Data Visualization in Therapy

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PSYC 6135 Data Visualization
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Meet the Team

Agenda

- Mental health and cognition
- Node-Link Diagrams
  - Psycheducation
  - Psychotherapy Process
- Visualizing therapeutic outcomes
- Advantages & Disadvantages of data visualization in therapy


ONE-SIZE FITS ALL
STORE
SALE


ONE-SIZE F
STORE
SALE

Cognition & Mental Health

Scizophrenia	→	Deficits in working memory, attention and information processing, verbal memory
Mood DIsorders	→	Impaired attention and concentration, verbal memory, executive functioning
Borderline Personality Disorder	→	Impaired attention, verbal memory, executive functioning

Trivedi, 2006

Cognition & Mental Health

Deficits in working memory, attention and information processing, verbal memory

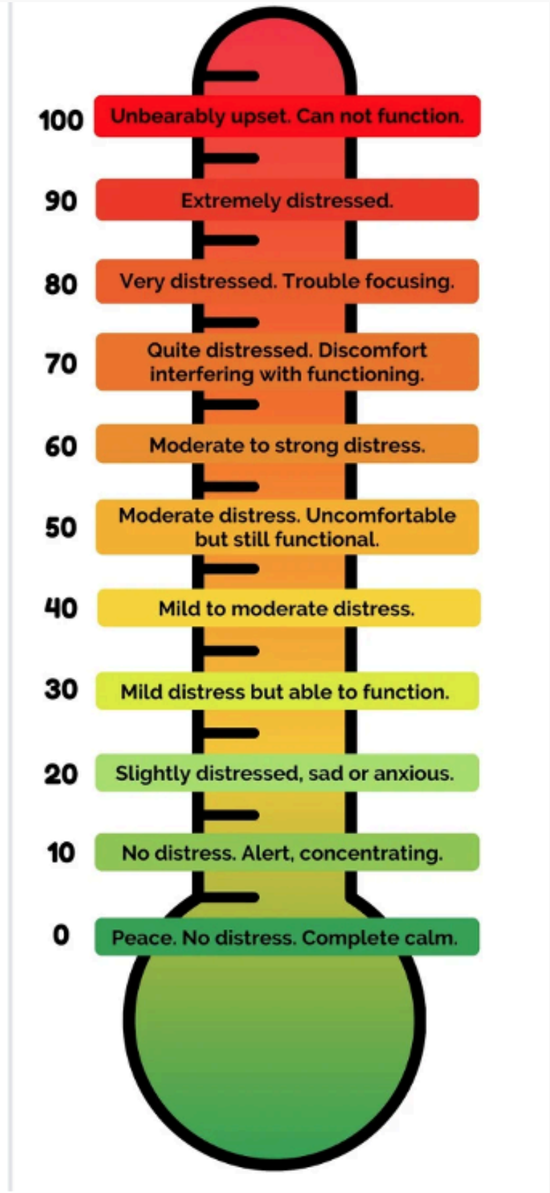
Impaired attention and concentration, verbal memory, executive functioning

Impaired attention, verbal memory, executive functioning

VISUAL AIDS

Hamptom, 1997

Emotions & Cognition



Distress Tolerance

Emotion Regulation

Mindfulness

Node-Link Diagrams

Visual encoding strategy for network data, where nodes are drawn as points and links between nodes are drawn as lines between them

