

# The Misprediction of Helpers in Comforting Situations and Its Mechanism

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**Background:** As a prosocial behavior, comforting behavior can prompt individuals to provide emotional support to others. After the comforting behavior, the comforter may estimate the consoled individual's reaction, and this prediction will influence their future behavior. According to social cognition theory, competence dominates self-cognition, and warmth dominates the cognition of others, which impacts the prediction accuracy of comforters. They may overestimate the negative reaction of the consoled. This misprediction has also been confirmed for other prosocial behaviors, such as helping behavior and sharing behavior.

**Methods:** In this study, 337 Chinese college students were investigated by convenience sampling. Through one real-world experiment and three imaginary-situation experiments, this study explored the phenomenon, effects and causes of the comforter's misprediction in the comfort condition.

**Results:** SPSS 23.0 and statistical methods such as analysis of variance, an independent sample *t*-test and an intermediary test were used. The comforters overestimated the negative responses and underestimated the positive responses of the recipients, and the intensity of this misprediction increased in the comfort failure condition. The comforters' misprediction arose because the recipients were more concerned with the warmth dimension of the comforters, whereas the comforters were more inclined to focus on their own competence dimension.

**Conclusion:** The comforter's prediction of the consoled's response was more negative than the actual situation, and this misprediction was more obvious when the consolation failed, which can be explained by social cognition theory. This study provides an understanding of how to relieve the psychological stress of comforters.

**Keywords:** misprediction, social cognition, comforting behavior, prosocial behavior

## Introduction

Prosocial behavior contributes to interpersonal interaction and social harmony. However, with the development of the market economy, Chinese society has entered an era of rapid economic, technological, and network development, and individuals' social lives and personal values have also been affected. The accelerated pace of life has led to an increasing distance between people, from the original "A good neighbor is better than a brother far off" to a society of strangers.<sup>1</sup> People are more likely to adopt indifferent and avoiding attitudes in the face of helping situations. Although such a choice may temporarily protect the interests of individuals from harm, it may cost society in the long run. If everyone chooses not to help others, then everyone will also be unable to obtain help from others, which is the helping dilemma we are facing.<sup>2</sup> To address the dilemma of prosocial behavior, it is necessary to explore the psychological mechanisms of helpers' related behaviors to propose effective interventions to reduce individuals' resistance to engaging in prosocial behaviors.

Comforting behavior is a type of prosocial behavior<sup>3</sup> in which an individual perceives the negative emotional state of another person and attempts to make the other person happy by relieving their negative emotion through words or behavior.<sup>4</sup> Comforting behavior requires conditions such as the recognition of another person's emotional experience.<sup>5-7</sup> It is also necessary to have the ability to recognize the causes of emotions in others.<sup>8-10</sup> Recognizing the situational appropriateness of emotional expression is another condition for achieving comforting behavior.<sup>11</sup> Effective comforting

begins to occur between the second and fourth years of life and relies on a growing understanding of the uniqueness, diversity and situational limits of others' emotional experiences.<sup>12-15</sup>

It is generally accepted that the two dimensions of social cognition are warmth and competence.<sup>16,17</sup> Reflecting evolutionary pressures, upon encountering conspecifics, social animals must immediately judge whether others are enemies or friends (ie, whether intentions are good or bad) and then judge whether others are capable of fulfilling those intentions; the ability and warmth dimensions contribute to understanding basic social structures regarding competition and status. Numerous studies have shown that these two dimensions are stable across cultures, time, and contexts.<sup>18-20</sup> The warmth dimension reflects traits related to perceived intention, such as friendliness, helpfulness, sincerity, trust, and moral sense; the competence dimension reflects traits related to perceived competence, such as intelligence, skills, creativity, and efficacy. Social cognition, such as when people make predictions, is not always accurate, and individuals' predictions about others' thoughts and behaviors often deviate from others' actual situations.<sup>21</sup> However, assessing the mental state of others and their reactions to that state is a basic aspect of everyday social life.<sup>22</sup>

Misprediction affects many prosocial behaviors, such as helping and sharing behaviors, with those expressing gratitude often underestimating the positive feelings of the appreciated person and overestimating their level of embarrassment;<sup>23</sup> helpers tend to underestimate the willingness of recipients to accept active help and underestimate the positive impact of active help on their own impression evaluations and interpersonal relationships;<sup>24</sup> and gift givers always overestimate the extent to which the price of the gift affects gratitude, yet recipients do not share this view.<sup>25</sup> Behaviorally, senders tend to predict the outcome of prosocial behavior more negatively than behavior receivers. Prosocial behavior has a positive role in promoting the harmonious development of human society, creating positive social connections, and forming happy and healthy life patterns.<sup>26</sup> The presence of misprediction hinders the stimulation and transmission of prosocial behaviors and is detrimental to people's positive interactions. For the predictors, misprediction is detrimental to positive affective experience and happiness. Misprediction can also cause problems for the objects of the forecast.<sup>27</sup>

