

## REJOINDER

# Warm Water and Loneliness Redux: Rejoinder to Shalev and Bargh (2014) Study 1

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Shalev and Bargh (2014) replied to our work and summarized results from 3 new studies concerning the associations between trait loneliness and showering/bathing habits. We clarify a few issues and provide a foundation for future work by conducting a meta-analysis of the relevant studies. The inclusion of new data does little to change our basic conclusions. There are no indications of strong connections between trait loneliness and showering/bathing habits. Additional studies are needed to test moderators of these associations, and to evaluate possible cross-cultural differences in the connection between loneliness and physical warmth extraction from baths and showers.

*Keywords:* loneliness, effect sizes, statistical precision, replication, meta-analysis

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Do lonely individuals use warm showers and baths to compensate for a lack of social connection? This provocative question has now generated a surprising number of empirical investigations. Shalev and Bargh (2014) replied to our article and summarized results from three new studies. An inspection of the size of the correlations from these new studies suggests their new effect size estimates are closer to our estimates than to those reported in their 2012 article. Thus, their reply reinforces the concerns motivating our replication studies and does little to answer questions about the anomalies in their Study 1a. In this rejoinder, we respond to a few issues and quantitatively summarize the results from the existing studies in this exchange.

### Is the Physical Warmth Extraction Index Variable the Most Valid Test of the Substitutability Hypothesis?

Bargh and Shalev (2012) created a physical warmth extraction variable by taking the average of the standardized frequency, warmth, and duration items. They argue that this summary variable captures how much net warmth participants extract from bathing activity (see p. 156). Shalev and Bargh (2014) justified this index by suggesting that their composite measure is akin to a snacking

index. However, we believe their snacking index analogy breaks down in this context. Pies, candy bars, and ice cream all contain calories, and they all belong to a superordinate snack category. In contrast, the frequency and duration items refer to different aspects of showering/bathing activity, and they are conceptually unrelated to warmth. Moreover, these items are not strongly correlated with the temperature variable (frequency:  $r = .04$  in the combined file for our Studies 1 to 4,  $r = .02$  in the combined file for our Studies 5 to 9; duration:  $r = .23$  in the combined file for our Studies 1 to 4,  $r = .14$  in the combined file for our Studies 5 to 9). Participants who report taking longer showers/baths also report taking warmer showers/baths, but it is not the case that participants who report taking more showers/baths also report taking warmer showers/baths. The frequency and duration items are negatively correlated ( $r = -.10$  in our Studies 1 to 4,  $r = -.12$  in our Studies 5 to 9). Participants who take longer shower/baths have a slight tendency to take fewer baths and showers per week.

Ultimately, their arguments did not change our perspective on the relative merits of the warmth item versus the physical warmth extraction index when testing the relevant hypothesis. As it stands, we believe it is reasonable to place more emphasis on the warmth item when evaluating the evidence for the ideas presented in Bargh and Shalev (2012). The warmth item is explicitly about water temperature and is therefore directly relevant to the substitutability hypothesis. We found virtually no support for the idea that lonelier people take warmer showers and baths, using a straightforward approach for testing the underlying ideas in the Bargh and Shalev (2012) article. Likewise, frequency should be positively correlated with loneliness if one follows the logic of the Bargh and Shalev arguments; however, there was no indication that frequency was positively correlated with loneliness in our studies or in their Study 1b. At best, there appears to be a small positive correlation between trait loneliness and the duration of showers and baths.

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On the other hand, it is possible that at least among those who take warm showers, variability in frequency and duration are the primary means by which these individuals extract warmth. This possibility suggests an interaction between temperature and the other two variables: Among those who take warmer showers, duration and frequency should be positively associated with loneliness. However, these interactions did not reach statistical significance in either of our combined files (the warmth by duration interaction:  $p = .497$  for Studies 1 to 4,  $p = .667$  for Studies 5 to 9; the Warmth  $\times$  Frequency interaction:  $p = .196$  and  $p = .808$ , respectively).

