Supplemental materials containing the raw data from the eight memory studies and additional analyses including sensitivity analyses, effect size measure, and results when treating words recalled as a count variable for “Benchmark Validation of Statistical Models: An Application of Mediation Analysis of Imagery and Memory”, *Psychological Methods.*

**Experimental Protocol for Memory Experiments**

Prior to the experiment, participants were given a sheet of paper with one of two instructions for either primary (repetition) or secondary (imagery) rehearsal.

* The Imagery condition students read, “As you hear each word, make an image of the word and the other words that you hear. For example, if you heard the words camel and woman, you would imagine a woman riding a camel.”
* In the Repetition condition, students read, “As you hear each word, repeat it over and over until you hear the next word.

The sheets had been shuffled and then handed out randomly to students in the class. Participants were unaware of the condition to which they were assigned.

A PowerPoint file was shown at the front of the room to help the experimenter conduct the experiment. Before the experiment began, the experimenter showed Slide 1 and told participants “I will read a list of words for you to remember. After I read the list of words to you, I will ask you to write down the words that you can remember from the list. You have been given instructions on a sheet. Please do the instructions even if you want to do something else. We will use the data for this class.”

The experimenter then advanced to Slide 2 and read a list of 20 nouns with 10 seconds between each word. The words were read in this order: Nice, Rock, Chair, Box, Calm, Think, Jump, Car, Happy, Flag, Star, Study, Talk, Clock, Stick, Caution, Rope, Send, Pole, Quick. Ten seconds after the last word on the list, the participants were asked to remember as many words from the list as they could.

After approximately three minutes, the experimenter advanced to Slide 3, and the participants were asked to stop and answer two questions on their sheet, (1) “I made mental images of the words,” and (2) “I repeated the words over and over”. Each question was answered on a scale of 1-Not-at-all to 9-Absolutely.

Next, the experimenter advanced to Slide 4, and the list of words was shown. Participants were asked to write the number of correct words recalled. Participants were given several minutes to score the number of correct words recalled. The students then turned in their sheet.

---- Insert Figure S1 about here ----

**Raw Data**

Table S1 contains the raw data used for the single mediator and multiple mediator models in the main body of the manuscript. Some of the data were used as examples in other publications (Coffman, MacKinnon, Zhu, & Ghosh, 2016; Huang et al., 2016; Miočević, Gonzalez, Valente, & MacKinnon, in press; Miočević, MacKinnon, & Levy, in press). The first column is the study variable which indicates the study each observation belongs to (i.e., study 1 – 8), the second column is the dummy-coded treatment variable, *X* (primary rehearsal = 0, secondary rehearsal = 1), the third column, *R,* is repetition on a 1 to 9 scale, the fourth column is, *Y*, total words recalled out of 20, the fifth column is imagery (i.e., the focal mediator), *M*, on a 1 to 9 scale, and the last column is the imagery by mediator interaction variable, *XM*.

---- Insert Table S1 about here ----

**Sensitivity to Measurement Error and Unmeasured Confounding**

A sensitivity analysis was conducted to test the robustness of the mediated effect through imagery to measurement error and unmeasured confounding (Fritz, Kenny, & MacKinnon, 2016). The reliabilities of the mediator and the outcome were varied from 1.00 to .80 while simultaneously estimating the correlation between the mediator and an unmeasured confounder, *RUM,* and the correlation between the outcome and an unmeasured confounder, *RUY*, that would make the mediated effect equal zero. Reliabilities of the mediator and outcome were varied by constraining the residual variance of *M* to $σ\_{M}^{2}$(1-Reliability) and the residual variance of *Y* to $σ\_{Y}^{2}$ (1-Reliability). The correlations between the mediator and the unmeasured confounder, *RUM,* and between the outcome and the unmeasured confounder, *RUY* were estimated by creating a latent variable, *U*, constraining its variance to 1.00, estimating a path from *U* to *M* and from *U* to *Y* constrained to be equal, and constraining the *b* path to zero. This resulted in the same unstandardized path coefficient from *U* to *M* and *U* to *Y* but different correlations between *M* and *U* and *Y* and *U* because the variance of *M* and *Y* were not in general equal (See Figure S2). For the two mediator model, a confounder of the repetition (*R*) – total words recalled (*Y*) relation was estimated in addition to the confounder of the imagery (*M*) – total words recalled relation (*Y*). The relation between the two confounders in the multiple mediator model was constrained to zero.

---- Insert Figure S2 about here ----

 When the reliability of imagery and words recalled was 1.00, the correlation between imagery and the unmeasured confounder that it would take for the mediated effect to equal zero ranged from -.476 to .757 and the correlation between words recalled and the unmeasured confounder ranged from -.418 to .669 (See Table S2). All studies resulted in positive correlations between the confounder and *M* and the confounder and *Y* except for Study 2 (-.476, and -.418, respectively). When reliability was .80, the unstandardized mediated effect estimate was larger, and the direct effect was smaller which is expected when correcting for measurement error in the mediator (Fritz et al., 2016; Hoyle & Kenny, 1999). The correlation between imagery and the unmeasured confounder that it would take for the mediated effect to be zero ranged from .517 to .847 and the correlation between words recalled and the unmeasured confounder ranged from .467 to .748. As the mediated effect increased in magnitude, the size of *RUM*and *RUY* that it would take to make the mediated effect equal zero also increased in magnitude. The three studies with the smallest sample sizes, (i.e., Studies 3, 5, and 7) resulted in a negative residual variance estimate for the mediator, imagery, when the reliability was assumed to be .80 (i.e., “Non-positive definite” entries in Table S2).

---- Insert Tables S2 – S4 about here ----

For the two mediator model, when the reliability of imagery and words recalled was 1.00, the correlation between imagery and the unmeasured confounder that it would take for the mediated effect to equal zero ranged from .246 to .740 and the correlation between words recalled and the unmeasured confounder ranged from .238 to .640 (See Table S3). When reliability was .80, the unstandardized mediated effect estimate was larger, and the direct effect was either closer to zero if it was originally positive or larger in magnitude if it was originally negative. The correlation between imagery and the unmeasured confounder that it would take for the mediated effect to be zero ranged from .517 to .832 and the correlation between words recalled and the unmeasured confounder ranged from .467 to .716. As the mediated effect increased in magnitude, the size of *RUM*and *RUY* that it would take to make the mediated effect equal zero also increased in magnitude. Four studies (i.e., Studies 3, 5, 7, and 8) resulted in a negative residual variance estimate for the mediator, imagery, when the reliability was assumed to be .80 (i.e., “Non-positive definite” entries in Table S3).

