Feeling lonely in the lab: A literature review and partial examination of recent loneliness induction procedures for experiments

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Few laboratory experiments have been conducted in loneliness research in the past. Therefore, the purpose of this article is to review, partially investigate and discuss loneliness induction procedures in order to facilitate future laboratory experiments in loneliness research (e.g. to examine the link between loneliness and social cognition). Previous studies have found both unconscious (i.e. professional hypnosis) and conscious (i.e. recalling and calling out lonely experiences) procedures to be successful in inducing loneliness. Another conscious procedure (i.e. recalling and writing down lonely experiences) that has been described in recent literature has not yet been examined. Therefore, the present study aimed to examine this procedure using a one-group before-after design. However, this procedure, in which the participants had to recall and write down two lonely situations, was not found to significantly induce loneliness. Of 16 participants, only three reported at least some higher feelings of loneliness following this procedure.

Keywords: loneliness, induction, experiment, laboratory

Highlights:

- Loneliness induction procedures serve to design laboratory experiments.
- Hypnosis or recalling and calling out lonely experiences induces loneliness.
- Recalling and writing down lonely experiences does not induce loneliness.

In general, loneliness is a considerable problem in today’s society, particularly amongst specific groups (e.g. the widowed, minorities, empty nest older adults, university freshmen; Cheng et al., 2015; Smrček & Stiksrud,

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Lonely people experience a severe deficiency in their everyday interpersonal relationships, for instance, because they lack friendships or intimate relationships. This experience is associated with a broad set of negative consequences with regard to mental and physical health (e.g., Jaremka et al., 2014; Penninx et al., 1997) and also with regard to (maladaptive) social cognitions (e.g., hypervigilance for social threats; Cacioppo & Hawkley, 2009). Thus, it is necessary to systematically investigate both causal and protective factors related to loneliness, as well as treatment options to reduce loneliness.

Experimental study designs in social and cognitive psychology generally serve to examine the effect of causal factors (say, stressful events; Ficková & Korcová, 2000) and treatment options (say, an intervention addressing maladaptive social cognition; Masi, Chen, Hawkley, & Cacioppo, 2011) as independent variables and protective factors as moderating variables on relevant dependent variables (say, loneliness). However, in loneliness research, many studies examining causal relationships have either cross-sectional (e.g., Pels & Kleinert, 2016a) or longitudinal designs (e.g., Hawkley, Thisted, & Cacioppo, 2009; Luo & Waite, 2014), whereas only few studies have an experimental design. To the best of our knowledge, of these, only four are laboratory experiments (Cacioppo et al., 2006; Dowd et al., 2014; Hu, 2009; Rotenberg & Flood, 1999). All the other experimental designs are implemented within field experiments (mostly intervention studies) or field studies (i.e., quasi-experimental studies in the field), making it difficult to clearly identify underlying mechanisms between independent variables and loneliness (as the dependent variable) due to low internal validity. In contrast, besides heightening internal validity, laboratory experiments could augment loneliness research because they offer the opportunity to install research paradigms and, thus, have economic advantages over field experiments. With this in mind, the purpose of the present manuscript is to review, to partially investigate and to discuss former loneliness induction procedures that could be used in future laboratory experiments, in order to examine aspects of loneliness (e.g., resulting social cognitions) not only in currently lonely (as Dowd and colleagues (2014) did when analyzing exercise cognitions in lonely people), but also in non-lonely participants.

Loneliness can be defined as “(...) the unpleasant experience that occurs when a person’s network of social relations is deficient in some important way (...)” (Perlman & Peplau, 1981, p. 31). According to this meta-definition, which combines and unites the definitions stemming from different theoretical approaches, loneliness has three characteristics (Peplau & Perlman, 1982; Perlman & Peplau, 1981): It is (a) subjective, (b) resulting from a deficiency in the interpersonal relationships of an individual and (c) unpleasant because it is painful. As such, loneliness is different from aloneness, which is “the objective state of having no one around” (Galanaki, 2004, p. 436).

