**Supplemental File**

**Mentalizing, but not autistic traits, predicts religious belief in a sample of healthy Japanese youth**

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**Study 1**

***(a) Methods***

***Materials and Procedure***

First, participants answered the demographic questions (age and gender).

Next, they rated a nine-item religious belief measure that was created for this study based on established Japanese scales. These measures consisted of two scales. First was the subscale of the Animism Scale for Adults (Ikeuchi, 2010), called “the apotheosis of natural products (three items).” Sample items are “I think gods dwell in big trees and rocks that exist in nature” and “I think there are ocean gods in the oceans, mountain gods in the mountains.” The second was the subscale of the Attitudes Toward Paranormal Phenomena Scale short edition (Sakata, Kawakami, & Koshiro, 2012), called “belief in spirituality (six items).” Sample items are “I believe in gods or spirits” and “I think punishment will follow rude behaviors with deities.” These items employed a five-point Likert scale ranging from 1 indicating “strongly disagree” to 5 indicating “strongly agree.” The average of ratings (1-5) for each item was calculated for each participant’s religious belief score (*α* = .89, *M* = 3.15, *SD* = 0.85, Kolmogorov-Smirnov test: *D* = 0.09, *p* = .438).

Then, the participants answered the Autism-Spectrum Quotient (AQ) Japanese version (Wakabayashi, Tojo, Baron-Cohen, & Wheelwright, 2004) to measure individual differences in autistic traits. The AQ has 50 items, each answerable with a four-point Likert scale ranging from 1 indicating “definitely disagree” to 4 indicating “definitely agree.” Sample items are “I prefer to do things the same way over and over again,” “I am fascinated by numbers,” and “I find social situations easy (reverse item).” Each item was scored one point if the participants strongly displayed an autistic-like response (definitely agree or definitely disagree), and no point if they slightly displayed an autistic-like response (agree or disagree). The sum of these points for each item was calculated for each participant’s AQ score (*α* = .77, *M* = 21.11, *SD* = 6.49).

In the analysis, all variable except gender were standardized.

**Study 2**

***(a) Method***

***Materials and Procedure***

First, participants answered the demographic questions (age, gender, nationality, and religious affiliation).

Next, they rated their agreement (from 1 indicating “strongly disagree” to 5 indicating “strongly agree”) with 13 items that measure individual differences in religious belief, which included the same nine items used in study 1 and four items on the belief in God measure used in Norenzayan et al. (2012, studies 1 and 2). Examples of the belief in God items are “When I am in trouble, I find myself wanting to ask God for help” and “I just don’t understand religion (reverse item).” These items were translated into Japanese by the author and a bilingual native English speaker. Although the original belief in God measure was a five-item scale, one item (“I believe in God”) was excluded because of its similarity with an item in the belief in spirituality scale (“I believe in gods or spirits”). The average of ratings for each of the 13 items was calculated for each participant’s religious belief score (*α* = .85, *M* = 3.22, *SD* = 0.70, KS test: *D* = 0.11, *p* = .09).

Then, the participants answered the AQ Japanese version and the short form of the Empathy Quotient (EQ-short, Wakabayashi et al., 2006). The EQ-short consists of 22 items and is used to measure the ability to infer and understand the mental states of others and to react appropriately to them in everyday life (e.g., Norenzayan et al., 2012; Willard & Norenzayan, 2013). Sample items are “I can easily tell if someone else wants to enter a conversation” and “I find it hard to know what to do in a social situation (reverse item).” The EQ-short was in English and its Japanese version was prepared based on the study by Wakabayashi, Baron-Cohen, & Wheelwright (2006), who translated the EQ into Japanese. The AQ and EQ measures employed a four-point Likert scale ranging from 1 indicating “definitely disagree” to 4 indicating “definitely agree.”

The AQ score was calculated in the same way as in study 1 (*α* = .70, *M* = 20.07, *SD* = 5.92). Each of EQ-short items were scored two points if the participants strongly displayed an empathizing response (definitely agree or definitely disagree), and one point if they slightly displayed an empathizing response (agree or disagree). The sum of these points for each item was calculated for each participant’s EQ score (*α* = .86, *M* = 19.15, *SD* = 7.41).

