NIHR | National Institute for Health and Care Research

The Effect of Experimental Manipulations on Intrusive Memories of Experimental Trauma – A Systematic Review and Meta-analysis

Mohith Varma, Shengzi Zeng, Xiaoqing Hu, Laura Singh, Emily Holmes

Citation

Mohith Varma, Shengzi Zeng, Xiaoqing Hu, Laura Singh, Emily Holmes. The Effect of Experimental Manipulations on Intrusive Memories of Experimental Trauma – A Systematic Review and Meta-analysis. PROSPERO 2024 Available from https://www.crd.york.ac.uk/PROSPERO/view/CRD42021224835

REVIEW TITLE AND BASIC DETAILS

Review title

The Effect of Experimental Manipulations on Intrusive Memories of Experimental Trauma – A Systematic Review and Meta-analysis

Review objectives

Intrusive memories are one of the most-commonly occurring symptoms after a traumatic experience. Intrusions can cause significant distress and their persistent recurrence is considered a core clinical feature in the diagnosis of various stress and trauma-related disorders (e.g. posttraumatic stress disorder, PTSD). Experimental psychopathology and basic memory research may inform the development of interventions to reduce intrusive memories of experimental trauma in controlled laboratory settings. Over the past decades, a burgeoning number of studies have tested the effects of various forms of interventions in reducing the frequency of intrusive memories of trauma. However, the overall effect of all interventions combined, overall effect of specific interventions across multiple studies, the moderating factors, and which interventions are most effective remain unknown. Addressing these questions may

not only facilitate clinical treatment innovation, but will also illuminate the mechanisms underlying modification of intrusive memories. Here, we plan to conduct the first meta-analysis to address these questions.

We will first review research that examines experimental manipulations/strategies within the context of intrusive memories of experimental trauma (i.e. intrusions induced experimentally via exposure to analogue forms of traumatic content; e.g. viewing distressing film clips or images depicting traumatic scenes). We will then compare the effects between different forms of experimental manipulations to identify which manipulation is more effective and why they are more effective.

Brief review question: Quantify the difference in effects of experimental manipulations targeted at altering the frequency of intrusive memories of experimental/analogue trauma in healthy participants.

Keywords

experimental manipulations, experimental trauma, intrusions, intrusive memories, trauma film

SEARCHING AND SCREENING

Searches 1 change

Databases:

i. Web of Science

ii. PsycINFO (via ProQuest)

iii. ProQuest Dissertation

iv. PubMed

v. BioRxiv/PsyArxiv

Search Date for the aforementioned databases: 15/12/2020

Studies and datasets will also be obtained using:

i. Citations from recent review articles (both forward and backward citations)

ii. Email soliciting unpublished data from all authors published on the captioned topic for meta-analysis.

Language: English

Timespan: All years

Study design 1 change

Inclusion Criteria:

i. Experimental studies

ii. Experimental exposure to analogue forms of trauma (e.g. trauma film, emotionally negative images etc.)

iii. Study must include an experimental manipulation (including pharmacological/substance-related interventions/manipulations) targeted at altering the frequency of traumatic intrusive memories

Exclusion Criteria:

i. Case studies

ii. Correlation studies

iii. Experimental studies using naturally-occurring or real-life trauma exposure (e.g. real-life motor accident).

ELIGIBILITY CRITERIA

Condition or domain being studied

The focus of this meta-analysis is to examine and compare the effects of experimental manipulations targeted at altering the frequency of intrusive memories of experimental trauma. The primary outcome variable of this meta-analysis is the number of intrusive memories of experimental trauma as measured post the manipulation/strategy on: i) intrusion diary, and ii) lab-based intrusion tasks.

Population

Inclusion Criteria:

Samples containing healthy participants

Exclusion Criteria:

Samples from clinical populations

Intervention(s) or exposure(s)

Experimental manipulations/strategies that have been tested within the context of altering the frequency of intrusive memories of experimental trauma. Given there is a lack of top-down frameworks/models that classify the various manipulations into specific categories, we will adopt a bottom-up data-driven approach to explore whether we could develop superordinate experimental manipulation/strategy categories of individual strategies.

Comparator(s) or control(s)

In each study, after we identify the key experimental manipulation, we will identify the corresponding control condition. This control could be a no-task condition: when researchers compared playing Tetris game (experimental condition) with no game playing at all (control condition). In the absence of a no-task control condition, the control would be an alternative task condition, e.g., when experimenter compared sleep (experimental condition) with wakeful (control condition); or when experimenter compared playing Tetris game (experimental condition) with playing a different game (control condition).

