

**Exclude Me If You Can –  
Cultural Effects on the Outcomes of Social Exclusion**

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Published in: Journal of Cross-Cultural Psychology 2015, Vol. 46(4) 579–596  
DOI: 10.1177/0022022115571203

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**Abstract**

We examined how individualistic versus collectivistic cultural backgrounds affected the psychological experience of social exclusion. We found that Turkish, Chinese and Indian participants (collectivistic background) differed in their experience of social exclusion from German participants (individualistic background): German participants experienced lower fulfilment of psychological needs in response to social exclusion, whereas Turkish, Chinese and Indian participants were affected to a lesser extent (Turkey, India, Hong Kong) or not at all (mainland China) by social exclusion manipulations. Testing two different explanatory mechanisms in Study 3, we found that the difference in dealing with social exclusion was not associated with activating social representations in participants with collectivistic background but with exclusion being associated with more threat in participants with individualistic background. In Study 4, cultural differences emerged also on the physiological level: German participants' heart rates were increased when excluded, while Chinese participants showed no change in heart rate during exclusion. The results are discussed regarding their implications for the role of self-construal and culture when dealing with the threat of social exclusion.

*Keywords:* social exclusion; culture; basic needs; heart rate

It takes some willpower to not look at a notification of somebody requesting to connect with you on a social network right away. Similarly, realizing that somebody has taken you off their list of contacts can cause a considerable amount of rumination. Our sense of connection to others is the basis of life in the complex setting of human societies. The attention we give to social media, emphasizing connection and belonging, is only one manifestation of this. Relying on others in every aspect of our existence is intertwined with the adaptive nature of human culture that allows us to survive in diverse geographical settings by utilizing the accumulation and coordination of the specific skills and cultural practices the collective offers. The motivation to belong and fear of being excluded are therefore considered universal psychological tendencies. However, adapting to very different environments, cultures differ greatly in how individuals define their personal connection to others. The present experiments were designed to examine how and why culture affects people's experience of social exclusion.

### **Social exclusion and self**

The need to belong has been theorized to be as basic to our mind as hunger or thirst to our body. People strive to connect with others even at high cost, and avoid disconnection by all means (Baumeister & Leary, 1995). Not only does the need to belong shape emotion and cognition, it also influences psychological and physical health: Cultivating social networks produces positive emotions (McAdams & Bryant, 1987) and serves as protective factor for various health problems (Cohen & Wills, 1985). Given the importance of feeling socially included, being socially excluded has painful and stressful outcomes for individuals. Previous research has shown consistently that negative consequences of exclusion are powerful and immediate (see Williams, 2007): Social pain activates the same neuronal alarm system as physical pain (the anterior cingulate cortex; Eisenberger, Liebermann, & Williams, 2003), and poses a threat to four fundamental needs of the self, belonging, self-esteem, control, and meaningful existence (Williams, 1997; Williams, Cheung, & Choi, 2000).

**Culturally determined self-construal and social exclusion**

The importance of being included is culturally universal, as all cultures are based on living together in communities. However, living together can be very different depending on the context. Culture is the specific way in which a community adapts to their environment and the specific culture that people are immersed in has important and profound implications for our thoughts and behaviors (Heine, 2008). These differences are reflected in variations in the self-construal that distinguishes between independent and interdependent aspects of the self (Markus & Kitayama, 1991). Independent and interdependent selves are strongly related to the cultural dimensions of individualism and collectivism, established by Hofstede (1980): People with more independent self-construal focus on individual uniqueness, autonomy, and independence. Individualistic cultures which base their social norms on this type of self-construal are mainly located in North America or Western Europe. People with more interdependent self-construal set their priorities on group harmony, interpersonal relations, and interdependence. Social connections are an integral part of their self-view (Markus & Kitayama, 1991). The latter is the case in collectivistic cultures in Asia, Africa or South America (Hofstede, Hofstede, & Minkov, 2010). So far, the dimension of individualism-collectivism has intriguingly clarified a broad range of controversial effects, e.g. within the areas of cognitive consistency (Hoshino-Browne et al., 2005) or reactance (Jonas et al., 2009).

The relationship between culture, self-construal and social exclusion has been examined to some extent. In a recent study, it has been observed that US participants with an accessible interdependent self-construal were less affected by negative consequences of social exclusion than US participants with independent self-construal indicating a role for self-construal in coping with exclusion (Gardner, Knowles, & Jefferis, 2012). Likewise, an interdependent self-construal in Chinese participants has been shown to facilitate the recovery for belonging and meaningful existence after exclusion (Ren, Wesselmann, & Williams, 2013). These studies have not investigated cultural differences directly, but the results suggest that a self-

construal defined by social representations may protect from the negative outcomes of exclusion.

### **Which self-construal is more vulnerable to social exclusion?**

The observed differences allow for two different expectations: One could argue that collectivists who focus on interdependence are more vulnerable when faced with exclusion which could be a threat to their social world; an incident of social exclusion could mean “social death” (Williams, 2007). Therefore, the attenuated negative psychological effects of exclusion in collectivists might represent the result of an alarm system, allowing collectivists to detect and buffer social exclusion experiences before they turn into serious threats to the interdependent self. Given that positive social experiences or even memories of these can restore a sense of connection (Twenge et al., 2007), having a more interdependent self might help dealing with the threat inherent in social exclusion. Gardner and colleagues (2012) suggest that *social representations* might act as an active buffer against the negative effects of exclusion. Accordingly, the collectivist’s immediate reaction to exclusion would be larger than the individualists’. A mediation of this initial reaction through social representations should, however, result in an attenuated secondary reaction.

Having some empirical indication that collectivists are less susceptible to social exclusion in terms of psychological consequences, one could even go a step further: Possibly, in collectivistic cultures the exclusion of the individual is not perceived to be especially *threatening* since it does not affect the core of the interdependent self, defined through the association with others rather than through individual social standing (Markus & Kitayama, 1991). In individualistic cultures, on the other hand, an instance of exclusion might be more threatening; the exclusion of the unique individual could be perceived as rejection of what defines the person: the core of the independent self, which, by definition, is solely accountable for its successes and failures. Following this assumption, collectivists might not circuit an active buffering process but might simply not be impacted in the structure of their social self-

definition when excluded. This explanation has the advantage of being more parsimonious not assuming an additional regulation mechanism, and it challenges Western-centric assumptions that deviations from the patterns found in Western samples are due to psychological processes added to a the “baseline” process found in Westerners.

Previous research as well as theoretical considerations suggest that a collectivistic self-construal is less susceptible to the negative psychological effects of exclusion. However, so far there has been no cross-cultural comparison to discern whether this is due to better regulation strategies or less subjective experience of threat.