When the reliability of repetition and words recalled was 1.00, the correlation between repetition and the unmeasured confounder that it would take for the mediated effect to equal zero ranged from .000 to .219 and the correlation between words recalled and the unmeasured confounder ranged from .000 to .221 (See Table S4). When reliability was .80, the unstandardized mediated effect estimate was larger in magnitude for four out of the eight studies (for positive and negative valued mediated effects) and smaller in magnitude for one study. The direct effect was either closer to zero if it was originally positive or larger in magnitude if it was originally negative. The correlation between repetition and the unmeasured confounder that it would take for the mediated effect to be zero ranged from .000 to .244 and the correlation between words recalled and the unmeasured confounder ranged from .000 to .247. Four studies (i.e., Studies 3, 5, 7, and 8) resulted in a negative residual variance estimate for the mediator, imagery, when the reliability was assumed to be .80 (i.e., “Non-positive definite” entries in Table S4).

**Count Outcome Analysis**

Because the outcome variable, total words recalled, was a count variable, additional analyses were conducted to take into account the non-linear relation between the predictors and the expected count of total words recalled. The potential outcome framework was used to estimate mediated effects when the relations in the single mediator model are not necessarily linear (Muthén & Asparouhov, 2015; VanderWeele, 2015) such as for Poisson regression of a count outcome variable. The potential outcomes framework produces two indirect effect estimates, the total natural indirect effect (TNIE) and the pure natural indirect effect (PNIE), two direct effect estimates, the total natural direct effect (TNDE) and the pure natural direct effect (PNDE), and the total effect (TE). The TNIE is the indirect effect had the entire population been exposed to the secondary rehearsal condition (i.e., imagery) and the PNIE is the indirect effect had the entire population been exposed to the primary rehearsal condition (i.e., repetition). These two indirect effects correspond to the indirect effect in the imagery and repetition conditions respectively. The TNDE and PNDE have an analogous interpretation to the TNIE and PNIE. The indirect effects (TNIE and PNIE) will differ from each other and the direct effects (TNDE and PNDE) will differ from each other when there are either nonlinear effects included in the model (e.g., the *XM* interaction in the memory studies), or the outcome variable is categorical, or both (VanderWeele, 2015). It is expected that the indirect effects and the direct effects will not be identical when the outcome variable is a count variable and these differences will be larger when the *XM* interaction is included in the regression models.

Two programs were used to estimate the indirect and direct effects using the potential outcomes framework. The MODEL INDIRECT command in M*plus* 7.4 (Muthén & Muthén, 2015) was used to estimate the effects using the potential outcome framework and treating the outcome as a Poisson distributed variable (Muthén & Asparouhov, 2015) and the R package ‘mediation’ was also used to estimate the effects using the potential outcomes framework and treating the outcome as a Poisson distributed variable (Tingley, Yamamoto, Hirose, Keele, & Imai, 2014). There were only minor differences between the estimates from M*plus* and the R package, as expected. The mediated effects are in terms of the change in the expected log-count from changing the status of the mediator from repetition to imagery holding the direct effect of rehearsal constant. The direct effects are in terms of the change in the expected log-count from changing the status on the rehearsal, *X*, from repetition to imagery holding the mediator constant. The total effect is in terms of the change in the expected log-count from changing the status on rehearsal from repetition to imagery.

 M*plus* 7.4 MODEL INDIRECT results for the mediated, direct, and total effect estimates applying the potential outcomes framework to the single mediator model with imagery as the mediator, no *XM* interaction, and treating words recalled as a Poisson-distributed outcome are displayed in Table S5. The TNIE ranged from 1.348 to 3.208 and was significant for five out of the eight studies. The PNIE ranged from 1.386 to 2.929 and was significant for five out of the eight studies. Neither the TNDE nor the PNDE were significant across the eight studies. The total effect ranged from 0.364 to 4.742 and was significant for five out of the eight studies. The estimates were very close to the linear regression model estimates described in the main manuscript because the average count variables were large enough to be considered normally distributed.

M*plus* 7.4 MODEL INDIRECT results for the mediated, direct, and total effect estimates applying the potential outcomes framework to the single mediator model with imagery as the mediator, the *XM* interaction included, and treating words recalled as a Poisson-distributed outcome are displayed in Table S6. The TNIE ranged from -1.950 to 4.366 and was significant for three out of the eight studies. The PNIE ranged from -0.072 to 6.096 and was significant for three out of the eight studies. The TNDE was not significant for any of the eight studies. The PNDE ranged from -3.352 to 6.056 and was significant for three out of the eight studies. The total effect ranged from 0.446 to 4.745 and was significant for five out of the eight studies.

---- Insert Tables S5 – S8 about here ----

The R package ‘mediation’ results for the mediated, direct, and total effect estimates applying the potential outcomes framework to the single mediator model with imagery as the mediator, no *XM* interaction, and treating words recalled as a Poisson-distributed outcome are displayed in Table S7. The TNIE ranged from 1.350 to 3.169 and was significant for five out of the eight studies. The PNIE ranged from 1.406 to 2.893 and was significant for five out of the eight studies. The average of the TNIE and PNIE (i.e., Average IE) ranged from 1.419 to 3.031 and was significant for five out of the eight studies. Neither the TNDE, nor the PNDE, nor the average of the TNDE and PNDE (i.e., Average DE) were significant across the eight studies. The total effect ranged from 0.364 to 4.767 and was significant for five out of the eight studies.

The R package ‘mediation’ results for the mediated, direct, and total effect estimates applying the potential outcomes framework to the single mediator model with imagery as the mediator, the *XM* interaction included, and treating words recalled as a Poisson-distributed outcome are displayed in Table S8. The TNIE ranged from -1.940 to 4.728 and was significant for three out of the eight studies. The PNIE ranged from -0.072 to 6.150 and was significant for three out of the eight studies. The average of the TNIE and PNIE (i.e., Average IE) ranged from 0.694 to 3.367 and was significant for four out of the eight studies. The TNDE was not significant for any of the eight studies. The PNDE ranged from -3.337 to 5.933 and was significant for two out of the eight studies (one positive valued and one negative valued). The average DE ranged from -1.397 to 3.932 and was significant for one out of the eight studies. The total effect ranged from 0.470 to 4.625 and was significant for five out of the eight studies. Overall, the results treating the words recalled as a count variable were very similar across the M*plus* MODEL INDIRECT command and the R package ‘mediation’. Additionally, the results were similar to when words recalled was treated as a continuous variable.

