Emotion

On the Association between Loneliness and Physical Warmth-Seeking through Bathing: Reply to Donellan et al. (2014) and Three Further Replications of Bargh & Shalev (2012) Study 1

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Full Title:	On the Association between Loneliness and Physical Warmth-Seeking through Bathing: Reply to Donellan et al. (2014) and Three Further Replications of Bargh & Shalev (2012) Study 1
Abstract:	As Tversky and Kahneman (1971) noted, effect sizes in smaller samples are inherently unstable. Donellan et al. (2014) in a large sample show that the relation between trait loneliness and warmth extraction through bathing activities is much smaller than in our initial smaller samples. We report further replications of our original findings in samples from India, Israel, and North America, again showing significant correlations between loneliness and physical warmth extraction from bathing and showering; the overall effect being reliable across all three samples, although, consistent with Donellan et al.'s conclusions, smaller than in our original studies. We also respond to criticisms of the original data analyses, noting that removal of the problematic 'bathing frequency' item from the warmth index did not substantially change the results and thus our conclusions from them. We also note that in their 2 studies in which Donellan et al. attempted to most closely follow our original procedure, they did replicate our original results, but not in the other 7 studies in which considerable procedural changes were made. As our new replications reveal variability in bathing and showering preferences and habits around the world, we recommend the inclusion of a wider sample of cultures beyond North American in future research. This research should also focus not only on the narrower question of how loneliness relates to bathing activities but on the broader relation between feelings of social coldness (e.g., after rejection or exclusion) and the seeking of physical warmth (e.g., warm food and drink, thermostat settings).
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Running Head: REPLY TO DONNELLAN ET AL.

On the Association between Loneliness and Physical Warmth-Seeking through Bathing: Reply to Donnellan et al. (2014) and Three Further Replications of Bargh & Shalev (2012) Study 1

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Donnellan et al. (2014) report nine studies on the relation between bathing activities and loneliness, in replication of the original two studies of Bargh and Shalev (2012, Studies 1a and 1b). Their surveys were conducted both in person (university samples) and over the internet (e.g., mTurk). Their combined *N* of over 3000 respondents is much larger than in our original smaller samples, and across their several studies and in a meta-analysis of the combined sample, the relation between loneliness and 'warmth extraction' through bathing (bathing more often, taking longer showers/baths, using hotter water) was negligible at best. Some indication was that duration of bathing or showering and not so much frequency or water temperature might be the strongest correlate of loneliness; this conclusion is also supported by our further, cross-cultural data collections (see below and Table 3 in Online Supplemental Materials).

As to the overall size and reliability of the bathing-loneliness relation, we agree with Donnellan and colleagues that our considerably larger effect sizes compared to theirs were most likely due to our considerably smaller samples, a university student sample in our Study 1a, and a community sample (town green) in our Study 1b. As Tversky and Kahneman (1971) pointed out over 40 years ago the effect sizes of small samples such as ours can fluctuate greatly. Given the consistency and preponderance of the data presented by Donnellan et al. (2014), as well as the results of our own replications (see below), we are in harmony with their conclusion that the relation between showering/bathing (water temperature, frequency, duration) and loneliness is considerably smaller than it appeared based on our initial studies. Yet we also note that the more exact of their replication studies (5 and 6), the ones that most closely followed our original procedure, were also the ones that did show the loneliness-

warmth index correlations (comparable in size to those we obtained in the further cross-cultural replications), whereas their studies that included many other measures we did not include, and which made other procedural changes from the original studies, were the ones that did not find the same results as we did (see below). In other words, the closer they followed our original procedures, the more likely they were to find our original effect.

Moreover, based on the cross-cultural replications (provided in the Supplemental Online Materials), we suggest that researchers use caution in drawing universal conclusions regarding bathing and loneliness from single cultures (such as based on samples drawn mainly from North America). There do appear to be variations in bathing habits and preferences for water temperature, and also significant relations obtained in other cultures (Indian, Israeli) between bathing (especially duration) and loneliness. Thus the conclusion of Donnellan et al. we most strongly endorse is that further research is needed to better understand the conditions under which 'social coldness' feelings, as in loneliness (but also following exclusion or rejection), might lead to an implicit or explicit seeking of the substitute of physical warmth (in ways additional to showering or bathing as well) as an effective if temporary ameliorative strategy.