As the saying goes, "A good word makes people warm like a fire in the cold winter", and comforting behaviors prompt individuals to put themselves in the shoes of others and provide emotional support for them.<sup>28</sup> According to the cognitive appraisal theory of emotions, after implementing comforting behaviors, the comforters infer the experience of the consoled person based on cues, which leads to emotional experiences. There are two main strategies that people use to perform predictive behaviors: one is "from outside to inside", where they use the external performance of another person to infer their internal mental activity, and the other is "self-referential", where people first estimate how they themselves would react in an emotional situation different from the current one and then adjust this self-assessment to accommodate the differences between themselves and others.<sup>29</sup> Both of these strategies have limitations. Using external cues to infer internal mental activity in others is not reliable. Individuals' outward appearances, such as expressions and behaviors, may or may not be consistent with their internal activity. It has been shown that predictors tend to overestimate the accuracy of information conveyed through facial expressions.<sup>30</sup> It has also been found that help seekers underestimate the compliance rate of potential helpers in various contexts after having been rejected once.<sup>31</sup> Help seekers do not realize that saying 'no' to a request for help would be awkward for others, and the underestimation of this social cost leads help seekers to underestimate the likelihood that others will comply with their request. Recipients also underestimate the pleasure that helpers experience from helping.<sup>32</sup> The help giver may also mispredict due to the use of external cues alone to make judgments. For those who do not ask for help, potential helpers are prone to interpret their behavior as if they do not need help.<sup>33</sup> They ignore real activities performed by help seekers and equate their behavior with what they truly think, creating a misprediction in potential helpers. There are also limitations to the self-referential strategy. If the situations of others and a person are similar, the person can use his or her own reaction as beneficial information to speculate on the reactions of others.<sup>34</sup> However, when others are not in the same situation as an individual, especially when those situations evoke different emotional states and assume that others' attitudes, preferences, and behaviors are the same as those of the individual, bias, inadequate consideration, and regretful social behavior can occur.<sup>35</sup> Asymmetries in the focus of the recipient and the giver determine the difference in the initial anchor points in the process of self-referral.<sup>36</sup> Some scholars have also found that when motivation is not strong enough, individuals adjust to others' perspectives based on their own perspectives by following the principle of "stopping when satisfied".<sup>37</sup> It is difficult for people to account for the perspectives of others—their perspectives are subject to egocentrism, social

projection, and multiple attribution errors.<sup>38</sup> If comforters have inaccurate perceptions of comforting behavior, could there be a similar bias in predictions to that of helpers and sharers?

Hypothesis 1: In a consolation situation, there is a bias between the comforter's prediction of the consoled's response and the consoled's actual response, with the comforter overestimating the consoled's negative response and underestimating the consoled's positive response.

Consolation outcomes are not always desirable, and in consolation failure situations, comforters exhibit comforting behaviors with good intentions but an undesirable outcome characterized by high warmth but low competence. Researchers have argued that people classified as high on one dimension and low on another elicit predictable and ambivalent emotional and behavioral responses.<sup>16</sup> When consolation is successful, both competence and warmth are demonstrated by the comforter, and the level of misprediction may be low; when consolation fails, the comforter may fail to experience the warmth that the comforting behavior brings to others and perceive that others are concerned only with their own competence deficits. Does the effect of misprediction increase under failure conditions?

Hypothesis 2: In situations where consolation fails, comforters' mispredictions are greater than in successful situations, and comforters underestimate the positive response of the consoled to a greater extent.

The concerns of the comforters and the consoled are not aligned. The study proves that, from the perspective of the actor, eg, self-relevant and individualistic, the individual will interpret it in terms of ability; if the perspective of the observer is taken, eg, other related and collectivist, the subject interprets it in terms of warmth-ethics.<sup>39,40</sup> Wojciszke (2005) further states that competence dominates self-perceptions because it directly affects the well-being of the self; moral emotions dominate people's perceptions of others because they usually have a direct impact on the well-being of others around them.<sup>41</sup> Recipients are more concerned about their own benefits and the intentions of the other party,<sup>42</sup> and receiving help is also part of the benefits. Accordingly, comforters may base their predictions on the perspective of competence, while consoled individuals interpret comforters in terms of warmth, which leads to misprediction in comforting situations.

Hypothesis 3: Misprediction arises because the consoled are more concerned with the warmth dimension of the comforter, while the comforter is more concerned with his or her own competence dimension.

This study investigated the accuracy of comforters' estimates of the responses of consoled individuals in consolation situations, the influence of consolation outcomes on mispredictions, and the causes of comforters' mispredictions.

## Study I: Misprediction of Comforters in Real Situations

### Research Design

Study 1, as a preexperiment, used the "sending a comforting email" scenario to explore the existence of a comforter's misprediction in a real situation. This experiment was modeled on the experimental procedure of Kumar et al,<sup>23</sup> where the comforters were asked to write a consolation email to someone close to them within two days.

A between-subjects design was used, with the independent variable being role divided into two levels: comforter and consoled. The dependent variable indicators and measurements selected in this study are mainly based on the studies of Kumar et al on the misprediction of prosocial behavior.<sup>23</sup> If it turns out that the comforter significantly underestimated the consoled's positive feelings and overestimated their level of embarrassment, H1 would be tested.

### Participants

College students were recruited on an Internet platform and asked to find a companion as a comforter. A total of 37 participants, 13 males and 24 females, with a mean age of 20.84 years ( $SD = 2.42$ ), participated in the experiment as comforters. All 37 people who participated in sending the comforting letter gave the experimenter permission to contact the recipients. Thirty-seven recipients, as the consoled, received the experimenter's questionnaire via mail, 35 of whom

completed it (13 males and 22 females); the respondents had a mean age of 20.83 years ( $SD = 2.90$ ) and a response rate of 94.59%. The data of participants whose peers did not respond were excluded.

## Materials

The subject was asked to explain why he or she was comforting them, to describe how he or she experienced their feelings, and to give them some guidance in more than 150 words. The comforter could let the consoled person know that the researcher would send them a short questionnaire that they could fill in if they wished.

Immediately after writing and sending the comforting letter, the subjects were asked to complete a questionnaire reporting their personal experience and predictions about the consoled's experience. The comforters first reported their name, age, sex, the name of the recipient, the recipient's email address, length of the comforting letter and general content of the comforting letter (confidentiality could be maintained for content involving privacy). The comforters were then asked to report their personal emotional experience and to predict their experience with the consoled. The comforters first predicted how surprised the recipient would be to receive the letter (0 = not at all surprised, 10 = extremely surprised) and how surprised the recipient would be by the content of the comforting letter (0 = not at all surprised, 10 = extremely surprised). Then, based on a 10-point scale, the comforters predicted how the consoled would feel after reading the letter (negative numbers indicate more negative than normal, positive numbers indicate more positive than normal, and 0 indicates no difference from normal) and reported how writing the letter made the comforter feel based on the same scale. Using the same scale, the comforters also predicted how embarrassed the consoled reported feeling after reading the letter (0 = not at all embarrassed, 10 = extremely embarrassed) and reported how embarrassed the comforter felt about sending the letter. Finally, the comforters reported their current relationship status with the recipient (-5 = feeling that we are far apart, 5 = feeling that we are very close).