### **Overview of the present research**

The present experiments were intended to examine *how* and *why* people with different cultural backgrounds differ in their reaction to social exclusion. In Studies 1 and 2, we investigated whether people with collectivistic backgrounds differed from people with individualistic backgrounds in their psychological reaction to exclusion. To compare immediate reactions and thereby test directly whether differences were due to different perception of threat or different degrees of buffering at similar perception of threat, we investigated different explanatory approaches on the implicit psychological level in Study 3. In Study 4, we looked at physiological reactions during the experience of social exclusion.

We manipulated inclusionary status in two ways, each excluding the individual person: In Studies 1 and 2, social exclusion was manipulated through recall of past social exclusion by essay writing; Studies 3 and 4 manipulated social exclusion using the virtual ball-tossing game Cyberball<sup>1</sup>. Investigating different cultures, we based our classification of individualism/collectivism on Hofstede et al.’s (2010) long-term study of cultural dimensions: We compared Turks (individualism score [IND] = 37; Study 1), mainland Chinese (IND = 20; Study 2), Indians (IND = 48; Study 3) and Hong Kong Chinese (IND = 25; Study 4) as

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<sup>1</sup> Unlike the essay task, Cyberball is technically not an exclusion but a ostracism paradigm. Ostracism typically occurs during an unfolding sequence of behaviors, whereas social exclusion happens after initial interaction and subsequent separation from others or as a hypothetical consequence in the future (Williams, 2007). For reasons of consistency, we stick to the main term “exclusion” within the manuscript.

collectivists with Germans ( $IND = 67$ ) as individualists. To capture psychological consequences of exclusion, we assessed the four typically measured fundamental needs – belonging, control, self-esteem, and meaningful existence<sup>2,3</sup>. Testing explanatory approaches and underlying mechanisms, we collected data on implicit activations and physiological responses. All materials, except for the Indian questionnaire in Study 3 which was conducted in English, were translated and back-translated to ensure equivalence in meaning.

### **Study 1**

Study 1 provides a first test of whether social exclusion is experienced differently in different cultures. Assuming that exclusion would not affect the core of the interdependent self defined by the association with others, we hypothesized that collectivists would not perceive exclusion to be as threatening as individualists. To investigate this assumption, we recruited participants from Germany and Turkey and manipulated inclusionary status by asking them to visualize a past experience of exclusion or inclusion. Participants' thoughts and feelings were assessed with a questionnaire. We expected Turks to be less affected by the exclusion manipulation than Germans.

### **Method**

#### **Participants**

One hundred and forty students participated for research credit. Two research assistants checked whether the participants had performed the manipulation accurately: Participants were excluded from the analyses if they had written about an experience that was unrelated to the instruction, if they had written that they could not remember a matching experience, or if they had written nothing ( $N = 19$ ). This resulted in a sample of 121: 70 students from a German university (57 female and 13 male) and 51 students from a Turkish university (44

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<sup>2</sup> In our calculations, we averaged all basic needs items together to create an overall measure of basic need satisfaction as all needs were highly intercorrelated,  $r_s > .48$ ,  $p_s < .001$ . We used this procedure in alignment with recent social exclusion research (e.g., Wirth, Sacco, Hugenberg, & Williams, 2010).

<sup>3</sup> In Studies 1 and 2, we also measured mood (see Supplementary Materials).

female and 7 male). They ranged in age from 19 to 55 years ( $M = 22.36$ ,  $SD = 4.74$ ) in the German sample and from 17 to 30 years ( $M = 20.18$ ,  $SD = 2.19$ ) in the Turkish sample.

### **Design and procedure**

The experiment was based on a 2 (*inclusionary status*: exclusion vs. inclusion) x 2 (*culture*: Turkey vs. Germany) factorial design. Participants were recruited for a paper-and-pencil study on visualization of past experiences. They were randomly assigned to one of the essay conditions in which they wrote about a previous experience from their lives. Then, they filled out the rest of the questionnaire (manipulation check and need fulfilment). Finally, participants were debriefed and thanked for their participation.

### **Materials**

**Inclusionary status.** Participants were asked to intensively relive in their minds and write about a previous experience from their life. In the exclusion condition, they wrote about a time in which they had been excluded by one or more people; in the inclusion condition, they were instructed to write about a time in which they had been included and accepted by one or more people. Prior studies have shown that visualizing a past instance of exclusion evokes responses comparable to those found using interpersonal methods for creating exclusion (e.g., Pickett, Gardner, & Knowles, 2004). To investigate the essay's severity between culture groups, two coders, unaware of the study's goal, rated the essays according to level of severity on 7-point Likert scales; interrater reliability was acceptable,  $r = .80$ .

**Manipulation check.** To assess the effectiveness of the inclusionary status manipulation, participants answered two items ("To what extent did you feel excluded at that time?", "To what extent were you ignored by the other people?"; Germany and Turkey:  $\alpha = .83$ ).

**Need fulfilment.** Eleven items assessed the perceived fulfilment of the four fundamental needs in response to the essay, based on the items of Zadro, Williams, and Richardson (2004): belonging (e.g., "I felt poorly accepted by the others."), self-esteem (e.g., "I felt that the others



failed to perceive me as a worthy and likeable person.”), control (e.g., “I felt that I was able to live my life as I wanted.”), and meaningful existence (e.g., “I felt as though my existence was meaningless.”). We aggregated all items to an overall needs scale (Germany:  $\alpha = .90$ ; Turkey:  $\alpha = .87$ ).

All questions were rated on 9-point Likert scales from 1 (*not at all*) to 9 (*very much*).

## Results

**Manipulation check.** Those participants writing about an instance of exclusion reported that they felt more excluded ( $M = 6.35$ ,  $SD = 1.89$ ) than those writing about an instance of inclusion ( $M = 3.53$ ,  $SD = 2.50$ ),  $t(118) = -6.97$ ,  $p < .001$ ,  $d = -1.28$ . Essays by Germans and Turks did not differ in level of severity,  $t(119) = 0.52$ ,  $p = .602$ ,  $d = 0.10$ .

**Need fulfilment.** A 2 (inclusionary status)  $\times$  2 (culture) ANOVA resulted in a main effect of inclusionary status,  $F(1,117) = 42.08$ ,  $p < .001$ ,  $\eta_p^2 = .27$ : Excluded participants expressed lower need fulfilment ( $M = 4.23$ ,  $SD = 1.33$ ) than included participants ( $M = 6.23$ ,  $SD = 1.84$ ). The ANOVA also revealed an interaction,  $F(1,117) = 5.12$ ,  $p = .026$ ,  $\eta_p^2 = .04$ : Excluded Germans showed lower need fulfilment ( $M = 3.94$ ,  $SD = 1.13$ ) than excluded Turks ( $M = 4.63$ ,  $SD = 1.50$ ),  $t(58) = -2.04$ ,  $p = .046$ ,  $d = -0.53$ . After inclusion, Germans ( $M = 6.50$ ,  $SD = 1.75$ ) and Turks ( $M = 5.87$ ,  $SD = 1.93$ ) did not differ in need fulfilment,  $t(59) = 1.33$ ,  $p = .187$ ,  $d = -0.35$ . However, both Turks,  $t(49) = 2.54$ ,  $p = .014$ ,  $d = 0.73$ , and Germans,  $t(68) = 7.27$ ,  $p < .001$ ,  $d = 1.76$ , indicated lower need fulfilment after exclusion than after inclusion.