1. Problems with the data in original Study 1a

Donnellan et al. report problems with our Study 1a dataset which they were first to notice after we shared the dataset with them in early 2012. First, the researchers noted the overall preference for cold water temperatures and identified this as a problem with our data set; however we had no reason at that time not to believe that our respondents were giving their actual preferences. And our additional surveys on Indian respondents (see below) also show an overall preference for colder water temperatures, so that there are indeed people who

prefer colder water temperatures. However, their further data on North American samples, and our own further American sample data do not show the preference for cold water temperatures shown in our original Study 1a. It is possible that international students in the original Study 1a with such preferences contributed to the overall colder preferences but this is merely speculation. The responses in our Study 1a (an American sample) as to preferred water temperature therefore appear anomalous in light of our own and Donnellan et al.'s further data. One positive outcome of this issue (especially given the results of our Indian sample, see Online Supplemental Materials) is that it highlights cultural and individual differences in bathing practices and preferences beyond those of North America.

Relatedly, regarding our conceptualization of the "warmth index", Donnellan and colleagues (2014) argue that only the water temperature item "is directly related to theorizing about warmth and loneliness. Items about the frequency and duration of showers/baths refer to different kinds of behaviors and are not as relevant to the substitutability hypothesis with respect to physical warmth and psychological warmth." We disagree. The original "warmth extraction index" was designed as conceptually analogous to a measure of food intake for dieters in that it offered several different methods to extract warmth from bathing/showering activity: you can take more baths/showers, you can use hotter water in each one you take, *or* you could stay under the warm water longer each time (see next paragraph). You need not use all three methods to increase the amount of warmth experienced. Each of them independently would serve to increase the total amount of warmth experienced by the body. This is analogous to a measure of snacking on which you can report eating pies, candy bars, or ice cream -- the more of one you eat the less of the others you would need to eat. This also means the three

items need not (and indeed were not expected to) correlate with each other. For these reasons we considered the correlations of loneliness with the warmth index to be the appropriate test of our substitution hypothesis.

Moreover, Donnellan et al. find an overall effect mainly for duration and in their data set respondents took warmer not colder baths/showers (see their Appendix), indicating that in their data (as in our Study 1b, in which participants showed a clear preference for warmer water) longer baths or showers meant more warmth extracted. Also, in our follow-up replication studies, water temperature and duration repeatedly correlated significantly: in our American mTurk sample for bath .185; for shower .213; see Table 7), in the Indian sample for bath (.167; see Table 8), and in the Israeli sample for bath (.330; see Table 9); also positively but not significantly in the Indian sample for shower (.095) and Israeli sample for shower (.079; see Table 10). Thus over all of these data sets there is a general, consistent positive relation between water temperature and duration, consistent with our understanding of the duration variable as a means of physical warmth extraction.

In addition to the cold-water preference in our original Study 1a sample, there was also a problem with the bathing frequency distribution in that same sample, which was identified by and communicated to us by Dr. Cesario after his initial reanalysis of our datasets in early 2012. In our Study 1a, the university sample, of the N=51 respondents, 46 reported taking less than 1 bath/shower per week on average (in the Study 1b community sample, only 11 of the 40 who responded to the item reported less than 1 bath/shower per week). We do not know why the student sample in 1a reported such a low frequency of bath/showers per week (and can only speculate about the possible reasons, such as their giving insufficient attention to the item).

Most importantly, however, neither of these apparent anomalies in Study 1a (low bathing frequency and overall cold water preference) occurred in our Study 1b replication with a community sample, yet Study 1b obtained the same pattern of results (see below). Nor were such anomalies apparent in our further replication samples and in the two Donnellan et al. studies that most closely followed our original procedures, yet all continued to obtain the same reliable or marginally reliable correlation between loneliness and the warmth index.

