



# State relationship orientation and helping behaviors: the influence of hunger and trait relationship orientations

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## Abstract

Exchange orientation (EO) and communal orientation (CO) are two fundamental relationship orientations (ROs). We argue that state RO (i.e., the relative activation of the two ROs at a specific moment) varies across situations and should be differentiated from trait ROs. In two studies, we examined how state RO affected subsequent helping behaviors and how it was influenced by a situational factor (i.e., hunger). We also examined whether trait ROs moderated the above links. An eye-tracking paradigm (Study 1) and a scenario-based paradigm (Study 2) were adopted to assess state RO. The two studies consistently found that relatively more activation of state EO over state CO reduced helping tendency toward strangers (Study 1) and acquaintances (Study 2). High trait CO amplified the effect in Study 1. Moreover, hunger heightened the relative activation of state EO over state CO in both studies, but the effect was only significant for participants with high trait EO in Study 1. The results highlight the importance to study the momentary variation of ROs and open new research directions.

**Keywords** Communal orientation · Exchange orientation · Eye-tracking · Helping · Hunger · Relationship orientation

People can be either exchange- or communal-oriented when interacting with others (Clark & Mills, 2012; Mills & Clark, 1994). When people are exchange-oriented, they are concerned about reciprocity and aim to maintain balanced exchanges with the partner. When people are communal-oriented, they care about the partner's needs and offer help without expecting payback. While individual differences in trait relationship orientations (ROs) are observed (Chen et al., 2001; Clark & Finkel, 2005), recent findings suggest that the activation of the two ROs varies across situations even in the same relationship context (Jiang et al., 2014; Li & Fung, 2019; Savani et al., 2016). The current research proposes the concept of state RO and argues that it should be conceptually differentiated from trait ROs. We examined

how state RO influenced subsequent helping behaviors, and how state RO was affected by a situational factor (i.e., hunger). We also investigated whether trait ROs moderated the above effects.

## State RO: the missing piece in previous research

Previous research has investigated RO from two perspectives. First, the two ROs are conceptualized as trait individual differences. Trait exchange orientation (EO) reflects how much people care about reciprocity and equity in interpersonal exchanges. Trait communal orientation (CO) indicates how much people are concerned about others' needs in interpersonal interactions (Mills & Clark, 1994; Perugini & Gallucci, 2001; Sprecher, 1998). The two ROs are two coexisting dimensions that can differentiate individuals' disposition in how they handle relationships. Second, the ROs are considered to characterize different types of relationships. Relationships differ quantitatively in their communal strength (Clark & Mills, 2012; Mills et al., 2004). In relationships with low communal strength (e.g., strangers and co-workers), EO is regularly adopted, and people keep

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track of social exchanges and respect the rule of reciprocity. In relationships with high communal strength (e.g., kinship and close friendship), CO is habitually adopted, and people are willing to satisfy the partner's needs at a high cost (Clark et al., 1986, 1989; Clark & Mills, 1979).

However, the above two perspectives cannot adequately explain the influence of a variety of other factors on people's adoption of the two ROs. For example, the prevalence of the exchange and communal norms vary across different cultural contexts. European Americans in the United States reported a higher level of EO than Indians and Japanese (Miller et al., 2014, 2017). More transient situational factors, such as monetary reminders and acute stress, also affect the momentary activation of ROs. For example, monetary reminders boosted EO and caused people to refrain from emotional expressions and prosocial behaviors in both distant and close relationships (Jiang et al., 2014; Savani et al., 2016). Daily personal stress weakened CO and reduced constructive interactions with both mothers and romantic partners (Li & Fung, 2019).

To better conceptualize the momentary variations of the two ROs, we believe that they are better considered as two modules, or two sets of rules that guide interpersonal interactions. The two modules coexist in people's mind. The activation of the two orientations is not exclusive to a specific group of individuals or some specific types of relationships. The activation of the two orientations is not all-or-none, either. In most situations, both EO and CO are activated to some extent. The CO and the altruistic tendency still exist when we interact with strangers (e.g., Levine et al., 2001). Similarly, EO and the rule of reciprocity are also at the back of our minds even in parent-child relationship (e.g., Silverstein et al., 2002). What guides interpersonal behaviors at a given situation is the *relative activation* of the two ROs at that moment. When EO is relatively more activated than CO, people are more likely to pay attention to past exchange record and act based on reciprocity rules. When CO is relatively more activated, people are more likely to observe others' needs and provide help to address the needs. The two orientations can also be simultaneously activated with similar strength. In that case, individuals' behaviors would be influenced by both sets of principles and become less characteristic of either orientation. We define the concept state RO to indicate the *relative activation* of the two ROs at a specific moment. It is not about any specific relationship orientation, but reflects a relative status about the comparative activation of the two ROs.

The state RO is jointly influenced by various factors and their interactions, including trait ROs, chronic contextual factors, and more transient situational factors. Trait EO and trait CO represent individual differences in the dispositional activation of the two orientations, respectively. Together

with other chronic contextual factors (e.g., relationship type, cultural values), they can affect the habitual activation of the two ROs across situations. When individuals have higher trait EO, dealing with an exchange-oriented relationship, or living in a culture valuing the exchange norm, the chronic activation of the EO will be higher so the state RO at a given moment in the above situations will also reflect a relatively higher activation of EO. In addition to these chronic factors, the momentary state RO is also influenced by transient situational factors (e.g., acute stressor, fluctuation of emotions). For example, acute personal stress (e.g., a critical exam) may raise the momentary activation of state EO, even for those with high trait CO.

We believe that the concept of state RO provides a concise way to capture the momentary variation of the two ROs. It not only better integrates previous findings about RO but also completes the understanding about how RO affects interpersonal interactions. The state RO can be a key factor that bridges different external factors with interpersonal behaviors. A range of external factors can influence the ongoing state RO. The current state RO will then direct people's interpersonal decisions.

The current two studies aim to empirically test the role of state RO in relationship dynamics. Using different paradigms assessing state RO and in two different relationship contexts, we examined how state RO influenced people's helping tendency, how a situational factor (i.e., hunger) affected state RO, and how trait ROs moderated the above two processes.

## State RO and helping behaviors

Helping behaviors reflect people's concern for others' welfare and contribute to social capital of the society. Previous research has found that RO can influence people's prosocial tendency and helping behaviors. People with high trait CO and those primed to expect a communal relationship with another person are more likely to offer help to others (Clark et al., 1987). Similarly, people with high trait CO were more likely to make socially responsible decisions, while people with high trait EO were more likely to pursue self-interests when primed with power (Chen et al., 2001). However, the relationship between trait ROs and helping behaviors can be altered by situational factors. For example, the negative association between trait EO and prosocial tendency was eliminated when individuals were primed with mortality salience (Schindler et al., 2014). Thus, trait ROs may not be the proximal factor that directly influences people's interpersonal behaviors. Instead, trait RO can interact with situational factors to affect the momentary state RO, which in turn determines individuals' behaviors in a specific situation.

