Title of Resource: The effects of temperature on perceptions of loneliness

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Brief Description: The study is a between-subjects independent measures design. Students collect data, conduct a t-test, and write a lab report. The exercise is designed for an introductory research methods course or an introductory statistics course.

Keywords: Two-group design, Experimental Designs, t-test for Independent Means, Embodied Cognition, Social

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Instructors:

This exercise is based on the embodied cognition literature, which suggests that the environment, perceptions of the environment, or the sensations experienced by our bodies can have an impact on our cognitive processes. For instance, Williams and Bargh (2008) found people who held a hot beverage judged others as warmer interpersonally. Zhong & Leonardelli (2008) found that recalling memories of being excluded socially resulted in participants perceiving lower room temperatures than participants who were asked to remember socially inclusive events. If heat (cold), or perceptions of heat (cold), influence perceptions of social attachment, we suggest that feelings of warmth (coldness) may influence feelings of attachment (loneliness). In this activity students are given the opportunity to conduct or participate in a between-subjects independent measures experiment examining the impact of heat on feelings of loneliness. We provide different ways in which heat can be manipulated such as touching a hot/cold drink, eating a hot/cool gum or mint, or viewing hot/cold scenery. We recommend the short loneliness scale (Hughes, Waite, Hawkley, & Cacioppo, 2004) be used as the dependent variable. The independent t-test can be used to analyze the data.

This exercise can be used to highlight aspects of:
1. basic experimental research, using a two-group between subjects design
2. problems with conducting experimental research, potential threats to validity, how constructs are operationalized, sample size
3. research ethics

This activity can be used either in class as a lab or students can be asked to collect data outside of class.

Collection of data out of class:
Certain institutions may request that students obtain ethics approval for conducting research outside of class, even if it is solely for pedagogical purposes. In that case, we recommend that the instructor seek the approval, using the material provided here.

The instructor initially provides a description of the activity to the students in class, describes briefly embodied cognition (see References below), and provides all of the material (this takes approximately 45 minutes). It is an excellent opportunity to remind students about ethics and their obligations to obtain free and informed consent from their participants, we therefore recommend distribution of this exercise only after students have learned about ethics. Following the description of the exercise, the instructor has various options as to how to administer this lab:
- If the instructor feels that the students have the necessary skills for conducting this lab, then students may be asked to proceed on their own.
- If the instructor feels that students need guidance at the various stages of writing a lab report, then the exercise can be broken down into a series of steps:
  o Students are asked to write the Introduction first. Feedback is provided before proceeding
  o Students are asked to make corrections to their Introduction then asked to write the Method section. Feedback is provided before proceeding to collect the data
  o Students collect their data, analyse it, write their Results, Discussion, Reference sections and hand-in the completed lab report
  o Students each present their findings in a 2-page PowerPoint presentation to the class. We highly recommend having students present in class as this provides a great opportunity to discuss many aspects about research. For instance, students see the numerous ways in which the independent variables can be operationalized, which can lead to different results. Furthermore, students see for
themselves that even operationalizing a variable in the same way may lead to different results (i.e., some significant and some not). If the independent variable was operationalized in the same manner by everyone, the instructor can request students’ data beforehand, run an independent samples t-test, and show them the results of this t-test with a larger sample size in comparison to the results for their individual t-tests (this has always led to significant results for us) which can then be used to discuss sample size and power. Students invariably also talk about the problems that emerged when running their study which we relate to threats to validity. For example, they may not have been able to guarantee the same environment for all participants, the experimenter may have inadvertently acted in a different way with the participants in the different conditions because they knew about the hypotheses (thus we can discuss the benefits of a double-blind condition). For a class size of 25 students, presentations take about 2 hours in total.

- For very large classes where individual projects would not be possible, students could work in groups of 2 to 4. For the class presentations, students could be asked to prepare posters of their results and volunteer honours students, fourth-year psychology students, and graduate students could be provided with a marking guide and asked to evaluate the posters (having more than one person review and evaluate each poster would be recommended).

- Asking students to provide consent and feedback sheets to their participants also introduces them to the importance of Ethics in conducting research and ensuring that participants have free and informed consent.