**Empirical Power and Standardized Effect Size for all Eight Studies**

As described in the main manuscript, a standardized mediated effect measure was computed for the mediated effect through imagery in the single mediator model with and without the *XM* interaction, the mediated effect through imagery in the multiple mediator model, and the mediated effect through repetition in the multiple mediator model (See Table S9). The effect size measure is the mediated effect divided by the standard deviation of *Y* (MacKinnon, 2008; Miočević, O’Rourke, MacKinnon, & Brown, 2017). The effect size for the mediated effect from the single mediator model with the *XM* interaction ranged from -0.024 in Study 1 to 1.802 in Study 5. Zero was not contained within the confidence intervals for three out of the eight studies. The effect size for the mediated effect from the single mediator model without the *XM* interaction ranged from 0.395 in Study 2 to .803 in Study 5. Zero was not contained within the confidence intervals for five out of the eight studies. The effect size for the mediated effect through imagery ranged from 0.465 in Study 2 to 0.721 in Study 5. Zero was not contained in the confidence intervals for five out of the eight studies. The effect size for the mediated effect through repetition ranged from -0.234 in Study 8 to 0.406 in Study 3. Zero was always contained in the confidence intervals.

---- Insert Table S9 about here ----

As described in the main manuscript, a post-hoc power analysis for the mediated effect was conducted for each of the eight studies using the parameter estimates for the mediation models applied to the data aggregated across all eight studies using M*plus* 7.4 (Thoemmes, MacKinnon, & Reiser, 2010). On average, the empirical post-hoc power was .690 to detect the mediated effect though imagery with the *XM* interaction, .765 to detect the mediated effect without the *XM* interaction, .733 to detect the mediated effect through imagery in the multiple mediator model, and .062 to detect the mediated effect through repetition in the multiple mediator model. Overall, there was power close to .80 to detect the mediated effect through imagery and the empirical power to detect the effect through repetition was close to the nominal .05 Type 1 error rate.