A challenge for studying state RO is how to assess the momentary activation of the two ROs. In previous studies, the intrapersonal variation of ROs is either assessed by repetitive daily self-reports or implied by subsequent interpersonal behaviors (e.g., Li & Fung, 2019; Savani et al., 2016). Both methods cannot capture the momentary change of state RO. As the information that people refer to when making interpersonal decisions marks a critical difference between EO and CO, we developed two new paradigms, one based on the eye-tracking technique (Study 1) and the other based on helping scenarios (Study 2), to measure state RO. Both paradigms assess participants' preference toward the two types of information (i.e., exchange history versus partner's needs) while deciding whether to help others. The momentary preference toward different types of information can be an objective real-time indicator of state RO. Preference toward information on exchange history indicates more activation of EO, whereas preference toward information on partner's needs indicates more activation of CO. With the newly developed paradigms, the current two studies are able to directly assess state RO (i.e., the relative activation of CO versus EO at a given moment) and examine how it is related to helping behaviors. It is expected that relatively more activation of state EO over state CO would decrease the likelihood for people to offer help.

### The influence of situational factors on state RO

An important nature of state RO is that it is susceptible to the influence of situational factors. Previous research has shown that, in a specific situation, the influence of situational factors on human behaviors can be greater than individual dispositions (e.g., Liberman et al., 2004). In other words, while trait ROs reflect people's relatively stable dispositional difference in RO across situations, transient situational factors may exert a substantial influence on momentary activation of the two ROs in a specific situation. Thus, in addition to the relationship between state RO and helping behaviors, the current two studies also aim to test whether a specific situational factor, hunger, can affect the state RO.

Hunger signals the basic physiological need for food. It reflects the deprivation of a most fundamental physiological need in Maslow's hierarchy of needs (Maslow, 1943). Physical stress caused by visceral needs can highlight primary self-interests and restrain the pursuit of higher-level needs (e.g., love and belongingness). Previous studies have found that hunger promoted individuals' focus on present pleasure and preference to hedonic choices (Otterbring, 2019). Hungry individuals also demonstrated higher tendency to acquire food and nonfood items (Xu et al., 2015). In the

interpersonal context, hunger is found to boost self-interests in social interactions (Faber & Häusser, 2022). Moreover, sticking to the rule of reciprocity (i.e., EO) is found to be the default for social interactions, even when cognitive control resources are depleted (Halali et al., 2014). Meanwhile, depletion of self-regulatory energy reduced willingness to offer help to strangers but not family members (DeWall et al., 2008), suggesting that caring for others' needs (i.e., CO) is effortful. Thus, with elevated self-interests, we expect the active experiencing of hunger to affect state RO. In particular, it could promote the momentary activation of the EO (i.e., ensuring that one is not exploited) and dampen the activation of the CO (i.e., checking whether the partner needs help).

### Trait ROs as moderators

While state RO plays an essential role in linking situational factors (e.g., hunger) with interpersonal decisions (e.g., helping behaviors), trait ROs are expected to moderate both paths. First, trait ROs may moderate the effect of state RO on helping behaviors. State RO reflects the real-time allocation of cognitive resources to process information related to either helping record or partner's needs. Whether the cognitive shift can translate into actual behavioral change depends on people's skills and motivation to perform the behaviors (Bandura, 1965; Cramer et al., 1988). Trait ROs, either EO or CO, are related to a set of chronically accessible motivational and behavioral responses following the respective interaction norm. For people with low trait ROs, they have few readily available prepotent responses. Thus, even when state RO has changed and attention shifts to either exchange- or communal-oriented information, it may not easily translate into actual behaviors. In contrast, those with high trait ROs have more prepotent interpersonal responses. No matter whether the prepotent responses are exchange- or communal-oriented, the change of state RO will be more likely to result in the change of actual behaviors. Thus, we expect the link between state RO and helping behaviors to be stronger for people with higher trait ROs.

Second, trait ROs may moderate the effect of hunger on state RO. Hunger reflects deprivation of a fundamental physiological need and directs resources to prioritize self-interests. Trait EO is also characterized by an egoistic focus in social interactions. It is related to a calculative way of offering help and overreaction to daily conflicts (Jarvis et al., 2019). People with high trait EO have a higher dispositional tendency to react in an exchange-oriented manner. The dispositional tendency can be suppressed or inhibited when self-regulatory resources are abundant, but when individuals are physiologically deprived, their behaviors

will be dominated by the dispositional tendency. Thus, for those with high trait EO, their state EO will be more readily activated in compromised conditions (e.g., hunger). In contrast, trait CO cultivates supportive relationships that care for each partner's welfare and benefit both personal and relational well-being. The communal context can also lead people to be less self-protective (Clark et al., 2017; Le et al., 2018). Thus, people with high trait CO have a predisposition to react in a communal-oriented manner across situations. Their state RO would be more resistant to the influence of hunger.

## The current research

To conclude, we propose four hypotheses. First, relatively more activation of state EO over state CO (i.e., relatively more attention paid to information about exchange history over partner's needs) is expected to be related to decreased helping behaviors, and relatively more activation of state CO over state EO would be related to increased helping behaviors (H1). Moreover, both trait EO and trait CO are expected to enhance the influence of state RO on helping behaviors (H2). That is, relatively more activation of state EO (or CO) will be more strongly related to decreased (or increased) helping behaviors for people with high trait ROs. Third, hunger is expected to raise the relative activation of state EO over state CO (H3). Lastly, trait EO is expected to intensify the effect of hunger on state RO, whereas trait CO is expected to weaken the effect (H4). Two studies were conducted to test the hypotheses with two different paradigms to measure state RO (i.e., eye-tracking and helping scenarios) and in two different relationships (i.e., strangers versus acquaintances). Both studies received ethical approval from the Human Research Ethics Committee of The Education University of Hong Kong. All measures, manipulations, and exclusions of the studies were reported.

## Study 1

Study 1 adopted an eye-tracking based paradigm to measure state RO and examined helping behaviors toward a stranger during a computerized mathematics game. Participants' trait ROs were assessed after the game. All the four hypotheses were tested in the study.

## Method

### Participants and procedure

The required sample size was estimated before data collection by G\*Power 3.1 (Faul et al., 2009). A sample of 150 was needed to detect a partial  $R^2$  of 0.04 at the  $\alpha$  level of 0.05 with 0.80 power. We expanded the target sample size by around 20% to account for possible invalid data and recruited a total of 176 students from a university in Hong Kong. The participants were offered either a monetary stipend of 54 Hong Kong dollars (equivalent to around 6.97 US dollars) or course credit for participation. Participants with visual impairments other than short-sightedness, long-sightedness, or astigmatism were screened out from the study.

Participants were told that the main purpose of the experiment was to examine how caloric level influenced mathematic performance. After registration, the participants were first randomly assigned to either the satiation condition or the hunger condition. Those in the satiation condition were instructed to have a decent meal (e.g., breakfast, lunch, or afternoon tea) less than one hour before the start of the experiment, whereas those in the hunger condition were instructed not to eat anything for at least four hours before the experiment. All experimental sessions for both conditions were scheduled during the day around the meal times. The participants rated their subjective satiation level (1 = very hungry, 7 = very satiated) and reported the number of hours since their last meal upon arrival at the laboratory. Then, they were asked to play an "interactive" mathematics game. For each session, one participant and one same-sex confederate were paired up, and the experimenter briefed them together about the procedure of the game.