## Discussion

In Study 1, Germans compared to Turks were more affected by the exclusion manipulation: Faced with exclusion, Germans experienced lower fulfilment of basic needs than Turks; faced with inclusion, no cultural differences emerged. However, participants from both cultures experienced a difference between being excluded and being included. These cultural-specific effects could be observed although participants from both cultures perceived the remembered situation to be an exclusionary event and described it as being severe to

similar degrees. Overall, our results indicate that individualists were affected more strongly by the exclusion manipulation. Collectivists appeared to be less threatened by exclusion. Our results are consistent with findings for people with independent versus interdependent self-definition and represent a replication on an intercultural level (Gardner et al., 2012; Ren et al., 2013).

## **Study 2**

Having obtained initial evidence for a cultural difference in responding to social exclusion, we aimed to replicate Study 1 with a different and, in particular, more collectivistic sample, i.e. Chinese participants. Analogous to Study 1, exclusion was manipulated by asking participants to visualize a past experience of exclusion or inclusion and thoughts and feelings were rated on several dimensions. We expected Chinese participants to be less affected by exclusion than Germans and, compared to Study 1, to show a more pronounced result pattern.

## **Method**

### **Participants**

One hundred and twenty-nine undergraduates participated in this study in exchange for research credit. Again, two research assistants checked the essays: Participants were excluded from the analyses if they had written about an experience that was unrelated to the instruction, if they had written that they could not remember a matching experience, or if they had written nothing ( $N = 10$ ). This resulted in a sample of 119 participants: 59 students from a German university (42 female, 17 male) and 60 students from a Chinese university (30 female, 30 male). They ranged in age from 19 to 58 years ( $M = 26.37$ ,  $SD = 6.45$ ) in the German sample and from 18 to 23 years ( $M = 20.68$ ,  $SD = 0.99$ ) in the Chinese sample.

### **Design and procedure**

Using the same design and procedure as in Study 1, the experiment was based on a 2 (*inclusionary status*: exclusion vs. inclusion) x 2 (*culture*: China vs. Germany) factorial design. Different to Study 1, participants completed the study online.

## Materials

The same materials as in Study 1 were used. Manipulation check: Germany:  $\alpha = .85$ ; China:  $\alpha = .77$ . Need fulfilment: Germany:  $\alpha = .88$ ; China: .79. The interrater reliability for the coding of essays was acceptable,  $r = .86$ .

## Results

**Manipulation check.** Participants writing about an instance of exclusion reported that they felt more excluded ( $M = 5.65$ ,  $SD = 2.02$ ) than those writing about an instance of inclusion ( $M = 3.05$ ,  $SD = 2.19$ ),  $t(117) = -6.72$ ,  $p < .001$ ,  $d = -1.24$ . Essays by German and Chinese participants did not differ in level of severity,  $t(117) = -0.33$ ,  $p = .745$ ,  $d = -0.06$ .

**Need fulfilment.** A 2 (inclusionary status) x 2 (culture) ANOVA resulted in a main effect of inclusionary status,  $F(1,115) = 40.32$ ,  $p < .001$ ,  $\eta_p^2 = .26$ : Excluded participants ( $M = 4.91$ ,  $SD = 1.27$ ) indicated lower need fulfilment than included participants ( $M = 6.35$ ,  $SD = 1.40$ ). Moreover, the ANOVA revealed an interaction,  $F(1,115) = 19.27$ ,  $p < .001$ ,  $\eta_p^2 = .14$ : When excluded, Germans indicated lower need fulfilment ( $M = 4.34$ ,  $SD = 1.41$ ) than Chinese ( $M = 5.48$ ,  $SD = 0.80$ ),  $t(60) = 3.89$ ,  $p < .001$ ,  $d = 1.00$ . When included, Germans responded with higher need fulfilment ( $M = 6.80$ ,  $SD = 1.64$ ) than Chinese ( $M = 5.92$ ,  $SD = 0.98$ ),  $t(55) = -2.45$ ,  $p = .017$ ,  $d = -0.66$ . Germans indicated a significant difference in need fulfilment between exclusion and inclusion,  $t(57) = 6.18$ ,  $p < .001$ ,  $d = 1.64$ ; Chinese reported only a marginal difference between exclusion and inclusion,  $t(58) = 1.94$ ,  $p = .057$ ,  $d = 0.51$ .

## Discussion

Overall, the results indicate that participants with individualistic cultural background were more affected by the exclusion manipulation than participants with collectivistic cultural background, although, as in Study 1, both perceived the remembered situation to be an exclusionary event and described it as severe to a similar extent. Compared to Chinese, Germans reported lower need fulfilment when excluded. Importantly, only German participants indicated a difference between exclusion and inclusion; the Chinese participants'

reaction, on the other hand, was very similar in situations of exclusion and inclusion. The finding that Chinese participants did not show significantly lower need fulfilment when excluded than when included – in comparison to Turkish participants who did show a difference in need fulfilment – might be explained with differences in the self-construal: According to Hofstede et al. (2010), China can be categorized as more collectivistic than Turkey. It seems plausible that level of collectivism is associated with the extent of negative consequences of exclusion. A comparison of effect sizes (China:  $d = 0.51$ ; Turkey:  $d = 0.73$ ) supports this interpretation.

Since basic needs have been conceptualized to represent the individual's capacity to efficiently interact with the social environment, a higher degree of need fulfilment indicates less experience of a threat to self-integrity. As suggested in the introduction, this might be due to collectivists being less impacted in the structure of their social self-definition by social exclusion. Having established an association between culture and psychological costs of being excluded by others, in the next studies we intended to gain more specific insights into the underlying reasons that lead collectivists to be less affected by exclusion.

### **Study 3**

The previous studies showed that collectivistic and individualistic people differed in their psychological reaction to social exclusion. This could be either due to collectivists not being as threatened by social exclusion as individualists or, as Gardner and colleagues (2012) suggested, due to the collectivists' social representations that act as an active buffer. Study 3 aimed to directly investigate both explanatory approaches using implicit measures. We moreover added a control condition to determine whether the observed cultural differences were due to the impact of exclusion or inclusion. In Study 3, we compared the response patterns of German and Indian participants. Manipulating inclusionary status with the virtual ball-tossing game Cyberball, we created a more involving situation. We expected Indians to be less affected by exclusion than Germans and the differential response pattern to be due to

the impact of exclusion and not inclusion. Furthermore, we predicted German participants to show greater activation of threat and not Indian participants to show greater activation of social representations mediating the observed pattern.