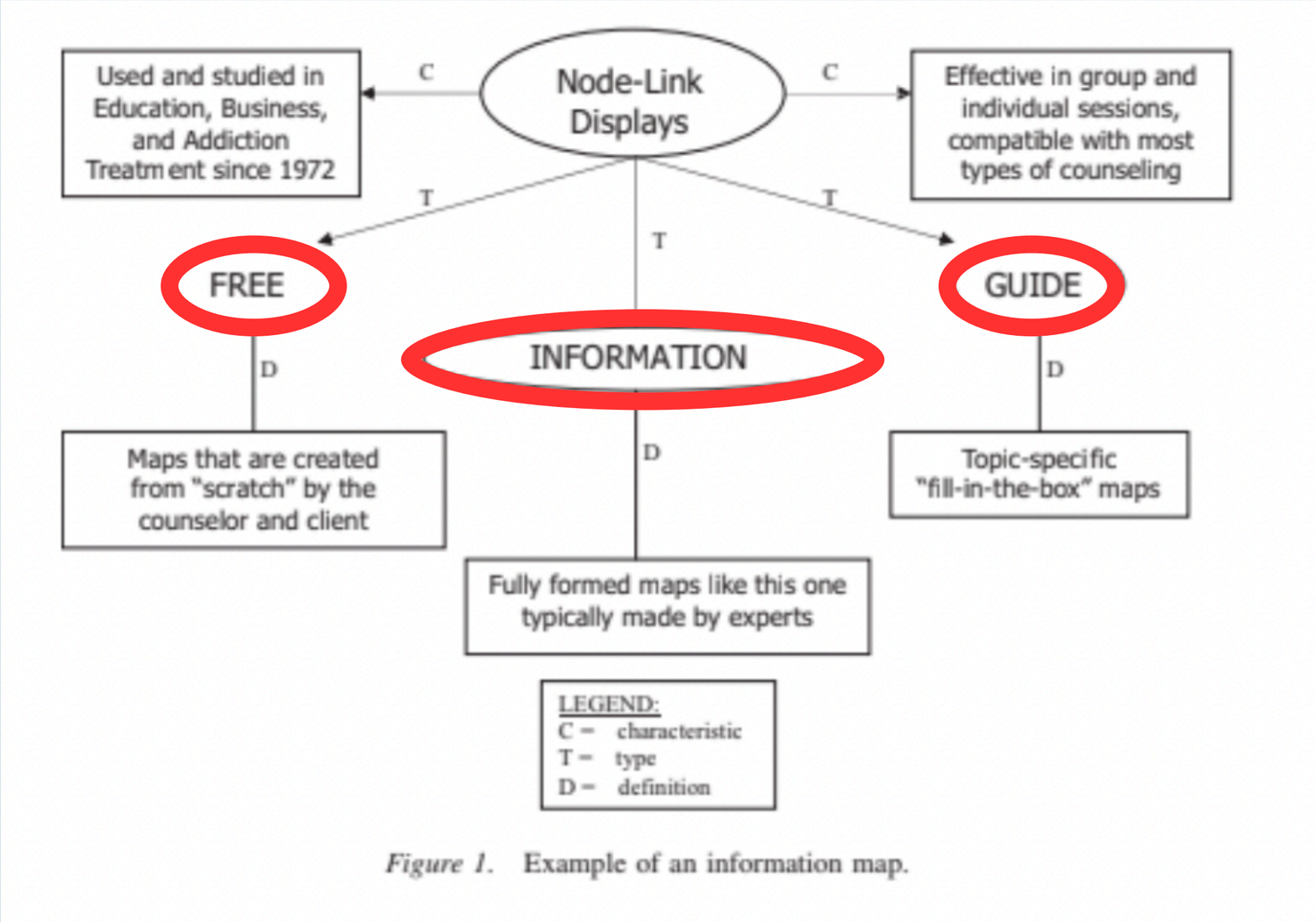


Figure 1. Example of an information map.

Dansereau & Simpson, 2009

Information Maps

- Used to communicate information about specialized topics
- Node shape and colour are used to clarify or highlight information
- Different lines are used to specify the nature of the relationship