**"Interactive" mathematics game.** The game serves two purposes. First, participants' relative attention toward information about exchange history and partner's needs while deciding whether to help the partner was recorded by an eye-tracker to indicate state RO. Second, the actual helping decisions made were recorded to indicate helping behaviors.

In the game, the participants need to mentally calculate the remainder of a three-digit integer divided by seven. For each trial, a random three-digit integer would appear in the upper-middle part of the screen, and two possible answers would simultaneously appear in the lower part of the screen. The participants need to press the S (indicating the choice on the left) or L (indicating the choice on the right) key on the keyboard to choose the correct answer. Feedback was given for each trial and a count of correct answers was constantly shown at the bottom of the screen. To motivate the participants to obtain good performance in the task, if they could finish 100 correct trials within eight minutes while

maintaining an accuracy rate higher than 90%, they would be rewarded an additional 20-dollar coupon (equivalent to around 2.58 US dollars).

Moreover, the participants were told that interaction between the two players was built in the mathematic task to keep their interest. Some help-seeking opportunities would be randomly granted to each player among the calculation trials. When the opportunity was granted to one player, he/she was required to indicate how much he/she needed the partner's help from 1 (low) to 9 (high). Then the other player would receive this information together with the exchange record between the two players and decide whether to offer help. If the second player agreed to help, he/she would complete five trials for the first player. Thus, for each player, they would encounter *help-seeking trials* in which they indicate how much they need the partner's help (see Figure S1a in the supplementary information). They would also encounter *help-sought trials*, in which they receive the request from the partner and decide whether to offer help (see Figure S1b).

Then, the participant and the confederate were told that one of them would stay in the eye-tracking room and his/her attention during the mathematical game would be measured. The other one would go to another room with equipment to measure physiological responses which was across the corridor, and his/her emotional reactions during the game would be measured. The participant and the confederate were also shown to the other room with physiological equipment and asked to draw lots to decide who would stay in the eye-tracking room. The actual participant would always be assigned to stay in the eye-tracking room, and the confederate would leave for the other room with another experimenter.

In fact, the game was not interactive but followed a preset process. A total of 10 help-seeking and 10 help-sought trials would appear for each participant. When the "interactive" trials would appear and all responses of the "partner" were decided beforehand and kept consistent for all the participants. The partner would offer help to the participant 5 out of the 10 help-seeking trials following a preset sequence and always indicate a medium need strength (i.e., varying between 5 and 6) in all 10 help-sought trials. Our major interest was the participants' attention during the 10 help-sought trials (see Figure S1b) and how many times they agreed to offer help to the confederate.

**Eye-tracking.** To assess participants' attention during the help-sought trials, we used the EyeLink 1000 eye tracker from the SR Research Limited with a sampling rate of 500 Hz and monocular recording. The stimuli were presented on a 22-inch monitor with an aspect ratio of 16:10 and display resolution of 1680 × 1050 pixels. The participants were asked to sit naturally with their chin rested on

a padded chinrest. The participants' eyes were about 85 cm away from the monitor and 55 cm away from the eye tracker.

The eye-tracking technique provides direct and objective records of participants' visual attention (Mele & Federici, 2012). It has been widely used to measure people's attentional preference in psychological research (e.g., Crawford et al., 2016; Isaacowitz et al., 2006). In the current study, it could directly assess participants' attention paid to information about the partner's need versus the helping record, respectively. During the help-sought trials, under the question "Offer help to the partner?", two graphs would appear on the left and right side of the screen, one showing the strength of the partner's need, and the other one showing previous helping record between the two players (i.e., how many times they offered help to each other up to now). Two areas of interest (AOIs) were set for the need strength graph and the helping record graph, respectively. Each AOI was defined following the boundaries of the graph with a size of 400 mm × 400 mm. Participants' fixation duration toward each AOI was recorded. More attention paid to the need strength graph indicates more activation of state CO, whereas more attention paid to the helping record graph indicates more activation of state EO. The position of the two graphs and the position of the "Yes" and "No" choices for offering help were both counterbalanced across the 10 help-sought trials. We recorded how many times the participants agreed to offer help to the "partner" and their overall accuracy in all the calculation trials.

Each participant first went through some practice trials of the mathematics game to familiarize themselves with different types of trials during the game. Subsequently, a nine-point eye-tracker calibration was conducted. To make the interactive nature of the game more believable, the experimenter then went out of the lab to check whether the "participant" in the other room had finished the preparation for around half a minute. The mathematics game began after the experimenter returned. After the interactive game, the participants were asked to complete a questionnaire about their trait ROs and demographic information. Finally, they were asked whether they had any suspicion about the procedure and were debriefed regarding the true purpose of the study.

A total of 29 participants (14 from the satiation condition) were excluded from data analyses due to one or more of the following reasons: (a) 6 (all from satiation condition) for failure to fully abide by the eating instruction for the assigned condition, (b) 7 (2 from satiation condition) for failure to generate complete eye-tracking data, (c) 4 (2 from satiation condition) for failure to understand or complete the mathematical game, (d) 8 (2 from satiation condition) for lower than 80% accuracy rate in the mathematical game, (e) 6 (3 from satiation condition) for suspicion of the research procedure, and (f) 1 (from the satiation condition)

for mismatch of the participant's and the confederate's gender. Two participants were excluded for multiple reasons, one (from hunger condition) for both (b) and (e), and one (from satiation condition) for (b), (c), and (e). The final sample included 147 participants (78 females;  $M_{\text{age}} = 19.98$  years,  $SD_{\text{age}} = 2.19$  years), with 74 (40 females) assigned to the satiation condition and 73 (38 females) to the hunger condition. Most participants reported education level at the bachelor level (96.6%).

## Measures

**State RO.** Fixation duration (FD) within the need strength AOI and that within the helping record AOI recorded by the eye-tracker were extracted for each help-sought trial. Following similar studies about selective fixation to two stimuli (e.g., Isaacowitz et al., 2006), the index for state RO for each trial was calculated according to the formula:  $\text{State RO} = (\text{FD}_{\text{need strength}} - \text{FD}_{\text{helping record}}) / (\text{FD}_{\text{need strength}} + \text{FD}_{\text{helping record}})$ , which controlled for individual differences in the overall fixation tendency. The final state RO index was calculated as the mean across the 10 help-sought trials. A higher value of the index indicated relatively more activation of state CO over state EO.

**Helping.** The participants' decision for the 10 help-sought trials was recorded. The number of times that they agreed to offer help to the confederate was used as the indicator for helping behaviors.