### **Method**

One hundred and eighty-three persons participated in this online study. 80 students and employees from a German university (51 female, 28 male, and 1 who did not specify gender), who were invited through the university mailing service and participated for research credit, and 103 Indian participants (35 female and 68 male), who completed the study through Amazon.com's online data collection tool for \$0.25. They ranged in age from 17 to 61 years ( $M = 28.06$ ,  $SD = 8.82$ ) in the German sample and from 20 to 68 years ( $M = 32.30$ ,  $SD = 10.32$ ) in the Indian sample.

### **Design and procedure**

The experiment was based on a 3 (*inclusionary status*: exclusion vs. inclusion vs. control condition) x 2 (*culture*: India vs. Germany) factorial design. Participants were recruited to participate in an online study on mental visualization. They were randomly assigned to the inclusion, exclusion, or control condition. In the inclusion and exclusion condition participants played Cyberball, in the control condition they visualized the scene of a sketch drawing. Next, they completed measures of implicit threat and social representations, manipulation checks, and need fulfilment. Finally, participants were debriefed and thanked.

### **Materials**

**Inclusionary status.** Cyberball (version 3; Williams & Jarvis, 2006) was used to manipulate inclusionary status. Participants were told that Cyberball exercises mental visualization skills. They were led to believe that were playing with two other participants via internet; the other players, however, were computer simulated and followed specific settings. A virtual ball was tossed 40 times between the three "players". Participants in the inclusion condition were thrown the ball roughly one third of the time by the others. In the exclusion

condition, they got the ball twice at the beginning of the game and never again. In the control condition, participants did not play Cyberball but looked at and mentally visualized a black and white sketch of a mountain for two minutes (Riva, Williams, Torstrick, & Montali, 2014).

**Implicit measure of threat and social representations.** To both capture the concept of threat and social embeddedness, participants viewed three photos of “human pyramids.” Due to consisting of several people standing on each others’ shoulders, this gymnastic group formation can evoke a sense of instability and trepidation, as well as a sense of social integration and embeddedness. The photos consisted of groups of six, ten, and 11 Caucasians and Asians creating a formation that could be imitated by amateurs; in each photo, one person was circled in red. Participants responded to the two questions with regard to the circled person. After each photo, they answered one item implying threat, “How unstable would you feel?” (Germany:  $\alpha = .56$ ; India:  $\alpha = .60$ ), and one item implying social representations, “How integrated would you feel?” (Germany:  $\alpha = .69$ ; India:  $\alpha = .72$ ).

**Manipulation check, need fulfilment.** In the Cyberball conditions, the success of the manipulation was assessed by the item “What percent of the throws were directed to you?”. All reported how excluded they felt during Cyberball or the mental visualization task. Need fulfilment was assessed as in the previous studies (Germany:  $\alpha = .91$ ; India:  $\alpha = .89$ ).

All questions were rated on 7-point Likert scales from 1 (*not at all*) to 7 (*very much*).

## Results

For mean differences, see Table 1.

**Manipulation check.** Participants reported fewer throws during Cyberball in the exclusion condition ( $M = 14.25$ ,  $SD = 15.66$ ) than in the inclusion condition ( $M = 44.72$ ,  $SD = 20.04$ ),  $t(110) = 8.83$ ,  $p < .001$ ,  $d = 1.68$ . Moreover, participants felt more excluded in the exclusion condition ( $M = 5.75$ ,  $SD = 1.39$ ) than in the inclusion ( $M = 3.00$ ,  $SD = 1.88$ ),  $p < .001$ , and in the control condition ( $M = 2.63$ ,  $SD = 2.05$ ),  $p < .001$ ; these latter conditions, however, did not differ,  $p = .732$ , Bonferroni,  $F(2,180) = 50.10$ ,  $p < .001$ ,  $\eta_p^2 = .36$ .

**Need fulfilment.** We calculated a 3 (inclusionary status) x 2 (culture) ANOVA on need fulfilment which revealed a main effect of inclusionary status,  $F(2,177) = 73.14, p < .001, \eta_p^2 = .45$ : Participants indicated lower need fulfilment in the exclusion condition ( $M = 2.99, SD = 1.04$ ) than in the inclusion ( $M = 4.80, SD = 1.00$ ),  $p < .001$ , and control condition ( $M = 5.06, SD = 1.03$ ),  $p < .001$ , Bonferroni; they, however, did not differ in the latter conditions,  $p = .425$ . Importantly, the ANOVA also showed an interaction,  $F(2,177) = 4.66, p = .011, \eta_p^2 = .05$ . In the exclusion condition, Germans indicated lower need fulfilment than Indians,  $t(51) = 3.17, p = .003, d = 0.89$ ; German and Indian participants, however, did not differ in the inclusion,  $t(61) = -0.72, p = .475, d = -0.18$ , and control condition,  $t(65) = -0.72, p = .568, d = -0.14$ . Bonferroni post hoc comparisons moreover revealed that both Germans and Indians showed lower need fulfilment in the exclusion compared to the inclusion,  $p < .001$ , and control condition,  $p < .001$ , whereas they did not differ in the latter conditions,  $ps > .79$ .

**Implicit threat.** The 3 (inclusionary status) x 2 (culture) ANOVA on implicit threat also revealed an interaction,  $F(2,177) = 5.54, p = .005, \eta_p^2 = .06$ . Analogous to the result pattern of need fulfilment, German participants indicated more threat in the exclusion condition than Indian participants,  $t(51) = -2.59, p = .013, d = -0.73$ ; Germans and Indians did not differ in the inclusion,  $t(61) = 1.48, p = .144, d = 0.38$ , and in the control condition,  $t(65) = 1.31, p = .195, d = 0.32$ . Whereas Indians had a similar threat activation in all conditions,  $ps > .36$ , Germans indicated more threat in the exclusion compared to the inclusion,  $p = .018$ , and control condition,  $p = .042$ , with the latter conditions not differing,  $p = 1.00$ , Bonferroni.

To test whether the extent of need fulfilment in response to social exclusion versus inclusion that was moderated by culture, was mediated by an implicit activation of threat, we conducted a moderated mediation analysis using the PROCESS tool by Hayes (2012). The model of implicit threat revealed an interaction between inclusionary status and culture,  $b = 0.42, SE = .14, t(112) = 2.92, p = .004$ , suggesting that the indirect effect of inclusionary status on need fulfilment through implicit threat emerged as a function of culture. Implicit

threat mediated the effect of inclusionary status on need fulfilment among German, 95% CI = [0.01, 0.19], but not Indian participants, 95% CI = [-0.15, 0.01]. The direct effect was also moderated, as indicated by an interaction between inclusionary status and culture in the model of need fulfilment, holding implicit threat constant,  $b = -0.20$ ,  $SE = .09$ ,  $t(112) = -2.16$ ,  $p = .033$ . Both German,  $b = 1.11$ ,  $SE = .14$ ,  $t(112) = 8.00$ ,  $p < .001$ , and Indian participants,  $b = 0.70$ ,  $SE = .12$ ,  $t(112) = 5.67$ ,  $p < .001$ , had lower need fulfilment when excluded than when included. These results suggest a specific process at work linking inclusionary status to need fulfilment depending on culture. In general, this is influenced through an implicit activation of threat. Those excluded activated more threat than those included among German but not Indian participants, and this in turn translated into lower need fulfilment, see Figure 1.