The construct of loneliness can be described in terms of scope and time. With regard to scope, loneliness is conceptualized as global construct in the sense of Vallerand (1997), as described elsewhere (Pels & Kleinert, 2016b). Loneliness
is related to the entirety of an individual’s interpersonal relationships and not restricted to a specific context (i.e. a life domain like family, leisure time, work) or situation (i.e. the “here and now”). With regard to time, loneliness is a rather stable construct. However, whether loneliness is stable or dynamic seems to depend highly on the momentary phase of life (e.g. middle childhood, Dongmei & Zongkui, 2006; later life, Newall, Chipperfield, & Bailis, 2014) and the specific circumstances of interpersonal relationships during this phase of life (e.g. friendship quality, Dongmei & Zongkui, 2006; widowhood, Newall et al., 2014).

Up to now, three laboratory experiments have used loneliness induction procedures to evoke loneliness in study participants (Cacioppo et al., 2006; Hu, 2009; Rotenberg & Flood, 1999). These experiments differed in the type of loneliness induction they used, using either (a) unconscious (Cacioppo et al., 2006) or (b) conscious (Hu, 2009; Rotenberg & Flood, 1999) reminiscence on past individual profound loneliness experiences. The unconscious reminiscence procedure, used in one of the three studies, consisted of a loneliness induction by a hypnosis professional, guiding the participants from relaxation to hypnosis, and, subsequently, inducing loneliness with a script asking the participants to think of a time during which they felt lonely and to re-experience those feelings (Cacioppo et al., 2006). Of the two studies that used conscious reminiscence procedures, one required participants to recall and write down one of their loneliest experiences (Hu, 2009). In the other, participants were given two items from a loneliness scale presenting two lonely situations (Rotenberg & Flood, 1999) and asked to think, for two minutes, about a time that they felt that way, before recalling out loud, for a further minute, the experience that made them most lonely.

Of the three aforementioned studies, just two of the studies measured the success of the loneliness induction. In their randomized two-group before-after design, Cacioppo et al. (2006) found that the unconscious reminiscence procedure worked for all but one of the participants. Using a randomized multi-group design, Rotenberg and Flood (1999) found that participants in their loneliness induction group indicated higher levels of loneliness compared to groups that received sad mood and neutral mood inductions, respectively, indicating the success of the loneliness induction procedure. Consequently, only the success of the conscious recalling-and-writing-down reminiscence procedure by Hu (2009) remains unclear.

With this in mind, the present study aims to analyze the potential of a conscious recalling-and-writing-down reminiscence procedure to induce loneliness. The supposed benefit of this is twofold: Firstly, a recalling-and-writing-down procedure can be assumed to evoke stronger effects than a recalling-out-loud procedure because it involves a stronger inner dialogue and greater cognitive involvement while writing. Secondly, it can be assumed that writing down something, as opposed to telling something to somebody, is more subjective and deep because it is anonymous. Thus, it is hypothesized that a conscious recalling-and-writing-down procedure that stimulates the conscious reminiscence of lonely experiences will lead to significantly higher feelings of loneliness than before.
Method

Sample

The sample size was calculated with the software G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009). Using the function of “a priori analysis”, the sample size was computed as a function of the one-tailed significance level (α = .05), the desired statistical power (1-β = .80) and a to-be-detected effect size (d = 0.70). The desired statistical power of .80 was set at the recommended minimum (Cohen, 1992). The moderate effect size of d = 0.70 was chosen (Cohen, 1988) to allow the detection of relevant differences (i.e. a very small difference that emerges as significant because numerous cases are included would not be useful for future laboratory studies using loneliness induction procedures). The calculation estimated a sample size of N = 16.

Thus, the final sample consisted of 16 adults (four males, twelve females) ranging from 45 to 78 years of age (M = 61.25, SD = 11.76). Participants were recruited via health sport groups of the local University campus. About two thirds of the participants (ten participants) were employees, whilst the remaining six participants were retired. All participants took part in the study voluntarily.

Treatment

All participants underwent a so-called “recalling-and-writing-down” loneliness induction procedure that was based on previous procedures (Hu, 2009; Rotenberg & Flood, 1999). In detail, the procedure consisted of recalling and writing down two lonely situations from the past in 2 x 2 steps: First, the participants were given an item from the German version of the UCLA Loneliness Scale (Döring & Bortz, 1993; Russell, Peplau, & Cutrona, 1980) describing a lonely situation (“I am no longer close to anyone”) and asked to think about a situation in which they felt that way. Second, they were asked to write down their loneliness experience during this situation taking into account (a) why this situation took place, (b) their feelings, (c) thoughts and (d) body sensation in this situation. Third, the participants were given a second item (“I feel left out”) representing another lonely situation and, again, asked to think about a situation in which they felt this way. Fourth, they were again asked to write down their loneliness experience during this situation. Participants were given five minutes for each situation. To ensure that participants had actually thought about lonely situations, their written experiences were collected upon completion and briefly checked in terms of their content.