**Trait ROs.** The 14-item Communal Orientation Scale (Clark et al., 1987) was adopted to measure the participants' trait CO (Cronbach's  $\alpha = 0.68$ ), whereas five items from the Exchange Orientation Scale (Mills & Clark, 1994) were used to measure trait EO (Cronbach's  $\alpha = 0.64$ ). The other four items of the Exchange Orientation Scale were not analyzed as they impaired the reliability of the scale.<sup>1</sup> The participants rated all the items from 1 (extremely uncharacteristic of me) to 7 (extremely characteristic of me). Sample items were "When making a decision, I take other people's needs and feelings into account (CO)," and "When I give something to another person, I generally expect something in return (EO)."

**Demographic information.** The participants' age, gender, education level, and monthly family income were recorded.

## Results

Descriptive statistics of the sample were presented in Table S1 in the supplementary information. The participants in

the two conditions did not differ significantly in age,  $t(145) = -0.41$ ,  $p = .680$ , family income,  $t(143) = 0.94$ ,  $p = .351$ , trait CO,  $t(145) = 0.56$ ,  $p = .559$ , or trait EO,  $t(145) = 0.53$ ,  $p = .533$ .

## Preliminary analyses

As expected, participants in the satiation condition ( $M = 5.45$ ,  $SD = 0.86$ ) reported a significantly higher subjective satiation level compared to those in the hunger condition ( $M = 2.93$ ,  $SD = 1.12$ ),  $t(135.10) = 15.22$ ,  $p < .001$ . Time from the last decent meal (in hours) was also significantly shorter for those in the satiation condition ( $M = 0.65$  h,  $SD = 0.32$ ) than those in the hunger condition ( $M = 9.32$  h,  $SD = 4.13$ ),  $t(72.88) = -17.86$ ,  $p < .001$ . No significant gender differences were found in state RO, trait RO, or helping behaviors,  $ps > 0.12$ . Gender also did not moderate the effect of hunger on state RO,  $b = -0.04$ ,  $SE = 0.06$ ,  $t = -0.69$ ,  $p = .493$ , or the effect of state RO on helping behaviors,  $b = -0.81$ ,  $SE = 2.05$ ,  $t = -0.40$ ,  $p = .692$ . Thus, no gender effects were examined in the analyses.

## Data analysis plan

Two regression models were estimated to test the relationship between state RO and helping behaviors (H1), as well as how trait ROs moderated the relationship (H2). Model 1 tested H1, in which state RO was estimated as the predictor of helping behaviors. Trait EO and trait CO and their interactions with state RO were added in Model 2 to test the moderating effects of trait ROs (H2). Satiation status was controlled in both models.

Similarly, two regression models were estimated to test the relationship between satiation status (0 = satiation, 1 = hunger) and state RO (H3), and how trait ROs moderated the relationship (H4). In Model 3, satiation status was estimated as the predictor of state RO (H3). Then, trait EO and trait CO and their interactions with satiation status were added in Model 4 to examine the moderating effects of trait ROs (H4). Trait EO and trait CO were standardized before being entered into all the models. Model 2 from the PROCESS 3.0 macro of SPSS (Hayes, 2017) was used to estimate the moderation models.

## State RO and helping behaviors

The results of Models 1 and 2 were presented in Table 1. Results of Model 1 supported H1. A higher value of the state RO index (i.e., relatively more activation of state CO over state EO) was significantly related to more helping behaviors,  $b = 1.95$ ,  $SE = 0.96$ ,  $p = .043$ , 95% CI = [0.06, 3.83]. In other words, relatively more activation of state CO over

<sup>1</sup> We replicated the analyses using all nine items of the Exchange Orientation Scale. The pattern of the results as reported in Tables 1 and 2 remained unchanged.

**Table 1** Regression models testing the effect of state RO on helping behaviors (Model 1) and the moderating effects of trait EO and CO (Model 2) while controlling for satiation status in Study 1

Variables	Model 1			Model 2		
	<i>b</i>	<i>SE</i>	95% CI	<i>b</i>	<i>SE</i>	95% CI
Constant	6.46***	0.28	5.91–7.01	6.37***	0.26	5.86–6.89
Satiation status (0 = satiation, 1 = hunger)	0.27	0.37	-0.47–1.00	0.38	0.35	-0.32–1.07
State RO (CO vs EO)	1.95*	0.96	0.06–3.83	2.27*	0.93	0.43–4.11
Trait EO				-0.44*	0.18	-0.79 – -0.09
Trait CO				0.13	0.20	-0.27–0.52
State RO × Trait EO				0.20	0.69	-1.17–1.58
State RO × Trait CO				3.40**	1.05	1.32–5.47
<i>F</i>		2.25			5.21***	
<i>R</i> <sup>2</sup>		.03			.18	

Notes. Higher state RO index indicated relatively more activation of state CO over state EO. Trait EO and trait CO were standardized. RO = relationship orientation, EO = exchange orientation, CO = communal orientation; \* $p < .05$ , \*\* $p = .002$ , \*\*\* $p < .001$

state EO would be related to a higher likelihood to offer help to the confederate.<sup>2</sup>

In Model 2, the main effect of state RO on helping behaviors remained to be significant,  $b = 2.27$ ,  $SE = 0.93$ ,  $p = .016$ , 95% CI = [0.43, 4.11]. Moreover, the effect was moderated by trait CO,  $b = 3.40$ ,  $SE = 1.05$ ,  $p = .002$ , 95% CI = [1.32, 5.47]. Simple slope analyses showed that the positive association between state RO and helping behaviors was stronger for people with high trait CO (mean + 1SD),  $b = 5.67$ ,  $SE = 1.50$ ,  $p < .001$ , 95% CI = [2.70, 8.64] (Fig. 1). The effect remained significant for people with average trait CO,  $b = 2.27$ ,  $SE = 0.93$ ,  $p = .016$ , 95% CI = [0.43, 4.11], but was

helping behaviors,  $b = 0.20$ ,  $SE = 0.69$ ,  $p = .771$ , 95% CI = [-1.17, 1.58], but the main effect of trait EO on helping behaviors was significant,  $b = -0.44$ ,  $SE = 0.18$ ,  $p = .014$ , 95% CI = [-0.79, -0.09]. H2 was partially supported.

### Satiation status and state RO

The results of Models 3 and 4 were presented in Table 2. In Model 3, satiation status was not significantly related to state RO,  $b = -0.03$ ,  $SE = 0.03$ ,  $p = .402$ , 95% CI = [-0.09, 0.04]. In Model 4, the main effect of satiation status on state RO remained to be not significant,  $b = -0.03$ ,  $SE = 0.03$ ,

**Table 2** Regression models testing the effect of satiation status on state RO (Model 3) and the moderating effects of trait EO and CO (Model 4) in Study 1