**Implicit social representations.** Another 3 (inclusionary status) x 2 (culture) ANOVA on implicit social representations showed no significant effects,  $ps > .30$ ,  $F_s < 1.20$ .

### Discussion

We replicated the main result pattern: Germans experienced lower need fulfilment when excluded than Indians. When included, they indicated similar need fulfilment. As in Study 1, both cultural groups differed in their basic need fulfilment between exclusion and inclusion. Additionally, in Study 3 we observed that the differential response patterns were due to the impact of exclusion and not inclusion: The effect of inclusion resembled that of a neutral control condition, similar to other research (e.g., Kerr, Seok, Poulson, Harris, & Messe, 2008). Importantly, some insight in the underlying mechanism for the cultural difference in responding to social exclusion was gained: Implicit activation of threat mirrored the differences between cultures regarding need fulfilment, thereby reflecting the interaction we have been finding so far: Being excluded, Germans reported higher levels of implicit threat compared to Indians; being included, both cultures showed a similarly low threat activation. Threat activation, furthermore, mediated the effect of inclusionary status on need fulfilment, suggesting that the psychological consequences of social exclusion are associated with the



experience of threat. The concept of social embeddedness, on the other hand, was not specifically activated under social exclusion, neither among Germans nor Indians.

This replicates the result pattern found in the other studies and, in addition, provides a potential interpretation of the cultural differences in response to exclusion: Whereas no evidence for social representations as underlying psychological mechanism was obtained, the implicit test of threat activation suggested that collectivists might not actively circuit a psychological process when excluded. Instead, exclusion might not impact the constitution of the collectivists' self-construal as much as individualists'. In other words, we have tested a theory proposing an underlying mechanism by looking at the availability of social representations against the alternative idea that there might not be one, by adding a measure of threat. Our results seem to point to a cultural difference in the activation of threat when excluded rather than to an additional underlying mechanism present only in collectivists.

#### **Study 4**

Even though the results from Study 3 suggest that it might indeed be a lack of perceiving threat in the first place that leads to an attenuated response to social exclusion in collectivists, we are still only capturing secondary assessments of the situation, potentially mediated by cultural norms. To not only rely on explicit self-reports that bear the problem of people not necessarily having access to the reasons for their more distal reactions to exclusion on the need-measure (Nisbett & Wilson, 1977), we tested threat during exclusion more directly, by examining physiological responses in individualists and collectivists. The apparent alternative explanation of our findings of cross-cultural differences – collectivists being just as or even more affected by exclusion episodes but expressing their distress differently – led us to conduct a study in which we included physiological measures in response to exclusion. Looking at physiological correlates, we should be able to discern whether our findings were merely due to a tendency to subdue expressions of being impacted by an episode of exclusion or whether they might be rooted in the threat being less salient for

those with a more collectivistically defined self. Therefore, we investigated the psychological variables in combination with physiological data, examining heart rate. Heart rate is recognized as a reliable indicator of cognitive or emotional activation (Obrist, 1981); a significant increase in heart rate is associated with social stress (Kirschbaum, Pirke, & Hellhammer, 1993). Again, we operationalized self-construal by comparing the responses to exclusion in different cultures, Germany and Hong Kong, and manipulated inclusionary status using Cyberball. We hypothesized participants from Hong Kong to be less affected by social exclusion than participant from Germany. Moreover, we expected the physiological data to mirror this differential response pattern.

### **Method**

Eighty undergraduate students participated in this study for research credit. Participants who were familiar with Cyberball ( $N = 4$ ) and one extreme outlier on mean heart rate ( $>4$  SDs above the mean) suggesting technical difficulties, were excluded from the analyses. This resulted in a sample of 75 participants: 36 students from a German university (27 female and 9 male) and 39 students from a Hong Kong university (25 female and 14 male). They ranged in age from 19 to 46 years ( $M = 25.47$ ,  $SD = 5.24$ ) in the German sample and from 18 to 34 years ( $M = 19.64$ ,  $SD = 3.48$ ) in the Hong Kong Chinese sample.

#### **Design and procedure**

The experiment was based on a 2 (*inclusionary status*: exclusion vs. inclusion) x 2 (*culture*: Hong Kong vs. Germany) factorial design. Participants were recruited for a lab study on mental visualization. Upon arrival, they were given an information sheet to brief them on the study's procedure and to check a set of possible exclusion criteria (pregnancy, medication, BMI, familiarity with Cyberball). After that, electrodes were attached and checked for function. Next, the participant's basic heart rate was recorded in a 10 minutes rest condition, during which the participant was asked to sit quietly and relax with open eyes. Afterwards, the experimenter started the questionnaire on the computer. After reading an introductory text,

Cyberball was started. Participants were randomly assigned to inclusion and exclusion conditions. During Cyberball, participants' heart rate was recorded again. Next, participants completed the second part of the questionnaire (manipulation check, need fulfilment). Finally, the experimenter removed electrodes, debriefed, thanked, and dismissed the participant.

### **Materials**

**Inclusionary status.** Participants played Cyberball with identical settings as in Study 3. The average playing time was 2.56 min ( $SD = 0.14$ ) in the exclusion condition and 2.46 min ( $SD = 0.24$ ) in the inclusion condition; for further analysis, we separated the playing time, adapted on each participant, into three thirds (1/3 Cyberball: exclusion:  $M = 51.18$  sec,  $SD = 2.71$ ; inclusion:  $M = 49.74$  sec,  $SD = 5.66$ ; 2/3 Cyberball: exclusion:  $M = 102.13$  sec,  $SD = 5.49$ ; inclusion:  $M = 98.16$  sec,  $SD = 9.63$ ; 3/3 Cyberball: exclusion:  $M = 153.59$  sec,  $SD = 8.20$ ; inclusion:  $M = 147.56$  sec,  $SD = 14.38$ ).

**Manipulation check, need fulfilment.** Again, participants estimated the percentage of throws they received and reported on 9-point Likert scales how excluded they felt and how fulfilled they experienced their basic needs (Germany:  $\alpha = .94$ ; Hong Kong:  $\alpha = .89$ ).

