other users from its influence. The communion motivation (caring for others) is evidently essential for encouraging the behavior of reporting fake news, but the agency motivation (concern for self-interest) is also important and should not be viewed as a hindrance. The primary reason is that when social media users experience a lack of congruence between agency and communion, perceiving reporting fake news as beneficial to others but not offering personal gains, such as enhancing their social reputation, they will be less likely to be

motivated to report fake news. Thus, we contend that, compared to social media users whose agency and communion are congruent, those whose motivations are incongruent are less likely to report fake news. Accordingly, we hypothesize:

Hypothesis 1. The incongruence between agency and communion in moral motivation is negatively related to social media users' fake news reporting behavior.

The integration of agency and communion motives among social media users signifies an advanced development of moral function. However, under the premise that users can fully reconcile agency and communion motives, how does the synchronized variation in the strength of these two motives affect the behavior of reporting fake news? Previous research indicates that, in addition to the structure of moral motivation (where moral exemplars can integrate agency and communion motives), the strength of moral motivation also explains moral behavior (Frimer et al., 2011, 2012; Walker, 2013). At the strength level, existing research has found that moral exemplars exhibit greater agency and communion motivations than comparison ordinary individuals (Frimer et al., 2011). In other words, when users are better able to reconcile agency and communion, especially when this reconciliation occurs at a higher level, it increases the likelihood of adopting the corresponding behavior. In the context of this study, under the condition that users' agency and communion motivations are well reconciled, stronger agency and communion motivations will promote users to report more fake news. Conversely, when users' agency and communion motivations are relatively weaker, their willingness to report fake news may be lower, resulting in fewer reports of fake news. Therefore, as the congruence between agency and communion motives increase from low to high, fake news reporting behavior will also increase. Thus, we hypothesize:

Hypothesis 2. Fake news reporting behavior will be higher when congruence between agency and communion occurs at high levels, compared to when it occurs at lower levels.

The reconciliation model suggests that if moral behaviors contain elements that can enhance self-worth—specifically, if moral behaviors can legitimately be seen as self-enhancing and self-promoting—individuals will have a stronger motivation to act morally (Walker, 2013). This is because helping others may benefit the helper, especially when such behaviors are noticed by observers, which can establish a positive reputation and lead to personal benefits (Frimer et al., 2014). Social media platforms have two distinct user groups: verified and unverified users, and they derive different personal benefits from engaging in moral behaviors. Unverified users (i.e., anonymous users) conceal their real identities, presenting a virtual persona instead. In contrast, verified users' real identities (such as their name and affiliation) must be authenticated by the platform and made publicly available. Therefore, compared to unverified users, verified users are more likely to enhance their personal reputation and gain additional benefits by engaging in moral actions, such as reporting fake news. Based on this, we argue that unverified users are more likely to report fake news when their communion motivation outweighs their agency motivation (i.e., when they emphasize other-enhancing motives). On the other hand, for verified users, due to the additional personal benefits they may obtain, verified users with a motivation system where their agency motivation is higher than their communion motivation (i.e., when they focus more on self-enhancing motives) are more likely to report fake news. Accordingly, we hypothesize:

Hypothesis 3a. For unverified social media users, when their moral motivation of communion is higher than agency, they will report more fake news.

Hypothesis 3b. For verified social media users, when their moral motivation of agency is higher than communion, they will report more fake news.

Research setting

Context

To test our research hypothesis empirically, we leveraged data from Weibo, a prominent and widely used social media platform in China. Users can not only post, like, share or comment on posts but also report fake news to the platform by clicking a button next to the post and selecting the reason ‘fake news’ for reporting. Given the transparency of Weibo’s reporting system, along with its resemblance to reporting systems found on other social media platforms like Facebook and X platform, Weibo presents an ideal environment for our study. In particular, the platform provides details regarding reported records, including the user who reported the post (reporter), the time of the reports, and evidence that supports or disproves the authenticity of the post. This feature enables us to retrieve the number of report times made by reporters based on unique homepage links, and provides access to their homepages to collect demographic information and posting history. More explanations can be found below.

