

SUPPLEMENTARY MATERIALS

Details of questionnaire measures

Dependent measures

Cooperative behaviour:

Perceived social support was measured with three items ($\alpha = .78$): “In my view, most pilgrims are supportive of others”, “In my view, most pilgrims are respectful of others”, “If I need help, other pilgrims would help me”. These were constructed for this study; the third item was based on measures of expected social support used in previous research [1, 2].

Giving social support to other crowd members was measured with two items constructed for this study, partly based on items used in previous research on social support in mass events [1]: “I have been helpful to others”, “I have shown concern for others’ needs” ($\alpha = .66$).

Predictors

Density: The number of people per square meter is the standard estimate measure of crowd density in the crowd safety industry [3].

Shared social identity:

Perception of others in the crowd as good Muslims was measured with three items: “I think of the other people here as Muslim brothers”; “The Muslim identity is important to the other people in the crowd”; and “In my view, other people in this crowd are good Muslims” ($\alpha = 0.79$).

Social identification with the crowd was measured with five items: “I feel at one with the people around me”, “I feel that I am part of this crowd”, “I feel a sense of togetherness with other people on the Hajj”, “I feel unity with others”, and “I feel strong ties with other people in the Hajj” ($\alpha = .83$). The precise wording of these items was developed

for this study, but they are similar to those used in previous scales [4, 5] and which are defined by Leach et al. [6] as the “solidarity” dimension of social identification.

Demographic measures

Age was recorded as follows: 18 to 19 years old; 20 to 29; 30 to 39; 40 to 49; 50 and over.

(The questionnaire was mistakenly formatted “18-20, 20-30, 30-40, 40-50, 50 and over”. We have therefore re-presented these data, though it is likely that there is some minor error in the figures in each age category.)

Gender was recorded as male or female.

Level of education was recorded as follows: illiterate; educated to “read and write” level; to primary school level; to secondary school level; to undergraduate degree level; Master’s degree; doctorate. In the analysis, this was treated as an ordinal variable.

Previous experience of the Hajj was measured with two levels: first time or have been before.

Nationality was recorded verbatim, but was subsumed within the six regional Hajj establishments in the analysis (i.e., Arab and Arabian Gulf countries; America, Australia and Europe [including Turkey]; South Asia; South East Asia; Iran and Tajikistan; and non-Arab African countries).

Language was recorded in terms of the seven languages: Arabic, Malay, Urdu, French, Persian, Turkish, and English

Acquiescence measure Drawing on advice from Vignoles (personal communication), we created a measure of acquiescent response style. We took four pairs of items that seemed to point in opposite directions and therefore where it might be assumed that agreement with both items would indicate a tendency to agree with questionnaire items. To create the acquiescence measure we averaged all of these for each participant ($M = 4.77$, $SD = 0.63$, range = 2.75-7.00). The four pairings items were as follows:

“There is enough space for everyone” and “It is too crowded here”

“I feel safe at Tawaf” and “Tawaf can be dangerous”

“The Saudi staff are hostile to us” and “I like the Saudi staff”

“The Saudi authorities provide appropriate information for us” and “The Saudi authorities are not communicating adequately with us”

Note: the questionnaire also included a number of items for variables not examined here, including perceived safety, positive experience, psychological change, and perceptions of management.

Results: additional analysis

Given that response rates correlated with age, education and gender, we compared participants in each of these categories on *giving social support* to test for demographic evidence of such a bias. There was no significant difference for age group, $F(4, 1158) = 1.01$, $p = .40$. For level of education, there was an overall significant difference, $F(6, 1156) = 2.29$, $p = .03$). LSD post hoc tests showed that illiterate participants differed marginally from those with Master's ($p = .053$) and PhD ($p = .08$) degrees; illiterate participants reported giving less social support than these other groups. However, these were the smallest three groups; and there was no difference in reported support between the illiterate participants and any other groups. For gender, men ($M = 6.16$) were significantly more likely than women ($M = 5.95$) to report giving social support, $t(1161) = 3.98$, $p < .001$. This result, unlike those for age and level of education, might suggest that we were more likely to successfully recruit cooperative (males) than less cooperative (female) pilgrims. However, the ratio of males versus females in the sample was actually in line with the proportion at the Hajj cited in official statistics; where research assistants were unable to recruit one female pilgrim they would move on to another female rather than recruit an additional male.