**Heart rate.** In Germany, heart rate was measured placing two electrocardiograph electrodes on the right and left side of the neck and one on the left side of the torso 2 cm below the rib cage. Signals were recorded at 2000 Hz using a Biopac (Biopac Systems, Santa Barbara, CA) MP150 system including amplifiers for ECG collection. The signal was sampled at a rate of 200 samples per second, streamed onto the computer screen, and saved to a hard drive. After recording, ECG data were edited for artifacts, and beats-per-minute (BPM) were computed off-line using AcqKnowledge software. In Hong Kong, heart rate was measured by placing three standard ECG electrodes on the right and left side of the neck and lower center of the chest. An ECG-Flex/Pro sensor was used to record signals. Signals were recorded using the FlexComp Infiniti system. The signals were sampled at a rate of 256 samples per second, streamed onto the computer screen and saved to the hard drive of a PC.

## Results

For mean differences, see Table 2.

**Manipulation check.** Participants reported that they received significantly fewer throws during Cyberball in the exclusion ( $M = 7.80$ ,  $SD = 5.66$ ) than in the inclusion condition ( $M = 42.01$ ,  $SD = 14.60$ ),  $t(73) = 13.45$ ,  $p < .001$ ,  $d = 3.15$ . Moreover, participants perceived the extent of being excluded as significantly higher in the exclusion condition ( $M = 7.39$ ,  $SD = 2.10$ ) than in the inclusion condition ( $M = 3.41$ ,  $SD = 2.15$ ),  $t(73) = -8.12$ ,  $p < .001$ ,  $d = -1.90$ .

**Need fulfilment.** We calculated a 2 (inclusionary status) x 2 (culture) ANOVA on need fulfilment and found a main effect of inclusionary status,  $F(1,71) = 99.35$ ,  $p < .001$ ,  $\eta_p^2 = .58$ : Excluded participants experienced lower need fulfilment ( $M = 3.84$ ,  $SD = 1.42$ ) than included participants ( $M = 6.67$ ,  $SD = 1.19$ ). The ANOVA moreover revealed an interaction,  $F(1,71) = 6.98$ ,  $p = .010$ ,  $\eta_p^2 = .09$ : Excluded German participants showed lower need fulfilment than excluded Hong Kong Chinese participants,  $t(36) = -2.65$ ,  $p = .012$ ,  $d = -0.88$ . There was no difference between cultures in response to inclusion,  $t(35) = 1.03$ ,  $p = .312$ ,  $d = 0.35$ . However, both Hong Kong Chinese,  $t(37) = 5.31$ ,  $p < .001$ ,  $d = 1.75$ , and Germans,  $t(34) = 8.70$ ,  $p < .001$ ,  $d = 2.98$ , indicated differing need fulfilment between exclusion and inclusion.

**Heart rate.** In Cyberball, the fact that oneself is excluded from others is not apparent from the beginning, as also in the exclusion condition participants receive the first two throws. The realization of exclusion develops gradually. We therefore split the heart rate data into thirds to be able to analyze the gradual development of feeling excluded. Investigating heart rate development, we calculated a three-factor ANOVA with the between-subject factors inclusionary status (exclusion vs. inclusion) and culture (Hong Kong vs. Germany) and the within-subject factor time (first third of Cyberball vs. second third of Cyberball vs. third third of Cyberball)<sup>4</sup>. The ANOVA indicated a trending three-way interaction,  $F(2,134) =$

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<sup>4</sup> We included the following covariates since they are known for their influence on heart rate variability: age, gender, medication (Antelmi et al., 2004) and basic heart rate (higher resting heart rate in people with East Asian cultural orientation; Yang, 2013).

2.27,  $p = .108$ ,  $\eta_p^2 = .03$ . To further probe this trend, we conducted a two-factor (culture x time) ANOVA for each inclusionary condition. The ANOVA revealed an interaction between culture and time for the exclusion condition,  $F(2,64) = 7.21$ ,  $p = .001$ ,  $\eta_p^2 = .18$ , see Figure 2, but not for the inclusion condition,  $F(2,62) = 1.22$ ,  $p = .303$ ,  $\eta_p^2 = .04$ . Further contrast analyses within the exclusion condition showed a significant difference between the first and the second third of Cyberball only among German participants,  $F(1,14) = 4.94$ ,  $p = .043$ ,  $\eta_p^2 = .26$ , whose heart rate significantly increased. Hong Kong Chinese participants did not show a heart rate difference between the first and second third of Cyberball,  $F(1,14) = 2.05$ ,  $p = .174$ ,  $\eta_p^2 = .13$ . In the next period, neither Germans,  $F(1,14) = 0.99$ ,  $p = .336$ ,  $\eta_p^2 = .07$ , nor Hong Kong Chinese,  $F(1,14) = 1.46$ ,  $p = .247$ ,  $\eta_p^2 = .09$ , changed their heart rate significantly compared to the period before, i.e. the heart rate of Germans remained on the increased level.

Examining the link between physiological and psychological data, we examined correlations between need fulfilment and the extent of heart rate change which was calculated by deducting the basic heart rate (resting condition) from the overall Cyberball heart rate. For Hong Kong Chinese, there were no significant correlations,  $r_s < .19$ ,  $p_s > .42$ . However, for Germans we observed a negative relationship between heart rate change and need fulfilment approaching significance in the exclusion condition,  $r(19) = -.43$ ,  $p = .064$ . In the inclusion condition there was no correlation,  $r(17) = .083$ ,  $p = .750$ . This indicates that for Germans lower need fulfilment was associated with a greater change in heart rate when excluded.

### Discussion

Study 4 replicated the association of a more individualistic self with more negative psychological experiences in the face of exclusion. In comparison to Hong Kong Chinese, Germans experienced lower fulfilment of basic needs when excluded. When included, participants from both cultures reported similar need fulfilment. As in Studies 1 and 3, however, both cultures differed between inclusion and exclusion in their need fulfilment. Importantly, the results on the physiological level mirrored the differences between cultures,

for participants' heart rate: Individualists showed a significant increase of heart rate after the realization of being excluded and kept this high level; collectivists did not show a significant change of heart rate during the experience of social exclusion. This suggests that our previously found result patterns were not due to different response and regulation strategies in different cultures, but that different self-construals vary in how susceptible they are to exclusion: With increase in heart rate being related to social stress (Kirschbaum et al., 1993), individualists appear to be threatened in a more immediate manner in their social standing compared to collectivists. The finding that collectivists did not even display immediate cardiovascular reactions indicates that they were not equally threatened by social exclusion.