Data collection and sample

We collected our data for the first time in January 2023 and further updated it in March 2024. We gathered a total of 13,346 report records. A single report record contains only one instance of fake news; however, that instance of fake news may be reported by multiple users. Each report of fake news by the reporter (referring to social media users who report fake news) will be considered a valid report. Since one piece of fake news can be reported by multiple users, meaning that one report record may involve multiple valid reports, we have collected a total of 24,853 valid reports involving 16,629 reporters as of March 2024. Next, we focused on these reporters and went to their homepages to collect their posting history. Due to instances of reporters deactivating their accounts and the participation of official institutional accounts in reporting, we identified 15,256 reporters and collected a total of over 4 million posts from their personal homepages. Ultimately, our dataset includes the number of times each reporter participated in reporting, along with their detailed demographic information such as gender, verification status, credit level, membership level and registration time, as well as their posting history. The posting history mainly refers to the content and timestamps of each post.

Variable operationalization

The dependent variable, $\ln(\text{ReportedTimes} + 1)_i$, represents the logarithmic transformation of the number of reported times made by reporter i . We have two independent variables: Agency_i and Communion_i , which respectively represent the scores of the reporter i on the dimensions of agency and communion in moral motivation. In the acquisition of scores for agency and communion, word frequency analysis is a commonly used quantitative method because the utilization of words reflects the semantic dimensions of psychological constructs (Tausczik and Pennebaker, 2010). Specifically, we employed the moral motivation dictionary to measure the Agency_i and Communion_i of reporters, which was originally designed by Frimer for LIWC. It contained of 349 words for the agency dimension and 146 words for the communion dimension, and it has been extensively used by scholars in the field of library and information science. To facilitate its application across diverse backgrounds, the moral motivation dictionary used in related studies was translated into simplified Chinese, with Cronbach’s alphas of .95 and .79 for agency and communion words, respectively (Zhang and Yu, 2018). After a series of translations and tests of dictionary validity, the latest Chinese version of moral motivation dictionary obtained from the original authors retains 722 agency words and 290 communion words. We calculated the agency and communion dimensions in moral motivation for each reporter using the following formula:

$$\text{Agency}_i = \frac{\sum \text{Freq}_{A,j}(T_i)}{722 * |T_i|}, \text{Communion}_i = \frac{\sum \text{Freq}_{C,j}(T_i)}{290 * |T_i|} \quad (1)$$

where, $Agency_i$ and $Communion_i$ represent the agency and communion motivation scores for reporter i , respectively; T_i represents the set of all posts posted by reporter i ; $Freq_{A,j}(T_i)$ and $Freq_{C,j}(T_i)$ denote the frequency of agency or communion word j in all posts posted by reporter i , respectively. Additionally, we also incorporated a set of control variables in our estimations, as shown in Table 1.

Variables	Description
$\ln(\text{ReportTimes}+1)_i$	Log of the number of reported times made by reporter i
$Agency_i$	The score obtained by reporter i on the agency dimension
$Communion_i$	The score obtained by reporter i on the communion dimension
$Gender_i$	1 if reporter i is male; 0 otherwise
$\ln(\text{DaysSinceRegist})_i$	Log of the number of days between registration and data collection date
$Verification_i$	1 if reporter i verified; 0 otherwise
VIP_i	The actual membership level of reporter i , with level 1 recorded as 1, and so on.
$Credit_i$	Divided into four levels, with reporter i categorized as low level = 1, moderate level = 2, good level = 3, and excellent level = 4
$\ln(\text{NumberOfPosts})_i$	Log of the number of all posts posted by reporter i

Table 1. Summary for the key variables.

Analysis and results

Analytical model

We used the PR-RSA to analyse and provide empirical evidence for hypothesis. As recommended by Edwards and Parry (1993), we zero-centred $Agency_i$ and $Communion_i$ prior to calculating the second-order terms to avoid multicollinearity and facilitate the interpretation of the results. Specifically, a polynomial regression analysis was conducted on users' fake news reporting behavior, as illustrated below:

$$\ln(\text{ReportedTimes})_i = b_0 + b_1 Agency_i + b_2 Communion_i + b_3 Agency_i^2 + b_4 Agency_i \times Communion_i + b_5 Communion_i^2 + controls + \varepsilon_i \quad (2)$$

Where $i = 1, 2, \dots, 15256$; b_0, b_1, \dots, b_5 are model parameters to be estimated; and ε_i is the error term.