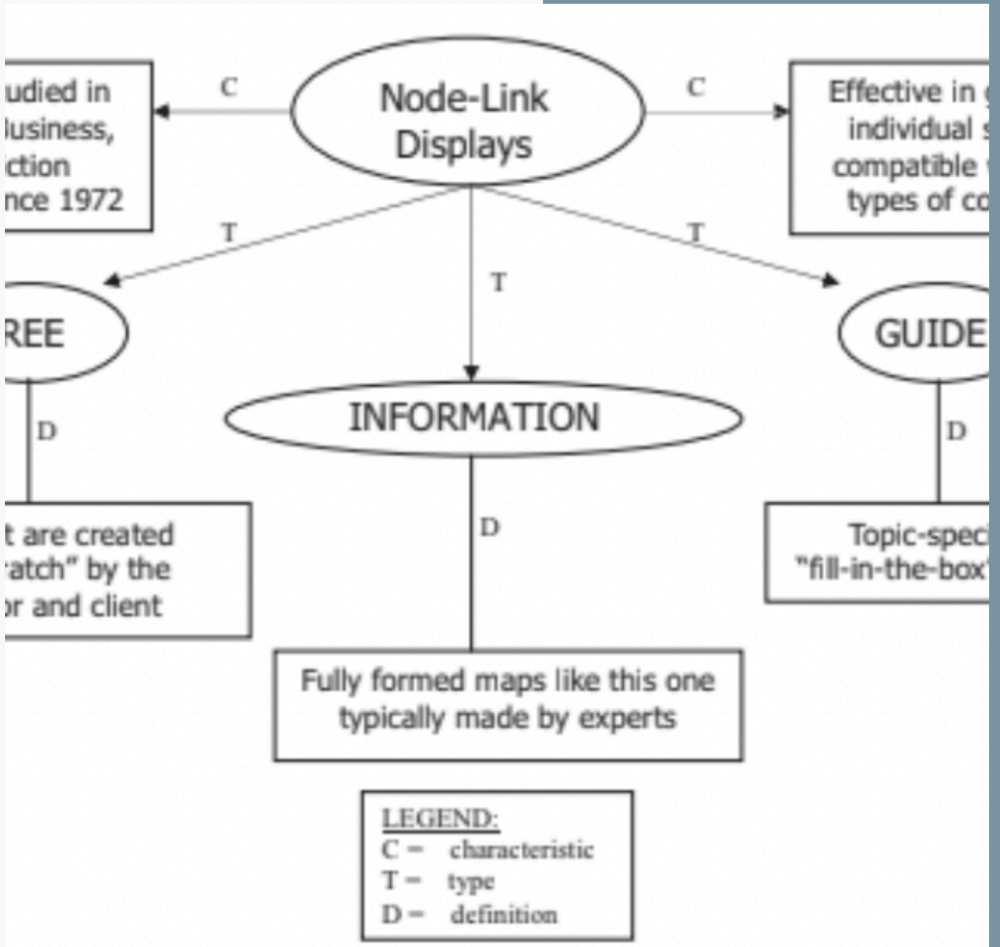
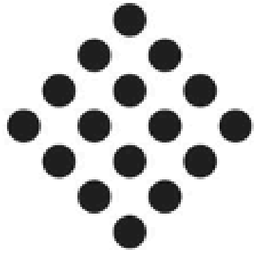


Figure 1. Example of an information map.

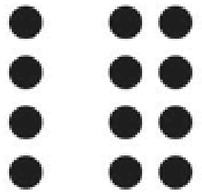
Dansereau & Simpson, 2009

Gestalt Principles



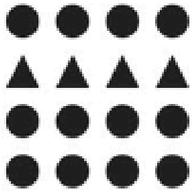
Good Figure

Objects groupped together tend to be perceived as a single figure. Tendency to simplify.



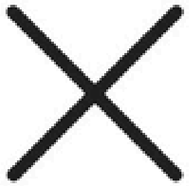
Proximity

Objects tend to be grouped together if they are close to each other.



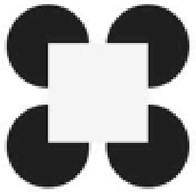
Similarity

Objects tend to be grouped together if they are similar.



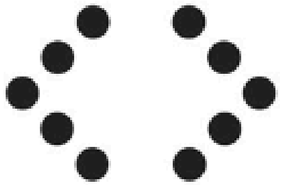
Continuation

When there is an intersection between two or more objects, people tend to perceive each object as a single uninterrupted object.



Closure

Visual connection or continuity between sets of elements which do not actually touch each other in a composition.



Symmetry

The object tend to be perceived as symmetrical shapes that form around their center.