Measures

Loneliness. Loneliness was measured with a single item that was integrated into the items of a German language short-version (Albani et al., 2005; Grulke et al., 2006) of the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1971). The single item for measuring loneliness, which is not uncommon in loneliness research (see Hopman-Rock and Westhoff (2002) for an example), was chosen as it replicates the measurement used in Rotenberg and Flood (1999) and is particularly practicable in laboratory studies. Whereas Rotenberg and Flood (1999) used the loneliness-item that is part of the original English version of the POMS (McNair et al., 1971), we had to integrate the loneliness item manually as it is not part of the German version. The German short-version of the POMS consists of 35 items measuring affective mood states. Following the stem “Please rate to what extent the following adjectives are true with regard to your momentary mood”, participants were asked to indicate their depression/dejection (e.g. “desperate”), vigor/activity (e.g. “energetic”), fatigue/inertia (e.g. “exhausted”), anger/hostility (e.g. “angry”) and loneliness (“lonely”) on a
scale ranging from 0 (= “not at all true”) to 6 (= “very true”). However, in the current study, the item “lonely” was the only item of interest. Thus, in the subsequent analyses all other items were left out, although participants were asked to answer each item in order to conceal the intent of the study.

**Social preferences.** In order to control for whether the social preferences of an individual have an impact on the loneliness induced by the two items describing social situations, two single items were developed. Specifically, the participants were asked to indicate what kind of tasks they prefer (“If you think about yourself, what kind of tasks do you prefer at work?”) and whether they prefer being in a group or alone (“If you think about yourself, do you prefer being alone or being in a group?”) using dichotomous response options (“individual tasks” vs. “group tasks” and “rather alone” vs. “rather in a group”).

**Procedure and study design**

Firstly, permission was obtained from the ethics commission of the local university to carry out the following procedure and study design. Thus, the research was conducted according to the Declaration of Helsinki.

Participants were recruited via health sport groups at the local campus. The experimenter visited the groups during a regular session and asked for voluntary study participation. In order to conceal the intent of the study a cover story was created. Potential participants were told that the study was about the association of memories and creativity. Actually, the memories consisted of recalling two lonely situations.

After welcoming volunteers to the laboratory, they were required to provide signed consent to participate. Subsequently, a pre-experimental one-group before-after design was realized: At the onset of the study, participants received a paper-and-pencil questionnaire measuring mood (POMS) prior to the induction (t0), which promptly started following the completion of the questionnaire. Following the 10-minute induction period, mood was measured once again (t1) and participants were asked to indicate their social preferences. Following the completion of data collection, participants were informed of the actual study aim and asked for informed consent. Finally, they underwent a prophylactical counterinduction (watching funny videos) and were dismissed.

**Data analysis**

Data analysis comprised descriptive and inferential examination of the data using SPSS 22.0 and, where necessary, manual computation. Prior to the inferential examination, loneliness data were checked for normal distribution based on the guidelines from Ghasemi and Zahediasl (2012). As both a visual inspection of the data and the results of a Shapiro-Wilk test (t0: \(W(16) = 0.54, p < .001\); t1: \(W(16) = 0.48, p < .001\)) revealed non-normal distributions, the hypothesis was proved with a Wilcoxon signed ranks test for paired samples. Following the recommendations provided by Marascuilo and McSweeney (1977), pairs having no difference (i.e. zero differences) were manually included into the test as there was a high number of zero differences: Given p zero differences, all pairs received the rank \((p + 1)/2\), with half assigned a negative and half assigned a positive sign.

Subsequently, to test the potential impact of social preferences, we first computed the difference in loneliness between t0 and t1 (i.e. change in loneliness). Second, two Mann-Whitney-U-tests were conducted to compare “preferring group tasks” versus “preferring individual tasks” and, respectively, “preferring being alone” versus “preferring being in a group” with regard to the loneliness difference values. In each test, the one-tailed level of significance was set at \(\alpha = .05\).
Results