Still, this non-normal underlying distribution for the frequency items in Study 1a may have made the reported correlations between frequency and loneliness problematic in that particular study. Given this issue with the frequency item in Study 1a, the important question became: was it artificially responsible for producing our basic findings and thus our conclusions as reported in the original article? In fact it was not: in our reanalyses (as reported to the journal editor in early 2013), removing the frequency item from the warmth index, so that the index is based only on the water temperature preference and duration items, still gives correlations with loneliness of $r=.43$, $p = .002$ in Study 1a, and $r=.30$, $p=.06$, in Study 1b.

Finally, Donnellan et al. criticized our use of the initial version of the UCLA Loneliness scale (Russell et al., 1978) instead of the more recent, revised version (Russell, 1996). According to Russell (1996, p. 21) the fact that the initial scale worded all items in a negative or lonely direction "created the possibility that loneliness scores would be affected by systematic biases in responding such as an acquiescent response set." Donnellan et al. report that they were more likely to replicate our original findings when using the 1978 scale than the later 1996 scale. But this point concerns how to improve future research on the relation between physical

warmth seeking and measures of 'social coldness', and is not a point about the replicability of our original findings.

2. Responses to the Donnellan et al. procedure

Donnellan et al. made substantial changes to our original procedure in 7 of the 9 studies they report. In the other two, they find the same effect we did, although of substantially smaller magnitude. Unlike our original procedure the Donnellan et al. Studies 1-4 and 7-9 respondents answered many other questionnaires including the Big Five personality scales, subjective well-being and mood inventories, writing styles and personality, and so on (all of which were likely to have primed much additional mental content than was the case in our original respondents), and then the loneliness scale and the bathing/showering items. We administered the General Lifestyles Questionnaire and the loneliness scale in a random order, instead of the fixed order they used. Directly asking about loneliness and then showering/bathing as in most of their studies may have clued those participants in to the relation between the two and thus affected their responses. Another problem is that the researchers apparently did not take any steps to check their participants' degree of awareness of their study goal or hypotheses. No mention is made of performing any such debriefing for suspiciousness or awareness of study hypotheses (as we had done) in any of their 9 studies. Certainly an increased awareness of the hypothesis or purpose of the questionnaires could have changed responses and thus weakened the effects.

In Study 5, which they describe as their attempt to use our original procedures and measures as closely as possible, they did obtain a reliable effect, $r = .10$, $p = .029$, between

loneliness and the warmth index. In Study 6, using both the short version and the revised version of the UCLA loneliness scale, they obtained a similar size correlation, $r = .08$, $p = .057$. In short, when they most closely followed our original procedures (their Studies 5 and 6), they were able to replicate our results, and when they made substantial departures from our procedures (their Studies 1-4, 7-9), they were not able to. In our view, then, not 9 but only 2 reasonably exact replication studies are presented in Donnellan et al. (2014) and both of those do find the originally reported effect, again albeit of smaller magnitude than we reported based on our much smaller sample sizes. Our larger sample sizes in the further replications produce effect sizes more comparable to theirs.

3. Further cross-cultural surveys of the bathing-loneliness relation

The finding by Donnellan et al. that of all the index variables, shower/bathing duration has the stronger relation to loneliness is supported also by further follow-up studies on Israeli, American, and Indian samples (see Online Supplemental Materials). In those studies it is often duration or water temperature that singly correlates the best and not so much the frequency measure. However, as described below, in the new cross-cultural datasets we continue to obtain (though smaller) reliable relations between trait loneliness and warmth extraction from bathing or showering. As these data are from different cultures and samples (other than the American) and use separate sets of bath and shower items, they do not pertain to Donnellan et al.'s focus on the replicability of our original study. We include them here instead to demonstrate cross cultural variability in the shower/bathing-loneliness effect and consequently to encourage future research to examine the effect on a world-wide basis. We also included separate items regarding bathing and showering which revealed clear cultural differences in

preference and frequency of one over the other, as well as in preferred water temperature and daily frequency (see Online Supplemental Materials). One thing suggested by these additional cross-cultural replications is that overall meta-analyses based predominately on data from a single, relatively homogenous culture such as North America, and which therefore do not take into account potential cultural differences, might well obscure a more variable pattern that exists across cultures. Moreover, it is problematic to include into a single overall meta-analysis data across studies with such a variety of procedures as across Donnellan et al.'s 9 studies as well as our new replications.