After the comforters completed the survey, the recipients were contacted via email. The recipients were informed that they had recently received a letter in their email inbox from a close friend, were asked to check it and read it, and were invited to complete a voluntary and confidential online survey (if they felt the email was risky, they could check with their friends before completing it). The survey asked the recipient to report the name of the sender of the comforting letter and their age and sex. Based on the same scale as the senders, they were asked to report how surprised they were to receive the letter, how surprised they were about the content of the comforting letter, how reading the letter made them feel and how embarrassed they felt after reading the comforting letter. The specific scale is provided in the [Appendix](#).

## Statistical Analysis and Results

With role as the independent variable; surprise, feeling and embarrassment as the dependent variables; and relationship as the covariate, a repeated-measures ANOVA was conducted, and the results of the experiment are shown in [Table 1](#). To better fit the research purpose, this study performed a statistical analysis of only the comforter's prediction and did not analyze the comforter's own feelings.

The results showed that there was a significant difference between the degree of embarrassment predicted by the comforter and the actual degree of embarrassment of the consoled,  $F_{(1,34)} = 5.544$ ,  $p = 0.025$ ,  $\eta^2_p = .144$ . The actual level of embarrassment reported by the consoled individuals ( $M = 1.714$ ,  $SD = 2.177$ ) was significantly lower than that

**Table 1** Predictions of the Comforters and Judgments of the Comforted

Dependent Variable	Predictions of Comforters M(SD)	Judgment of the Consoled M(SD)	F
1. Level of surprise of the consoled in receiving the letter	5.971 (2.407)	6.229 (2.340)	0.862
2. Degree to which the consoled was surprised by the content of the letter	5.514 (2.381)	5.400 (2.226)	0.541
3. Feeling of the consoled	2.486 (1.541)	3.029 (1.723)	1.728
4. Level of embarrassment of the consoled	3.686 (3.367)	1.714 (2.177)	5.544*

**Note:** \* $p < 0.05$ .

**Abbreviations:** M, mean; SD, standard deviation.

predicted by the comforter ( $M = 3.686$ ,  $SD = 3.367$ ). The interaction between relationship and role was not significant,  $F_{(1, 34)} = 1.799$ ,  $p = .189$  and  $\eta_p^2 = 0.052$ .

There were no significant differences between the comforters and the consoled individuals in terms of the degree of surprise at receiving the letter, the degree of surprise at the content of the letter, or the feeling of the consoled individual.

A one sample  $t$  test for the variable “relationship” was significantly above the median of 0,  $t_{0.05/2,34} = 16.054$ ,  $p < 0.001$  ( $M = 3.743$ ,  $SD = 1.379$ ).

## Study 2: Misprediction Due to Different Roles in Imaginary Situations

### Research Design

Study 2 used the “essay saving failure” scenario to explore whether the comforters make mispredictions in the imaginary situation. Studies 1 and 2 are proposed to jointly validate H1 from different perspectives.

The experiment used a between-subjects design, with the independent variable being role divided into two levels: comforter and consoled. The dependent variable indicators and measurements selected in this study are mainly based on the studies of Shang et al on the misprediction of helping behavior.<sup>21</sup> If the comforter significantly underestimates the consoled’s satisfaction, gratitude, willingness to seek comfort again and feelings, then H1 can be tested.

Referring to the experimental procedure of Shang et al.<sup>21</sup> The subjects first read the textual description of the essay preservation failure scenario, and after fully substituting themselves into the role, they finally made the corresponding judgments on the relevant values.

According to G\*power’s calculations, for a moderate effect size ( $f = 0.25$ ), a minimum of 128 people would be required for Experiment 2 to achieve a statistical power of 0.8.

### Participants

College students were recruited on an Internet platform. A total of 128 subjects participated in the experiment; 48 were male and 80 were female, with a mean age of 21.38 years ( $SD = 1.16$ ).

### Materials

The experimental material was specified as follows:

Imagine yourself bumping into your friend Zhang on the road one day; he looks sullen and complains to you that he spent almost a day writing a paper on the computer, but in the end, he did not manage to save it because of a computer problem. You pull him down on a bench and begin to comfort him and cheer him up.

The participants in the consoled condition read similar scenarios and simply imagined themselves as recipients who were consoled by their friend Zhang because they had failed to save their papers.

The comforter was asked to predict the reaction of the consoled: “How satisfied do you think Zhang is with you” ( $-7 =$  very dissatisfied,  $7 =$  very satisfied), “Do you think Zhang is complaining about or grateful to you” ( $-7 =$  very complaining,  $7 =$  very grateful), “Do you think Zhang would be willing to seek your comfort again if Zhang encountered difficulties in the future” ( $1 =$  not at all willing,  $7 =$  very willing), and “How do you think Zhang felt after the comforting behavior took place” (ranging from  $-7$  to  $7$ , with negative numbers being more negative than normal, positive numbers being more positive than normal, and  $0$  being no different from normal). The participants were subsequently asked about their own response: “How satisfied are you with Zhang?” ( $-7 =$  very dissatisfied,  $7 =$  very satisfied), “Are you complaining about or grateful to Zhang?” ( $-7 =$  very complaining,  $7 =$  very grateful), “If you encounter difficulties again in the future, would you be willing to seek comfort from Zhang again?” ( $1 =$  not at all willing,  $7 =$  very willing), and “How did you feel after the comforting behavior took place?” (ranging from  $-7$  to  $7$ , with negative numbers being more negative than normal, positive numbers being more positive than normal, and  $0$  being no different from normal).