Demographics: those inside vs outside the Mosque

Age: A chi-square test was performed and no significant relationship was found between age and Mosque location, $\chi^2 (1, N = 1166) = 4.45, p = .35$. Therefore, the five age groups sampled inside the Mosque were roughly in proportion to the overall sample.

Level of education: A chi-square test was performed and no significant relationship was found between education and Mosque location, $\chi^2 (6, N = 1166) = 19.40, p = .11$. For all seven categories, sampling across the two locations was in proportion to their representation in the sample as a whole.

Gender: A chi-square test was performed and a significant relationship was found between gender and Mosque location, $\chi^2 (1, N = 1166) = 9.06, p = .003$. Men made up 64% of the overall sample but the proportion of men (compared to women) sampled within the Mosque was 59%.

Previous experience of Hajj: A chi-square test was performed, and a significant relationship was found between previous experience and Mosque location, $\chi^2 (1, N = 1166) = 8.81, p = .003$. People for whom this was their first Hajj made up 69% of the sample, but the proportion of these new people (compared to people who had been before) sampled within the Mosque was 74%.

Hajj service provider: A chi-square test was performed, and a significant relationship was found between Hajj provider and Mosque location, $\chi^2 (5, N = 1166) = 82.03, p < .001$. For all the regional groups except one (non-Arab African countries), the number sampled outside the Mosque was greater than that sampled inside the Mosque; in the sample as a whole, the proportion of non-Arab African country pilgrims was 9%, but they made up 18% of those sampled in the Mosque.

Language: A chi-square test was performed, and a significant relationship was found between language and Mosque location, $\chi^2 (6, N = 1166) = 169.43, p < .001$. For all groups

except the French-speaking, the number sampled inside the Mosque was proportionate to the overall sample. In the sample as a whole, the percentage of French speakers was 9%, but the percentage of French speakers compared to other language groups sampled inside the Mosque was 22%.

Predictors of cooperation: additional analysis

Perceived social support.

Table A. Means and SDs for perceived social support for the different age groups, showing that participants in the 40-49 age bracket reported most, and those under 20 reported least, perceived social support

| Age group | <i>M</i> | <i>SD</i> |
|------------------|-----------------|------------------|
| <20 | 5.35 | 1.30 |
| 20 - 29 | 5.62 | 1.12 |
| 30 – 39 | 5.82 | 0.90 |
| 40 – 49 | 5.91 | 0.90 |
| 50+ | 5.83 | 1.00 |

Table B. Means and SDs for perceived support across different language groups, showing that French speakers were less likely than other language groups to perceive social support

| Language | <i>M</i> | <i>SD</i> |
|-----------------|-----------------|------------------|
| English | 5.76 | 1.17 |
| French | 5.19 | 1.15 |
| Malay | 6.07 | 0.72 |
| Urdu | 6.07 | 0.58 |
| Persian | 5.78 | 0.87 |
| Turkish | 5.52 | 1.23 |
| Arabic | 5.98 | 0.85 |

Table C. Means and SDs for perceived support across different Hajj establishments, showing that those from Turkey, America, Australia and Europe and countries from the non-Arab African Hajj establishments perceived less social support than did other groups

| Hajj service provider | <i>M</i> | <i>SD</i> |
|-------------------------------------|----------|-----------|
| Pilgrims of the Arabian Countries | 5.98 | 0.84 |
| South East Asia Pilgrims | 6.04 | 0.73 |
| South Asian Pilgrims | 6.05 | 0.59 |
| Turkey, America, Australia & Europe | 5.44 | 1.29 |
| Non-Arab African Countries | 5.53 | 1.10 |
| Iran & Tajikistan | 5.79 | 0.78 |

Giving social support.

Table D. Means and SDs for perceived social support for the different age groups, showing that participants in the <20-39 age bracket reported giving less social support than those 40 years old and older.

| Age group | <i>M</i> | <i>SD</i> |
|-----------|----------|-----------|
| <20 | 6.06 | 0.70 |
| 20 - 29 | 6.01 | 0.99 |
| 30 – 39 | 6.00 | 0.80 |
| 40 – 49 | 6.12 | 0.88 |
| 50+ | 6.11 | 0.84 |

A *t*-test was carried out on the relation between gender and giving social support and it was found that males ($M = 6.16, SD = 0.85$) gave more support than females ($M = 5.95, SD = 0.86$), $t(1161) = 3.98, p < 0.001$.