In the new replication surveys (see Online Supplemental Materials) on Indian (N = 199), Israeli (N=149) and American (N = 207) samples there were significant correlations between trait loneliness and the warmth index in the .14-.18 range on the shower items and marginally significant correlations of .13 and .14 on the bath items (see Tables 1 and 2); the only exception being the Israeli-bath correlation in which there was much missing data. Across all three new samples the loneliness-warmth index was reliable for showering (.143, N = 552) and for baths (.093, N = 491), and also over all these three new and the original two samples (.174, N = 637). Consistent with the findings of Donnellan et al., bathing and showering duration appears to be the variable more consistently related to loneliness in the American and Israeli samples, but water temperature is more related to loneliness in the Indian sample. Taken together, these data on quite different and diverse cultural samples than before and using separate bath and shower items, continue to show a relation between loneliness and warmth extraction through bathing or showering, with the correlations in the range of those observed in Donnellan et al. (2014) Studies 5 and 6.

4. Directions for Future Research: The Physical-Social Warmth Relation more generally

Bargh and Shalev (2012) were not alone in noting the potential for physical warmth as an ameliorative for social coldness. Inagaki and Eisenberger (in press) conducted an fMRI investigation of human insula's responsiveness to both social and physical coldness. They compared activations during reading of socially warm and neutral messages from friends and family and holding warm and neutral-temperature objects (a warm pack and a ball). Results showed an overlap between physical and social warmth: Participants felt physically warmer after reading the positive (compared with neutral) messages and more socially connected after holding the warm pack (compared with the ball). Neural activity during social warmth overlapped with neural activity during physical warmth in the ventral striatum and middle insula, but neural activity did not overlap during a different pleasant task (soft touch). The researchers concluded that "together, these results suggest that a common neural mechanism underlies physical and social warmth."

Other research has similarly shown that experiences of physical warmth increase feelings and tendencies towards social warmth. After holding a warm object, participants increased their trusting behavior in an economics game (Kang et al., 2011, Study 2), reported feeling closer to other people (IJzerman & Semin, 2009), young children primed with physical warmth were more generous (prosocial) to other children (IJzerman et al., 2012) and felt more connected to those they knew (Inagaki & Eisenberger, in press). Research has also demonstrated the complementary finding that social coldness in the form of rejection and exclusion produces feelings of physical coldness (e.g., reduced estimates of room's temperature; see review in Bargh & Shalev, 2012) and causes an actual decrease in body

temperature (IJzerman et al., 2012) – thus the seeking of physical warmth to restore body temperature homeostasis after experiences of social coldness seems a quite reasonable strategy. Other researchers in addition to us have found that people seek out physical warmth following experiences of social coldness as from rejection and exclusion (Zhong & Leonardelli, 2008).

Thus we concur with Inagaki and Eisenberger (in press) that the door should not be closed just yet on the potential therapeutic value of physical warmth for such cases. After all it represents a commonly available and extremely safe and cheap source of potential relief relative to expensive therapy sessions and pharmaceutical interventions that alter brain chemistry. Moreover, while we agree with Donnellan et al. that further research on this topic is needed, we hope that this future research will investigate not only the other sources of social coldness (e.g., rejection, exclusion, homesickness), but also other sources of physical warmth as possible amelioratives. Sitting close to a warm fire, having hot instead of cold drinks, turning up the thermostat -- all are alternative sources of physical warmth that were not included in our initial correlational investigations. And that is not even to mention the physical warmth experience that would be most effective of all in reducing loneliness: holding a loved one close. As Bowlby (1969) emphasized in his seminal analysis of the infant-caretaker relationship, there are good reasons why physical warmth and social warmth come to be associated in the human mind.