The experimenter stressed to all subjects that they were invited to substitute themselves into the roles as much as possible while reading, using their imagination for the situational experience. After reading the material, the participants were asked to numerically and honestly predict or report.

## Statistical Analysis and Results

Independent samples *t*-tests were conducted with satisfaction, gratitude, willingness to seek comfort again and feeling as the dependent variables and role as the independent variable. The results of the experiment are presented in Table 2. The results indicate that there was a significant difference in satisfaction between the comforters and the consoled individuals ( $t_{0.05/2,126} = -4.608, p < 0.001; d = -0.815$ ). The actual satisfaction reported by the consoled participants ( $M = 5.000, SD = 1.563$ ) was significantly higher than the predicted value of the comforters ( $M = 3.625, SD = 1.804$ ).

The difference in gratitude between the comforters and consoled individuals was significant ( $t_{0.05/2,126} = -4.141, p < 0.001, d = -0.732$ ). The actual gratitude reported by the consolers ( $M = 4.969, SD = 1.709$ ) was significantly greater than that predicted by the comforters ( $M = 3.641, SD = 1.914$ ).

There was a significant difference between the comforters' and consoled individuals' willingness to seek comfort again,  $t_{0.05/2,126} = -2.822, p = .006, d = -0.499$ . The actual reported intention to seek comfort again by the comforted individuals ( $M = 5.547, SD = 1.126$ ) was significantly greater than the predicted value of the comforters ( $M = 5.016, SD = 1.000$ ).

The difference between the feelings of the comforters and consoled individuals was not significant ( $t_{0.05/2,126} = -1.546, p = 0.125$ ). The statistical power of this study was 0.8.

## Study 3: Effect of Different Roles and Comfort Outcomes on Misprediction Research Design

Study 3 used a "learning difficulty" scenario with two conditions—successful and unsuccessful consolation—to investigate whether the effects of the participants' mispredictions were consistent across the two conditions. The study proposes to validate H2.

A 2 (role: comforter/consoled) \* 2 (outcome: success/failure) within-subjects design was used. The dependent variable indicators and measurements selected in this study are based mainly on the studies of Shang et al on the misprediction of helping behavior.<sup>21</sup> If there is no significant difference between the prediction of the comforter and the judgment of the consoled in the successful situation of consolation, in the situation of consolation failure, the comforter significantly underestimates the satisfaction, gratitude, willingness to seek comfort again, and feeling of the consoled, and H2 is supported.

Referring to the experimental procedure of Shang et al.<sup>21</sup> The subjects first read the textual description, and after fully substituting themselves into the role, they finally made the corresponding judgments on the relevant values.

According to calculations by G\*power, for a moderate effect size ( $f = 0.25$ ), a minimum of 33 people would be required for Experiment 3 to achieve a statistical power of 0.8.

## Participants

College students were recruited on an Internet platform. A total of 36 participants, 14 males and 22 females, participated in the experiment, with a mean age of 21.19 years ( $SD = 0.98$ ).

**Table 2** Predictions of the Comforters and Judgments of the Consoled (Study 2)

Dependent Variable	Predictions of Comforters M±SD	Judgment of the Consoled M±SD	t
1. Satisfaction level of the consoled	3.625±1.804	5.000± 1.563	-4.608***
2. Appreciation level of the consoled	3.641±1.914	4.969±1.709	-4.141***
3. The consoled's willingness to seek comfort again	5.016±1.000	5.547±1.126	-2.822**
4. The feeling of the consoled	2.859±1.910	3.375±1.864	-1.546

Notes: \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

Abbreviations: M, mean; SD, standard deviation.



## Materials

The participants first read the textual description of the learning difficulty situation:

Imagine your friend, Chen, has recently been having trouble with his major studies, he can't keep up with the teacher in class, there's a lot of work he can't do after class, and he's a little discouraged. He asks you out to dinner, and you look at him sulking and decide to comfort him.

The participants in the comforters' condition read the above scenario, and those in the successes' group subsequently read the following text description:

You listened patiently to his worries, patted him on the shoulder to show your understanding of his feelings, and shared your own experiences related to your studies. Chen's confidence was restored, and he decided to keep trying.

Subjects in the reassuring failure group read another situation description:

You reassured Chen not to be upset; he would be able to catch up slowly. You talked for a long time, but his mood did not seem to change a lot. He was still sullen, very silent.

The participants were asked to put themselves fully into the role of the comforters and then make judgments on the relevant values (satisfaction, gratitude, willingness to seek comfort again, feeling, as in Experiment 2). The participants in the consoled condition read a similar scenario, imagining themselves only as the recipient of comfort from their friend Chen because of their learning difficulties. The same judgments were made on the relevant values (satisfaction, gratitude, willingness to seek comfort again, and feeling), as in Experiment 2.

## Statistical Analysis and Results

A repeated-measures ANOVA was conducted with satisfaction, gratitude, willingness to seek comfort again, and feelings as dependent variables and roles and outcomes as independent variables. The results of the experiment are presented in Table 3.

The interaction between outcomes and roles was significant when satisfaction was the dependent variable,  $F_{(1, 35)} = 13.234, p < 0.001, \eta^2_p = 0.274$ . When consolation was successful, the comforters' predicted satisfaction was not significantly different from the actual satisfaction reported by the consoled,  $F_{(1, 35)} = 0.827, p = 0.37, \eta^2_p = 0.023$ ; when consolation failed, the comforters significantly underestimated the consoled's satisfaction,  $F_{(1, 35)} = 19.34, p < 0.001, \eta^2_p = 0.356$ . This result suggests a greater misprediction for the comforters when comforting failed. In addition, the main effects of role ( $F_{(1, 35)} = 13.944, p < 0.001, \eta^2_p = 0.285$ ) and outcome ( $F_{(1, 35)} = 75.382, p < 0.001, \eta^2_p = 0.683$ ) were significant.