### **General discussion**

The reported studies provide convergent evidence that people with an individualistic cultural background – contrary to people with a collectivistic background – were affected more strongly by social exclusion in the commonly used paradigms. The pattern emerged in four studies using two different manipulations of social exclusion and between five different cultural groups, pointing to the central role of self-construal in how people deal with exclusion, or – as Studies 3 and 4 suggest – in how much exclusion poses a threat to the individual. Study 1 investigated how Turks versus Germans dealt with exclusion, finding Germans being more negatively affected by exclusion. In Study 2 the comparison of participants from another collectivistic culture, China, with Germans revealed a similar pattern, suggesting that individualists were more threatened by social exclusion than collectivists. In our third study, we replicated the pattern in a German and Indian sample and observed furthermore that the collectivistic advantage in dealing with social exclusion was not associated with activating implicit social representations but with less activation of threat. In Study 4, we replicated the pattern of results among Hong Kong Chinese and German participants and, additionally, observed the hitherto found differences in the physiological responses of collectivistic and individualistic individuals. This finding corroborates the idea

that the found differences were not due to different response and regulation strategies in different cultures, but rather that collectivists were less affected by exclusion already at an immediate response level. Altogether, we have observed that individualists were more affected by social exclusion on both psychological and physiological levels; collectivists, on the other hand, showed less physiological stress in addition to higher levels of psychological well-being.

### **The results in the context of earlier research**

Previous research from Fiske and Yamamoto (2005) has also found culture to be a moderating factor. In their study, Americans showed disappointed reactions after an exclusionary feedback and strongly lowered their expectations about the unknown partner; Japanese, on the other hand, maintained cautious expectations in response to the exclusionary feedback. This research supports our results that people with individualistic background are affected more by inclusionary changes than people with collectivistic background.

Results which appear contradictory at first glance are reported by Garriss, Ohbuchi, Oikawa, and Harris (2011): Japanese participants showed higher rejection sensitivity than American participants. Also, Yamaguchi and colleagues found that higher levels of collectivism were related to greater rejection sensitivity (Yamaguchi, Kuhlman, & Sugimori, 1995). Our results that collectivists were less affected by concrete instances of exclusion than individualists, however, plausibly fit into these results, when taking into account the following: As Way and Lieberman (2010) suggest, collectivists might particularly benefit from being part of an interdependent social network and thus be protected against singular social losses; being absolutely disconnected from social support, however, might be particularly aversive. Thus, collectivists might be better “prepared” by higher rejection sensitivity and, at the same time, less threatened by single events of social exclusion.

In Garriss et al.’s (2011) cross-cultural rejection study, inclusionary status and culture only resulted in main effects. Looking at the reported mean differences, however, Japanese

compared to Americans indicated smaller differences between the conditions rejection and acceptance on all dependent variables, namely negative and depressive affect, belongingness, and meaningful existence (except positive affect). The authors suggest that uneven sample sizes for Americans and Japanese might have lowered the chance to detect interactions.

Our results are also in accordance with research by Knowles and Gardner (2008) showing that an activation of group identity can help to recover from exclusion: Salient group membership was associated with less negative mood and more trust in social competence following exclusion. Similarly, our findings match the results of Gardner et al. (2012) and Ren et al. (2013) where a highly interdependent self-construal was associated with less negative emotion and a facilitated recovery after exclusion. Gardner et al. (2012) have theorized that people search for social support to protect themselves from the negative effects of exclusion and suggested that a chronic interdependent self-construal protects from the negative consequences of exclusion. An interdependent self-construal is defined by chronically accessible social representations (Markus & Kitayama, 1991); collectivists may thus be constantly regulating social reassurance. This may serve as a natural buffer.

### **The proposed underlying mechanism**

Taking a perspective backed by existing psychological research with a focus on individualistic countries, the idea of collectivists facing the same threat of exclusion but having better regulation strategies is in accordance with our first two studies. In Studies 3 and 4, however, the findings of implicit social representations not being specifically activated but exclusion being associated with less activation of threat, mirrored in exclusion not even initially leading to a heart rate increase in collectivists, suggest a different, more parsimonious, interpretation: These findings imply that the threat of social exclusion is not experienced as such for those with a collectivistic orientation. Including the manipulation checks (in Studies 2, 3, and 4 collectivists perceived the exclusion manipulation as less intense; see Supplementary Materials), it becomes even clearer that collectivists feel less



impacted by social exclusion. In particular, the finding of heart rate not increasing after exclusion in collectivistic participants suggests that they experience substantially less cognitive or emotional activation (Obrist, 1981) and social stress (Kirschbaum et al., 1993) during exclusion. This could mean that collectivists do not need an active buffer or constant regulation strategies against the negative effects of exclusion as they might just not be as vulnerable to exclusion directed at the individual person, as individualists are. According to Markus and Kitayama (1991) the interdependent self-construal is defined by means of connections with others. The idea of the collectivistic self being defined interpersonally becomes even clearer looking at cross-cultural studies on psychological reactance which consistently show that collectivists react more strongly to restrictions on the group level, and less to restrictions that affect individual decision making (Graupmann, Jonas, Meier, Hawelka, & Aichhorn, 2012; Jonas et al., 2009). Likewise, our results suggest that the coordinates that define the collectivistic self, make it less susceptible to threats to individual belonging. The individual self, separate from others is not a core aspect of self-integrity, and therefore less guarded by highly sensitive reactions to individual social exclusion.

As we propose different underlying motivations in collectivists and individualists, i.e. a more ego-focused perspective of individualists leading to the more severe consequences of social exclusion, the question emerges of whether this also relates to the different underlying motivations in the four basic needs. According to Williams (2007), belonging and self-esteem are relational needs, whereas control and meaningful existence are efficacy needs – needs that are more associated with an adequate individual social standing. In post-hoc analyses separating the needs measure into relational and efficacy needs, the difference between collectivistic and individualistic cultures in response to exclusion was more pronounced in efficacy needs,  $p$ s between  $<.001$  and  $.048$ , than in relational needs,  $p$ s between  $.098$  and  $.403$ , except for Study 2 where it was balanced (see Supplementary Materials). This suggests again, that for individualists the threat inherent in exclusion is a rejection of what defines the self.

Moreover, the fact that culture did only weakly moderate drops in relational needs might support Williams' (2007) claim that some aspect of social exclusion is a universal, unmoderated experience.

### **Limitations**

In most of our studies, we had an over-representation of women. To understand the impact this over-representation might have had on our results, we included gender as variable in all analyses. However, it did not interact with inclusionary status and culture in any of our analyses,  $ps > .12$ . Although recent research has found significant gender differences in coping with social exclusion with men responding in a “fight or flight” manner and women using a “tend-and-befriend” tactic (Aydin, Graupmann, Fischer, Frey, & Fischer, 2011; Weik, Maroof, Zöller, & Deinzer, 2010), there is no evidence for gender differences in *experiencing* social exclusion. Previous research allows for the assumption that men and women experience exclusion similarly in an immediate reaction, motivating them to different coping strategies. Therefore, we conclude that the over-representation of women had no impact on our results.