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Supplemental Materials:

Three Further Replications of Bargh & Shalev (2012) Study 1

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General Description

We conducted three replications to further test the association between trait loneliness and bathing habits. To examine the possible role of cultural differences in preference for temperature, duration and frequency of bathing habits, we recruited two online mTurk samples of American and Asian (Indian) participants, and a sample of Israeli students of Ben Gurion University of the Negev. The data for the online samples were collected during September, 2012. The students' sample data was collected during October-November, 2012. In each case, our N's were determined by the goal of attaining a sample size at least 2.5 times the original sample (see similar recommendation by Simonsohn, 2013). To examine the possible difference between bathing and showering habits, we separately asked about bathing and showering habits.

Participants.

American Sample. A sample of 207 mTurk respondents in the U.S. (101 female, 106 male) was recruited. The sample ranged from 18 to 71 years of age, with a mean age of 31.25 (*SD*=11.52). Ethnicity was as follows: 75.4% Caucasian, 14.5% Black, 5.3% Asian, 3.4% Hispanic, 1.4% Mixed.

Asian Sample. The sample included 199 mTurk Asian respondents in India (82 female, 117 male). The sample ranged from 18 to 67 years of age, with a mean age of 30.69 (*SD*=9.28). Ethnicity was as follows: 96.5% Asian, 3% Caucasian, 0.5% Black.

Israeli Sample. The participants were 149 Ben Gurion University students (95 female, 54 male) who were recruited in the students' hall (student union) in exchange for a candy bar. The sample ranged from 20 to 64 years of age, with a mean age of 25.69 (*SD*=4.77). The participants' ethnicity was 100% Caucasian.

Sampling.

Because of possible cultural variability in bath/shower habit we permitted participants to not respond on all bathing/showering questions yet still get the compensation. However, we did exclude participants who skipped the loneliness scale items or the demographic details or participants who did not follow the instructions. This attrition-based data-quality (incomplete responses) issue is a common one on mTurk and has been noted and addressed by others (e.g., Horton, Rand, & Zeckhauser, 2011; Rand, Greene, & Nowak, 2013; Robertson & Yokum, 2012). In the Asian sample, rate of exclusion was 33.6% because of missing demographic details (age, gender and ethnicity), missing loneliness items or misunderstanding of the instructions, such as writing numbers or verbal descriptions unrelated to the questions being asked. In the American sample, the exclusion rate was 9.6% because of considerably fewer missing responses. In the Israeli students sample the rate of exclusion was 0%. In the Israeli and Asian samples none of the participants showed awareness of the study hypothesis. In the American sample two participants indicated some awareness of the study hypothesis, and thus their data were excluded from the analyses.

Materials.

We used the 10 negative UCLA Loneliness items as in Bargh and Shalev (2012; see Russell et al., 1978). For the American sample, the internal consistency of the scale was Cronbach's α =.89; for the Asian sample the internal consistency for the scale was Cronbach's α =.82; and for the Israeli sample the internal consistency for the scale was Cronbach's α =.88.

The Lifestyle Habits scale items were separated for bathing questions and showering questions (see Table 11 for bathing and showering questions and scoring categories).

Procedure.

The American and Asian mTurk participants were asked to fill out a short survey on their lifestyle habits in exchange for a small monetary compensation. They first responded to three general life style questions, as in the original study. (These questions were "1. In the past 3 months, how often have you been involved in physical activity? (3+ times per week , Once per week, Once per month, Once per 6 months)" "2. Do you feel you eat healthy 'most of the time?' (Yes No)" "3. How many meals do you have per day? (5+ meals (smaller meals), 3-4 meals, 2 meals, 0-1 meal). Next came the three questions concerning bath frequency, water temperature, and duration and three questions concerning shower frequency, water temperature and duration. Half of the participants completed the loneliness scale before the lifestyle survey and the other half completed the survey in the opposite order. Next, they were asked their age, gender and ethnicity. Finally, they were asked what they thought the study was about. In the Indian sample only, the participants were also asked in the demographic section in what country they have a permanent address.

The Israeli students were recruited in the students' hall (union) in exchange for a candy bar. As in the original survey there were three questions on general lifestyle in the beginning that were not scored. Next, they filled out the lifestyle habits scale containing the loneliness and bathing-showering scales in a randomized order. Finally, they were asked what they thought the study was about, were debriefed, thanked and dismissed.

Results.