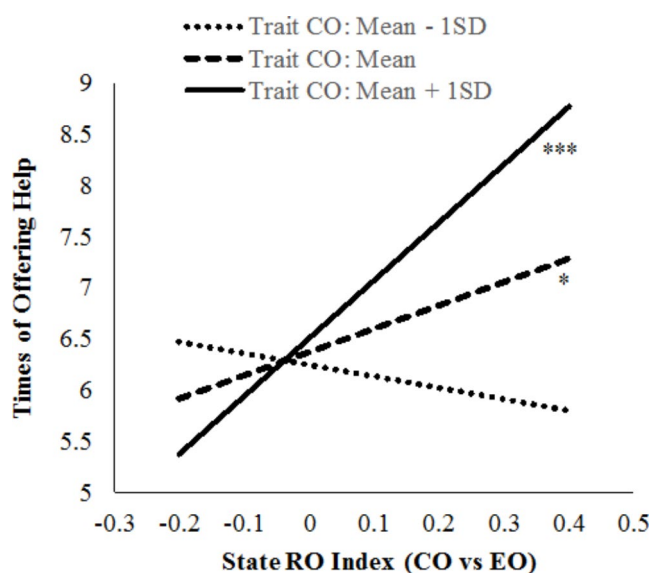
Variables	Model 3			Model 4		
	<i>b</i>	<i>SE</i>	95% CI	<i>b</i>	<i>SE</i>	95% CI
Constant	0.10***	0.02	0.06–0.15	0.10***	0.02	0.05–0.14
Satiation status (0 = satiation, 1 = hunger)	-0.03	0.03	-0.09–0.04	-0.03	0.03	-0.09–0.04
Trait EO				0.04	0.02	-0.003–0.09
Trait CO				0.03	0.02	-0.02–0.07
Satiation status × Trait EO				-0.09**	0.03	-0.16 – -0.03
Satiation status × Trait CO				-0.04	0.03	-0.11–0.02
<i>F</i>		0.71			1.92	
<i>R</i> <sup>2</sup>		.01			.06	

Notes. Higher state RO index indicated relatively more activation of state CO over state EO. Trait EO and trait CO were standardized. RO = relationship orientation, EO = exchange orientation, CO = communal orientation; \*\* $p = .005$ , \*\*\* $p < .001$

not significant for people with low trait CO (mean – 1SD),  $b = -1.12$ ,  $SE = 1.30$ ,  $p = .389$ , 95% CI = [-3.69, 1.45]. Meanwhile, trait EO did not moderate the effect of state RO on

$p = .395$ , 95% CI = [-0.09, 0.04]. However, trait EO significantly moderated the effect of satiation status on state RO,  $b = -0.09$ ,  $SE = 0.03$ ,  $p = .005$ , 95% CI = [-0.16, -0.03]. Further simple slope analyses showed that only for people with high trait EO (mean + 1SD), satiation status had the expected negative effect on state RO,  $b = -0.12$ ,  $SE = 0.05$ ,  $p = .009$ , 95% CI = [-0.21, -0.03] (Fig. 2). In other words, hunger promoted the activation of state EO over state CO (i.e., relatively more attention paid to the exchange record

<sup>2</sup> We tested the relationship between state RO and helping decision at trial level using multilevel modeling. State RO and helping decision (as a binary outcome) in each help-sought trial were considered as the level 1 data nested within individuals. Results consistently indicated that state RO (i.e., relatively more fixation toward partner's needs over help record) was significantly related a higher likelihood to offer help to the partner,  $\beta = 0.29$ ,  $SE = 0.12$ ,  $p = .019$ .



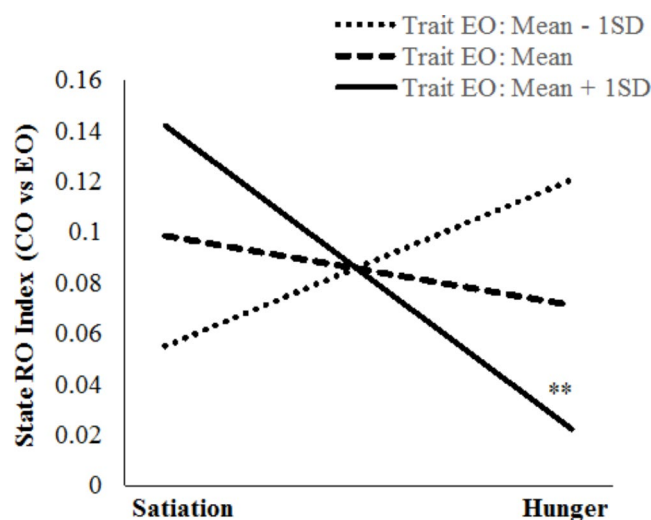
**Fig. 1** Trait CO moderated the effect of state RO on helping behaviors in Study 1. Higher state RO index indicated relatively more activation of state CO over state EO. CO=communal orientation, EO=exchange orientation, RO=relationship orientation; \* $p = .016$ , \*\*\* $p < .001$

than the strength of the partner's need) for those with high trait EO. However, the effect of satiation status on state RO was not significant for those with average trait EO,  $b = -0.03$ ,  $SE = 0.03$ ,  $p = .395$ , 95% CI = [-0.09, 0.04], or low trait EO (mean - 1SD),  $b = 0.07$ ,  $SE = 0.05$ ,  $p = .152$ , 95% CI = [-0.02, 0.16]. Meanwhile, trait CO did not moderate the effect of satiation status on state RO,  $b = -0.04$ ,  $SE = 0.03$ ,  $p = .188$ , 95% CI = [-0.11, 0.02]. H3 and H4 were partially supported.

## Discussion

Results of Study 1 confirmed our hypothesis that, on top of trait ROs, state RO significantly affected people's helping behaviors (H1). In particular, relatively more activation of state CO over state EO was linked to a higher likelihood to help a stranger in a mathematical task. However, H2 on the moderating effect of trait ROs on the effect of state RO on helping behaviors was only partially supported. Trait CO, but not trait EO, strengthened the effect of state RO on helping behaviors.

Meanwhile, the hypothesis about the influence of hunger on state RO (H3) was partially supported. Only for people with high trait EO, those in the hungry condition paid more attention to the exchange history relative to the partner's needs (i.e., relatively more activation of state EO over state CO) than those in the satiated condition. H4 about the moderating effect of trait ROs on the effect of hunger on state RO was partially supported as well. Trait EO, but not trait CO, moderated the effect of hunger on state RO.



**Fig. 2** Trait EO moderated the effect of satiation status on state RO in Study 1. Higher state RO index indicated relatively more activation of state CO over state EO. EO=exchange orientation, RO=relationship orientation, CO=communal orientation; \*\* $p = .009$

Study 1 also has the following limitations. First, although the eye-tracking paradigm assesses participants' attentional preference while making the helping decision and can serve as an objective real-time indicator of state RO, the eye-tracking technique is not a perfect measure for attention. In some cases, it is possible for people to fixate on a certain area while attending to objects in the extra-foveal region (Palmer, 1999). To eliminate the ambiguity, a scenario-based paradigm was used to measure state RO in Study 2. Participants explicitly choose between different types of information (i.e., exchange history vs. partner's needs) to assist decision-making in the new paradigm. Second, Study 1 only examined interaction with a stranger. Study 2 examined helping tendency toward an acquaintance to test the generalizability of the results to another relationship context. Lastly, trait ROs were measured immediately after the eye-tracking session in Study 1. Although t-tests showed that no significant differences existed in trait ROs across the two conditions, participants' answers were still susceptible to the influence of lab experience and situational thoughts and feelings. To minimize these influences, trait ROs were measured more than one week after the assessment of state RO and helping decisions in Study 2.