---- Insert Table S10 about here ----

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| Table S1 |
| *Raw data for all eight memory studies* |
| study | X | R | Y | M | XM |
| 1 | 1 | 1 | 9 | 6 | 6 |
| 1 | 1 | 1 | 14 | 8 | 8 |
| 1 | 1 | 1 | 17 | 9 | 9 |
| 1 | 1 | 3 | 8 | 7 | 7 |
| 1 | 1 | 7 | 10 | 7 | 7 |
| 1 | 1 | 2 | 10 | 6 | 6 |
| 1 | 1 | 1 | 8 | 3 | 3 |
| 1 | 1 | 7 | 12 | 6 | 6 |
| 1 | 1 | 3 | 12 | 7 | 7 |
| 1 | 1 | 6 | 15 | 7 | 7 |
| 1 | 1 | 6 | 7 | 8 | 8 |
| 1 | 1 | 9 | 10 | 8 | 8 |
| 1 | 1 | 3 | 8 | 5 | 5 |
| 1 | 1 | 1 | 9 | 5 | 5 |
| 1 | 1 | 4 | 15 | 8 | 8 |
| 1 | 1 | 4 | 15 | 9 | 9 |
| 1 | 1 | 3 | 9 | 4 | 4 |
| 1 | 1 | 7 | 18 | 7 | 7 |
| 1 | 1 | 4 | 6 | 3 | 3 |
| 1 | 1 | 1 | 8 | 5 | 5 |
| 1 | 1 | 8 | 10 | 8 | 8 |
| 1 | 1 | 4 | 16 | 9 | 9 |
| 1 | 1 | 1 | 13 | 9 | 9 |
| 1 | 1 | 1 | 8 | 4 | 4 |
| 1 | 1 | 1 | 6 | 7 | 7 |
| 1 | 1 | 9 | 13 | 5 | 5 |
| 1 | 1 | 3 | 12 | 8 | 8 |
| 1 | 1 | 5 | 12 | 7 | 7 |
| 1 | 1 | 3 | 8 | 9 | 9 |
| 1 | 1 | 6 | 13 | 7 | 7 |
| 1 | 1 | 3 | 7 | 7 | 7 |
| 1 | 1 | 7 | 15 | 8 | 8 |
| 1 | 1 | 1 | 11 | 6 | 6 |
| 1 | 1 | 2 | 7 | 4 | 4 |
| 1 | 1 | 7 | 7 | 5 | 5 |
| 1 | 1 | 2 | 18 | 8 | 8 |
| 1 | 1 | 2 | 14 | 9 | 9 |
| 1 | 1 | 1 | 8 | 6 | 6 |
| 1 | 1 | 5 | 9 | 6 | 6 |
| 1 | 0 | 9 | 10 | 1 | 0 |
| 1 | 0 | 9 | 10 | 1 | 0 |
| 1 | 0 | 9 | 13 | 9 | 0 |
| 1 | 0 | 9 | 9 | 3 | 0 |
| 1 | 0 | 9 | 11 | 2 | 0 |
| 1 | 0 | 5 | 20 | 1 | 0 |
| 1 | 0 | 9 | 10 | 1 | 0 |
| 1 | 0 | 7 | 12 | 9 | 0 |
| 1 | 0 | 6 | 13 | 1 | 0 |
| 1 | 0 | 9 | 10 | 2 | 0 |
| 1 | 0 | 9 | 11 | 1 | 0 |
| 1 | 0 | 8 | 12 | 3 | 0 |
| 1 | 0 | 9 | 13 | 1 | 0 |
| 1 | 0 | 9 | 12 | 2 | 0 |
| 1 | 0 | 8 | 9 | 2 | 0 |
| 1 | 0 | 9 | 10 | 4 | 0 |
| 1 | 0 | 9 | 11 | 1 | 0 |
| 1 | 0 | 6 | 8 | 3 | 0 |
| 1 | 0 | 9 | 10 | 2 | 0 |
| 1 | 0 | 10 | 10 | 3 | 0 |
| 1 | 0 | 6 | 6 | 9 | 0 |
| 1 | 0 | 8 | 12 | 6 | 0 |
| 1 | 0 | 9 | 10 | 1 | 0 |
| 1 | 0 | 6 | 10 | 3 | 0 |
| 1 | 0 | 9 | 10 | 1 | 0 |
| 1 | 0 | 8 | 9 | 1 | 0 |
| 1 | 0 | 8 | 11 | 2 | 0 |
| 1 | 0 | 8 | 6 | 1 | 0 |
| 1 | 0 | 8 | 9 | 2 | 0 |
| 1 | 0 | 9 | 10 | 4 | 0 |
| 1 | 0 | 9 | 11 | 1 | 0 |
| 1 | 0 | 8 | 9 | 3 | 0 |
| 1 | 0 | 9 | 14 | 5 | 0 |
| 1 | 0 | 8 | 8 | 4 | 0 |
| 1 | 0 | 9 | 10 | 8 | 0 |
| 1 | 0 | 9 | 8 | 2 | 0 |
| 1 | 0 | 6 | 14 | 5 | 0 |
| 1 | 0 | 9 | 12 | 1 | 0 |
| 2 | 0 | 9 | 4 | 9 | 0 |
| 2 | 0 | 7 | 10 | 1 | 0 |
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| 2 | 0 | 6 | 3 | 1 | 0 |
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| 2 | 0 | 9 | 8 | 2 | 0 |
| 2 | 0 | 7 | 14 | 9 | 0 |
| 2 | 0 | 8 | 13 | 8 | 0 |
| 2 | 0 | 8 | 15 | 1 | 0 |
| 2 | 0 | 9 | 14 | 4 | 0 |
| 2 | 0 | 9 | 10 | 4 | 0 |
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| 2 | 0 | 8 | 9 | 3 | 0 |
| 2 | 0 | 9 | 18 | 9 | 0 |
| 2 | 0 | 5 | 7 | 1 | 0 |
| 2 | 0 | 9 | 8 | 1 | 0 |
| 2 | 0 | 8 | 7 | 1 | 0 |
| 2 | 0 | 9 | 12 | 2 | 0 |
| 2 | 0 | 9 | 9 | 2 | 0 |
| 2 | 0 | 9 | 7 | 1 | 0 |
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| 2 | 1 | 2 | 13 | 8 | 8 |
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| 2 | 1 | 12 | 15 | 2 | 2 |
| 3 | 1 | 2 | 17 | 9 | 9 |
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| 3 | 1 | 3 | 12 | 8 | 8 |
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| 3 | 1 | 7 | 15 | 9 | 9 |
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| 3 | 1 | 1 | 15 | 6 | 6 |
| 3 | 1 | 5 | 9 | 9 | 9 |
| 3 | 1 | 1 | 13 | 8 | 8 |
| 3 | 1 | 2 | 15 | 9 | 9 |
| 3 | 0 | 9 | 10 | 2 | 0 |
| 3 | 0 | 7 | 12 | 8 | 0 |
| 3 | 0 | 9 | 5 | 1 | 0 |
| 3 | 0 | 8 | 7 | 3 | 0 |
| 3 | 0 | 9 | 7 | 3 | 0 |
| 3 | 0 | 9 | 11 | 1 | 0 |
| 3 | 0 | 8 | 9 | 2 | 0 |
| 3 | 0 | 8 | 11 | 2 | 0 |
| 3 | 0 | 6 | 12 | 3 | 0 |
| 3 | 0 | 9 | 9 | 1 | 0 |
| 3 | 0 | 9 | 9 | 3 | 0 |
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| 5 | 0 | 3 | 19 | 8 | 0 |
| 5 | 0 | 8 | 9 | 2 | 0 |
| 5 | 0 | 9 | 10 | 1 | 0 |
| 5 | 0 | 8 | 15 | 1 | 0 |
| 5 | 0 | 9 | 7 | 2 | 0 |
| 5 | 0 | 8 | 10 | 2 | 0 |
| 5 | 1 | 2 | 15 | 8 | 8 |
| 5 | 1 | 4 | 11 | 7 | 7 |
| 5 | 1 | 8 | 15 | 7 | 7 |
| 5 | 1 | 2 | 16 | 8 | 8 |
| 5 | 1 | 2 | 7 | 9 | 9 |
| 5 | 1 | 2 | 10 | 9 | 9 |
| 5 | 1 | 8 | 13 | 8 | 8 |
| 5 | 1 | 6 | 14 | 3 | 3 |
| 5 | 1 | 2 | 14 | 9 | 9 |
| 5 | 1 | 8 | 15 | 8 | 8 |
| 5 | 1 | 7 | 7 | 7 | 7 |
| 5 | 1 | 3 | 11 | 8 | 8 |
| 6 | 0 | 8 | 10 | 1 | 0 |
| 6 | 0 | 9 | 14 | 3 | 0 |
| 6 | 0 | 8 | 20 | 9 | 0 |
| 6 | 0 | 9 | 10 | 3 | 0 |
| 6 | 0 | 6 | 17 | 8 | 0 |
| 6 | 0 | 1 | 13 | 5 | 0 |
| 6 | 0 | 7 | 8 | 1 | 0 |
| 6 | 0 | 9 | 8 | 1 | 0 |
| 6 | 0 | 8 | 13 | 3 | 0 |
| 6 | 0 | 9 | 13 | 7 | 0 |
| 6 | 0 | 9 | 12 | 2 | 0 |
| 6 | 0 | 8 | 17 | 8 | 0 |
| 6 | 0 | 9 | 11 | 9 | 0 |
| 6 | 0 | 9 | 7 | 1 | 0 |
| 6 | 0 | 9 | 5 | 1 | 0 |
| 6 | 0 | 9 | 12 | 1 | 0 |
| 6 | 1 | 3 | 17 | 9 | 9 |
| 6 | 1 | 9 | 12 | 5 | 5 |
| 6 | 1 | 5 | 16 | 8 | 8 |
| 6 | 1 | 2 | 15 | 6 | 6 |
| 6 | 1 | 7 | 13 | 9 | 9 |
| 6 | 1 | 5 | 17 | 9 | 9 |
| 6 | 1 | 5 | 15 | 8 | 8 |
| 6 | 1 | 7 | 13 | 4 | 4 |
| 6 | 1 | 3 | 12 | 9 | 9 |
| 6 | 1 | 4 | 8 | 6 | 6 |
| 6 | 1 | 3 | 15 | 7 | 7 |
| 6 | 1 | 7 | 12 | 3 | 3 |
| 6 | 1 | 6 | 10 | 9 | 9 |
| 6 | 1 | 2 | 13 | 2 | 2 |
| 6 | 1 | 9 | 13 | 4 | 4 |
| 6 | 1 | 8 | 13 | 5 | 5 |
| 6 | 1 | 4 | 12 | 6 | 6 |
| 6 | 1 | 6 | 16 | 9 | 9 |
| 6 | 1 | 4 | 13 | 6 | 6 |
| 6 | 1 | 7 | 17 | 3 | 3 |
| 6 | 1 | 1 | 13 | 9 | 9 |
| 6 | 1 | 7 | 16 | 7 | 7 |
| 6 | 1 | 5 | 12 | 8 | 8 |
| 6 | 1 | 8 | 7 | 1 | 1 |
| 6 | 1 | 6 | 8 | 4 | 4 |
| 6 | 1 | 5 | 16 | 8 | 8 |
| 6 | 1 | 2 | 14 | 9 | 9 |
| 6 | 1 | 2 | 19 | 7 | 7 |
| 6 | 1 | 4 | 13 | 8 | 8 |
| 7 | 0 | 9 | 6 | 1 | 0 |
| 7 | 0 | 8 | 11 | 4 | 0 |
| 7 | 0 | 8 | 11 | 4 | 0 |
| 7 | 0 | 9 | 6 | 5 | 0 |
| 7 | 0 | 9 | 9 | 1 | 0 |
| 7 | 0 | 3 | 11 | 5 | 0 |
| 7 | 0 | 9 | 11 | 1 | 0 |
| 7 | 0 | 9 | 11 | 7 | 0 |
| 7 | 0 | 9 | 15 | 5 | 0 |
| 7 | 0 | 8 | 10 | 3 | 0 |
| 7 | 0 | 8 | 18 | 5 | 0 |
| 7 | 0 | 8 | 8 | 2 | 0 |
| 7 | 0 | 5 | 15 | 9 | 0 |
| 7 | 0 | 8 | 10 | 1 | 0 |
| 7 | 0 | 3 | 17 | 9 | 0 |
| 7 | 0 | 1 | 17 | 9 | 0 |
| 7 | 0 | 8 | 9 | 2 | 0 |
| 7 | 0 | 9 | 9 | 1 | 0 |
| 7 | 0 | 8 | 6 | 6 | 0 |
| 7 | 0 | 9 | 13 | 5 | 0 |
| 7 | 1 | 1 | 18 | 9 | 9 |
| 7 | 1 | 8 | 13 | 6 | 6 |
| 7 | 1 | 2 | 18 | 8 | 8 |
| 7 | 1 | 2 | 15 | 9 | 9 |
| 7 | 1 | 2 | 15 | 9 | 9 |
| 7 | 1 | 7 | 14 | 5 | 5 |
| 7 | 1 | 2 | 12 | 9 | 9 |
| 7 | 1 | 3 | 12 | 9 | 9 |
| 7 | 1 | 3 | 18 | 8 | 8 |
| 7 | 1 | 4 | 14 | 9 | 9 |
| 7 | 1 | 2 | 15 | 9 | 9 |
| 7 | 1 | 6 | 16 | 9 | 9 |
| 7 | 1 | 7 | 17 | 7 | 7 |
| 7 | 1 | 2 | 15 | 8 | 8 |
| 7 | 1 | 2 | 17 | 8 | 8 |
| 8 | 1 | 1 | 10 | 9 | 9 |
| 8 | 1 | 7 | 15 | 9 | 9 |
| 8 | 0 | 9 | 13 | 3 | 0 |
| 8 | 0 | 9 | 11 | 7 | 0 |
| 8 | 0 | 8 | 13 | 2 | 0 |
| 8 | 0 | 9 | 15 | 1 | 0 |
| 8 | 0 | 8 | 19 | 7 | 0 |
| 8 | 0 | 9 | 13 | 4 | 0 |
| 8 | 0 | 8 | 9 | 1 | 0 |
| 8 | 1 | 8 | 17 | 7 | 7 |
| 8 | 1 | 5 | 19 | 9 | 9 |
| 8 | 1 | 4 | 16 | 8 | 8 |
| 8 | 1 | 8 | 14 | 9 | 9 |
| 8 | 1 | 6 | 14 | 8 | 8 |
| 8 | 1 | 4 | 16 | 8 | 8 |
| 8 | 1 | 3 | 12 | 6 | 6 |
| 8 | 1 | 4 | 16 | 8 | 8 |
| 8 | 1 | 6 | 18 | 9 | 9 |
| 8 | 1 | 6 | 9 | 9 | 9 |
| 8 | 1 | 5 | 10 | 6 | 6 |
| 8 | 1 | 6 | 19 | 9 | 9 |
| 8 | 1 | 4 | 19 | 9 | 9 |
| 8 | 1 | 7 | 13 | 8 | 8 |
| 8 | 1 | 5 | 10 | 5 | 5 |
| 8 | 1 | 1 | 17 | 9 | 9 |
| 8 | 1 | 3 | 11 | 8 | 8 |
| 8 | 1 | 9 | 17 | 9 | 9 |
| 8 | 0 | 8 | 9 | 1 | 0 |
| 8 | 0 | 9 | 10 | 5 | 0 |
| 8 | 0 | 9 | 16 | 1 | 0 |
| 8 | 0 | 8 | 9 | 6 | 0 |
| 8 | 0 | 9 | 6 | 2 | 0 |
| 8 | 0 | 9 | 11 | 1 | 0 |
| 8 | 0 | 9 | 12 | 3 | 0 |
| 8 | 0 | 8 | 15 | 7 | 0 |
| 8 | 0 | 6 | 18 | 9 | 0 |
| 8 | 0 | 7 | 10 | 7 | 0 |
| 8 | 0 | 8 | 4 | 5 | 0 |
| 8 | 0 | 8 | 8 | 3 | 0 |
| 8 | 0 | 7 | 18 | 9 | 0 |
| 8 | 0 | 6 | 14 | 6 | 0 |
| 8 | 0 | 9 | 10 | 2 | 0 |
| 8 | 0 | 9 | 15 | 8 | 0 |
| 8 | 0 | 3 | 12 | 9 | 0 |