We first present the Pearson product-moment correlation coefficients that were computed to examine the relationships between trait loneliness and bathing habits (Tables 1-3). We then present additional gender-based analyses (Tables 4-5). Finally, we present the summary statistics of the three samples (Table 6), and internal correlations between the bathing and showering items and description of bath and shower items and scoring categories (Tables 7-11).

1. Association between Trait Loneliness and Bathing Items

As can be seen in Tables 1-2, Pearson product-moment correlation coefficients were calculated separately for bath and shower habits. In the Israeli sample, 37.6% of the bathing observations are missing. These participants verbally declared they never take baths and therefore skipped the bath items. We didn't expect this result and therefore had not included an "irrelevant" category as an option (see also description of the Israeli bath items in Table 11).

Table 1: Correlations between Trait Loneliness and Bathing Items – American, Asian, and Israeli Samples

	Bath Frequency	Bath Temperature	Bath Duration	Bath Index	N
American	-.034 p=.630	.016 p=.819	.234** p=.001	.136 p=.055	201-204
Asian	.016 p=.825	.227** p=.001	-.029 p=.685	.130 p=.067	199
Israeli	-.056 p=.59	-.086 p=.41	.031 p=.76	-.075 p=.48	91-92

*p < .05. **p <. 01. ***p <. 001

Note: Bath Frequency, Bath Temperature, and Bath Duration refer to the specific items included in the Bath Physical Warmth Index. The three items were standardized to compute the composite Physical Warmth Index separated for bathing and showering items.

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Table 2: Correlations between Trait Loneliness and Showering Items – American, Asian, and Israeli Samples

	Shower Frequency	Shower Temperature	Shower Duration	Shower Index	N
American	.016 p=.816	.101 p=.149	.175* p=.012	.158* p=.023	206
Asian	.000 p=.995	.175* p=.012	.079 p=.268	.141* p=.048	198-199
Israeli	.011 p=.894	.066 p=.423	.260** p=.001	.180* p=.029	148-149

*p < .05. **p <. 01. ***p <. 001

Note: Shower Frequency, Shower Temperature, and Shower Duration refer to the specific items included in the Shower Physical Warmth Index.

2. Correlations between Trait Loneliness and Bathing/Showering Across All Samples

To examine the overall relationship between all participants' bathing habits and showering habits and their degrees of loneliness, Pearson product–moment-correlation coefficients were computed separately for the bath index and loneliness and for the shower index and loneliness (see Table 3). There were separate shower items for the American, Asian and Israeli replications. We included the bath items for the American, Asian and Israeli respondents who reported they take baths. The three Bath items and the three Shower items were standardized separately to compute the composite Physical Warmth Index for the bathing and showering habits. To examine the comparability of the original studies and the current replications, the overall index includes the original index data of Bargh & Shalev (2012) samples 1a and 1b and the average index of the bath index and the shower index of the three replications.

For the participants who did not have a bath index score, the overall index score was their shower index score.

Table 3: Correlations between Bathing and Showering Items and Trait Loneliness across All Samples

	Shower				**Bath**				**Overall Index**
	Frequency	**Duration**	**Temp.**	**Index**	**Frequency**	**Duration**	**Temp.**	**Index**	
All	-.060 p=.162	.230** p <.001	-.009 p=.833	.143** p=.001	.084 p=.060	.121** p=.007	.027 p=.549	.093* p=.039	.174** p <.001
N	553	552	552	552	495	493	491	491	637

*p < .05. **p <. 01. ***p <. 001

3. Additional analyses by Gender

To examine the possibility that gender influences the association between bathing or showering habit and trait loneliness, we split the samples by gender. As can be seen in Tables 4 and 5 there are gender differences that cannot be generalized beyond the specific culture.