## Study 2

Study 2 adopted a scenario-based paradigm to measure state RO and examined helping behaviors toward acquaintances. All the four hypotheses were tested in the study.



## Method

### Participants and procedure

Participants were recruited through the online data collection platform Mechanical Turk (MTurk). Respondents who were at least 18 years old and lived in the United States were eligible for the study. Participants were told that the purpose of the study was to explore how people make helping decisions. They answered an online survey (i.e., the Time 1 survey) which first asked the number of hours since their last food intake (less than one hour ago, 1 to 2 hours ago, 2 to 3 hours ago, 3 to 4 hours ago, 4 to 5 hours ago, and more than 5 hours ago) and their subjective satiation level. They then were instructed to consider 10 different scenarios in which they needed to decide whether to offer help to an acquaintance, followed by a few demographic questions. They were asked to indicate the time from their last food intake again at the end of the Time 1 (T1) survey to ensure the accuracy of the information.

Only respondents who had the last food intake within one hour (i.e., the satiation condition) or more than 5 hours ago (i.e., hunger condition) were included for the current study. The survey was only activated in the early hours of the morning (around breakfast time) as relatively more respondents were expected to meet the requirements about the food-intake time (either satiated or hungry) during these hours. One week after T1, the qualified participants were invited through MTurk again to complete the Time 2 (T2) online survey. The survey was introduced as a separate study about relationship orientation and perceived stress. After completing scales about trait relationship orientations and perceived stress (as a potential confounding variable), participants were debriefed about the true purpose of the two surveys. The two-phase data collection protocol was adopted to avoid interference between the state and trait ROs. Participants received 0.5 US dollars for completing the T1 survey and 1 US dollar for the T2 survey.

The required sample size was estimated before data collection by G\*Power 3.1 (Faul et al., 2009). To detect a partial  $R^2$  of 0.03 at the  $\alpha$  level of 0.05 with 0.80 power, a sample of 202 was needed. The expected effect size (i.e., partial  $R^2 = 0.03$ ) was slightly smaller than Study 1 because the paradigm based on helping scenarios was expected to be less sensitive in detecting the fine variation of state RO. As MTurk may not be effective in inviting the same participants back for the T2 survey, we planned for a high attrition rate of 50% and aimed to recruit 150 participants for each condition at T1. In the end, 391 participants gave consistent answers to the food intake question at the beginning and toward the end of the T1 survey and met the requirement for either the satiation condition or the hunger condition.

Twenty-four of them were excluded for failing the attention check questions. The final sample consisted of 367 participants (208 females;  $M_{\text{age}} = 44.22$  years,  $SD_{\text{age}} = 13.53$  years), with 150 (75 females) in the satiation condition and 217 (133 females) in the hunger condition. Most participants were Caucasian (81.7%), 7.6% were African American, 6.3% were Asian, 2.2% were Hispanic, and 2.2% were of other ethnicities. All participants received upper secondary education (17.4%) or tertiary education (82.6%), and 82.6% of them were employed. Moreover, 282 of the 367 participants responded to the T2 survey one week later. Six of them failed the attention check and were excluded, leaving 276 participants (158 females;  $M_{\text{age}} = 44.86$  years,  $SD_{\text{age}} = 13.69$  years; 113 in the satiation condition and 163 in the hunger condition) with complete data for both time points. The study was preregistered at the Open Science Framework (<https://osf.io/kgxq8/>).

### Measures

**Subjective satiation level (T1).** Participants rated their subjective satiation level on a 7-point scale from 1 (very hungry) to 7 (very full).

**State RO and helping tendency (T1).** Ten scenarios were created to measure participants' state RO and helping tendency. In each scenario, participants needed to decide whether to offer help to an acquaintance (e.g., a colleague, a neighbor, an acquaintance, etc.). They were instructed to imagine a same-gender acquaintance whom they had known for a while but were not emotionally close. A sample scenario was "Your neighbor is replacing some of his/her furniture and is moving things in and out of his apartment. Will you lend a hand?"

After participants read each scenario, they were told that they could have one additional background information to help them make the decision. Two buttons labeled "How much s/he needs the help" and "Previous exchanges between you two" respectively were shown on the screen side by side, and participants were asked to choose one of them. The position of the two buttons was randomized across the 10 scenarios. After clicking one of the buttons, the additional information would be presented. Then, participants were asked to indicate how likely they would offer help in that scenario from 1 (extremely unlikely) to 7 (extremely likely). A trial scenario was presented in the beginning for the participants to familiarize themselves with the procedure. Choosing to know more about the partner's needs (versus the exchange history) reflected the activation of state CO (vs. EO), so the total number of times that a participant chose the communal information across the 10 scenarios was calculated and used to indicate state RO (CO vs. EO). The helping likelihood rating across the ten

scenarios was averaged to indicate helping tendency (Cronbach's  $\alpha=0.78$ ).

**Demographic information (T1).** Participants' age, gender, ethnicity, region of residence, employment status, and education were recorded.

**Trait ROs (T2).** As in Study 1, trait CO was measured by the 14-item Communal Orientation Scale (Clark et al., 1987), and trait EO was measured by the 9-item Exchange Orientation Scale (Mills & Clark, 1994). The two scales had good reliability in the current sample (Cronbach's  $\alpha=0.85$  and  $0.75$ ).

**Perceived stress (T2).** As the data were collected after the outbreak of the COVID-19 pandemic, which has brought unexpected changes to people's daily life, participants' stress level was measured by the 10-item Perceived Stress Scale (Cohen et al., 1983) as a potential confounding variable (Cronbach's  $\alpha=0.90$ ). A sample item was "In the last month, how often have you been upset because of something that happened unexpectedly?" Participants rated each item from 1 (never) to 5 (very often).

## Results

Descriptive statistics of the sample were presented in Table S2 in the supplementary information.

### Preliminary analyses

We first examined participants' demographic background in the T1 sample. Participants in the two conditions did not differ significantly in age,  $t(365) = -1.73, p = .085$ , ethnicity,  $\chi^2(4) = 0.49, p = .974$ , employment status,  $\chi^2(2) = 0.51, p = .776$ , or region of residence,  $\chi^2(6) = 11.56, p = .073$ . However, there were relatively more females in the hunger condition,  $\chi^2(1) = 4.60, p = .032$ , and those in the hunger condition also reported lower education level,  $t(335.49) = 2.62, p = .009$ . Moreover, as a manipulation check, participants in the satiation condition reported a significantly higher subjective satiation level ( $M=4.61, SD=1.36$ ) compared to those in the hunger condition ( $M=2.92, SD=1.00$ ),  $t(256.95) = 12.98, p < .001$ . All the analyses using the T1 sample were repeated while controlling for gender and education level, and the pattern of results did not change.