Collection of data in class:
If the instructor prefers to conduct the study in class, then participants cannot be informed of the hypotheses beforehand. The instructor’s ability to use the different independent variables identified in the exercise below is limited. One way to run it is to ask half the class to leave the room. The students sitting in the class can be given the consent form (i.e., CONSENT hot-cold activity loneliness), asked to look at the screen which will present a hot scene (e.g., desert landscape with no people or houses), then answer the questionnaire (i.e., Loneliness hot-cold activity questionnaire). The responses will be collected. Then, these students are asked to leave while the other students are asked to enter, be seated, and asked to read the same consent form. They are then shown the cold scene (e.g., snow landscape with no people or houses) and asked to complete the same questionnaire. Their responses are collected. Those students waiting outside the classroom are then asked to join their peers and they are all given the feedback sheet (i.e., FEEDBACK hot-cold activity loneliness). The concept of embodied cognition is then briefly discussed (see references below). Students are provided the references, the instructor writes the raw data on the blackboard which they are to copy and then they are requested to write a lab (with Introduction, Method, Results, Discussion, Reference sections). When done in class, the activity can take anywhere from 1 to 2 hours, depending upon how much the instructor wishes to talk about embodied cognition.

Data analysis:
For an introductory statistics course, students can calculate the t-statistic. An excel spreadsheet is provided and can be adapted for the size of class to verify their responses. For an introductory research methods course, students may not have taken introductory statistics, so the instructor can provide the students with the t-statistic (and can illustrate how it is calculated in class using the excel spreadsheet).

References for the lab


LAB DESCRIPTION

This assignment has received ethics approval from the Institutional Research Ethics Board. [This needs to be included only if required by your institution’s ethics board.]

You are asked to conduct a study involving an independent samples t-test design. The study involves determining whether being subjected to something cool or hot, feeling cool or hot, or eating something cool or hot influences feelings of loneliness. Note that the measure of loneliness consists of three items, measured on a scale of 1 to 3. The responses to the three items need to be totaled; the higher the total score, the greater the feelings of loneliness.

You will have to provide your professor with a brief description of the independent variable you have chosen and how you plan to manipulate it before starting the study if your independent variable and/or design differ markedly from what is suggested below. Not obtaining approval for changes made will result in a zero grade for the assignment.

Remember,
- try to ensure that all your participants are experiencing the same environment.
- ensure the confidentiality of your participants
- guarantee that your participants do not need to participate in the study and may decline at any time

The following are example independent variables. You will have to be more precise in your description.

**Cool/hot activities:**
(see: CONSENT hot-cold activity loneliness, Loneliness hot-cold activity questionnaire, FEEDBACK hot-cold activity loneliness)
- Exercising a lot versus sitting in a cold classroom
- Holding a hot drink versus holding a cold drink
- Taking hot clothes out of the dryer versus taking cold wet clothes out of the washing machine
- Walking Indoors (not exercising) versus walking outdoors
- Showing pictures of a winter scene versus a hot scene

**Cool/hot eating activities:**
(See attached files: CONSENT hot-cold food loneliness, Loneliness hot-cold food questionnaire, FEEDBACK hot-cold food loneliness)
- Chewing a hot spicy gum versus chewing a cool gum flavour
- Eating a spicy candy versus eating a cool mint
- Drinking a hot beverage indoors versus drinking a cold beverage indoors
- Eating a hot meal versus eating a cold meal
How to proceed with this activity:

1. Read the references on this topic:
   
   
   
   

2. Write the introduction for this topic

3. Choose one of the independent variables identified above and refine it (be as specific as possible in its description and try to make all other elements in your participants’ experience as similar as possible)

4. For the Hot-cold activity or indoor/outdoor activity: After identifying whether a potential participant is suitable (fits in the category of the independent variable), students will approach their peers/friends/family members and ask them if they would like to complete a questionnaire (see consent form hot-cold activity loneliness file). Participants have 5 questions to answer orally (see Loneliness hot-cold activity questionnaire), and then they will be given a feedback sheet (see Feedback hot-cold activity loneliness file).

5. For the Hot-cold food: Students will approach their peers and ask them if they wish to participate in their study (see Consent hot-cold food loneliness file). If they agree, participants will be asked to take one of the independent variables (gum, candy, or drink). Participants have 5 questions to answer orally (see Loneliness hot-cold food questionnaire), and then they will be given a feedback sheet (see Feedback hot-cold food loneliness file).