Table 4: Correlations between Trait Loneliness and Showering Items for Men and Women – American and Asian Samples

	Shower Frequency		Shower Temperature		Shower Duration		Shower Index	
	F	M	F	M	F	M	F	M
American	.107 p=.286 N=101	-.057 p=.565 N=105	-.046 p=.650 N=101	.209* p=.032 N=105	.123 p=.219 N=101	.221* p=.023 N=105	.103 p=.304 N=101	.209* p=.033 N=105
Asian	.009 p=.937 N=82	.006 p=.945 N=117	.334** p=.002 N=82	.000 p=.997 N=116	.195 p=.080 N=82	-.048 p=.606 N=116	.281* p=.011 N=82	-.024 p=.797 N=116
Israeli	-.361** p=.007 N=54	.113 p=.279 N=94	-.110 p=.428 N=54	.169 p=.104 N=94	.353** p=.009 N=54	.269** p=.009 N=94	.017 p=.905 N=54	.274** p=.008 N=94

*p < .05. **p <. 01. ***p <. 001

Table 5: Correlations between Trait Loneliness and Bathing Items for Men and Women – American and Asian Samples

	Bath Frequency		Bath Temperature		Bath Duration		Bath Index	
	F	M	F	M	F	M	F	M
American	.138 p=.172 N=100	-.168 p=.088 N=104	-.071 p=.482 N=99	.085 p=.398 N=102	.061 p=.548 N=99	.354** p<.001 N=103	.068 p=.505 N=99	.182 p=.067 N=102
Asian	-.132 p=.237 N=82	.083 p=.371 N=117	.348** p=.001 N=82	.091 p=.329 N=117	.034 p=.768 N=82	-.100 p=.285 N=117	.187 p=.092 N=82	.059 p=.527 N=117
Israeli	-.208 p=.22 N=36	.034 p=.80 N=56	-.122 p=.48 N=35	-.054 p=.69 N=56	.35* p=.03 N=36	-.095 p=.48 N=56	-.027 p=.87 N=35	-.065 p=.63 N=56

*p < .05. **p <. 01. ***p <. 001

4. Samples statistical characteristics

Tables 6-10 present additional information regarding relevant characteristics of the samples.

Table 6: Summary Statistics for Bathing and Showering Variables--American, Asian and Israeli Samples.

	Shower Duration	Shower Temperature	Shower Frequency	Bath Duration	Bath Temperature	Bath Frequency
American	M=3.80 SD=1.23 N=207	M=4.63 SD=.90 N=207	M=4.37 SD=1.20 N=207	M=4.62 SD=1.66 N=203	M=4.70 SD=.90 N=202	M=2.14 SD=1.76 N=205
	Min=1 Max=7	Min=2 Max=6	Min=1 Max=6	Min=1 Max=7	Min=1 Max=6	Min=1 Max=6
Asian	M=3.57 SD=1.16 N=198	M=3.00 SD=1.10 N=198	M=4.71 SD=1.31 N=199	M=3.85 SD=1.15 N=199	M=3.13 SD=1.16 N=199	M=5.18 SD=1.06 N=199
	Min=1 Max=7	Min=1 Max=6	Min=1 Max=7	Min=2 Max=7	Min=1 Max=6	Min=1 Max=7
Israeli	M=3.15 SD=.92 N=149	M=4.79 SD=.88 N=149	M=4.90 SD=.76 N=149	M=4.32 SD=1.57 N=93	M=4.77 SD=.86 N=92	M=1.23 SD=.92 N=93
	Min=1 Max=6	Min=2 Max=6	Min=1 Max=7	Min=1 Max=7	Min=2 Max=6	Min=1 Max=6

Table 7: Inter-Correlations between Bathing and Showering Variables in the American Sample (N =202-207)

Variables	1	2	3	4	5	6
1. Bath Frequency	–					
2. Bath Temperature	-.113	–				
3. Bath Duration	-.036	.185**	–			
4. Shower Frequency	-.089	-.094	.020	–		
5. Shower Temperature	-.071	.685**	.214**	-.066	–	
6. Shower Duration	.107	.168*	.452**	.060	.213**	–

*p < .05. **p <. 01. ***p <. 001

Table 8: Inter-Correlations between Bathing and Showering Variables in the Asian Sample (N =198-199)

Variables	1	2	3	4	5	6
1. Bath Frequency	–					
2. Bath Temperature	-.296**	–				
3. Bath Duration	-.388**	.167*	–			
4. Shower Frequency	.170*	-.054	.074	–		
5. Shower Temperature	- .285**	.883**	.163*	-.063*	–	
6. Shower Duration	.109	.083	.542**	.109	.095	–