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| Table S2 |
| *Mediated effect estimate and correlation between mediator and unmeasured confounder and correlation between outcome and unmeasured confounder to make the mediated effect equal zero for assumed reliability of 1.00 and .80* |
|  | Reliability |
|  | 1.0 | .80 |
| Study | *ab* | *c’* | *RUM* | *RUY* | *ab* | *c’* | *RUM* | *RUY* |
| 1 | 1.457\* | -1.114 | .462 | .436 | 2.291\* | -1.947 | .517 | .487 |
| 2 | 1.440 | 1.868 | -.476 | -.418 | 2.131 | 1.176 | .532 | .467 |
| 3 | 1.822 | 2.906 | .248 | .240 | Non-positive definite | Non-positive definite | Non-positive definite | Non-positive definite |
| 4 | 2.122\* | 0.138 | .654 | .592 | 3.060\* | -0.801 | .731 | .662 |
| 5 | 2.608 | -1.475 | .392 | .392 | Non-positive definite | Non-positive definite | Non-positive definite | Non-positive definite |
| 6 | 1.771\* | -0.198 | .757 | .669 | 2.338\* | -0.765 | .847 | .748 |
| 7 | 2.776\* | 1.341 | .635 | .511 | Non-positive definite | Non-positive definite | Non-positive definite | Non-positive definite |
| 8 | 2.186\* | 0.328 | .613 | .469 | 3.247\* | -0.730 | .685 | .524 |
| All Studies | 2.121\* | 0.045 | .602 | .524 | 3.129\* | -0.962 | .673 | .586 |
| *Note. ab* indicates the mediated effect estimate through imagery with no *XM* interaction included in the single mediator model and *c’* indicates the direct effect. *RUM* indicates the estimated correlation between imagery and the unmeasured confounder that it would take for the mediated effect to equal zero. *RUY* indicates the estimated correlation between words recalled and the unmeasured confounder that it would take for the mediated effect to equal zero. |