Table E. Means and SDs for support given for different levels of education, showing that higher level of education broadly correlates with more support given

| Level of education | <i>M</i> | <i>SD</i> |
|---------------------------|-----------------|------------------|
| Illiterate | 5.94 | 1.20 |
| Reads and writes | 5.91 | 1.06 |
| Primary level | 6.02 | 0.91 |
| Secondary level | 6.06 | 0.81 |
| Degree | 6.12 | 1.02 |
| Masters | 6.29 | 0.81 |
| Doctorate | 6.63 | 0.74 |

Table E. Means and SDs for giving support for different language groups, showing that French speakers reported giving less support than the other language groups

| Language | <i>M</i> | <i>SD</i> |
|-----------------|-----------------|------------------|
| English | 6.07 | 1.24 |
| French | 5.36 | 1.31 |
| Malay | 6.05 | 0.81 |
| Urdu | 6.25 | 0.66 |
| Persian | 6.32 | 0.80 |
| Turkish | 6.03 | 0.93 |
| Arabic | 6.12 | 0.90 |

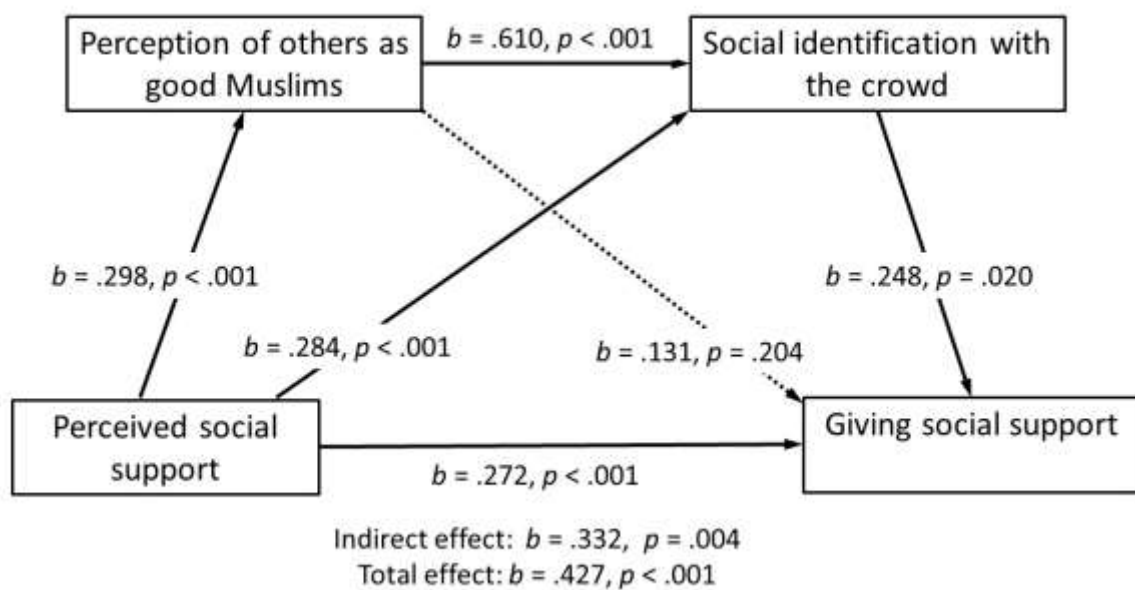
A *t*-test was carried out on the relation between giving social support and previous experience of attending the Hajj and it was found that those had been before ($M = 6.28$, $SD = 0.79$) gave more support than those for whom it was the first time ($M = 5.99$, $SD = 0.87$), $t(1161) = 5.44$, $p < 0.001$.