**Table 3** Predictions of the Comforters and Judgments of the Consoled (Study 3)

Dependent Variable	Predictions of Comforters M±SD	Judgment of the Consoled M±SD	F
<b>1. Satisfaction level of the consoled</b>			
Success	4.500±1.254	4.694±1.527	0.827
Failure	0.583±2.557	2.000±2.541	19.340***
<b>2. Appreciation level of the consoled</b>			
Success	4.444±1.319	5.250±1.461	19.636***
Failure	1.333±1.897	2.861±2.045	23.533***
<b>3. Consoled's willingness to seek comfort again</b>			
Success	4.889±1.260	4.861±1.437	0.014
Failure	2.028±2.236	2.528±1.540	1.981
<b>4. Feeling of the consoled</b>			
Success	3.472±1.298	3.889±1.563	3.182
Failure	-0.139±2.113	0.694±2.081	6.783*

Notes: \* $p < 0.05$ . \*\*\* $p < 0.001$ .

Abbreviations: M, mean; SD, standard deviation.

The interaction between outcomes and roles was significant when gratitude was the dependent variable,  $F_{(1, 35)} = 6.246, p = 0.017, \eta_p^2 = 0.151$ . When consolation was successful, the comforters underestimated the gratitude of the consoled,  $F_{(1, 35)} = 19.636, p < 0.001, \eta_p^2 = 0.359$ ; when consolation failed, the comforters underestimated the gratitude of the consoled to a greater extent,  $F_{(1, 35)} = 23.533, p < .001, \eta_p^2 = 0.402$ . This result suggests a greater misprediction for the comforters when comforting failed. In addition, the main effects of role ( $F_{(1, 35)} = 30.088, p < 0.001, \eta_p^2 = 0.462$ ) and outcome ( $F_{(1, 35)} = 91.843, p < 0.001, \eta_p^2 = 0.724$ ) were significant (see Figure 1). The statistical power of this study was 0.83.

The interaction between outcomes and roles was not significant when willingness to seek comfort again was the dependent variable,  $F_{(1, 35)} = 1.800, p = 0.188, \eta_p^2 = 0.049$ . The main effect of role was not significant,  $F_{(1, 35)} = 1.06, p = 0.31, \eta_p^2 = 0.029$ . The main effect of outcome was significant,  $F_{(1, 35)} = 119.023, p < 0.001, \eta_p^2 = 0.773$ . The participants' reported willingness to seek comfort again when reassurance was successful ( $M = 4.875, SD = 1.342$ ) was significantly greater than their willingness to seek comfort again when reassurance was unsuccessful ( $M = 2.278, SD = 1.923$ ).

When feeling was used as the dependent variable, the interaction between outcomes and roles was not significant,  $F_{(1, 35)} = 1.511, p = 0.227, \eta_p^2 = 0.041$ . The main effect of role was significant,  $F_{(1, 35)} = 7.851, p = 0.008, \eta_p^2 = 0.183$ . The actual feeling reported by the consoled participants ( $M = 2.292, SD = 2.435$ ) was significantly greater than the comforter's predicted value ( $M = 1.667, SD = 2.518$ ). The main effect of outcome was significant,  $F_{(1, 35)} = 100.679, p < 0.001, \eta_p^2 = 0.742$ . The participants reported significantly more feelings when comfort was successful ( $M = 3.681, SD = 1.442$ ) than when it was unsuccessful ( $M = 0.278, SD = 2.124$ ).

## Study 4: Causes of Comforters' Mispredictions

### Research Design

Study 4 used a "test failure" scenario to examine the stability of the comforters' mispredictions and to explore the causes of the mispredictions. This study was designed to test H3.

The study used a 2 (role: comforter/consoled) \* 2 (outcome: success/failure) between-subjects design. The dependent variable indicators and measurements selected in this study are mainly based on the studies of Shang et al on the misprediction of helping behavior.<sup>21</sup> If ability and warmth have no significant mediating effect on the relationship between role and rating in comfort success, then in the case of comforting failure, ability and warmth have significant mediating effects on the relation between role and rating, which can prove H3.



Figure 1 Interaction between outcomes (satisfaction and gratitude) and roles.



Referring to the experimental procedure of Shang et al.<sup>21</sup> The subjects first read the textual description, and after fully substituting themselves into the role, they finally made the corresponding judgments on the relevant values.

According to calculations by G\*power, for a moderate effect size ( $f = 0.25$ ), a minimum of 128 people would be required for Experiment 4 to achieve a statistical power of 0.8.

## Participants

College students were recruited on an Internet platform. A total of 136 participants, 36 males and 100 females, participated in the experiment, with a mean age of 21.97 years ( $SD = 3.80$ ).

## Materials

The experimental material read by the participants in the comforter condition was as follows:

Imagine yourself meeting your friend Li on your way home one day. He looks sullen and complains to you that he has spent a lot of time at driving school recently but failed his test because he was overly nervous in the test room. You look at him and pat him on the shoulder and say, 'That's not so bad, I have friends who have failed the test three or four times. It's only your first time, just do your best next time'.

Subjects in the successful group then read the following text description: "After hearing this, Li nodded, and his brow was stretched". Those in the unsuccessful group read a different description of the situation: "Li listened, still sullen, with a frown on his face".

The participants in the consoled condition read a similar scenario, only imagining themselves as recipients who were consoled by their friend Li because they had failed an exam.

The subjects read the textual description of the test failure situation and, after fully substituting themselves into the role, finally made judgments about the relevant values (satisfaction, gratitude, willingness to seek comfort again, feeling, competence, warmth). In this case, the comforters were asked to predict the reactions of the consoled: "How do you think Li would find your ability to comfort" (1=very poor, 7=very good) and "How warm do you think Li would find you" (1=very poor, 7=very good). The consoled were then asked "What do you think of Li's ability to comfort?" (1=very poor, 7=very good) and "What do you think of Li's warmth?" (1=very poor, 7=very good).