Symbol	Name	Function
	Start/end	An oval represents a start or end point
	Arrows	A line is a connector that shows relationships between the representative shapes
	Input/Output	A parallelogram represents input or output
	Process	A rectangle represents a process
	Decision	A diamond indicates a decision

Example of Information Maps

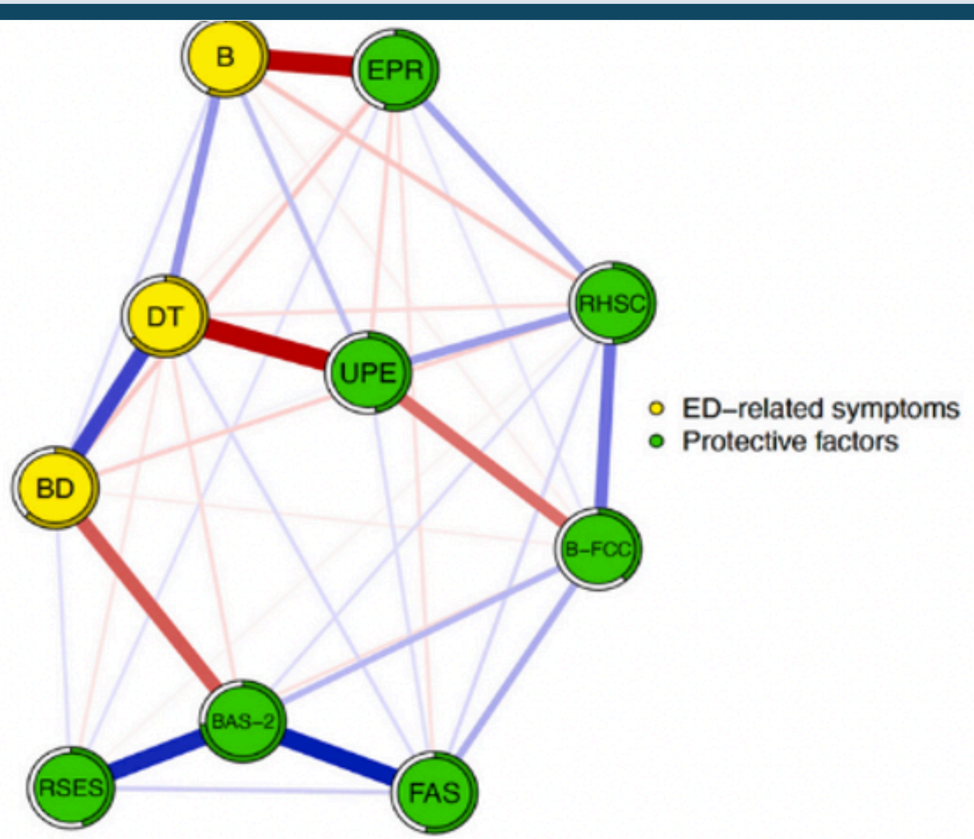


Fig. 1. Network model including ED symptom dimensions and protective factors.

Note: ED = Eating Disorder; DT = Drive for Thinness; B = Bulimia; BD = Body Dissatisfaction; BAS-2 = Body Appreciation Scale-2; FAS = Functionality Appreciation Scale; UPE = Unconditional Permission to Eat; EPR = Eating for Physical Rather than Emotional Reasons; RHSC = Reliance on Hunger and Satiety Cues; B-FCC = Body-Food Choice Congruence; RSES = Rosenberg Self-Esteem Scale.

