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Early beliefs about strangers are implicit, whether or not you are an Atheist participant. In Experiment 1, positive correlations were found that reduced the advantage in positive associations for believers.

* E-mail: shan@pku.edu.cn

Because Christian fundamentalists' belief and practice result in negative self-image or denial of the self [13–15], we hypothesized that the IPA with self-face in Chinese Christians is weakened relative to that in Chinese atheists. In addition, as self-face advantage reflects positive attitude toward the self [5], weakened



IPA with self-face may consequently reduce self-face advantage in Christians. We conducted two experiments to test these hypotheses. Experiment 1 compared the IPA with self-face over a friend's face in Christian and Atheist participants using the typical implicit association test (IAT, [18]). Experiment 2 assessed self-face advantage over friend-face in the same Christian and Atheist participants by measuring RTs to self-face and friend-face in a face-owner identification task (Figure 1). Hierarchical regression analyses were conducted to further assess whether religious belief and practice affect the relationship between the IPA with self-face and the self-face advantage across individuals. If the IPA mediates the self-face advantage in atheists, we would expect larger self-face advantage in those with greater IPA with self-face. However, we would not expect a positive correlation between the IPA with self-face and the self-face advantage across Christian participants if the IPA with self-face does not underlie the self-face advantage in Christian individuals.

Methods

Subjects

Forty Chinese undergraduate and graduate students participat-

responding hand and the category label in order to obtain high response accuracy. Each stimulus was presented for 300 ms at the center of the screen and was followed by a fixation cross with a duration varying between 900 to 1500 ms (mean = 1200 ms). On

Table 2. Mean RTs(ms) (SD) and difference in RTs in Experiment 2.

Faces	Atheists		Christians	
	Left	Right	Left	Right
Self-face	493 (71)	491 (66)	529 (93)	506 (71)
Friend-face	519 (63)	493 (58)	525 (83)	514 (71)
Difference	27(53)*	2(41)	-4(41)	8(34)

Note: There were twenty participants in each group of participants.

* $p < 0.05$.

doi:10.1371/journal.pone.0037824.t002

Hierarchical Regression Analyses

Hierarchical regression analyses were conducted to examine whether Subject Group (Atheists vs. Christians) affected the relationship between the IPA with self-face (IV) and the self-face advantage (DV). The model regressed the moderator, IV (normalized IAT effect), and their interaction. This analysis showed that the interaction of Subject Group and the IAT effect was predictive of individuals' self-face advantage ($F = 4.949$, $p = 0.006$; see Table 3 for statistic details), suggesting that the IAT effect predicted one's self-face advantage differently between Atheist and Christian participants. Post hoc regression analyses confirmed a positive correlation between the IAT effect and the self-face advantage in Atheist participants ($\beta = 0.583$, $p = 0.007$, Figure 2a) but not in Christian participants ($\beta = 0.022$, $p = 0.927$, Figure 2b). These results suggested that greater IPA with self-face positively predicted larger self-face advantage (i.e., faster responses to self-face than to friend-face) in Atheist participants but not in Christian participants.

Discussion

Previous research suggests that Christian belief and practice that emphasize human sinfulness [13] may weaken positive attitude toward the self [14,15] and reduce neural encoding of self-relatedness of personality trait words [17]. In two experiments the current work tested the hypothesis that the influence of Christian belief and practice on self-related processing may extend into the perceptual domain by reducing the implicit positive association with self-face and weakening the self-face advantage during face

Table 3. Hierarchical Regression Analysis on IAT effect with the self-face advantage as the Dependent Variable.

	Step1 β	Step2 β
IAT effect	0.307	0.018
Group	-0.416*	-0.435**
IAT x Group		0.440*
ΔR^2	0.186	0.106
ΔF	4.229*	5.386*
R^2	0.168	0.292
Adjusted R^2	0.142	0.233
Overall F	4.229*	4.949**
Df	37	36

* $p < 0.05$,

** $p < 0.01$.

doi:10.1371/journal.pone.0037824.t003

recognition. Experiment 1 found that, while Atheist participants responded faster to self-face when it was associated with positive than with negative trait words, this IAT effect was significantly reduced in Christian participants. Experiment 2 found that Atheist participants responded faster to self-face compared to friend-face, replicating the robust self-face advantage [3–5]. However, the self-face advantage was significantly weaker in Christian than in Atheist participants. Furthermore, the hierarchical regression analysis showed that the relationship between the IAT effect and the self-face advantage also differed significantly between Atheist and Christian participants, with a positive correlation between the IAT effect and the self-face advantage in atheists but not in Christians.

The results in Experiment 1 support our first hypothesis that the implicit positive attitude toward self-face is weakened in Christian relative to Atheist participants. According to the IPA theory of self-face advantage [5], the implicit positive attitude toward the self plays a pivotal role in the self-face advantage in behavioral responses during face recognition. Thus given the IPA theory and the results of Experiment 1, it can be assumed that the decreased self-face advantage in Christian than Atheist participants arose from the weakened IPA with self-face.