*p < .05. **p <. 01. ***p <. 001

Table 9: Inter-Correlations between Bathing Variables in the Israeli Sample (N =92-93)

Variables	1	2	3
1. Bath Frequency	–		

Variables	1	2	3
2. Bath Temperature	-.20	–	
3. Bath Duration	.059	.33**	–

*p < .05. **p <. 01. ***p <. 001

Table 10: Inter-Correlations between Showering Variables in the Israeli Sample (N =149)

Variables	1	2	3
1. Shower Frequency	–		
2. Shower Temperature	.141	–	
3. Shower Duration	.059	.079	–

*p < .05. **p <. 01. ***p <. 001

Table 11: Description of Shower and Bath Items

Bath Frequency Question: ***How often do you usually take a bath?***

Value	Responses	American	Asian	Israeli
1	Less than once a week	66.2%	1.5%	57.7%
2	Once a week	4.3%	3.5%	1.3%
3	Two-three times a week	2.4%	3.5%	0%
4	Once every other day	4.8%	1.5%	0.7%
5	Once a day	16.9%	47.7%	2.0%
6	Two- three times a day	4.3%	41.2%	0.7%
7	More than two- three times a day	0%	1.0%	0%
	Missing	1.0%	0%	37.6%
	Sample size	207	199	149

Bath Temperature Question: ***What temperature do you use for the water when you take a bath?***

Value	Responses	American	Asian	Israeli
1	Very Cold	0.5%	3.5%	0%
2	Cold	3.9%	32.7%	1.3%
3	Lukewarm	2.4%	26.6%	2.0%
4	Warm	23.2%	23.6%	17.4%
5	Hot	54.6%	11.1%	29.5%
6	Very Hot	13.0%	2.5%	11.4%
	Missing	2.4%	0%	38.3%
	Sample Size	207	199	149

Bath Duration Question: ***About how much time do you spend in the bath?***

Value	Responses	American	Asian	Israeli
1	Less than 2 minutes	5.3%	0%	3.4%
2	2-5 minutes	3.9%	10%	2.0%
3	5-10 minutes	18.4%	30.2%	14.8%
4	10-15 minutes	16.9%	35.2%	15.4%
5	15-20 minutes	18.8%	16.1%	11.4%
6	20-30 minutes	21.7%	5.5%	8.7%
7	More than 30 minutes	13.5%	3.0%	6.7%
	Missing	1.9%	0%	37.6%
	Sample Size	207	199	149

Shower Frequency Question: ***How often do you usually take a shower?***

Value	Responses	American	Asian	Israeli
1	Less than once a week	5.3%	3.5%	1.3%
2	Once a week	5.8%	5.0%	0.7%
3	Two-three times a week	6.3%	10.6%	3.4%
4	Once every other day	16.9%	6.0%	5.4%
5	Once a day	60.4%	47.2%	80.5%
6	Two- Three times a day	5.3%	27.1%	7.4%
	Missing	0%	0.5%	0%
	Sample Size	207	199	149

Shower temperature Question: ***What temperature do you use for the water when you take a shower?***

Value	Responses	American	Asian	Israeli
1	Very Cold	0%	4.0%	0%
2	Cold	3.9%	36.2%	0.7%
3	Lukewarm	5.3%	26.6%	7.4%
4	Warm	26.6%	22.1%	24.8%
5	Hot	52.2%	9.5%	45.6%
6	Very Hot	12.1%	1.0%	21.5%
	Sample Size	207	199	149

Shower Duration Question: ***About how much time do you spend in the shower?***

Value	Responses	American	Asian	Israeli
1	Less than 2 minutes	1.0%	2.0%	2.0%
2	2-5 minutes	10.1%	13.6%	19.5%
3	5-10 minutes	36.7%	37.2%	48.3%
4	10-15 minutes	25.6%	25.6%	23.5%
5	15-20 minutes	14.0%	15.6%	4.7%
6	20-30 minutes	11.6%	4.5%	2.0%
7	More than 30 minutes	1.0%	1.0%	0%
	Sample Size	207	199	149

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