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| Table S3 |
| *Two mediator model mediated effect estimate and correlation between mediator and unmeasured confounder and correlation between outcome and unmeasured confounder to make the mediated effect through imagery equal zero for assumed reliability of 1.00 and .80* |
|  | Reliability |
|  | 1.0 | .80 |
| Study | *ab* – Through Imagery | *c’* | *RUM* | *RUY* | *ab* | *c’* | *RUM* | *RUY* |
| 1 | 1.457\* | -0.611 | .462 | .436 | 2.291\* | -1.009 | .517 | .487 |
| 2 | 1.695 | 2.329 | .475 | .418 | 3.246 | 2.171 | .531 | .467 |
| 3 | 1.744 | 1.615 | .246 | .238 | Non-positive definite | Non-positive definite | Non-positive definite | Non-positive definite |
| 4 | 2.064\* | -0.373 | .651 | .588 | 2.963\* | -1.375 | .728 | .657 |
| 5 | 2.341 | -1.425 | .302 | .300 | Non-positive definite | Non-positive definite | Non-positive definite | Non-positive definite |
| 6 | 1.704\* | -0.420 | .740 | .640 | 2.340\* | -0.761 | .832 | .716 |
| 7 | 2.190 | 1.055 | .501 | .387 | Non-positive definite | Non-positive definite | Non-positive definite | Non-positive definite |
| 8 | 2.434\* | 0.962 | .613 | .469 | Non-positive definite | Non-positive definite | Non-positive definite | Non-positive definite |
| All Studies | 2.139\* | 0.109 | .589 | .511 | 3.360\* | -0.490 | .660 | .572 |
| *Note. ab* indicates the mediated effect estimate through imagery with no interactions included in the multiple mediator model and *c’* indicates the direct effect. *RUM* indicates the estimated correlation between imagery and the unmeasured confounder that it would take for the mediated effect to equal zero. *RUY* indicates the estimated correlation between words recalled and the unmeasured confounder that it would take for the mediated effect to equal zero. |

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| Table S4 |
| *Two mediator model mediated effect estimate and correlation between mediator and unmeasured confounder and correlation between outcome and unmeasured confounder to make the mediated effect through repetition equal zero for assumed reliability of 1.00 and .80* |
|  | Reliability |
|  | 1.0 | .80 |
| Study | *ab*- Through Repetition | *c’* | *RUM* | *RUY* | *ab* | *c’* | *RUM* | *RUY* |
| 1 | -0.502 | -0.611 | .219 | .221 | -0.938 | -1.009 | .244 | .247 |
| 2 | -0.717 | 2.329 | .003 | .002 | -2.110 | 2.171 | .015 | .013 |
| 3 | 1.369 | 1.615 | .000 | .000 | Non-positive definite | Non-positive definite | Non-positive definite | Non-positive definite |
| 4 | 0.568 | -0.373 | .000 | .000 | 0.672 | -1.375 | .000 | .000 |
| 5 | 0.218 | -1.425 | .000 | .000 | Non-positive definite | Non-positive definite | Non-positive definite | Non-positive definite |
| 6 | 0.289 | -0.420 | .000 | .000 | -0.006 | -0.761 | .000 | .000 |
| 7 | 0.871 | 1.055 | .000 | .000 | Non-positive definite | Non-positive definite | Non-positive definite | Non-positive definite |
| 8 | -0.878 | 0.862 | .173 | .106 | Non-positive definite | Non-positive definite | Non-positive definite | Non-positive definite |
| All Studies | -0.082 | 0.109 | .000 | .000 | -0.704 | -0.490 | .000 | .000 |
| *Note. ab* indicates the mediated effect estimate through repetition with no interactions included in the multiple mediator model and *c’* indicates the direct effect. *RUM* indicates the estimated correlation between repetition and the unmeasured confounder that it would take for the mediated effect to equal zero. *RUY* indicates the estimated correlation between words recalled and the unmeasured confounder that it would take for the mediated effect to equal zero. |