### What Are the Effect Size Estimates in Their New Data?

Bargh and Shalev graciously shared the raw data from their new studies. To facilitate comparisons with the existing studies, we averaged the separate bathing and showering items in each of their new studies to calculate overall frequency, warmth, and duration composite variables. We then standardized these composite variables within each sample to create the overall index composite variable in each sample. We also combined their data into a single file to compute overall correlations across their new data (akin to the approach they used in Table 3 of their online supplement). The correlations along with sample sizes are reported in Table 1. The correlation between loneliness and the overall index variable was statistically significant at  $p < .05$  ( $r = .14$ ), as was the correlation for the duration variable ( $r = .23$ ). However, there was no overall effect for the warmth variable,  $r = -.01$ ,  $p = .806$ , or for the frequency variable,  $r = -.01$ ,  $p = .774$ . The near-zero overall correlation between loneliness and the warmth variable is particularly striking and weakens support for the idea that lonely people prefer warm temperatures for baths and showers using their own data.

In addition, we have concerns about their MTurk sample from India, given differences in the amounts of excluded data from the samples collected from the United States versus India. Shalev and Bargh (2014) excluded 33.6% of the data collected from India, compared with 9.6% of the data from the United States. As we noted in our original article (Donnellan, Lucas, & Cesario, 2015), we agree that it is reasonable to try to identify attentive from

nonattentive respondents when using MTurk samples (see also Berinsky, Margolis, & Sances, 2014; Goodman, Cryder, & Cheema, 2013). However, we believe researchers should provide the explicit rationale for exclusions and report what happens when all participants are included in the analyses (see also Berinsky et al., 2014, p. 751). Bargh and Shalev did not describe the precise criteria they used to discard participants, and they did not report key results with all participants included. In contrast, we were explicit about our exclusion procedures and also reported results with all participants throughout our report. In short, we believe the MTurk sample from India should be viewed with some caution until the results are replicated and supplemented with additional cross-cultural samples beyond those derived from MTurk. This is especially important given possible differences between MTurk workers from the United States and India beyond just their country of origin (Ipeirotis, 2010). The potential for cross-cultural differences is intriguing and it would be ideal to have more data on this issue.

### What Happened With the Frequency Variable in Study 1a?

We are still perplexed by the frequency distribution reported for Bargh and Shalev's (2012) Study 1a. They asked participants, "How often you usually take a bath/shower?" for both studies, and yet the resulting distributions are substantially different in their Studies 1a and 1b. Bargh and Shalev explain this anomaly by suggesting that the participants in their first study misunderstood the question that was being asked. It is difficult to understand how undergraduate participants from an elite university could have misunderstood this item in such a way as to produce a distribution whereby 90% of the participants apparently take less than one shower or bath per week. This was our biggest reservation with their Study 1a, and none of the frequency distributions for samples from the United States look anything like the distribution in their Study 1a. Moreover, none of the available studies have been able to duplicate their initial correlation of .48 between trait loneliness and frequency of showering/bathing from Study 1a. In fact, the correlation between loneliness and the frequency item composites was negative and consistently near zero in all three of their new

Table 1  
*Correlations Between Trait Loneliness and Bathing/Showering Items: Original and New Bargh and Shalev (2012), and Shalev and Bargh (2014) Studies*

	Frequency	Temperature	Duration	Index	<i>n</i>
Original studies (Bargh & Shalev, 2012)					
Study 1a	.48*	.26	.29*	.57*	51
Study 1b	.03	.34*	.33*	.37*	41
New studies (Shalev & Bargh, 2014)					
Israel	-.005	.046	.179*	.121	148
India	-.009	.207*	.026	.136	199
United States	-.028	.068	.254*	.160*	206
Overall	-.012	-.010	.230*	.137*	553
95% CI	-.089 to .064	-.106 to .077	.147 to .306	.056 to .215	

*Note.* The overall correlation was based on an aggregate data file that combined the three new studies into a single file. 95% confidence intervals (CIs) constructed with biased-corrected bootstrapping procedures with 1,000 resamples using the aggregated data file.

\*  $p < .05$ .

studies (see Table 1). Accordingly, we think it would be prudent to discard Study 1a from the scientific record.

### Are Our Studies Really That Different From Their Studies?

Shalev and Bargh (2014) suggest that differences in measures and procedures across our nine studies are a concern that precludes taking a meta-analytically informed perspective on the existing literature. We disagree strongly with this perspective, and we doubt that most experts in meta-analysis would endorse this view. Moreover, we think the practice of embedding these particular questions within larger surveys would actually mitigate their concerns about participant awareness. Taking a step back, however, it is unclear why awareness of the purpose of the study would systematically bias the results one way or the other. It is entirely possible that participants would provide responses with an acceptable degree of fidelity to their actual thoughts, feelings, and behaviors, even if they were aware that researchers were truly interested in testing whether there is an association between loneliness and showering/bathing habits.