While polynomial regression is useful in estimating the relationship between dependent and independent variables, the estimated coefficients are challenging to interpret. Therefore, we adopted response surface analysis. The coefficients of polynomial regression are used to construct the response surface, which provides a three-dimensional visualization to reveal the relationship between the variables. In which, $Agency$ and $Communion$ are plotted on the perpendicular horizontal axes, while $\ln(\text{ReportedTimes} + 1)$ is plotted on the vertical axis. The features of the response surface relevant to this study include the slopes and curvatures of the congruence incongruence line. The following are the basic equations used in the PR-RSA.

$$\begin{aligned}
a_1 &= b_1 + b_2 \\
a_2 &= b_3 + b_4 + b_5; \\
t_1 &= (b_1 + b_2) / \left(\sqrt{SE_{b_1}^2 + SE_{b_2}^2 + 2cov(b_1 b_2)} \right); \\
t_2 &= (b_3 + b_4 + b_5) / \left(\sqrt{SE_{b_3}^2 + SE_{b_4}^2 + SE_{b_5}^2 + 2cov(b_3 b_4) + 2cov(b_3 b_5) + 2cov(b_4 b_5)} \right) \quad (3)
\end{aligned}$$

$$\begin{aligned}
a_3 &= b_1 - b_2 \\
a_4 &= b_3 - b_4 + b_5; \\
t_3 &= (b_1 - b_2) / \left(\sqrt{SE_{b_1}^2 + SE_{b_2}^2 - 2cov(b_1 b_2)} \right); \\
t_4 &= (b_3 - b_4 + b_5) / \left(\sqrt{SE_{b_3}^2 + SE_{b_4}^2 + SE_{b_5}^2 - 2cov(b_3 b_4) + 2cov(b_3 b_5) - 2cov(b_4 b_5)} \right) \quad (4)
\end{aligned}$$

$$\begin{aligned}
P_0 &= (b_2 b_4 - 2b_1 b_5) / (4b_3 b_5 - b_4^2) \\
E_0 &= (b_1 b_4 - 2b_2 b_3) / (4b_3 b_5 - b_4^2) \\
p_{11} &= \left[b_5 - b_3 + \sqrt{(b_3 - b_5)^2 + b_4^2} \right] / (b_4) \\
p_{10} &= E_0 - p_{11} P_0 \quad (5)
\end{aligned}$$

Where a_1 and a_2 are the slope and curvature of the congruence line, respectively, and their significance levels are tested by t_1 and t_2 . Similarly, a_3 and a_4 represent the slope and curvature of the incongruence line, respectively, with their significance levels tested by t_3 and t_4 . p_{11} and p_{10} are the slope and intercept of the first principal axis, respectively, with their significance levels are tested through bootstrapping. The coefficients b_1, b_2, \dots, b_5 are standardized coefficients estimated using equation (2), where SE is the standard error of the coefficient, and cov is the covariance between the coefficients.

As for how to interpret the meaning of these features, first, the slope (a_1) of the surface along congruence line represents how the reconciliation between agency and communion relates to reporting behavior. It shows variation of reporting behavior across the continuum from low to high when the strengths of agency and communion are the same. The curvature (a_2) of the surface along this line indicates whether the relationship between the strength of integration and reporting behavior is curvilinear. Second, the curvature (a_4) of the surface along incongruence line shows how the degree of discrepancy between agency and communion may influence reporting behavior. A significant negative curvature suggests that reporting behavior decreases as the strengths of agency and communion diverge and increases as their strengths converge (moving closer to the congruence line). The slope (a_3) of the surface along incongruence line indicates how the direction of the discrepancy influences reporting behavior. Third, the first principal axis indicates the ridge of a concave surface where the downward curvature is the least. If the intercept (p_{10}) of the first principal axis equals zero and the slope (p_{11}) equals one, it indicates that a ridge with the first principal axis along the congruence line. Otherwise, it indicates a translation or rotation of the ridge relative to the congruence line.