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| Table S5 |
| *Mediated, direct, and total effect estimates applying the potential outcomes framework using Mplus 7.4 MODEL INDIRECT treating the outcome as a Poisson distributed variable with no XM interaction.* |
|  |  |  |  |  |  |  |
| Study | N | PNIE | TNIE | PNDE | TNDE | TE |
| 1 | 77 | 1.486 [0.188, 3.348] | 1.348 [0.201, 2.728] | -0.984 [-2.559, 0.633] | -1.122 [-3.262, 0.646] | 0.364 [-0.965, 1.751] |
| 2 | 43 | 1.386 [-0.426, 4.438] | 1.619 [-0.616, 4.240] | 1.721 [-1.012, 4.724] | 1.954 [-1.317, 4.784] | 3.340 [1.500, 5.421] |
| 3 | 24 | 1.747 [-3.441, 5.985] | 2.222 [-8.788, 5.724] | 2.520 [-0.480, 13.127] | 2.995 [-0.739, 8.074] | 4.742 [2.740, 6.583] |
| 4 | 79 | 2.243 [1.253, 3.581] | 2.266 [1.351, 3.353] | 0.113 [-1.202, 1.505] | 0.136 [-1.520, 1.726] | 2.380 [1.204, 3.519] |
| 5 | 22 | 2.721 [-5.889, 7.397] | 2.414 [-16.621, 5.215] | -1.262 [-4.559, 18.835] | -1.569 [-7.282, 8.032] | 1.153 [-1.580, 3.807] |
| 6 | 45 | 1.783 [0.372, 3.542] | 1.766 [0.366, 3.287] | -0.109 [-1.818, 1.868] | -0.126 [-2.123, 2.037] | 1.657 [-0.484, 3.737] |
| 7 | 35 | 2.929 [0.876, 4.848] | 3.208 [1.079, 4.842] | 1.057 [-0.856, 4.070] | 1.335 [-1.152, 4.436] | 4.264 [2.433, 6.042] |
| 8 | 44 | 2.318 [0.641, 4.095] | 2.367 [0.741, 3.900] | 0.258 [-1.591, 2.717] | 0.308 [-1.930, 2.875] | 2.625 [0.565, 4.720] |
| *Note.* 95% percentile bootstrap confidence intervals are included in the brackets. |
| Table S6 |
| *Mediated, direct, and total effect estimates applying the potential outcomes framework using Mplus 7.4 MODEL INDIRECT treating the outcome as a Poisson distributed variable with the XM interaction.* |
|  |  |  |  |  |  |  |
| Study | N | PNIE | TNIE | PNDE | TNDE | TE |
| 1 | 77 | -0.072 [-1.734, 1.315] | 3.798 [2.290, 5.304] | -3.352 [-4.765, -1.773] | 0.518 [-1.304, 2.634] | 0.446 [-0.944, 1.856] |
| 2 | 43 | 2.034 [-0.719, 5.831] | 0.324 [-1.219, 3.406] | 3.014 [0.024, 5.042] | 1.305 [-2.758, 4.990] | 3.339 [1.499, 5.431] |
| 3 | 24 | 2.671 [-5.507, 18.792] | -1.311 [-22.759, 9.072] | 6.056 [-3.378, 26.999] | 2.073 [-13.595, 10.368] | 4.745 [2.811, 6.636] |
| 4 | 79 | 1.926 [0.907, 3.270] | 3.422 [0.545, 5.735] | -0.950 [-3.223, 2.288] | 0.545 [-0.935, 2.022] | 2.471 [1.377, 3.594] |
| 5 | 22 | 6.096 [-9.957, 8.269] | -1.950 [-29.449, 7.639] | 3.139 [-7.017, 31.629] | -4.906 [-7.560, 11.176] | 1.189 [-1.566, 3.797] |
| 6 | 45 | 2.492 [0.497, 5.656] | 1.161 [-0.081, 2.654] | 0.523 [-1.448, 2.913] | -0.808 [-3.328, 1.601] | 1.684 [-0.472, 3.783] |
| 7 | 35 | 3.492 [1.349, 5.958] | 0.261 [-14.079, 2.420] | 3.930 [1.460, 18.528] | 0.698 [-2.171, 4.097] | 4.191 [2.356, 6.127] |
| 8 | 44 | 1.940 [-0.051, 3.851] | 4.366 [0.081, 7.414] | -1.562 [-3.702, 2.576] | 0.864 [-1.708, 3.754] | 2.804 [0.599, 5.151] |
| *Note.* 95% percentile bootstrap confidence intervals are included in the brackets. |
| Table S7 |
| *Mediated, direct, and total effect estimates applying the potential outcomes framework using ‘mediation’ R package treating the outcome as a Poisson distributed variable with no XM interaction.* |
|  |  |  |  |  |  |  |  |  |
| Study | N | PNIE | TNIE | Average IE | PNDE | TNDE | Average DE | TE |
| 1 | 77 | 1.488 [0.255, 3.479] | 1.350 [0.240, 2.756] | 1.419 [0.247, 3.119] | -0.986 [-2.534, 0.641] | -1.124 [-3.208, 0.691] | -1.055 [-2.866, 0.661] | 0.364 [-0.940, 1.629] |
| 2 | 43 | 1.406 [-0.390, 4.274] | 1.642 [-0.616, 4.059] | 1.524 [-0.498, 4.126] | 1.746 [-0.967, 5.073] | 1.982 [-1.325, 4.958] | 1.864 [-1.146, 5.000] | 3.388 [1.488, 5.356] |
| 3 | 24 | 1.756 [-3.065, 7.363] | 2.234 [-6.950, 6.463] | 1.995 [-4.991, 6.931] | 2.533 [ -0.934, 11.549] | 3.010 [-1.654, 7.819] | 2.772 [-1.382, 9.800] | 4.767 [2.850, 6.672] |
| 4 | 79 | 2.224 [1.182, 3.524] | 2.247 [1.267, 3.330] | 2.235 [1.221, 3.422] | 0.112 [-1.243, 1.413] | 0.135 [-1.617, 1.633] | 0.124 [-1.428, 1.523] | 2.359 [1.006, 3.487] |
| 5 | 22 | 2.690 [-6.180, 7.790] | 2.390 [ -17.070, 5.200] | 2.540 [-11.530, 6.290] | -1.250 [-4.610, 18.760] | -1.550 [-7.020, 7.830] | -1.400 [-5.780, 13.330] | 1.140 [-1.730, 3.690] |
| 6 | 45 | 1.821 [0.476, 3.620] | 1.804 [0.484, 3.362] | 1.813 [0.486, 3.443] | -0.112 [-1.872, 1.795] | -0.128 [-2.132, 1.996] | -0.120 [-1.982, 1.869] | 1.693 [-0.684, 3.825] |
| 7 | 35 | 2.893 [0.974, 4.685] | 3.169 [1.262, 4.654] | 3.031 [1.128, 4.654] | 1.044 [-0.824, 3.904] | 1.319 [-1.069, 4.469] | 1.182 [-0.947, 4.143] | 4.213 [2.317, 6.240] |
| 8 | 44 | 2.311 [0.494, 4.034] | 2.360 [0.546, 3.859] | 2.335 [0.522, 3.933] | 0.257 [-1.554, 2.800] | 0.307 [-1.875, 3.075] | 0.282 [-1.707, 2.956] | 2.618 [0.479, 4.499] |
| *Note.* 95% percentile bootstrap confidence intervals are included in the brackets. |