The process of cooperation: Additional analysis

Serial mediation analysis

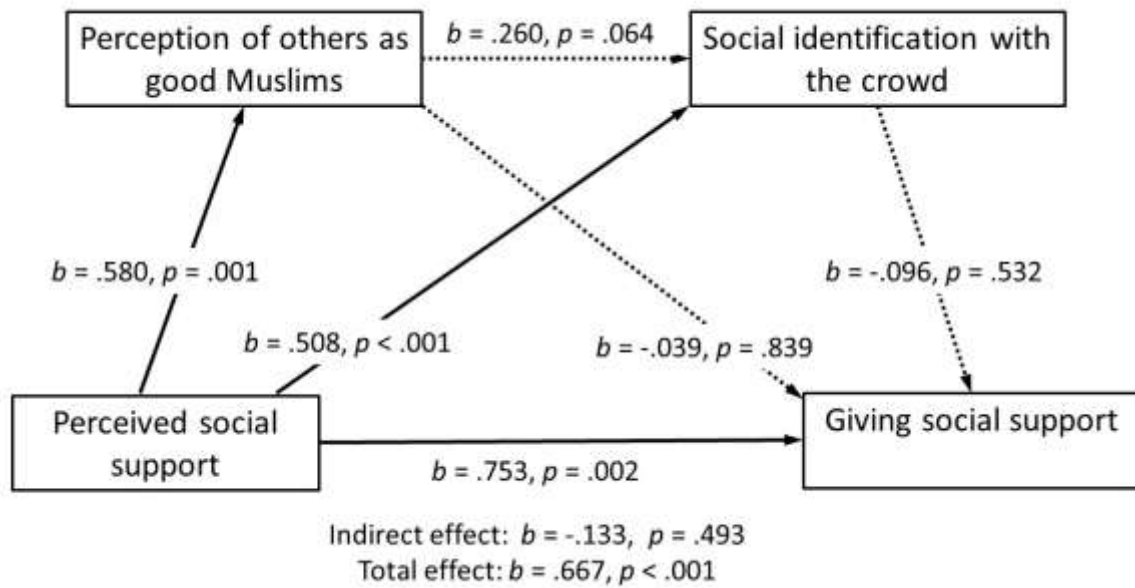
We ran the structural equation models again, without the four covariates education, language, prior experience of the Hajj, and acquiescence. For participants who responded in the plaza, there were no differences in significance levels for the pathways and indirect effects from the version of the model including the covariates – see Figure A.

Figure A. Structural equation model for in the plaza (without covariates)



However, for the participants who responded inside the grand Mosque, the effect of perceiving others as good Muslims on social identification with the crowd became marginally significant, $b = .260, p = .064$, compared to the model including the covariates. See Figure B.

Figure B. Structural equation model for inside the Grand Mosque (without covariates)