Then, we examined the sample with valid data from both T1 and T2. This time, participants in the two conditions did not differ significantly in gender,  $\chi^2(1) = 1.35, p = .246$ , ethnicity,  $\chi^2(4) = 4.54, p = .338$ , employment status,  $\chi^2(2) = 0.28, p = .868$ , region of residence,  $\chi^2(6) = 7.99, p = .239$ , trait CO,  $t(274) = -0.16, p = .874$ , trait EO,  $t(274) = -0.17, p = .862$ , or perceived stress,  $t(274) = -0.04, p = .969$ . But participants in the hunger condition reported older age,  $t(274) = -1.97, p = .049$ , and lower education

level,  $t(274) = 2.03, p = .043$ . The manipulation check was still significant. Participants in the satiation condition still reported higher subjective satiation level ( $M=4.69, SD=1.38$ ) than those in the hunger condition ( $M=2.92, SD=0.94$ ),  $t(183.29) = 11.88, p < .001$ . Analyses for the moderating effects of trait ROs were repeated while controlling age and education level. The pattern of the reported results did not change.

### Data analysis plan

Similar to Study 1, two regression models, Model 5 and Model 6, were estimated to test H1 (i.e., the relationship between state RO and helping tendency) and H2 (i.e., the moderating effects of trait ROs), respectively. Two more regression models, Model 7 and Model 8, were estimated to test H3 (i.e., the relationship between satiation status and state RO) and H4 (i.e., the moderating effects of trait ROs), respectively. Models 5 and 7 were tested using the T1 sample. Models 6 and 8 were tested in the sample with valid data from both T1 and T2. Trait EO and trait CO were standardized before being entered into the models. Model 2 from the PROCESS 3.0 macro of SPSS (Hayes, 2017) was used to estimate the moderation models.

### State RO and helping tendency

The results of Models 5 and 6 were presented in Table 3. Similar to Study 1, results of Model 5 supported H1. A higher value of the state RO index (i.e., relatively more activation of state CO over state EO) was significantly related to higher helping tendency,  $b = 0.05, SE = 0.02, p = .003, 95\% CI = [0.02, 0.09]$ . In other words, relatively more activation of state CO over state EO would be related to a higher likelihood to offer help to the acquaintance.<sup>3</sup>

In Model 6, the positive relationship between state RO and helping tendency was still significant,  $b = 0.05, SE = 0.02, p = .021, 95\% CI = [0.01, 0.08]$ , but it was not moderated by trait EO,  $b = 0.01, SE = 0.02, p = .480, 95\% CI = [-0.02, 0.05]$ , or trait CO,  $b = 0.00, SE = 0.02, p = .996, 95\% CI = [-0.04, 0.04]$ . Thus, H2 was not supported.

<sup>3</sup> We again tested the relationship between state RO and helping tendency for each scenario using multilevel modeling. The choice of information on partner's needs versus exchange history and helping decision in each scenario were considered as the level 1 data nested within individuals. Results consistently indicated that state RO (i.e., preference toward information on partner's needs over exchange record) was significantly related to a higher likelihood to offer help,  $\beta = 0.38, SE = 0.07, p < .001$ .

**Table 3** Regression models testing the effect of state RO on helping tendency (Model 5) and the moderating effects of trait EO and CO (Model 6) while controlling for satiation status in Study 2

Variables	Model 5			Model 6		
	<i>b</i>	<i>SE</i>	95% CI	<i>b</i>	<i>SE</i>	95% CI
Constant	4.79***	0.13	4.54–5.04	4.86***	0.14	4.57–5.14
Satiation status (0 = satiation, 1 = hunger)	0.05	0.10	-0.13–0.24	-0.01	0.11	-0.22–0.20
State RO (CO vs EO)	0.05**	0.02	0.02–0.09	0.05*	0.02	0.01–0.08
Trait EO				-0.17	0.13	-0.43–0.09
Trait CO				0.24	0.14	-0.03–0.51
State RO × Trait EO				0.01	0.02	-0.02–0.05
State RO × Trait CO				0.00	0.02	-0.04–0.04
<i>F</i>		4.62*			6.00***	
<i>R</i> <sup>2</sup>		.03			.12	

Notes. Higher state RO index indicated higher preference toward communal information across the 10 scenarios. Trait EO and trait CO were standardized. RO = relationship orientation, EO = exchange orientation, CO = communal orientation; \**p* < .05, \*\**p* = .003, \*\*\**p* < .001

**Satiation status and state RO**

The results of Models 7 and 8 were presented in Table 4. Results of Model 7 supported H3. Satiation status had a significant negative effect on state RO index, *b* = -0.68, *SE* = 0.29, *p* = .019, 95% CI = [-1.24, -0.11]. Participants in the hunger condition were less likely to choose the communal information to assist their decision making (i.e., relatively more activation of state EO over state CO).

In Model 8, the main effect of satiation status on state RO was not significant, *b* = -0.35, *SE* = 0.33, *p* = .293, 95% CI = [-1.00, 0.30]. Moreover, this effect was not moderated by trait EO, *b* = 0.04, *SE* = 0.34, *p* = .897, 95% CI = [-0.62, 0.71], or trait CO, *b* = -0.22, *SE* = 0.33, *p* = .503, 95% CI = [-0.88, 0.43]. Thus, H4 was not supported.

**Discussion**

With a different paradigm to measure state RO and in a different relationship context, results of Study 2 further supported our hypothesis that relatively more activation of state CO over state EO leads to enhanced helping tendency (H1). The results also supported that hunger could promote the

activation of state EO over state CO (H3). However, the moderating effects of trait ROs (H2 and H4) were not found in Study 2. The findings further highlight the importance of state RO in linking situational factors and interpersonal dynamics.

**General discussion**

The current two studies conceptually distinguished between trait and state ROs and investigated (a) how state RO influences ongoing interpersonal decisions (i.e., whether to offer help), (b) how a situational factor (i.e., hunger) affected state RO, and (c) how trait ROs moderated the above two effects. The two studies used two different paradigms (i.e., one based on eye-tracking and the other based on helping scenarios) to measure state RO and tested the four hypotheses across two different relationship contexts (i.e., stranger and acquaintance).

Results from both studies consistently supported the influence of state RO on helping behaviors (H1). Relatively more activation of state CO over state EO was related to increased helping tendency across the two studies, even

**Table 4** Regression models testing the effect of satiation status on state RO (Model 7) and the moderating effects of trait EO and CO (Model 8) in Study 2

Variables	Model 7			Model 8		
	<i>b</i>	<i>SE</i>	95% CI	<i>b</i>	<i>SE</i>	95% CI
Constant	6.15***	0.22	5.71–6.58	5.96***	0.25	5.46–6.46
Satiation status (0 = satiation, 1 = hunger)	-0.68*	0.29	-1.24 – -0.11	-0.35	0.33	-1.00–0.30
Trait EO				-0.32	0.26	-0.82–0.19
Trait CO				0.35	0.24	-0.13–0.83
Satiation status × Trait EO				0.04	0.34	-0.62–0.71
Satiation status × Trait CO				-0.22	0.33	-0.88–0.43
<i>F</i>		5.51*			1.60	
<i>R</i> <sup>2</sup>		.02			.03	

Notes. Higher state RO index indicated higher preference toward communal information across the 10 scenarios. Trait EO and trait CO were standardized. RO = relationship orientation, EO = exchange orientation, CO = communal orientation; \**p* = .019, \*\*\**p* < .001

when trait ROs were controlled. In fact, the main effects of trait ROs on helping behaviors were not significant except for trait EO in Study 1. The findings suggest that although trait ROs reflect people's dispositional endorsement of the two orientations, the momentary change of state RO is more influential on people's interpersonal decisions in a specific situation. In other words, state RO can be a more proximal factor that influences people's interpersonal behaviors compared to trait ROs. The introduction of the concept of state RO further facilitates our understanding of RO and how it is related to interpersonal dynamics.