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| Table S8 |
| *Mediated, direct, and total effect estimates applying the potential outcomes framework using ‘mediation’ R package treating the outcome as a Poisson distributed variable with the XM interaction.* |
|  |  |  |  |  |  |  |  |  |
| Study | N | PNIE | TNIE | Average IE | PNDE | TNDE | Average DE | TE |
| 1 | 77 | -0.072 [-1.618, 1.424] | 3.807 [2.213, 5.282] | 1.867 [0.860, 2.969] | -3.337 [-4.897, -1.894] | 0.540 [-1.693, 2.655] | -1.397 [-2.841, 0.083] | 0.470 [-1.021, 1.920]  |
| 2 | 43 | 2.043 [-0.831, 5.743] | 0.324 [-1.470, 3.362] | 1.184 [-0.436, 3.726] | 2.974 [-0.074, 5.311] | 1.255 [-2.786, 5.760] | 2.114 [-0.888, 4.948] | 3.298 [1.274, 5.313] |
| 3 | 24 | 2.695 [-4.826, 15.257] | -1.308 [-17.999, 9.521] | 0.694 [-9.222, 8.449] | 5.933 [-4.029, 22.648] | 1.930 [-10.754, 9.907] | 3.932 [-2.825, 13.802] | 4.625 [2.690, 6.757] |
| 4 | 79 | 1.944 [0.938, 3.206] | 3.479 [0.672, 5.844] | 2.711 [1.212, 4.164] | -0.885 [-3.171, 2.086] | 0.650 [-0.913, 2.040] | -0.117 [-1.689, 1.687] | 2.594 [1.344, 3.737] |
| 5 | 22 | 6.150 [-9.960, 8.140] | -1.940 [-27.800, 7.370] | 2.100 [-14.250, 6.590] | 2.980 [-6.810, 30.190] | -5.110 [-8.550, 11.030] | -1.060 [-5.920, 16.380] | 1.040 [-2.000, 4.130] |
| 6 | 45 | 2.546 [0.500, 5.536] | 1.173 [-0.048, 2.565] | 1.860 [0.522, 3.622] | 0.393 [-1.517, 2.887] | -0.980 [-3.564, 1.501] | -0.294 [-2.217, 1.911] | 1.566 [-0.448, 3.722] |
| 7 | 35 | 3.531 [1.363, 5.951] | 0.261 [-15.690, 2.379] | 1.896 [-6.037, 3.312] | 3.820 [1.514, 20.804]  | 0.551 [-2.219, 4.111] | 2.185 [0.074, 11.569] | 4.081 [2.166, 6.633] |
| 8 | 44 | 2.006 [-0.055, 3.908] | 4.728 [0.321, 7.502] | 3.367 [1.020, 5.086] | -1.101 [-4.053, 2.409] | 1.621 [-1.907, 4.113] | 0.260 [-2.408, 2.365] | 3.627 [0.500, 5.161] |
| *Note.* 95% percentile bootstrap confidence intervals are included in the brackets. |

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| Table S9 |
| *Effect size for mediated effect estimates through imagery and repetition with 95% percentile bootstrap confidence intervals* |
| Study | Effect size for Mediated effect through Imagery – *XM* interaction | Effect size for Mediated effect through Imagery – No *XM* interaction | Effect size for Mediated effect through Imagery – Multiple Mediator Model | Effect size for Mediated effect through Repetition – Multiple Mediator Model |
| 1 | -0.024 [-0.531, 0.471] | 0.489 [0.063, 1.105] | 0.489 [0.083, 1.170] | -0.168 [-0.875, 0.456] |
| 2 | 0.534 [-0.228, 1.442] | 0.395 [-0.210, 1.071] | 0.465 [-0.207, 1.231] | -0.197 [-0.681, 0.552] |
| 3 | 0.756 [-2.678, 2.544] | 0.540 [-1.676, 1.662] | 0.517 [-2.038, 1.453] | 0.406 [-0.933, 2.422] |
| 4 | 0.592 [0.274, 0.952] | 0.696 [0.414, 1.023] | 0.677 [0.375, 0.995] | 0.186 [-0.148, 0.542] |
| 5 | 1.802 [-6.912, 2.435] | 0.803 [-3.938, 2.196] | 0.721 [-4.044, 2.678] | 0.067 [-0.802, 2.849] |
| 6 | 0.719 [0.109, 1.511] | 0.532 [0.140, 0.999] | 0.512 [0.094, 1.040] | 0.087 [-0.273, 0.479] |
| 7 | 0.858 [0.366, 1.422] | 0.756 [0.288, 1.161] | 0.596 [0.074, 1.406] | 0.237 [-0.335, 0.785] |
| 8 | 0.483 [-0.043, 0.899] | 0.581 [0.130, 0.958] | 0.647 [0.224, 1.049] | -0.234 [-0.683, 0.166] |

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| Table S10 |
| *Empirical Power for mediated effect estimates through imagery and repetition* |
| Study | Empirical Power for Mediated effect through Imagery – *XM* interaction | Empirical Power for Mediated effect through Imagery – No *XM* interaction | Empirical Power for Mediated effect through Imagery – Multiple Mediator Model | Empirical Power for Mediated effect through Repetition – Multiple Mediator Model |
| 1 | .938 | .971 | .961 | .063 |
| 2 | .725 | .811 | .782 | .063 |
|  |  |  |  |  |
|  |  |  |  |  |
| 3 | .424 | .524 | .456 | .063 |
|  |  |  |  |  |
|  |  |  |  |  |
| 4 | .944 | .974 | .964 | .057 |
|  |  |  |  |  |
|  |  |  |  |  |
| 5 | .374 | .465 | .418 | .060 |
|  |  |  |  |  |
|  |  |  |  |  |
| 6 | .758 | .835 | .800 | .064 |
|  |  |  |  |  |
|  |  |  |  |  |
| 7 | .625 | .719 | .685 | .061 |
|  |  |  |  |  |
|  |  |  |  |  |
| 8 | .733 | .824 | .794 | .064 |
|  |  |  |  |  |
| Average | .690 | .765 | .733 | .062 |

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| *Figure S1*. PowerPoint slides used for the memory experiment protocol. Slides contain the instructions given to participants and the list of words to be recalled. |

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| *Figure S2*. Path diagram depicting how the correlation between *M* and unmeasured confounder *U* and the correlation between *Y* and unmeasured confounder *U* was estimated. The paths from *U* to *M* and *Y* were constrained to be equal, the variance of *U* was fixed to 1 and the *b* path was constrained to zero. |