In the analysis, all variable except gender were standardized.

***(b) Results and Discussion***

The same result in the article were obtained when the religious belief score was calculated either using the nine items in study 1 or the original five items on belief in God (Norenzayan et al., 2012).

When I use the nine items in study 1 (*α* = .89, *M* = 3.23, *SD* = 0.86, KS test: *D* = 0.11, *p* = .055), the AQ score did not predict religious belief (*β* = 0.003, *SE* = 0.08, *p* = .976), but gender predicted increased religious belief (*β* = 0.35, *SE* = 0.17, *p* = .043). The effect size (*f*2) of this analysis was .033, and post hoc power was .435. Meanwhile, the EQ score was a significant predictor of the religious belief score (*β* = 0.17, *SE* = 0.08, *p* = .042), along with gender (*β* = 040, *SE* = 0.17, *p* = .022). The effect size of this analysis was .079, and post hoc power was .818.

And when I use the five items on belief in God (*α* = .53, *M* = 3.23, *SD* = 0.71, KS test: *D* = 0.08, *p* = .409; “I believe in God” was replaced with “I believe in gods or spirits”), the AQ score did not predict religious belief (*β* = 0.002, *SE* = 0.09, *p* = .980), but gender predicted increased religious belief (*β* = 0.61, *SE* = 0.18, *p* = .001). The effect size of this analysis was .096, and post hoc power was .889. Meanwhile, the EQ score was a significant predictor of the religious belief score (*β* = 0.18, *SE* = 0.08, *p* = .026), along with gender (*β* = 062, *SE* = 0.17, *p* = .0003). The effect size of this analysis was .154, and post hoc power was .987.

**References**

Ikeuchi, H. (2010). Animistic thinking in adults: The memorial service for dolls as a voluntary loss. *Japanese Journal of Social Psychology*, 25, 167-177. (doi: 10.14966/jssp.KJ00006203282) (in Japanese with an English abstract)

Norenzayan, A., Gervais, W. M., & Trzesniewski, K. H. (2012). Mentalizing deficits constrain belief in a personal god. *PLoS ONE*, 7, e36880. (doi: 10.1371/ journal.pone.0036880)

Sakata, H., Kawakami, M., & Koshiro, E. (2012). Constructing attitudes towards paranormal phenomena scale (APPle) short edition (1): Attitudes towards paranormal phenomena (29). *The 76th annual convention of the Japanese Psychological Association*. 238. (in Japanese)

Wakabayashi, A., Tojo, Y., Baron-Cohen, S., & Wheelwright, S. (2004). The Autism-Spectrum Quotient (AQ) Japanese version: Evidence from high-functioning clinical group and normal adults. *The Japanese Journal of Psychology*, 75, 78-84. (doi: 10.4992/jjpsy.75.78) (in Japanese with an English abstract)

Wakabayashi, A., Baron-Cohen, S., Wheelwright, S., Goldenfeld, N., Delaney, J., Fine, D., Smith, R., & Weil, L. (2006). Development of short forms of the Empathy Quotient (EQ-short) and the Systemizing Quotient (SQ-short). *Personality and Individual Differences*, 41, 929-940. (doi: 10.1016/j.paid.2006.03.017)

Wakabayashi, A., Baron-Cohen, S., Wheelwright, S. (2006). Individual and gender differences in Empathizing and Systemizing: Measurement of individual differences by the Empathy Quotient (EQ) and the Systemizing Quotient (SQ). The Japanese Journal of Psychology, 77, 271-277. (doi: 10.4992/jjpsy.77.271) (in Japanese with an English abstract)

Willard, A. K., & Norenzayan, A. (2013). Cognitive biases explain religious belief, paranormal belief, and belief in life’s purpose. *Cognition*, 129, 379-391. (doi: 10.1016/j.cognition.2013.07.016)