## Statistical Analysis and Results

### Impact of Different Roles and Comfort Outcomes on Ratings

As the four dependent variables were similar to those used in the previous experiments, the scores of the subjects on the four indicators of satisfaction, appreciation, willingness to seek comfort again and feeling were first standardized and then averaged and named "rating", with higher scores indicating more positive predictions or reports from the subjects. The results of the experiment are presented in Table 4.

The interaction of the outcomes with roles was significant,  $F_{(1, 132)} = 5.996, p = 0.016, \eta^2_p = 0.043$ . When consolation was successful, the rating predicted by the comforters was not significantly different from that reported by the consoled,  $F_{(1, 132)} = 0.148, p = 0.702, \eta^2_p = 0.001$ ; when consolation failed, the comforters significantly underestimated the rating of the consoled,  $F_{(1, 132)} = 14.800, p < 0.001, \eta^2_p = 0.101$ . This result suggests that comforters' mispredictions were present only in contexts where comforting failed or where the strength of the misprediction was weaker when comforting was successful. In addition, the main effects of role ( $F_{(1, 132)} = 8.951, p = 0.003, \eta^2_p = 0.064$ ) and outcome ( $F_{(1, 132)} = 14.850, p < 0.001, \eta^2_p = 0.101$ ) were significant.

### Impact of Different Roles and Comfort Outcomes on Competence and Warmth

An ANOVA was conducted with ability and warmth as dependent variables and roles and outcomes as independent variables. The results of the experiment are presented in Table 5.

The interaction effect between the outcomes and roles was significant when competence was the dependent variable,  $F_{(1, 132)} = 9.597, p = 0.002, \eta^2_p = 0.068$ . When consolation was successful, there was no significant difference between the comforters' predicted competence scores and the consoled's reported competence scores,

**Table 4** Predictions of the Comforters and Judgments of the Consoled (Study 4)

Dependent Variable	Predictions of Comforters M±SD	Judgment of the Consoled M±SD	F
<b>1. Satisfaction level of the consoled</b>			
Success	3.265±2.416	3.147±1.438	0.046
Failure	0.677±3.140	3.118±1.684	19.670***
<b>2. Appreciation level of the consoled</b>			
Success	3.029±2.443	3.588±1.743	0.988
Failure	1.147±3.086	3.235±1.724	13.790***
<b>3. Consoled's willingness to seek comfort again</b>			
Success	4.265±1.483	4.206±1.321	0.033
Failure	3.353±1.368	3.971±1.167	3.613
<b>4. Feeling of the consoled</b>			
Success	2.559±2.389	3.000±1.688	0.573
Failure	-0.177±3.119	1.794±2.199	11.422***
<b>5. Rating of the consoled</b>			
Success	0.229±0.890	0.304±0.599	0.148
Failure	-0.642±1.061	0.110±0.565	14.800***

Note: \*\*\*p < 0.001.

Abbreviations: M, mean; SD, standard deviation.

**Table 5** Comforters' and Consoleds' Predictions and Judgments of Comforts' Ability and Warmth

Dependent variable	Predictions of Comforters M±SD	Judgment of the Consoled M±SD	F
<b>1. The ability of the comforters</b>			
Success	4.677±1.065	4.265±1.355	1.858
Failure	3.000±1.435	3.912±1.083	9.109**
<b>2. The warmth of the comforters</b>			
Success	5.000±0.953	5.118±1.200	0.168
Failure	4.088±1.525	5.088±0.965	12.130***

Notes: \*\*p < 0.01. \*\*\*p < 0.001.

Abbreviations: M, mean; SD, standard deviation.

$F_{(1, 132)} = 1.858, p = 0.175, \eta^2_p = 0.014$ ; when consolation failed, the comforters significantly underestimated the consoled's reported competence scores,  $F_{(1, 132)} = 9.109, p = 0.003, \eta^2_p = 0.065$ . This result suggests that in the case of comfort failure, the comforters underestimated the consoled's perception of their competence, indicating that the consoled did not value competence as much as the comforters predicted for the consoled. In addition, the main effect of role ( $F_{(1, 132)} = 1.370, p = 0.244, \eta^2_p = 0.010$ ) was not significant. The main effect of outcome ( $F_{(1, 132)} = 22.564, p < 0.001, \eta^2_p = 0.146$ ) was significant.

The interaction between outcomes and roles was significant when warmth was the dependent variable,  $F_{(1, 132)} = 4.722, p = 0.032, \eta^2_p = 0.035$ . When consolation was successful, there was no significant difference between the comforters' predicted perceptions of warmth and the consoled's reported perception of warmth,  $F_{(1, 132)} = 0.168, p = 0.683, \eta^2_p = 0.001$ ; when consolation failed, the comforters significantly underestimated the consoled's reported perception of warmth,  $F_{(1, 132)} = 12.130, p = 0.001, \eta^2_p = 0.084$ . This result suggests that, upon comfort failure, the comforters underestimated the consoled's perception of their warmth, indicating that the consoled valued warmth more than the comforters predicted for the consoled. In addition, the main effects for roles ( $F_{(1, 132)} = 7.576, p = 0.007, \eta^2_p = 0.054$ ) and outcomes ( $F_{(1, 132)} = 5.372, p = 0.022, \eta^2_p = 0.039$ ) were significant.

