

# Psychological mechanisms of the effects of psychedelics - from engaging stories to convincing evidence

Samuli Kangaslampi, Ph.D.

Faculty of Social Sciences / Psychology, Tampere University

## Background

- Classic psychedelics appear to have beneficial, therapeutic effects for some people in some contexts
- For better understanding and maximizing therapeutic effects, highly useful to find out how, through which psychological mechanisms, psychedelics or psychedelic-assisted treatment may lead to them
- Various possible mechanisms have been suggested and increasingly being studied
- Mediation analyses are a popular statistical tool to gather evidence about mechanisms
- However, such analyses can sometimes tempt researchers to overreach in providing engaging stories about mechanisms and causal processes without appreciating the limitations of their approach and equally likely alternative interpretations of their data
- The study of psychological mechanisms of treatments, interventions, and exposures has a long history in, e.g., psychotherapy and social psychological research  
→ Many lessons learned can be adapted from this research into research on psychedelics

## Level of Evidence for Some Suggested Mechanisms

### Acute Mechanisms

Mystical experiences – *average evidence*

- Many studies confirm that psychedelics can cause mystical-type experiences
- Mystical experience predicts and associates with longer-term therapeutic outcomes after psychedelic use in several controlled and naturalistic studies

Psychological insights – *emerging piecewise evidence*

- Some studies suggest classic psychedelics produce psychological or personal insights
- Acute insights associate with therapeutic outcomes in several laboratory and survey studies

Generally lacking: Convincing, direct analyses of mediating role in effects, pre-registered hypothesis testing

### Post-Acute Mechanisms

Psychological flexibility – *preliminary piecewise evidence*

- A few studies have found increases in psychological flexibility after psychedelic use, linked to mystical experiences and insight
- Increase in psychological flexibility associated with improved mental well-being in a few survey studies

Personality change – *weak piecewise evidence*

- Some studies suggest psychedelic ingestion/treatment may lead to enduring changes in personality traits, but contradicting results have also been reported
- Similar changes associated with better mental health in other areas of research

## Discussion

- Evidence for psychological mechanisms of the effects of psychedelics is limited, but increasing
  - Acutely, mystical experiences and insights appear to predict therapeutic changes
  - Little definite evidence for post-acute mechanisms
  - Many possibilities suggested by single studies
- Approaches some recent publications on mechanisms have taken have problems and limitations
- Claims about mechanisms based on correlational findings, especially from cross-sectional data, may be precipitous
- Mediation analyses, applied judiciously and thoughtfully, are a powerful tool to show that
  - a) changes in some post-acute mechanism are indeed caused by a psychedelic or its effects and in turn cause changes in a desired outcome, or
  - b) an acute mechanism, such as an event or experience, is indeed caused by psychedelic ingestion/treatment and in turn causes changes in a desired outcome
- However, when the necessary conditions for appropriate mediation analyses are not met, it is best to present research as exploring associations, not as causal
- Besides mediation analyses within a single study, evidence for the role of particular mechanisms in therapeutic effects may be gathered piecewise, with a wider program of research
- Researchers in the emerging field of psychedelics can learn much from the psychotherapy and social psychological literature, where similar issues about mechanisms have long been examined and debated

## Problems apparent in literature

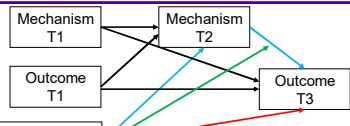
- Confusing potential mechanisms and contextual factors that change effects, i.e., mediators and moderators
- Lack of attention to temporal order of changes – did (change in) mechanism lead to change in outcome or vice versa
  - Without this information, causal claims are nearly impossible
- Alternative interpretations equally concordant with data not considered
  - E.g., change in suggested mechanism could be side effect or result of change in outcome
- Reliance on cross-sectional data, biasing estimates of longitudinal effects
- Possibility of cause X mechanism interaction on outcome typically ignored
- Most analyses exploratory, not pre-registered
- Frequent mixing of causal language with associational / correlational study designs

## Solutions and suggestions

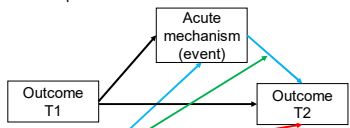
- Clearer separation into
  - Moderators of effects
  - Acute mechanisms
  - Post-acute mechanisms
- Considering and demonstrating temporal order in study designs and analyses
  - At least three points of measurement are typically required
- Analyzing the possibility of cause X mechanism interaction, using modern methods of mediation analysis
- Pre-registering analyses of mechanisms and specific hypotheses when planning studies
  - Demonstrating that particular processes do **not** mediate effects also very valuable
- Making a clear choice of either analyzing causal processes or exploring associations and sticking to this choice
  - In former case, careful consideration of what causal effects are being examined and what is being assumed is needed
  - Causal mediation analysis framework is useful
  - Both approaches are appropriate and valuable!

## More information

- Published commentary:  
<https://doi.org/10.1007/s00213-020-05703-9>
- Extended discussion and references:  
<https://kangaslampi.net/insight-2021>
- Contact author:  
samuli@kangaslampi.net



a) Simple cross-lagged panel model to provide causal evidence for the role of a post-acute mechanism



b) Simple mediational model to provide causal evidence for the role of an acute event-type mechanism, allowing for possible exposure X mechanism interaction