Main analysis results

Before testing the research model, considering the variables vary in their magnitudes, we standardized the independent variables for the main analysis. Meanwhile, in order to display the levels of the agency and communion more clearly, we report the descriptive statistical results in Table 2 before centring and the independent variables. Table 2 presents the descriptive statistics of our key variables and the correlation matrix.

We employed hierarchical regression to validate the appropriateness of polynomial regression for our study. The analysis results from Table 3 indicate that the variance of the quadratic model (i.e.,

Model 3; $R^2 = 0.1106$) exceeds that of the linear model (i.e., Model 2; $R^2 = 0.0719$), suggesting it is appropriate to perform polynomial regression for our study.

Hypothesis 1 proposed that the incongruence between agency and communion is negatively related to fake news reporting behavior. The results from Model 3 in Table 3 indicate that the curvature ($a_4 = -0.0090$, $p < .01$) along the incongruence line is significantly negative, as illustrated in Figure 1, where the response surface curves downward along the incongruence line. The results indicate that users' fake news reporting behavior is reduced when the strengths of agency and communion become further apart and is maximized when their strengths become more similar. Thus, hypothesis 1 is supported.

Variables	Mean	SD	1	2	3	4	5	6	7	8
1. Ln (ReportTimes+1)	0.7393	0.2335	-							
2. Agency	0.0005	0.0007	0.209***	-						
3. Communion	0.0004	0.0008	0.218***	0.302***	-					
4. Gender	0.6449	0.4785	-0.002	0.0003	-0.0002	-				
5. Ln (DaysSinceRegist)	8.1754	0.3694	-0.018**	0.0077	0.017**	-0.012	-			
6. Verification	0.0544	0.2268	0.062***	0.107***	0.108***	-0.026***	0.065***	-		
7. VIP	0.5544	1.7807	0.041***	0.047***	0.050***	-0.073***	0.049***	0.287***	-	
8. Credit	3.1438	0.4771	0.001	0.043***	0.027***	-0.044***	0.422***	0.263***	0.192***	-
9. Ln (NumberOfPosts)	5.7082	2.3292	0.025***	0.093***	0.072***	-0.155***	0.339***	0.243***	0.232***	0.391***

Note. The sample size of each variable in the table is 15256; * $p < 10$ percent, ** $p < 5$ percent, *** $p < 1$ percent.

Table 2. Descriptive statistics and correlation matrix.

Hypothesis 2 proposed that users report more fake news when agency and communion congruence occur at higher level than lower level. The results from model 3 in Table 3 display a significantly positive slope ($a_1 = 0.0956$, $p < .01$) along the congruence line, suggesting that when agency and communion increase together at the same level, users will report more fake news.

Variables	Dependent variable: Ln (ReportTimes+1)				
	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	0.8685***	0.8593***	0.8686***	0.8493***	1.4085***
Gender	0.0015	-0.0005	-0.0018	-0.0025	-0.0001
Ln (DaysSinceRegist)	-0.0149**	-0.0126**	-0.0131**	-0.0104**	-0.0802*
Verification	0.0583***	0.0275***	0.0152*	-	-
VIP	0.0032***	0.0028**	0.0027**	0.0025**	0.0037
Credit	-0.0079*	-0.0059	-0.0054	-0.0085**	0.0508*
Ln (NumberOfPosts)	0.0020**	0.0001	-0.0009	-0.0002	-0.0142**
Agency		0.0362***	0.0434***	0.0308***	0.2031***
Communion		0.0392***	0.0521***	0.0539***	0.0744**
Agency \times Agency			-0.0012***	-0.0007***	-0.0365***
Agency \times Communion			0.0070***	0.0083***	0.0411***
Communion \times Communion			-0.0008***	-0.0007***	-0.0085**
R ²	0.0055***	0.0719***	0.1106***	0.1053***	0.2011***
Sample size	15256	15256	15256	14426	830
Congruence line (Agency = Communion)					
Slope (a_1)			0.0956***	0.0848***	0.2776***
Curvature (a_2)			0.0049***	0.0068***	-0.0038
Incongruence line (Agency = -Communion)					
Slope (a_3)			-0.0086*	-0.0231***	0.1287***
Curvature (a_4)			-0.0090***	-0.0099***	-0.0862***
First principal axis					
Intercept (p_{10})			0.6952	2.3113*	-3.2596**
Slope (p_{11})			1.0543	1.0004	1.8874