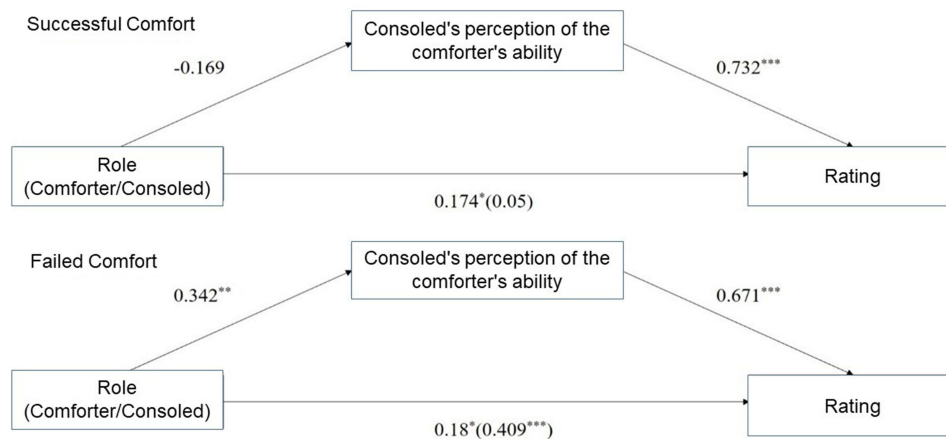
### The Mediating Effect of Ability and Warmth Between Roles and Ratings in Comforting Contexts

With role as the independent variable, rating as the dependent variable, ability as the mediating variable and outcomes as the moderating variable, the path of the moderating variable effect was between the independent and mediating variables. The mediating effect was tested by using the SPSS 23.0 macro program PROCESS compiled by Hayes (2013).

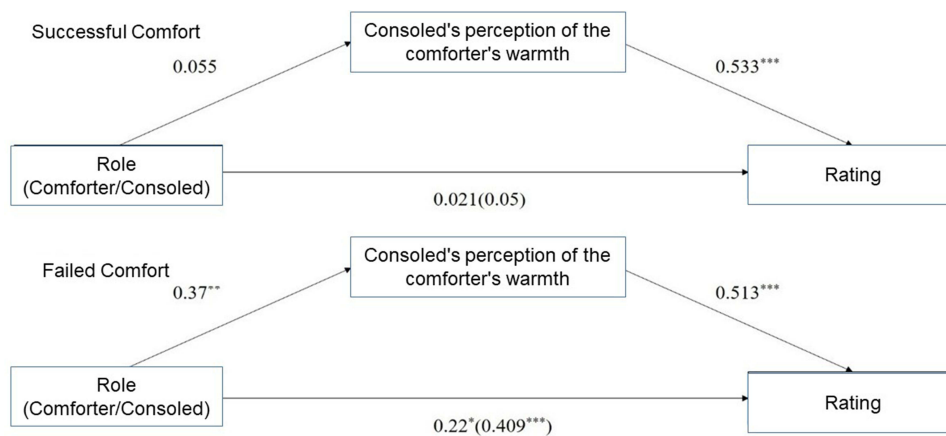
For successful reassurance, the 95% confidence interval was  $[-0.477, 0.092]$ , containing 0, indicating a nonsignificant mediating effect of ability; for failed reassurance, the 95% confidence interval was  $[0.127, 0.743]$ , not containing 0, indicating a significant mediating effect of ability (see Figure 2).

The same bootstrap sampling of 5000 mediated analyses was conducted with roles as the independent variable, ratings as the dependent variable, warmth as the mediating variable and outcomes as the moderating variable (Hayes, 2013)

For successful reassurance, the 95% confidence interval was  $[-0.172, 0.247]$ , containing 0, indicating a nonsignificant mediation effect of warmth; for failed reassurance, the 95% confidence interval was  $[0.129, 0.734]$ , not containing 0, indicating a significant mediation effect of warmth (see Figure 3). The statistical power of this study was 0.82.



**Figure 2** Mediating effect of ability. \*\*\* $p < 0.001$ , \*\* $p < 0.01$ . The coefficients are standardized regression coefficients.



**Figure 3** Mediating effect of warmth. \*\*\* $p < 0.001$ , \*\* $p < 0.01$ . The coefficients are standardized regression coefficients.

## General Discussion

In this study, four experiments were conducted to verify the existence of comforters' mispredictions in a comforting situation and that this bias increases when comforting fails. Furthermore, the comforters' mispredictions arose because they focused on their own competence dimension, whereas the consoled focused on the warmth dimension of the comforters.

In both real and imagined comfort situations, the comforters' predictions of the consoled's responses were more negative than the consoled's actual responses.

In real situations, comforters' predictions of consoled embarrassment were significantly greater than the consoled's actual responses, which is consistent with the findings of Kumar et al.<sup>23</sup> Anticipated emotions such as the decision maker's expected disappointment, as well as the advanced emotions and incidental emotions experienced during decision making, can directly and indirectly influence individuals' cognitive assessments and decision-making behaviors.<sup>43</sup> Anticipated negative emotions may allow comforters to reduce their self-efficacy, and Bandura argues that people's judgments of their abilities play a major role in their self-regulatory systems and that people tend to avoid tasks and situations that they believe are beyond their abilities and take on and perform those that they believe they can do.<sup>44</sup> If the comforters wrongly anticipate the level of embarrassment of the consoled, they may choose a more psychologically distant medium to express themselves, such as written form. However, text-based forms of media do not convey one's true intentions as clearly as voice-based forms;<sup>45</sup> moreover, this negative belief can prevent comforting behavior from occurring, and the helper becomes cautious and withdrawn when re-encountering the subject in need of comfort. It is possible that the "relationship" variable did not influence the results of the experiment, as subjects tended to write to people with whom they had better relationships. Interpersonal relationships are very important in Chinese culture. Recently, Chinese researchers have explored the influence of relationship type on helpers' misprediction and found that helpers' misprediction mainly occurs under conditions of normal relationships. When helpers and recipients have a normal relationship, helpers underestimate recipients' willingness to accept active help and recipients' positive emotional responses.<sup>24</sup> Future studies should try to manipulate relationship types to explore the misprediction of comforters.

In the imagined situation, the comforters significantly underestimated the consoled's satisfaction, gratitude and willingness to seek comfort again, while there was no significant difference in the dependent variable of feeling, which is generally consistent with the findings of Shang et al.<sup>21</sup> Regarding the results of the feeling variable, the researcher hypothesized that comforting behavior itself requires a certain level of emotion recognition, so the comforters were able to predict the feeling of the consoled more accurately in the comforting situation.