In our set of studies, we assumed self-construal differences through the investigation of different cultures. However, we have only once assessed self-reported level of individualism and collectivism (Study 3; see Supplementary Materials). Although this approach is common in intercultural research (e.g., Tray & Robins, 2008) we cannot be sure whether the underlying process is indeed collectivism and individualism or, e.g., power distance. However, recent findings matching our results have solely used self-reported independence and interdependence (Gardner et al., 2012; Ren et al., 2013) which supports our interpretation.

It should be noted that the measure of implicit threat and social representations used in Study 3 was not validated before and reliabilities were quite low. Therefore, these results should be interpreted with caution. Even though, the replication of the pattern using heart rate as a proxy for implicit threat in Study 4 suggests that it did tap into the same mechanism.

### **Implications and future research**

The current assumption about cultural reactions to social exclusion is that collectivistic cultures view ostracism as a major calamity (Triandis & Gelfand, 2012); this opinion emerged as a result of the importance of interdependence in collectivistic cultures. Our research suggests that collectivists might not be affected by *individual* social exclusion as much as individualists. As has been shown for threats to consistency (dissonance: Hoshino-Browne et al., 2005) and threats to freedom (Graupmann et al., 2012; Jonas et al., 2009), collectivists are less susceptible to threats directed at the individual self-definition but rather to threats that affect social identity. For collectivists, therefore, the “who” might matter in the context of social exclusion: If the target of exclusion is the own ingroup, it might hurt much more than the target being an individual. Also, the source of exclusion might be more important: In Studies 3 and 4 the excluders were strangers. In contrast to individualists (e.g., Gonsalkorale & Williams, 2007), collectivists might only be bothered when excluded by people who have strong ties to them.

Practically, our results could be applied in therapy settings or educational contexts where coping with social disappointments is an important topic: Mental trainings focusing on interdependent self-definition might be a way to reduce vulnerability to social threats. This notion is in line with Crocker and Park (2004) who suggest that the pursuit of self-esteem causes substantial costs to the individual. In line with their argumentation, our results indicate that the orientation towards others, or as they word it, “...goals that are larger than the self.” (Crocker & Park, 2004, p. 16) can be beneficial in the face of threat.

## **Conclusion**

In four studies we found responses to social exclusion to differ systematically between individualists and collectivists. In light of finding less negative consequences for collectivists on both psychological and physiological measures, the idea emerges that the collectivistic self might be structurally different from the individualistic one.

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Table 1

*Study 3: Means and standard deviations (in parenthesis) of variables as a function of inclusionary status and culture*

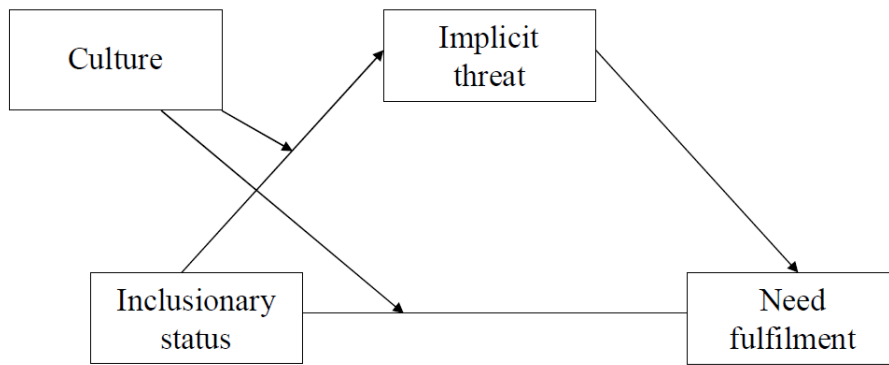
	Germany			India		
	Exclusion	Inclusion	Control	Exclusion	Inclusion	Control
	( <i>n</i> = 25)	( <i>n</i> = 27)	( <i>n</i> = 28)	( <i>n</i> = 28)	( <i>n</i> = 36)	( <i>n</i> = 39)
Need fulfilment	2.55 (1.04)	4.90 (0.77)	5.15 (0.93)	3.39 (0.89)	4.72 (1.15)	5.00 (1.11)
Implicit threat	4.45 (1.35)	3.36 (1.47)	3.49 (1.36)	3.35 (1.72)	3.93 (1.53)	3.95 (1.46)
Implicit social representations	5.05 (1.13)	5.17 (1.41)	5.13 (1.28)	4.62 (1.74)	5.29 (1.35)	4.94 (1.19)



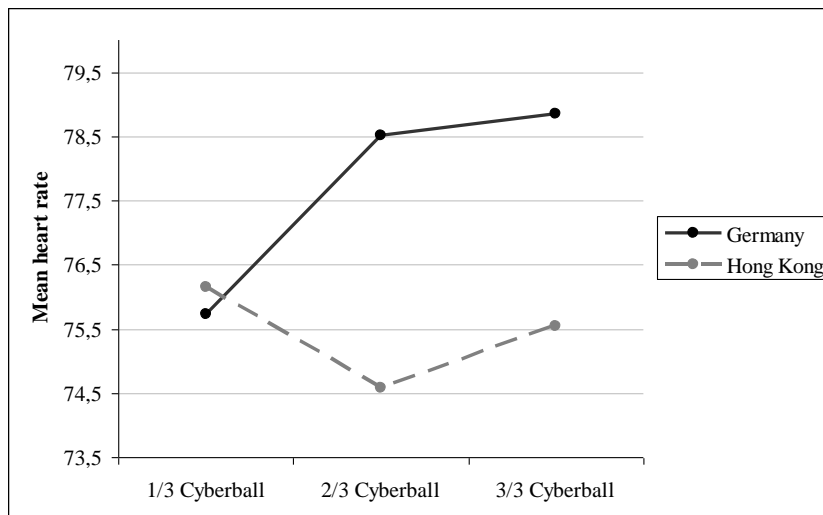
Table 2

*Study 4: Means and standard deviations (in parenthesis) of variables as a function of inclusionary status and culture*

	Germany		Hong Kong	
	Exclusion ( <i>n</i> = 19)	Inclusion ( <i>n</i> = 17)	Exclusion ( <i>n</i> = 19)	Inclusion ( <i>n</i> = 20)
Need fulfilment	3.27 (1.22)	6.93 (1.30)	4.40 (1.40)	6.53 (1.08)
Heart rate: First third	73.10	74.73	78.78	74.31
Cyberball (BPM)	(8.43)	(10.93)	(12.10)	(10.48)
Heart rate: Second	75.73	76.86	77.37	73.86
third Cyberball (BPM)	(10.08)	(10.96)	(12.75)	(10.51)
Heart rate: Third third	76.54	77.07	77.86	75.35
Cyberball (BPM)	(8.15)	(10.41)	(12.53)	(9.97)



*Figure 1.* Study 3: Moderated mediation model.



*Figure 2.* Study 4: Mean heart rate in the exclusion condition for German and Hong Kong Chinese participants (controlled for age, gender, medication, and basic heart rate).