OUTCOMES TO BE ANALYSED

Main outcomes

The primary outcome of this study would be the frequency of experimentally induced intrusive memories. Intrusive memories will be measured on: i) intrusion diary, and ii) lab-based intrusion tasks. One overall effect size will be computed followed by separate effect sizes for the intrusion frequency based on their measurement method (intrusion diary vs. lab-based intrusion task).

Measures of effect

Frequency and measurement of traumatic intrusions will be coded. For studies using multiple modes of measurement (e.g. intrusion diary + lab-based intrusion task), intrusion frequency will be separately coded based on the mode of measurement so that the same study could contribute to computing the effect size of trauma intrusions on multiple modes of measurement.

Additional outcomes

In addition to the intrusion frequency, we are also interested in how these experimental manipulations influence the emotional responses associated with these intrusions (e.g.

emotional distress associated with intrusions).
We will also code self-report questionnaires measuring intrusion-related symptoms (e.g. intrusion vividness, IES-R).

Measures of effect
Response ratings and mode of measurement of the additional outcomes will be coded.

DATA COLLECTION PROCESS

Data extraction (selection and coding)
In the identification and screening phase, titles, keywords, and abstracts of the studies identified through the literature search will be screened by two reviewers (MMV, SZ) to identify potentially relevant studies which meet the aforementioned inclusion criteria.

In the eligibility phase, the full texts of these publications will be assessed for eligibility by the three reviewers (MMV, SZ, LS will assess random 10% of full texts) separately. Interrater reliability will be computed. Disagreement will be reconciled by a fourth team member in order to reach a consensus.

Excel will be used for data management, duplicate identification, and screening eligibility procedures. All studies that meet the inclusion criteria will be further coded by three review authors (MMV, SZ, LS will code random 10% of studies) separately. Subset of the coded data will be cross-validated by other team members and research interns.

Study coding primarily will involve the following aspects:
a. Study/sample characteristics (e.g. within/between subject design; demographics)
b. Specific experimental manipulation/intervention
c. Nature of the experimental trauma exposure (e.g. film, images)
d. Frequency and measurement of trauma intrusions (descriptive and inferential statistics)
e. Descriptive and inferential statistics of additional outcomes
f. Information on risk of bias (i.e. based on the internal bias assessment on the quality of the study; see below for the procedure for internal bias assessment)
g. Publication status (published/unpublished)

Risk of bias (quality) assessment
Internal bias assessment: For the assessment of internal bias risk, three reviewers (MMV, SZ, LS) will independently assess the quality of the studies that meet the inclusion criteria. Reliability will be calculated. Disagreement will be reconciled by a fourth team member in order to reach a consensus. Quality assessment will be done by coding each study as to whether it provides information on the following aspects:
i. Sample characteristics (age, gender);
ii. Randomization procedures;
iii. Participants inclusion criteria;
iv. Data exclusion criteria;
v. Manipulation/intervention procedures;
vi. Outcome measure and mode of measurement;
vii. Comparable baseline trauma experiences between conditions;
viii. Inter-rater reliability for intrusion scoring (only for studies using intrusion diary);
ix. Analysis plan;
x. Peer-reviewed publication;

xi. Mood/distress check for experimental trauma induction;

External Bias/Publication Bias: Funnel plots will be used to assess the presence of publication bias. Egger's analysis will be used to quantify the funnel plot assessment findings. A trim-and-fill algorithm will also be applied to substitute studies which are missing due to impact of publication bias on literature search findings.

PLANNED DATA SYNTHESIS

Strategy for data synthesis

We will first calculate an overall effect size of experimental manipulations/strategies targeted at altering frequency of traumatic intrusions. We will next group individual manipulations into superordinate categories based on shared task/manipulation characteristics (e.g., Tetris, emotion regulation), and compare effect of different manipulations. We will also code time of administration of manipulation as pre- vs. during vs. immediate post vs. delayed post-experimental trauma exposure. Manipulations administered within the same day after the experimental trauma induction will be categorized under immediate post and manipulations administered at least after 24 hours delay after the experimental trauma exposure will be categorized under delayed post. This information will be used to study:

1) for each time period, effect of different superordinate categories of manipulations

2) for each superordinate category, effect of manipulation time.