Note. *p < 10 percent, **p < 5 percent, ***p < 1 percent.

Table 3. Polynomial regression results.

From Figure 1, it can be further observed that users' fake news reporting behavior exhibits a nonlinear increase along the congruence line from the front corner to the back corner on the response surface. This indicates that when users' agency and communion strengths are at the same level, any further increase will facilitate their reporting behavior of fake news. Thus, hypothesis 2 is supported.

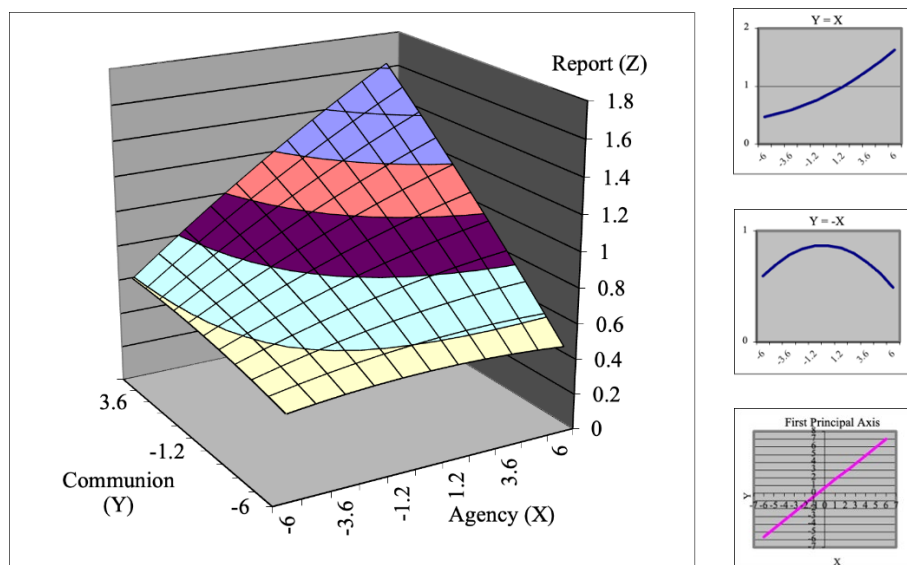


Figure 1. Response surface of agency and communion to reporting behavior (Model 3).

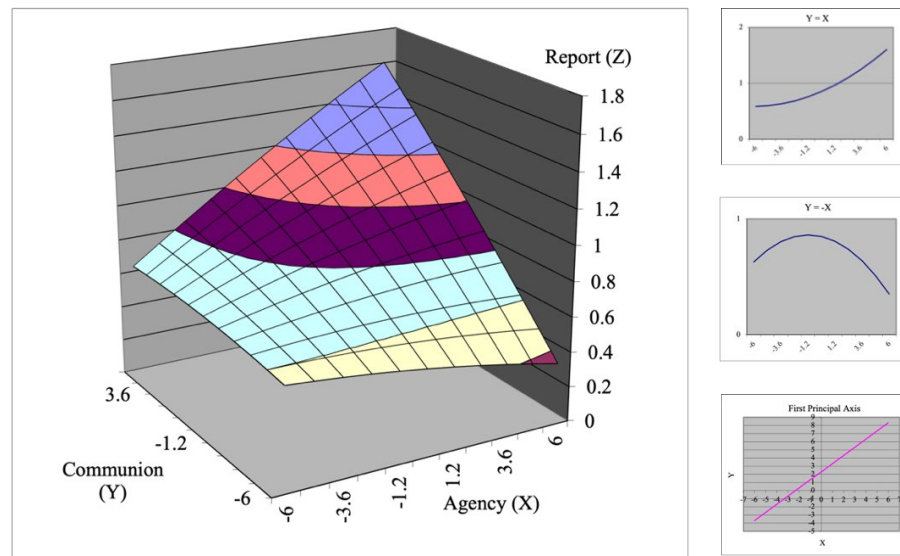


Figure 2. Response surface of agency and communion to reporting behavior (Model 4).