In contexts where comfort fails, the comforters significantly underestimate the gratitude and satisfaction of the consoled individuals. Gratitude is not only a social norm but also a highly adaptive norm, and expressing gratitude for the prosocial behavior of others reinforces the goodness of the givers.<sup>46</sup> However, this approach is not sufficient for explaining the effect of mispredictions during comfort failure. If, simply due to the influence of social approval, consoled exaggerates their judgments in both consolation success and failure contexts, then the comforter will underestimate the consoled's positive response in both contexts.

Social cognition theory appears to have stronger explanatory power for the effect of comforters' mispredictions. Perceivers typically perceive warmth as controllable, whereas competence is not directly controlled by the individual; moreover, some incompetent behavior does not undermine the perception of overall competence (eg, an absent-minded professor). In social perception, warmth judgments take precedence, and it is important to assess the intentions of others, which are sensitive to potential threats and contribute to biological survival.<sup>16</sup> In consolation situations, the comforter, as an actor, tends to perceive the self in terms of competence,<sup>39</sup> as competence directly affects the well-being of the self; the perceptions the consoled have of others are dominated by moral emotions, and they tend to interpret others from a warm-moral perspective.<sup>41</sup> When consolation is successful, both competence and warmth are reflected in the comforters, at which point there is less bias; when consolation fails, the high warmth and low competence characteristic of the comforters, combined with the inconsistency in the focus and perceived approach of the actor and recipient, leads to a stronger misprediction.

The effect of mispredicting on comforting behavior was consistent with that of mispredicting on helping behavior, with the intensity of mispredicting increasing in the failure condition. The experiments suggest that the misprediction of both comforting and helping behaviors can be explained in terms of social cognition; ie, the helper focuses on his or her own competence dimension, while the recipient focuses on the warmth dimension of the helper.

Misprediction in sharing behavior is mainly manifested by the tendency of gift givers to associate the amount they spend on a gift with the recipient's level of appreciation, where no such association exists for the recipient. Researchers have offered two explanations for this: one is egocentric bias, where people focus too much on their own experiences when trying to predict the reactions of others.<sup>37</sup> When selecting a gift, the giver had considered different options, and the recipient was unaware that the giver might have considered other gifts. They may have assessed their level of appreciation relative to not receiving a gift and perceived more consideration whenever they received a gift than when they did not. Second, reciprocity is prudent, and people are highly averse to the psychological experience of going into debt. Recipients may have more experience with indebtedness for more expensive gifts than for less expensive gifts. For some recipients, receiving a more expensive gift may be a disturbance, thereby reducing the pleasure they derive from receiving it. Indeed, past research has found that generous gifts elicit feelings of resentment rather than gratitude toward the giver.<sup>47</sup> The psychological mechanism of misprediction in sharing behavior is not consistent with misprediction in helping and comforting behavior. The experimenter suggests that the reason for the inconsistency may be that sharing behavior involves more material in form than comforting behavior. Comforting behavior is not costly, while sharing behavior implies loss. Lu et al proposed that we should pay attention to the adaptive function of misprediction instead of focusing on only its negative side.<sup>27</sup> From this point of view, gift givers can obtain certain psychological support by giving expensive gifts.

This study provides a reference for the psychological causes of comforter misprediction from social cognition theory. In terms of theoretical significance, this study enriches the understanding of the role of misprediction in prosocial behavior. While most existing studies focus on the misprediction of helpers in helping and sharing behaviors in prosocial behavior, this study focuses on the misprediction of comforters in comforting situations, which is unique; it expands the scope of research on the factors influencing prosocial behavior. This study reveals the influence of role factors (sender and receiver) on the production of misprediction in prosocial behavior, which enhances the systematicity of prosocial behavior research and enhances the ecological validity of prosocial behavior misprediction research. Most existing studies set up hypothetical contexts and less often examine misprediction in the context of real behaviors. In practical terms, it helps alleviate the psychological stress of the giver and promote the prosocial behavior of individuals; it also helps provide a theoretical basis for enhancing the comforting effect and helps people understand the psychological needs of different roles in comforting situations; it helps individuals build a good social interpersonal system and enhance trust and warmth in interpersonal communication.

Research on the role of misprediction on comforting behavior is still in its infancy, and there are many shortcomings in this area of study. First, a self-report method was used, and there may be some subjective factors, such as social approval. The social approval scale can be used to control for this after measurement, and some objective indicators, such as physiological indicators, can also be selected for future research to increase the internal validity of the experiment. Second, because Experiment 1 was a natural situation experiment, it was difficult to recruit participants, and the number of subjects was insufficient. Moreover, the content of the comfort letter may have affected the dependent variable; although embarrassment and surprise may not be closely related to the content of the letter, Experiment 1 still lacked rigorous experimental control. Thus, Experiment 1 is more of a quasiexperiment. In addition, future researchers can explore other mispredictions of prosocial behavior to enrich the theoretical framework of misprediction. Finally, the theoretical model underlying this study is only one of many perspectives, and future researchers can also propose different explanations based on different theories to enrich experimental studies of the causes of misprediction.

## Conclusions

In both real and imagined comforting situations, the comforters underestimate the positive responses of the consoled individuals and overestimate their negative responses.

This misprediction is unique in that it is stronger in contexts of comfort failure and persists steadily across contexts.

The cause of the comforters' mispredictions was that the comforters were concerned with their own levels of competence, while the consoled were more concerned with the level of warmth embodied by the comforters. This study helps relieve the psychological stress of comforters. Future studies should further explore the effect of relationship type on the misprediction of comforters.

## Data Sharing Statement

The data that support the findings of this study are available upon request from the corresponding author. The data are not publicly available because they contain information that could compromise research participant privacy/consent.

## Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The Biomedical Ethics Sub-Committee of the Academic Committee of Nanchang University approved the study.

## Informed Consent

Informed consent was obtained from all individual participants included in the study.

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## Disclosure

The authors report no conflicts of interest in this work.

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