Nonetheless, Shalev and Bargh (2014) correctly noted that we did not question our participants about their awareness of the study hypothesis.<sup>1</sup> To address this gap, we conducted an additional study (see the online supplemental materials) to evaluate how removing any aware participants would impact our results. As it turned out, removing any participant suspected of study awareness by at least one of the three authors did not change our effect size estimates to any appreciable degree. Thus, we do not think participant awareness is a critical confound in our studies.

Ultimately, we believe that the any differences across our studies should be seen as a virtue rather than a weakness, especially as it concerns the generalizability of the basic findings. We should also clarify a point about our procedures so that readers can better understand our decisions. Some of the differences in measures stem from the timing of our e-mail exchanges. We received an initial copy of their lifestyles questionnaire on February 28, 2012, but that survey asked participants to respond to the warmth item using picture of a thermometer rather than a survey item as described in the 2012 article. Given the discrepancy, we asked for clarification, but the response time did not work for our research goals. We wanted to collect data before the end of our spring semester, so we created an item modeled on the description in their published article (i.e., an item measured on a scale ranging from *cold* to *very hot*; Bargh & Shalev, 2012, p. 156).<sup>2</sup> We received a copy of the correct survey on May 30, 2012, but this was after we had already collected data for our Study 1. At that point, we decided to keep using our survey questions, given the similarities across the measures (see the Appendix in Donnellan, Lucas, & Cesario, 2015). To be sure, there is no theoretical reason to expect that differences in the two sets of measures would impact the ability of researchers to find a connection between showering/bathing habits and trait loneliness.

### What Happens When All Data Are Combined?

In light of our preference for meta-analytic approaches to research questions, we combined the correlations from Table 1 with the nine studies in our original article, along with three more

studies posted on the Psychology File Drawer (Donnellan & Lucas, 2014; Ferrell, Gosling, & Donnellan, 2014; McDonald & Donnellan, 2014) and the new study described in the online supplemental materials for this rejoinder. The correlations and overall meta-analytic effects sizes are displayed in Table 2. As shown in the bottom rows of Table 2, the aggregate effect size estimates were very similar to the ones reported in our original article. Lonely people appear to take longer showers/baths, but they also take fewer showers/baths per week. The most hypothesis-relevant estimate for the warmth item was not significantly different from zero. Thus, our original conclusions about the connections between bathing habits and trait loneliness are essentially unchanged when incorporating this new information.

There are at least two other aspects of Table 2 that are worth emphasizing. First, the .48 correlation between frequency and loneliness from Bargh and Shalev (2012) is a noticeable outlier, given that the next largest positive correlation is .08 (our Study 3). The *Q* statistic is not significant for the remaining 17 studies once this .48 effect is discarded ( $Q = 17.587$ ,  $df = 16$ ,  $p = .349$ ). These considerations reinforce our concerns about the anomalous results from Study 1a.

Second, the correlations from the University of Texas study are especially informative because they were collected by outside researchers who administered surveys to a large live-broadcast online course (Ferrell et al., 2014). There was an approximately 1-week gap between the lifestyle questions and the loneliness measure. College students completed the surveys simultaneously wherever they watched the broadcast lectures (i.e., they were not all in the same room when they answered the questions). Donnellan analyzed the data for the final write-up for the Psychology File Drawer. In other words, an independent research group obtained results more in line with those reported in Donnellan et al. (2015) than those reported in Bargh and Shalev (2012). Ultimately, we believe that independent inquiry into these questions from additional labs is necessary to clarify the empirical relations between trait loneliness and showering/bathing habits.

### Summary and Conclusion

The new data presented by Bargh and Shalev (2015) does not change our conclusions about the connections between loneliness and showering/bathing habits. Their new studies used larger sample sizes compared with their original studies but yielded smaller effect size estimates. When we combined the relevant data using meta-analytic procedures, the overall effect size estimates for the correlation between loneliness and the warmth variable was trivial and not statistically distinguishable from zero. Thus, we believe extreme caution is warranted before asserting that lonely people take warm showers to compensate for a lack of social connection. Lonelier people report taking fewer showers/baths, but they also report taking longer showers and baths. As is always the case, additional research by outside groups is needed. In particular,

<sup>1</sup> We did not previously think this was an issue because none of the participants in their 2012 article expressed accurate awareness of the purpose of their questionnaire studies.