The concept of a fluctuating state RO also highlights the importance of considering situational factors when studying RO and helps explain previous findings about intrapersonal variations of RO. In Clark and colleagues' early studies about RO (e.g., Clark et al., 1986; Clark & Mills, 1979; Clark & Taraban, 1991), it was found that participants can be manipulated to expect either a communal or an exchange relationship with a stranger and would behave accordingly in that relationship with the manipulated RO. Now, we further revealed that, even within the same relationship, RO can vary because of the influence of momentary physical or mental stressors (Jiang et al., 2014; Li & Fung, 2019). It is also possible that different groups may experience different levels of situational stress (e.g., stress brought by the pandemic or social injustice), which may result in group differences in the shift of ROs. Future studies are encouraged to further explore these directions.

Another point to note is that trait ROs were not significantly related to state RO in both studies (see Tables 2 and 4), which further supports that trait and state ROs are two distinct concepts. EO and CO are two coexisting relationship modules which guide people's interpersonal behaviors. The activation of the two orientations varies across situations. Trait EO and trait CO reflect the dispositional activation of the two ROs, respectively. For individuals with high trait EO (or CO), the chronic activation of the EO (or CO) is high across situations. In contrast, state RO reflects the *relative* activation of the two ROs at a given moment. It is a relative index and is jointly influenced by the two trait ROs, relationship context, acute and chronic contextual factors. Thus, in a specific situation, especially when the influence of situational factors is strong, trait ROs may not have a direct effect on state RO.

In addition to the theoretical effort to distinguish between trait and state ROs, the current studies also developed new paradigms to capture state RO more accurately and objectively. In Study 1, the eye-tracking technique was adopted to directly assess participants' attention paid to different types of information (i.e., partner's need vs. exchange history) while making helping decisions. In Study 2, 10 scenarios were created which allowed participants to explicitly

choose a piece of additional information (i.e., partner's need vs. exchange history) before making a helping decision. Both paradigms can reflect participants' current preference toward communal or exchange information, which is at the core of RO functioning (Clark & Mills, 2012). The two paradigms have their respective strengths and shortcomings. The eye-tracking paradigm is more objective and provides a continuous and precise measure of state RO, but fixations may not always reflect attention. The helping-scenario paradigm is direct and easier to administer. However, it may not be as sensitive as the eye-tracking one and may require a larger sample size. For example, the effect of hunger on state RO in Study 2 was only detected when the sample size was relatively large (i.e., the T1 sample) but became not significant when only participants with valid data at both time points were analyzed. With complementary strengths, the two paradigms provide critical tools for studying state RO in the future and can suit a variety of study designs.

The two studies also tested how a specific situational factor, hunger, could shift the state RO. The findings were partially consistent across the studies. Supporting H3, hunger increased the relative activation of state EO over state CO when dealing with acquaintances in Study 2. However, the main effect of hunger on state RO was not significant when dealing with strangers in Study 1. Simple slope analyses showed that the effect was only significant for individuals with high trait EO. The findings partially support that state RO in a same relationship can change across different situations (i.e., with varying physiological status). They also suggest that the effect of situational factors on state RO can be affected by other factors, such as the relationship context. It is possible that the activation of the EO is generally high across situations when interacting with strangers, so that the situational influence of hunger would be weaker compared to when interacting with acquaintances.

Moreover, results about the moderating effects of trait ROs were inconsistent in the two studies. In Study 1, partially supporting H2 and H4, trait CO was found to strengthen the effect of state RO on helping tendency toward a stranger and trait EO was found to enhance the effect of hunger on state RO. In Study 2, both the link between state RO and helping tendency and that between hunger and state RO were not moderated by trait ROs. The inconsistent results can be partly due to the different relationship contexts examined in the two studies. Relationship with acquaintances has higher communal strength than that with strangers (Clark & Mills, 2012). Trait EO and the rule of reciprocity are more relevant and influential in relationships with strangers. Thus, when experiencing a physiological deprivation, people's trait EO (i.e., the high chronic tendency to emphasize equity) facilitates the relative activation of state EO when interacting

with strangers (Study 1), but not with acquaintances (Study 2).

Similarly, people with high trait CO have a high chronic propensity to care about others' needs. The communal norms in interpersonal interactions and the motivation to help others are more accessible for them. Thus, in Study 1, when state CO is relatively more activated in a particular situation, the attentional preference toward the stranger's needs is more readily translated into actual helping behaviors. But for people with low trait CO, relatively more activation of state CO may not easily lead to changes in actual helping behavior toward the stranger. However, in Study 2, as the relationship with acquaintances is more communal itself, the relatively more activation of state CO can translate into actual helping behavior easily regardless of people's trait CO.

Besides relationship context, the inconsistent results across the two studies may also be due to methodological differences. For example, trait ROs were measured immediately after the helping task in Study 1 but were measured one week later in Study 2. The two studies also used different paradigms to assess state RO. Further studies are needed to test whether the current results can be replicated.

The current study also has the following limitations. First, only between-subject differences in state RO were examined. The eye-tracking paradigm could be further adapted in future studies to monitor the within-person variation of state RO across different situations. Second, only one partner in the interaction was studied. Future studies could keep track of both partners' state RO and examine how the dyadic interactions influence relationship dynamics. Third, the interplay between trait and state ROs could be studied in more communal relationships and with different types of situational factors. Lastly, manipulation of satiation status did not occur in an experimental setting in both studies. Although we have theoretical reasons to support the causal link from situational factors (e.g., satiation status) to state RO, future studies are encouraged to use stricter experimental manipulation of satiation status to further support the causal effect.

To conclude, the current studies introduced the new concept of state RO and examined how state RO influenced helping behaviors and how trait ROs and situational factors jointly affected the state RO. Methodologically, the two paradigms developed make it possible to examine the momentary variation of the two ROs by assessing preference toward communal versus exchange information during ongoing interpersonal interactions. Theoretically, the distinction between trait and state ROs further advances the understanding about RO and opens up new research directions.

**Supplementary information** The online version contains supplementary material available at <https://doi.org/10.1007/s12144-022-03666-y>.

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**Data availability** The datasets generated and analysed during the two studies and related study materials were available at the Open Science Framework (Study 1: <https://osf.io/yasmf/>; Study 2: <https://osf.io/mkrfx/>).

## Declarations

**Conflict of interest** On behalf of all authors, the corresponding author states that there is no conflict of interest.

**Consent to participate** Informed consent was obtained from all individual participants included in the two studies.

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