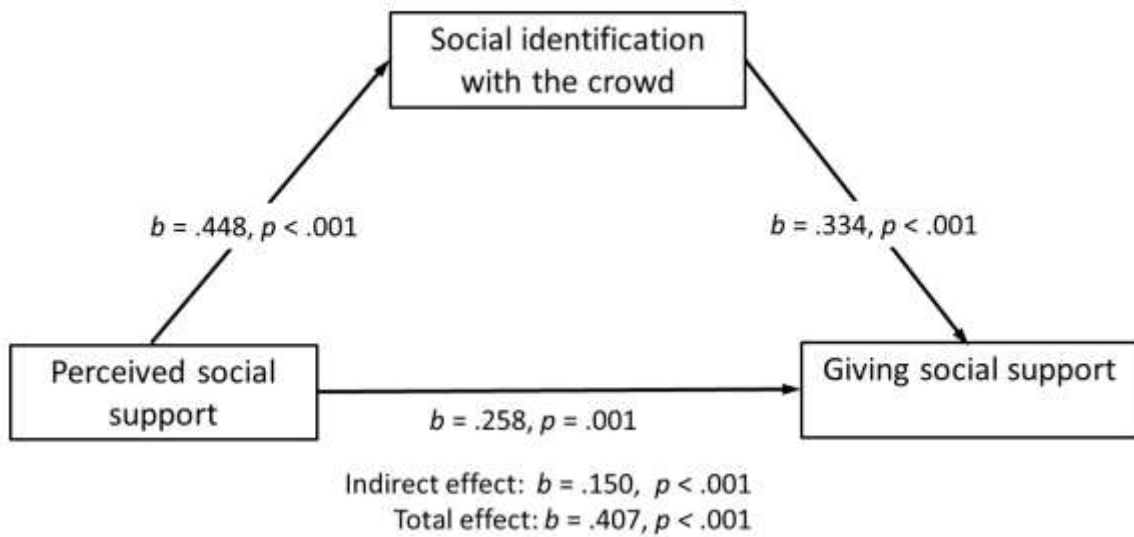


Certain fit statistics improved without covariates, for both participants on the plaza, $AIC = 24775.578$, $RMSEA = .107$, $SRMR = .063$, $CFI = .868$, $\chi^2(59) = 560.115, p < .001$, and inside the Mosque, $AIC = 13725.594$, $RMSEA = .076$, $SRMR = .047$, $CFI = .908$, $\chi^2(59) = 201.510, p < .001$. As one or more of the covariates of previous Hajj experience, language, and acquisition were significant or marginally significant (below $p = .06$) for either of the locations, and education was a significant covariate in the other analyses, we have included them for both locations in the main analyses.

Simple mediation analysis

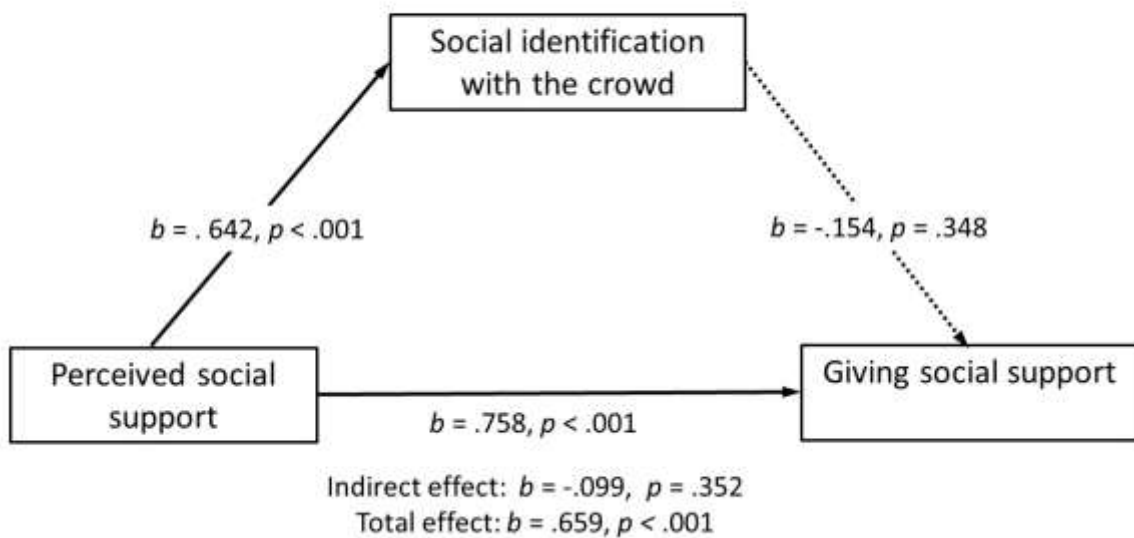
We also ran a simple mediation model from perceiving social support to giving social support via social identification with the crowd, thus removing the perception of others as good Muslims. We included the four covariates of education, language, prior experience of the Hajj, and acquiescence. For participants who responded on the plaza, there was a significant indirect effect of perceived social support on giving social support via social identification with the crowd, $b = .150, p < .001$, where the direct effect, $b = .407, p < .001$. See Figure C.

Figure C. Simple mediation model for in the plaza



However, for participants who responded inside the Grand Mosque, the same indirect effect was non-significant, $b = -.099, p = .352$, but the direct effect remained significant, $b = .659, p < .001$. See Figure D.

Figure D. Simple mediation model for in the Grand Mosque



The fit indices were better for these simple mediation models than for the serial mediation models we have reported in the main manuscript, both for on the plaza, AIC = 27504.311, RMSEA = .070, SRMR = .045, CFI = .916, $\chi^2(64) = 300.918$, $p < .001$, and inside the Grand Mosque, AIC = 15359.590, RMSEA = .040, SRMR = .043, CFI = .963, $\chi^2(64) = 147.636$, $p < .001$.

References

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