<sup>2</sup> The description of the items in the published article does not consistently refer to showers/baths, but we assumed this was an oversight.

Table 2  
Meta-Analytic Results

	Frequency	Temperature	Duration	Index
Bargh and Shalev studies				
Bargh and Shalev (2012) Study 1a	.48	.26	.29	.57
Bargh and Shalev (2012) Study 1b	.03	.34	.33	.37
Israel	-.01	.05	.18	.12
India	-.01	.21	.03	.14
United States	-.03	.07	.25	.16
Donnellan et al. (2015) studies				
Study 1	-.15	-.03	.07	-.06
Study 2	-.11	.02	.08	-.01
Study 3	.08	-.02	.17	.13
Study 4	-.20	.01	.02	-.10
Study 5	-.07	.06	.18	.10
Study 6	-.13	.07	.16	.06
Study 7	-.10	.03	.11	.02
Study 8	-.08	.01	.10	.02
Study 9	-.08	-.12	-.01	-.13
MSU Spring 2014	-.06	.00	.13	.04
MSU Summer 2014	-.03	-.07	.01	-.05
University of Texas	-.07	-.08	.09	-.03
Israel M & D	-.15	-.05	.16	-.03
<i>N</i>	5,289	5,285	5,290	5,293
Random-effects model				
Point estimate	-.067	.017	.115	.043
95% CI	-.107 to -.027	-.020 to .055	.081 to .149	-.006 to .092
<i>p</i>	.001*	.356	.000*	.086
Fixed-effects model				
Point estimate	-.076	.015	.116	.031
95% CI	-.103 to -.049	-.012 to .042	.089 to .142	.004 to .058
<i>p</i>	.000*	.273	.000*	.026*

*Note.* Sample sizes of 51 and 41 were used for Bargh and Shalev Studies 1a and 1b, respectively. Effect sizes for Study 6 and the MSU Summer 2014 study were calculated using the average of the *z*-scored UCLA Loneliness measure and the Bargh and Shalev Loneliness measure. University of Texas data are from Ferrell et al. (2014), and the Israel M & D data are from McDonald and Donnellan (2014). MSU = Michigan State University.

future studies should evaluate cross-cultural differences and test theoretically relevant potential moderators of these relations.

## References

- Bargh, J. A., & Shalev, I. (2012). The substitutability of physical and social warmth in daily life. *Emotion, 12*, 154–162. <http://dx.doi.org/10.1037/a0023527>
- Berinsky, A. J., Margolis, M. F., & Sances, M. W. (2014). Separating the shirkers from the workers? Making sure respondents pay attention on self-administered surveys. *American Journal of Political Science, 58*, 739–753. <http://dx.doi.org/10.1111/ajps.12081>
- Donnellan, M. B., & Lucas, R. E. (2014). Showering and Loneliness Take 10 (2014, April 29). Retrieved from <http://www.PsychFileDrawer.org/replication.php?attempt=MTg2>
- Donnellan, M. B., Lucas, R. E., & Cesario, J. (2015). On the association between loneliness and bathing habits: Nine replications of Bargh and Shalev (2012) study 1. *Emotion, 15*, 109–119.
- Ferrell, J. D., Gosling, S. D., & Donnellan, M. B. (2014). Showering and Loneliness: U of T Replication (2014, April 30). Retrieved from <http://www.PsychFileDrawer.org/replication.php?attempt=MTg3>
- Goodman, J. K., Cryder, C. E., & Cheema, A. (2013). Data collection in a flat world: The strengths and weaknesses of Mechanical Turk samples. *Journal of Behavioral Decision Making, 26*, 213–224. <http://dx.doi.org/10.1002/bdm.1753>
- Ipeirotis, P. (2010). *Demographics of Mechanical Turk*. CeDER-10–01 Working Paper. Department of Information, Operation, and Management Sciences. New York University. <https://archive.nyu.edu/handle/2451/29585>
- McDonald, M., & Donnellan, M. B. (2014). Showering and loneliness: Participants from Israel. Retrieved from <http://www.PsychFileDrawer.org/replication.php?attempt=MTk5>
- Shalev, I., & Bargh, J. (2014, September 8). On the association between loneliness and physical warmth-seeking through bathing: Reply to Donnellan et al. (2014) and three further replications of Bargh and Shalev (2012) Study 1. *Emotion*. Advance online publication. <http://dx.doi.org/10.1037/emo0000014>

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