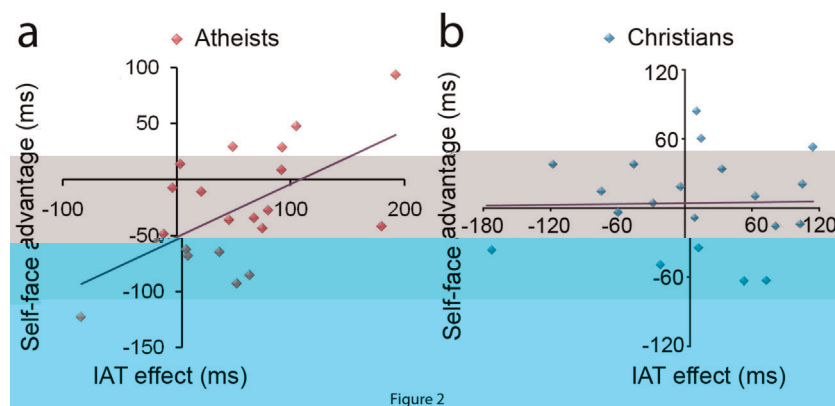


Figure 2. Correlation Result of Atheists and Christians. The X-axis represents the IAT effect (i. e., RTs to self-face when it is associated with negative items minus when associated with positive items). The Y-axis represents self-face advantage (i. e., left hand RTs to self-face minus those to friend-face in the Face-owner identification task).

doi:10.1371/journal.pone.0037824.g002

The results of hierarchical regression analyses further support the association between the IPA with self-face and self-face advantage in Atheist participants but not in Christian participants. Thus our findings on the one hand support the IPA theory by showing evidence for the association between the implicit positive view of the self and the self-face advantage. On the other hand, our results suggest that the implicit positive view of the self can be reduced by Christian belief and practice that repudiates the distinctness of the self and friends and this in turn can eliminate the advantage of self-face over friend-face in the believers.

Previous studies have shown evidence that Christian belief and practice influence social cognitive processes [17,21–23]. For example, it has been shown that Christian belief and practice decreased self-relevance encoding during self-reflection [17], and increased prosocial behaviors [21] and implicit self-regulation [22]. Priming Christian religious concepts also led to increased racial prejudice [23]. Our work compliment previous work by showing that Christian belief and practice also affect self-related processing in the perceptual domain by adopting a weakened positive association with self-concept advocated by Christianity. Similarly, the difference in self-concept between Western and East Asian cultures also gives rise to the variation of self-face advantage across Westerners and Chinese [5,8]. A recent event-related brain potential study showed evidence for a greater self-face advantage in RTs in British than in Chinese participants [9]. Cultural difference also exists in the neural mechanisms underlying self-face recognition. Relative to friend-face, self-face elicited an enhanced frontal activity at about 200 ms after stimulus onset in Westerners, whereas a reverse pattern was observed in Chinese. Thus an unresolved issue related to the current work is whether the neural mechanisms underlying self-face recognition are different between Christian and atheists. This can be examined in future work that combines brain imaging and the self-face recognition paradigm used in the current study.

There are several limitations in the current study. First, the current work tested the difference in self-face recognition between Christian and Atheist participants in a specific sociocultural context (i.e., Chinese culture). Christians constitute a minority group of members of the current society in China [12] and this is different from the situation in the Western societies. Thus it is unclear whether Christian fundamentalism in the Western

societies may influence self-face recognition in a similar vein. Further research may test Christian participants in Western cultures in order to examine whether Christian belief and practice produce similar influence on self-face recognition in different sociocultural environments.

Second, there has been evidence that self-construals influence the neural representation of the self and close others. It has been shown that, relative to priming Western cultures, priming East Asian cultures led to similar neural representation of personality traits of the self and a close other in the medial prefrontal cortex [24]. Moreover, relative to interdependent self-construal priming, independent self-construal priming increased the right frontal activity that differentiated self-face from faces of familiar others [25]. Because there has been no research report of cultural values and self-construals of Chinese atheists and Christians and these were not measured either in the current work, it is unknown to what degree our Atheist and Christian participants were different in self-construals and whether the difference in self-construals, if any, may contribute to the difference in self-face recognition in the two subject groups. One of our recent studies measured self-construals using the Self-construal Scale [26] and the pilot data suggest that both Christian and Atheist participants exhibited greater interdependent than independent self-construal scores [Ma and Han, unpublished data]. Future research should clarify how self-construals contribute to the difference in self-face advantage between atheists and Christians.

Finally, although the behavioral performances in the face-own identification task suggested a different relation between self and a close other in Atheist and Christian participants, the current work did not measure subjective feelings of self-friend relationship and thus was unable to address how the relationship between the self and a friend influences self-face recognition in the two subject groups. The current work only tested a small number of participants. Future work may test whether the conclusion based on our findings can be applied to a large population.

Author Contributions

Conceived and designed the experiments: YM SH. Performed the experiments: YM. Analyzed the data: YM. Contributed reagents/materials/analysis tools: YM. Wrote the paper: YM SH.

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