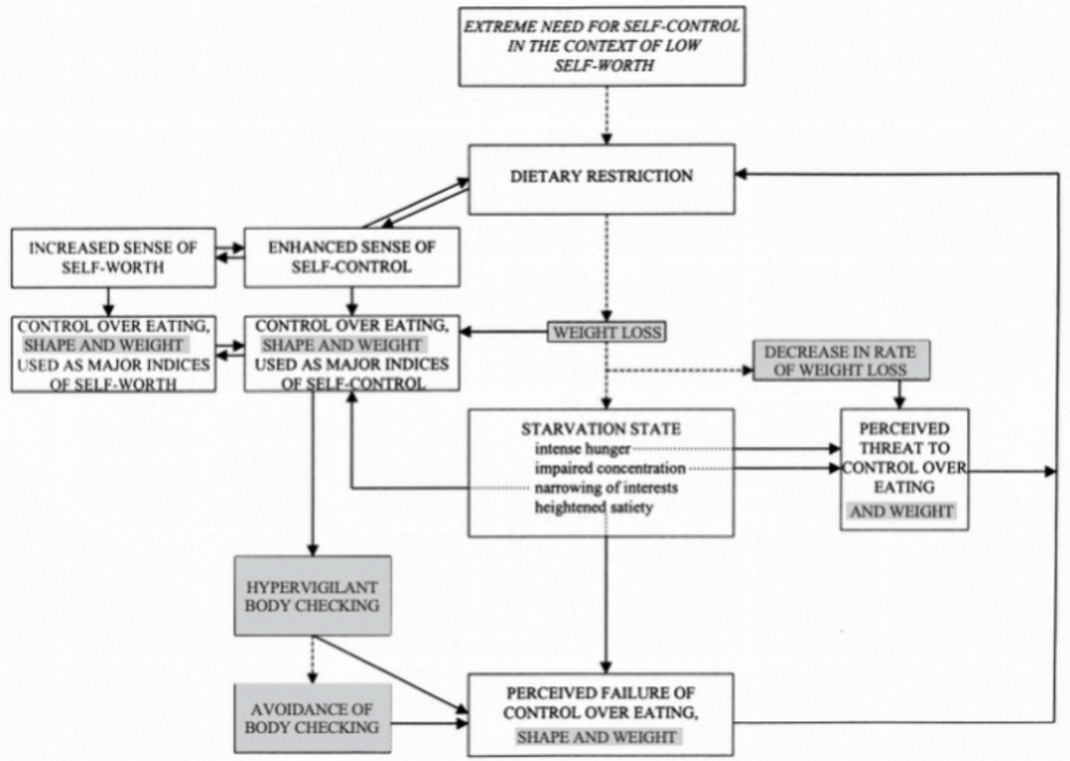
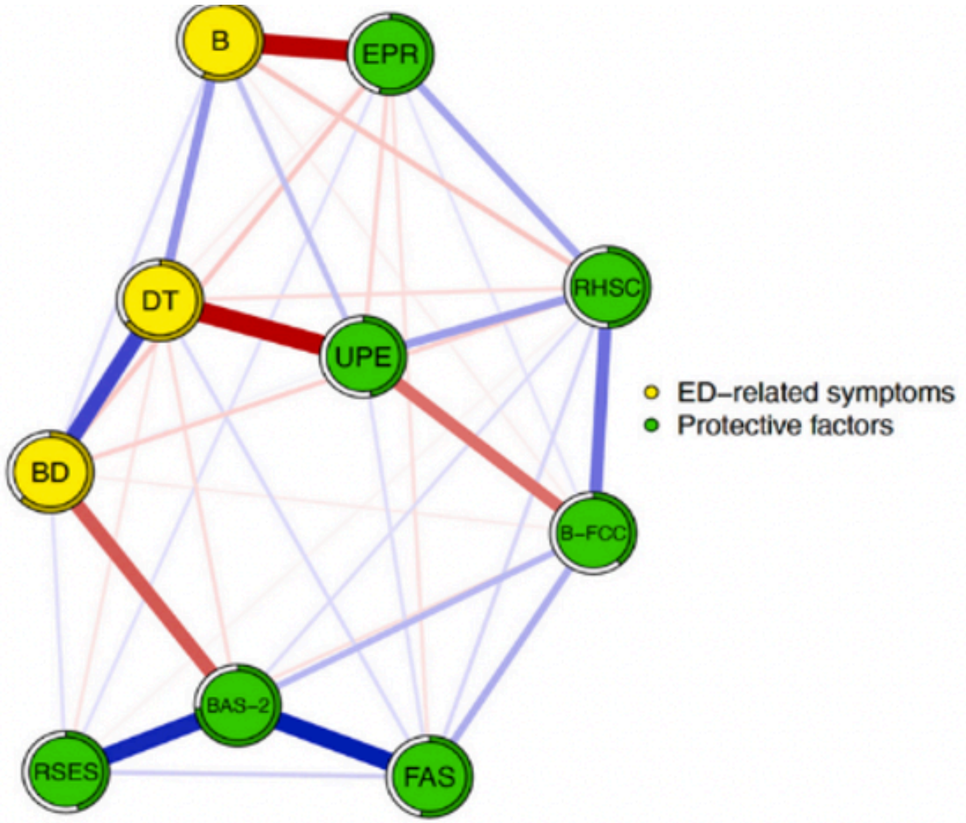