Hypothesis 3a proposed that unverified reporters report more fake news when their communion exceeds agency. The results from model 4 in Table 3 display a significantly negative slope ($a_3 = -0.0231, p < .01$) and curvature ($a_4 = -0.0099, p < .01$) along the incongruence line, as manifested in Figure 2, showing reporting behavior initially rises slowly and then declines rapidly along the line of incongruence from the back corner to the front corner on the surface. Because the curvature along incongruence line is significantly negative, the surface has a ridge. Thus, we further examine the first principal axis to see whether it is coincident with the congruence line. The purpose is to check the region where more reporting behavior occurs. As shown in Table 3, the first principal axis is $y = -1.0004x + 2.3113$. Its slope ($p_{11} = -1.0004$) is not significantly different from 1, but the intercept ($p_{10} = 2.3113$) is significantly different from 0, indicating that the ridge of the response surface does not run along the congruence line but instead parallel move towards the region where communion exceeds agency. The above results collectively corroborate that when communion exceeds agency, unverified users are more inclined to engage in reporting behaviors. Thus, Hypothesis 3a is supported.

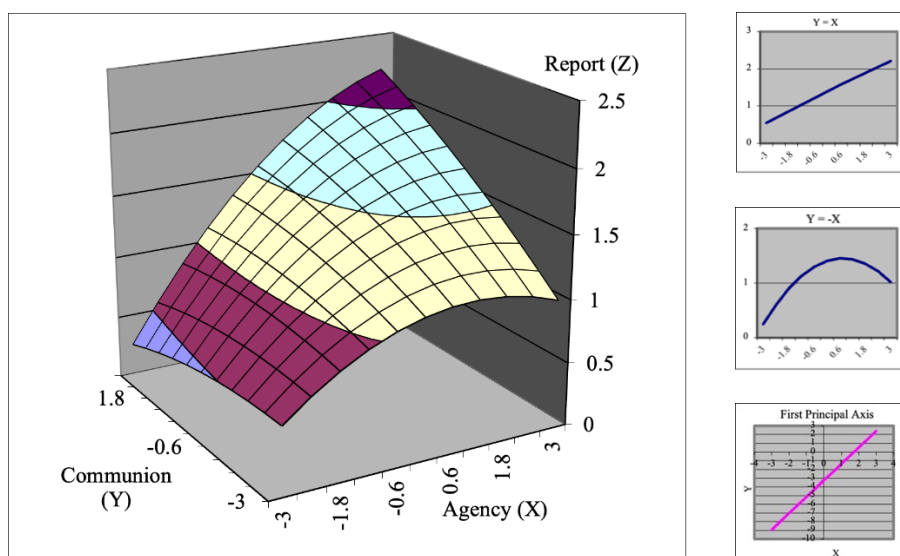


Figure 3. Response surface of agency and communion to reporting behavior (Model 5).

We tested hypothesis 3b using the same procedure. The results from model 5 in Table 3 display a significantly positive slope ($a_3 = 0.1287$, $p < .01$) and negative curvature ($a_4 = -0.0862$, $p < .01$) along the incongruence line, as manifested in Figure 3, showing reporting behavior initially rises rapidly and then declines slowly along the line of incongruence from the back corner to the front corner on the surface. To check the region where more reporting behavior occurs, we also examined the first principal axis. As shown in Table 3, the first principal axis is $y = -3.2596 + 1.8874x$, whose slope ($p_{11} = 1.8874$) is not significantly different from 1 and the intercept ($p_{10} = -3.2596$) is significantly different from 0. This represents that the ridge of the surface does not run along the congruence line but instead parallel move towards the region where agency exceeds communion. The above results corroborate that verified users will report more fake news when moral motivation of agency exceeds communion. Thus, Hypothesis 3b is supported.