6. Obtain 20 different participants for each condition (total of 40 different people).

7. Analyze your data and verify your calculations with the t-test excel file.

8. Write your report (Introduction, Method, Results, Discussion, References) using:

   a. References already provided
   
   b. APA format

9. You will present a one-slide PowerPoint presentation summarizing your study design and results to the class. (Provide your professor with a copy of this presentation)
Your assignment will be evaluated in terms of:
- completeness (all components have been included in the assignment)
- thoroughness of the introduction
- only one quotation for the entire lab
- creativity (is what you are presenting original or did you just paraphrase the textbook or study guide or reference material)
- clarity
- accuracy in reporting of reference material and findings
- well-written report
- good presentation
- inclusion of the completed questionnaires by participants (without their names)
- inclusion of all hand calculations
RESEARCH CONSENT FORM AND LETTER OF INFORMATION

Hello, my name is __________ and I am conducting a study for a (name of course) lab. The study involves answering 5 questions, two demographic questions and three loneliness questions.

If you agree to participate, you will not be identified personally, I will keep a record only of the answers you give me to the questions. The questionnaire will be kept completely confidential and it is anonymous. Once my responses have been recorded on a file, I will be presenting the total results to my class and in a written assignment for my professor.

You can choose to quit at any time and not answer some or all of the questions.

Would you be interested in participating?
Loneliness hot-cold activity questionnaire

Participant number:__________

Circle:  Hot  or  Cold  activity

The following questions are about how you feel about different aspects of your life. For each one, tell me how often you feel that way.

<table>
<thead>
<tr>
<th>Question</th>
<th>Hardly Ever</th>
<th>Some of the Time</th>
<th>Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>*1. First, how often do you feel that you lack companionship:</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Hardly ever, some of the time, or often?</td>
<td></td>
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</tr>
<tr>
<td>*2. How often do you feel left out:</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Hardly ever, some of the time, or often?</td>
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<tr>
<td>*3. How often do you feel isolated from others? (Is it hardly ever,</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>some of the time, or often?)</td>
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</tbody>
</table>

Circle:  Male  Female

How old are you? __________

* Items from:
FEEDBACK SHEET

Does feeling hot or cold influence our feelings of loneliness? Zhong & Leonardelli (2008) and Williams and Bargh (2008) have both described the effects of feeling cold on social attachment. In the former, they found that when people are socially excluded they tend to seek out warmth and comfort. In the latter, participants who held a warm (vs. cold) beverage felt greater attachment and liking for others. Eisenberger and Williams (2003) used an fMRI to measure whether social exclusion actually hurts (physically). In the study that you participated in, we expected that the effect of feeling warm would make a person feel less socially excluded than feeling cold.

If this topic interests you, and you want to know more about it, some references have been identified below. You may also e-mail me if you wish to know the results of the study. Thank you very much for your time.

References


Hello, my name is __________ and I am conducting a study for a (name of course) lab. The study involves answering 5 questions, two demographic questions and three loneliness questions.

If you agree to participate, you will not be identified personally, I will keep a record only of the answers you give me to the questions. The questionnaire will be kept completely confidential and it is anonymous. Once my responses have been recorded on a file, I will be presenting the total results to my class and in a written assignment for my prof.

You can choose to quit at any time and not answer some or all of the questions.

Would you be interested in participating?
Loneliness hot-cold food questionnaire

Questionnaire

Participant number:__________

Circle: Hot or Cold activity

The following questions are about how you feel about different aspects of your life. For each one, tell me how often you feel that way.

<table>
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<th>Some of the Time</th>
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<tbody>
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<td>2</td>
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<tr>
<td>*2. How often do you feel left out: Hardly ever, some of the time, or often?</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>*3. How often do you feel isolated from others? (Is it hardly ever, some of the time, or often?)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Circle: Male Female

How old are you? ____________

* Items from:
FEEDBACK hot-cold food loneliness

FEEDBACK SHEET

Does eating something cool or hot influence our feelings of loneliness? Zhong & Leonardelli (2008) and Williams and Bargh (2008) have both described the effects of feeling cold on social attachment. In the former, they found that when people are socially excluded they tend to seek out warmth and comfort. In the latter, participants who held a warm (vs. cold) beverage felt greater attachment and liking for others. Eisenberger and Williams (2003) used an fMRI to measure whether social exclusion actually hurts (physically). In the study that you participated in, we expected that the effect of eating something warm would make a person feel less socially excluded than eating something cold.

If this topic interests you, and you want to know more about it, some references have been identified below. You may also e-mail me if you wish to know the results of the study. Thank you very much for your time.

References


<table>
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<th>Participant</th>
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