Fig. 2. A schematic representation of the processes involved in the maintenance of typical Western cases of anorexia nervosa. Shaded areas represent those processes that are peculiar to Western cases. Processes that take place over an extended time are represented by dashed lines.

Example of Information Maps



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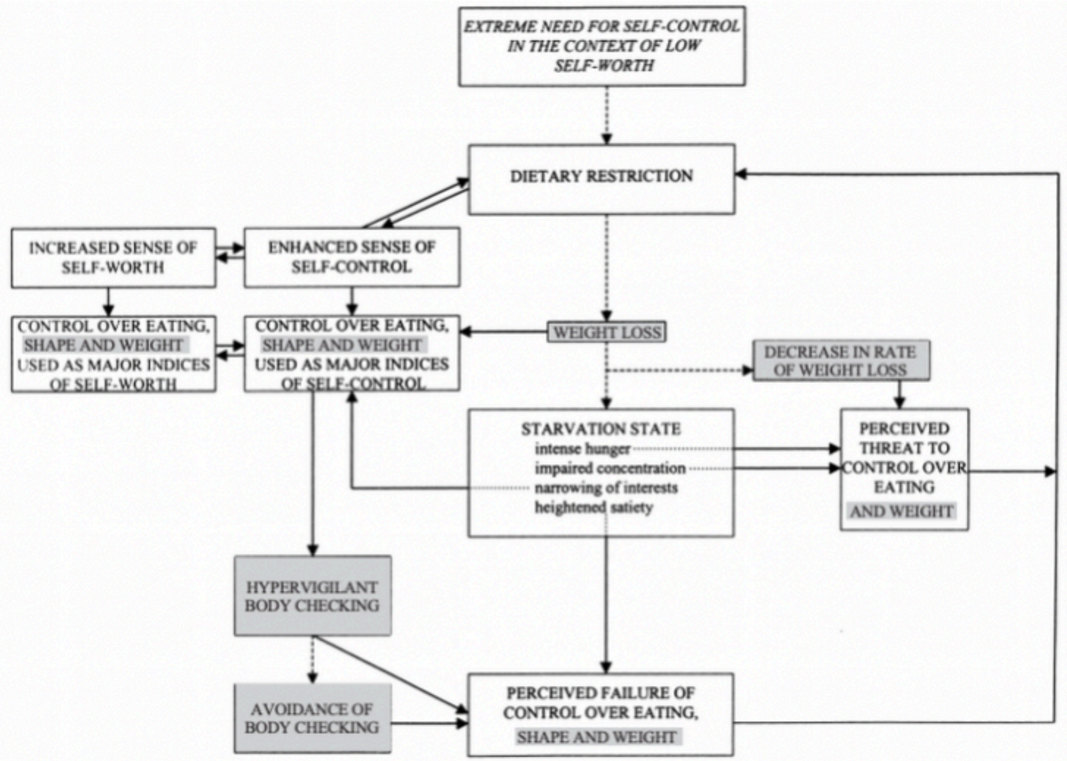