Discussion

Theoretical implications

This study presents four key theoretical implications. First, it offers a novel perspective on fake news reporting behavior through the lens of moral motivation. While previous studies have focused on the antecedents of online reporting behavior at the social, platform, or content levels, such as educational interventions, interface design, or online content formats, few have considered moral motivation. Given that online reporting is a prosocial behavior reflecting concerns with social norms and moral responsibility, this study highlights the role of moral motivation. Using fake news reporting as the research context, this study explores how moral motivation influences users' reporting behaviors, providing new insights and contributing to existing research in this field.

Second, this study clarifies the debate on how the agency and communion dimensions of moral motivation influence moral behavior. Drawing on the reconciliation model of moral centrality, this study offers a comprehensive analysis of how the congruence or incongruence between agency and communion influences fake news reporting behavior. Based on unique field data, including over 13,000 reports and more than 4 million posts from 15,256 reporters, the findings show that incongruence between agency and communion negatively impacts fake news reporting behavior. Conversely, when agency and communion motivations are congruent, the likelihood of fake news reporting increases as the congruence between these dimensions grows. This study reveals the complex mechanisms through which the agency and communion dimensions of moral motivations influence fake news reporting behavior by demonstrating the existence of a curvilinear relationship.

Third, the analysis of user heterogeneity further reveals the differential impacts of the agency and communion on individuals' moral behavior. The results show that unverified social media users report more fake news when their moral motivation of communion is higher than agency. Conversely, verified social media users report more fake news when their moral motivation of agency outweighs communion. This finding illustrates the varying impact of moral motivations on distinct user groups, highlighting how user heterogeneity moderates the effects of agency and communion on fake news reporting behavior. It also contributes to ongoing debates on the agency and communion dimensions, showing their differentiated influence across different user categories.

Finally, this study is the first to employ PR-RSA to examine the impact of moral motivation duality on individual behavior. Unlike previous studies that calculated agency and communion as a single variable through subtraction or division, PR-RSA maintains the distinctiveness of these variables and reveal the complex curvilinear relationships between them and reporting behavior. In this regard, PR-RSA overcomes the limitations of traditional statistical models, providing a unique opportunity to understand the relationship between moral motivation and reporting behavior. We

encourage future research to adopt PR-RSA to explore complex variable relationships, especially when the congruence or incongruence of these variables has a significant impact.

Practical implications

First, this study shows that social media users whose agency and communion motivations are incongruent are less likely to engage in fake news reporting behavior. When the congruence between these two motivations is stronger, users are more likely to report fake news. Therefore, we suggest that social media platforms should emphasize the dual value of online reporting behaviors for both individuals and society, thus helping users better recognize that reporting fake news can serve both public and personal interests. Platforms could implement mechanisms, such as certification or reputation-building systems, to help users enhance their personal standing through the act of reporting fake news.

Second, the findings also suggest that the moral motivations influencing fake news reporting differ for verified and unverified social media users. Therefore, social media platforms can adopt tailored incentive strategies for each user group. For unverified users, platforms should emphasize the potential harm that fake news can cause to vulnerable groups, thus enhancing their moral motivation of communion. In contrast, for verified users, incentives focused on self-interest, such as access to exclusive content or other tangible rewards, should be used to bolster their moral motivation of agency.

Limitations and future research

This study has two limitations, which present opportunities for future research. First, we only used data collected from Chinese social media platforms, and the relatively homogeneous social context may raise concerns about the generalizability of the research results. Therefore, we recommend that future research attempt to use data from other cultural backgrounds or countries to test the validity of this study. Second, the focus of this study was to explain whether the users' agency and communion motivations are fully reconciled to influence the fake news reporting behavior. However, it did not empirically test which strategies could promote the integration of agency and communion among social media users. Future researchers might continue to explore how to effectively promote the full integration of these motivations among users.

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