A Virtual Out-of-Body Experience Reduces Fear of Death

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Supporting Information

A. Participants

Table A – Characteristics of the Participants by Experimental Group

|                  | DBE            | OBE            |
|------------------|----------------|----------------|
| **Age:** Mean ± SE | 20.1 ± 0.50    | 20.6 ± 0.56    |
| **Self Esteem**: Median (IQR) | 35 (5)         | 35 (4)         |

| Religion                  | Frequency |
|---------------------------|-----------|
| Believer and practicing   | 1         | 0           |
| Believer non-practicing   | 4         | 4           |
| Agnostic                  | 1         | 3           |
| Atheist                   | 9         | 9           |
| Other                     | 1         | 0           |

* Self Esteem using the Rosenberg Self Esteem Scale (Rosenberg, 1965) with Spanish translation (Martín-Albo et al., 2007). There are 10 items each scored on a scale of 1, 2, 3 or 4. Taking the sum of these the maximum score is 40. The higher the overall score the greater the self-esteem.

B. Statistical Model

This section is very similar to the method used in a previous paper (Bergström et al., 2016). The (Bayesian) statistical model is one overall model, where all equations are treated simultaneously rather than as a series of separate models. In other words the Bayesian method returns the joint posterior distribution of all the model parameters. In the following, \( X_i \) refers to the Condition for the \( i \)th individual where \( X_i = 0 \) (DBE) or 1 (OBE). The overall model has the following components:

The questionnaires scores, mybody and otherbody do not depend on Condition (since they are recorded before the two conditions DBE and OBE are introduced). We use the
logistic model in (Lunn et al., 2012) (p132-134). The probabilities $p_1, \ldots, p_7$ of a score of 1,...,7 respectively have prior distributions with vary wide variance. The expected values of Fig. 4 are computed from the distribution of the posterior expected values $\sum_{i=1}^{7} p_i$.

For the remaining questions in Tables 1-2 the parameters of the linear model that relate the mean of the logistic distribution to the linear model are specified as follows: 

$$\mu_i = \beta_0 + \beta_1 X_i, i = 1, \ldots, n$$

with prior distribution $(\beta_0, \beta_1)$: bivariate normal with mean $(0, \pm 120)$ and variance-covariance matrix with each variance 1600 and each covariance 160. The mean for $\beta_1$ is taken as -120 in the case where our hypothesis is that $\beta_1 > 0$ (e.g., otherbodyobe) and 120 when the hypothesis is that $\beta_1 < 0$ (e.g., connectionob). Note that this gives the prior $P(\beta_{31} > 0) = 0.0013$ (the probability of a standard normal variate being $> 3$) in the case when the mean is -120, and similarly $P(\beta_{31} < 0) = 0.0013$ when the mean is 120.

For the drop2 mean the model is as shown in Table 3, where $(\beta_{30},\beta_{31})$: bivariate normal with variance-covariance matrix as above and mean for $\beta_{31}$ as -120 (since the hypothesis is that $\beta_{31} > 0$). The prior distribution of the variance of drop2 was modeled as a Gamma distribution with parameters $(0.001, 0.001)$ in the JAGS / BUGS specification.

For the total FOD (Fig. 9) the distribution of the sum of the expected values of each of the 7 components (shown in Table 3) was found. The individual expected value distributions were modeled as in 1 above.

Under this method readers are free to interpret the probabilities of the hypotheses in different ways of course. We have used the following: We start with a strong bias against each of the hypotheses - the prior probability assigned is about 1/1000. If the posterior probabilities are around the 50% range then we would say that from being biased against the hypothesis we move to a 50-50 probability and more evidence is needed. Probabilities above 70% we refer to as ‘some’ evidence in favor of the hypothesis. For 80% or more we use the term ‘good evidence’. Above 90% ‘strong evidence’, and in one case with the probability almost 1 we use the terms ‘very strong’ or ‘overwhelming evidence’.

Each Markov Chain Monte Carlo simulation was run 7 times (according to convention) with a sample size of 60,000 observations and a burn-in of 3000. All Rhat
values - measuring consistency between the results of the 7 chains - were equal to 1.0 (i.e., to 1 d.p.) meaning that reasonable convergence was obtained.

C. Further out-of-body questions

Figure A shows the out-of-body questions not included in Fig. 5.

![Box plots for the out-of-body questions additional to those of Fig. 5 (see Table 1)](image)

D. Posterior distributions of the model parameters

The following Figures should be examined in relation to Table 3 and Section E below, they give the posterior distributions of the model parameters.
Figure B - Posterior distribution of the coefficient of Condition ($\beta_{11}$) in the model for connectionobe.

Figure C - Posterior distribution of the coefficient of Condition ($\beta_{21}$) in the model for otherbodyobe.
Figure D - Posterior distribution of the coefficient of Condition \( (\beta_{31}) \) in the model for drop2.

Figure E - Posterior distribution of the coefficient of Condition \( (\beta_{41}) \) in the model for solitude.
Figure F - Posterior distribution of the coefficient of Condition \((\beta_{41})\) in the model for *lifeisbrief*.

Figure G - Posterior distribution of the coefficient of Condition \((\beta_{41})\) in the model for *loseall*. 
Figure H - Posterior distribution of the coefficient of Condition ($\beta_{41}$) in the model for *dieyoung*.

Figure I - Posterior distribution of the coefficient of Condition ($\beta_{41}$) in the model for *howitwillbe*.
Figure J - Posterior distribution of the coefficient of Condition ($\beta_{41}$) in the model for *candonothing*.

Figure K - Posterior distribution of the coefficient of Condition ($\beta_{41}$) in the model for *disintegration*.
E. Statistics of the Posterior Distributions of the Parameters

Table B shows the mean, SD and 95% credible intervals of the posterior distributions of the parameters in Section D.

**Table B** - Mean, SD and 95% Credible Intervals for the Posterior Distribution of Coefficient of Condition in Table 3.

| Coefficient of Condition | Mean | SD  | 95% Credible Interval |
|--------------------------|------|-----|-----------------------|
| connectionobe            | -1.5 | 0.71| -2.9 to -0.1          |
| otherbodyobe             | 1.4  | 0.69| 0.1 to 2.8            |
| drop2                    | 0.4  | 0.13| 0.1 to 0.6            |
| solitude                 | -1.1 | 0.69| -2.5 to 0.2           |
| lifeisbrief              | -0.4 | 0.66| -1.7 to 0.9           |
| loseall                  | -0.9 | 0.67| -2.2 to 0.4           |
| dieyoung                 | -0.6 | 0.66| -1.9 to 0.7           |
| howitwillbe              | -0.8 | 0.66| -2.1 to 0.5           |
| candonething             | -1.3 | 0.69| -2.7 to 0.0           |
| disintegration           | -0.3 | 0.68| -1.7 to 1.0           |
**Supporting References**

Bergström, I., Kilteni, K., and Slater, M. (2016). First-person Perspective Virtual Body Posture Influences Stress: A virtual reality body ownership study. *PLOS ONE* 11(2): e0148060.

Lunn, D., Jackson, C., Best, N., Thomas, A., and Spiegelhalter, D. (2012). *The BUGS book: A practical introduction to Bayesian analysis*. CRC press.

Martín-Albo, J., Núñez, J.L., Navarro, J.G., and Grijalvo, F. (2007). The Rosenberg Self-Esteem Scale: translation and validation in university students. *The Spanish journal of psychology* 10, 458-467.

Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, N.J., USA: Princeton University Press.