Weighted average effect sizes (d+) will be used to compute effect sizes for each of the experimental manipulation/strategy categories across the studies on i) intrusion diary, ii) lab intrusion tasks. Separate effect sizes will be computed based on the two modes of measurement of experimentally-induced intrusions.

For testing overall effect of all experimental manipulations on altering frequency of traumatic intrusions, we will adopt three-level multilevel meta-analytical approach to model three levels of variance: (i) variances due to sampling error, (ii) within-study variances among multiple effect sizes from the same study and (iii) variances due to between-study heterogeneity.

Homogeneity Q and I^2 statistics will be used to compare and contrast the variability in individual effect sizes both within-study as well as comparisons between studies.

Same aforementioned analyses will also be performed on two additional outcomes, namely, i) emotional response associated with intrusions, ii) intrusion-related symptoms questionnaires.

We plan to conduct aforementioned analyses in R using freely-available packages such as metafor. We plan to visualize our meta-analysis results using forest plots.

Analysis of subgroups or subsets

Meta regression will be used to conduct moderation analyses using the following moderators:

a. Superordinate category of the experimental manipulations/strategies (based on shared task/manipulation characteristics)

b. Nature of experimental trauma exposure (e.g. film, images),

c. Nature of comparison condition (passive (no-task) or active (alternative task) control),

d. Study design (within vs. between-subject),

e. Mode of intrusion measurement (e.g. intrusion diary etc.),

f. Neuroimaging or psychophysiological measures included (yes vs. no),

g. Publication status (published vs. unpublished),

h. Gender,

i. Age,

j. Country or continent.

Additionally, we will subset the experimental manipulations/strategies of the included studies based on the time they were administered (pre vs. during vs. immediate post vs. delayed post experimental trauma exposure). Within each subset, we will compare the effectiveness of different experimental manipulations/strategies using multilevel meta-analysis, Homogeneity Q, I² statistics to offer a more nuanced account on which manipulation(s) are most effective in reducing trauma intrusions at specific time periods before, during or after the trauma exposure.

REVIEW AFFILIATION, FUNDING AND PEER REVIEW

Review team members

- Mr Mohith Varma, University of Hong Kong
- Ms Shengzi Zeng, University of Hong Kong
- Dr Xiaoqing Hu, University of Hong Kong
- Dr Laura Singh, Uppsala University
- Dr Emily Holmes, Uppsala University

Review affiliation

University of Hong Kong

Funding source

National Natural Science Foundation of China, No.31922089

<\/div>

General Research Fund, Hong Kong Research Grants Council, No. 17601318

<\/div>

The State Key Laboratory of Brain and Cognitive Sciences, The University of Hong Kong<\/div>
<\/div>

Named contact 1 change

Mohith Varma Shengzi Zeng. Room 6.80, 6/F, Social and Cognitive Neuroscience Laboratory, Department of Psychology, University of Hong Kong, Pokfulam Road, Hong Kong

mohith96@connect.hku.hk; zengsz96@connect.hku.hk

TIMELINE OF THE REVIEW

Review timeline

Start date: 15 December 2020. End date: 31 August 2021

Date of first submission to PROSPERO

07 December 2020

Date of registration in PROSPERO

07 January 2021

CURRENT REVIEW STAGE

Publication of review results

The intention is to publish the review once completed.The review will be published in English

Stage of the review at this submission

Review stage	Started	Completed
Pilot work	✓	✓
Formal searching/study identification	✓	✓
Screening search results against inclusion criteria		
Data extraction or receipt of IP		
Risk of bias/quality assessment		
Data synthesis		

Review status

The review is currently planned or ongoing.

ADDITIONAL INFORMATION

PROSPERO version history

- Version 1.2 published on 09 Nov 2021
- Version 1.1 published on 07 Jan 2021
- Version 1.0 published on 07 Jan 2021

Review conflict of interest

None known

Country

China, Sweden

Medical Subject Headings

Cognition; Humans; Memory

Revision note 1 change

1. Studies including pharmacological/substance-related manipulations are also now part of the inclusion criteria.2. No listserv will be used to obtain studies and datasets.

Disclaimer

The content of this record displays the information provided by the review team. PROSPERO does not peer review registration records or endorse their content.

PROSPERO accepts and posts the information provided in good faith; responsibility for record content rests with the review team. The owner of this record has affirmed that the information provided is truthful and that they understand that deliberate provision of inaccurate information may be construed as scientific misconduct.

Any enquiries about the record should be referred to the named review contact