Overall, the results show low feelings of loneliness throughout the study, with all participants scoring in the lower half of the 7-point Likert response scale. At the onset of the study (t0: $M = 0.13$, $SD = 0.50$), one participant indicated weak feelings of loneliness ($= 2$), whilst the remaining participants indicated that they did not feel lonely at all ($= 0$). After the loneliness induction procedure (t1: $M = 0.44$, $SD = 1.03$), three participants reported higher feelings of loneliness than before, with two of them indicating rather weak feelings ($= 1$) and one indicating moderately greater feelings of loneliness ($= 3$). However, overall, the Wilcoxon signed rank test, taking into account zero differences ($T_{emp} = 45.5 > T_{crit} = 35 = \alpha = .05$), was non-significant, indicating that there was no significant change in loneliness from t0 (positive rank sum: 45.5) to t1 (negative rank sum: 90.5). Thus, our hypothesis was not statistically confirmed. Moreover, as indicated by two Mann-Whitney-U-tests, there were no significant differences with regard to the change in loneliness between “preferring group tasks” and “preferring individual tasks” ($U = 28.50$, $p = .758$) and, respectively, between “preferring being alone” and “preferring being in a group” ($U = 15.50$, $p = .364$).

Discussion and conclusion

The purpose of the present manuscript was to review, to partially investigate and to discuss loneliness induction procedures in laboratory experiments as this can provide a basis to future loneliness research. As shown by previous studies, unconscious (hypnosis; Cacioppo et al., 2006) as well as conscious (recalling-and-calling-out-loud reminiscence; Rotenberg & Flood, 1999) loneliness induction procedures can induce feelings of loneliness. Thus, despite doubts and problems that have been expressed previously (Schumaker, Krejci, Small, & Sargent, 1985) it appears possible to induce feelings of loneliness.

However, in our study, a conscious recalling-and-writing-down reminiscence procedure based on Hu (2009) and Rotenberg and Flood (1999) was not found to induce loneliness. Only three out of 16 participants reported at least some higher feelings of loneliness following a procedure in which the participants had to remember and to write down two lonely situations. Consequently, our study did not detect relevant and significant differences in loneliness before and after the induction procedure, indicating that the procedure would not be suitable for future laboratory studies.

A content-related explanation for this non-significant effect might be that, against our expectations, writing down one’s feelings does not involve a stronger inner dialogue and greater cognitive involvement. Participants might utilize a strategy to maintain their self-esteem by preventing themselves from thinking about the situations too intensively. In contrast, while saying reminiscences about past lonely situations out loud (as done by Rotenberg & Flood, 1999) participants have less cognitive capacity for controlling their thoughts and feelings as they are consciously engaged in talking all the time.
Consequently, future studies should either use hypnosis (Cacioppo et al., 2006) as an unconscious loneliness induction procedure or recalling-and-calling-out-loud reminiscence (Rotenberg & Flood, 1999) as a conscious loneliness induction procedure. Both procedures were built upon subjective experiences relating to interpersonal relationships (and not upon objective circumstances as in the Cyberball-paradigm (Williams & Jarvis, 2006) or in priming procedures (Baumeister, Twenge, & Nuss, 2002) to induce social isolation that, in contrast to loneliness, concern the objective interpersonal characteristics of a situation (De Jong Gierveld, van Tilburg, & Dykstra, 2006). Moreover, Cacioppo and colleagues (2006) found their unconscious hypnosis-induced loneliness to be unpleasant (as indicated by, for example, negative mood and low self-esteem), thereby reflecting the characteristics of actual loneliness (see Peplau & Perlman, 1982; Perlman & Peplau, 1981).

Of course, it is debatable whether inducing loneliness in this way is a valid reflection of actual loneliness in terms of the scope and the time dimension of loneliness. The induced loneliness is restricted to the momentary situation and restricted in time (until an ethically necessary counterinduction in the laboratory takes place; see Cacioppo et al., 2006) in such a way that prevents the observation of global, long-term consequences. Moreover, an unconscious loneliness induction via hypnosis requires highly hypnotizable participants (Cacioppo et al., 2006).

Nonetheless, loneliness inductions serve to clarify the mechanisms related to loneliness. Thus, to sum up, both procedures appear to be feasible and efficacious options to design loneliness experiments, with both procedures more economical options than, for example, long-term isolation studies (during which participants would get separated from their spouse, family and friends). It is important to note that an experimental study of either nature would have a higher internal validity than recent field experiments.

References


RECEIVED 23.08.2016.
REVISED RECEIVED 25.03.2017.

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**PSIHOLIGIJA, 2017, Vol. 50(2), 203–211**