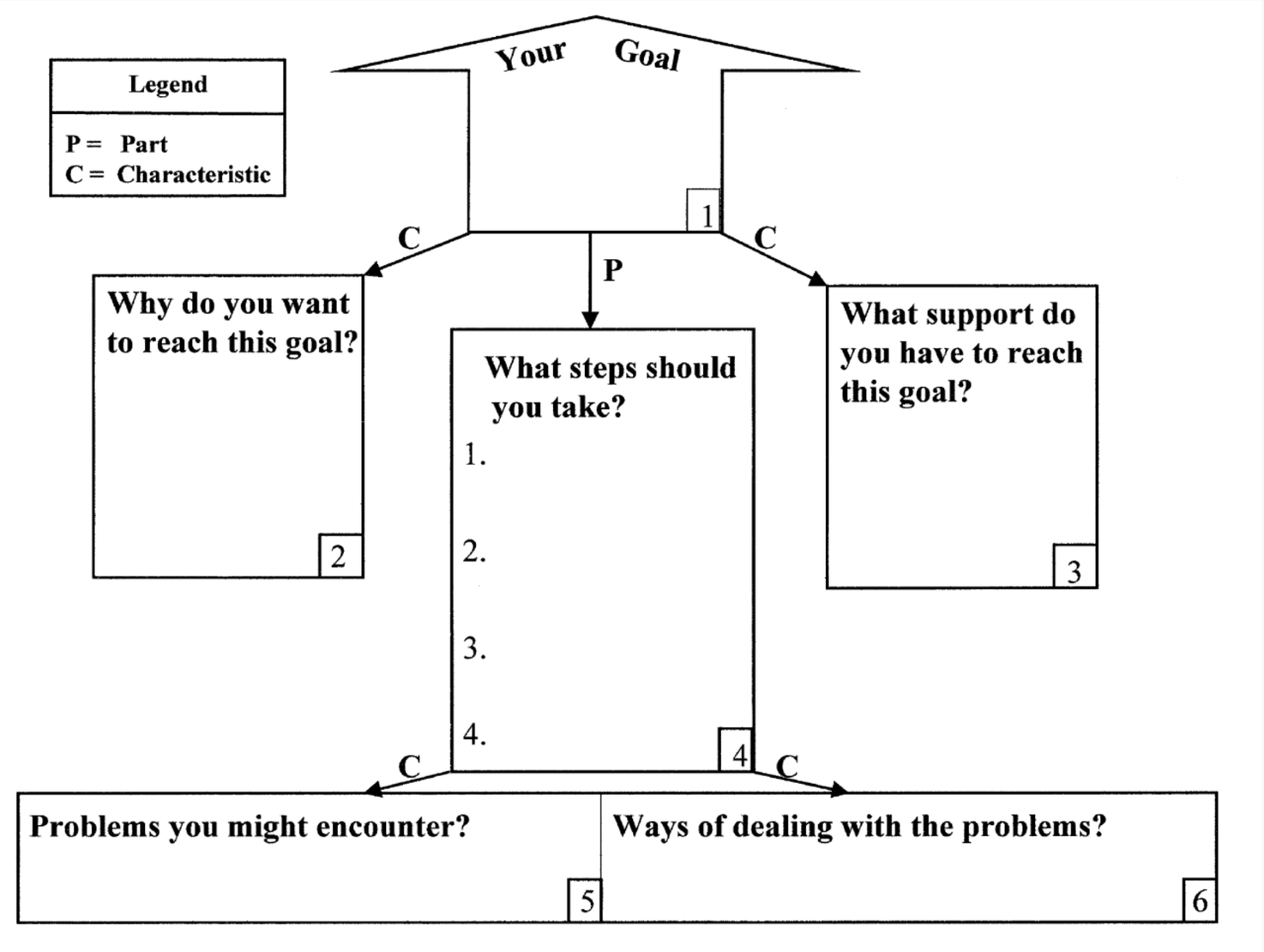
Fig. 2. A schematic representation of the processes involved in the maintenance of typical Western cases of anorexia nervosa. Shaded areas represent those processes that are peculiar to Western cases. Processes that take place over an extended time are represented by dashed lines.

Guide Maps

Fill in the blank tools

Used to facilitate self-exploration, planning, decision making, problem solving, and assessment

- Structure of the map and questions within nodes are guided by the therapist
- Relevant informaiton is inserted into the nodes by the client

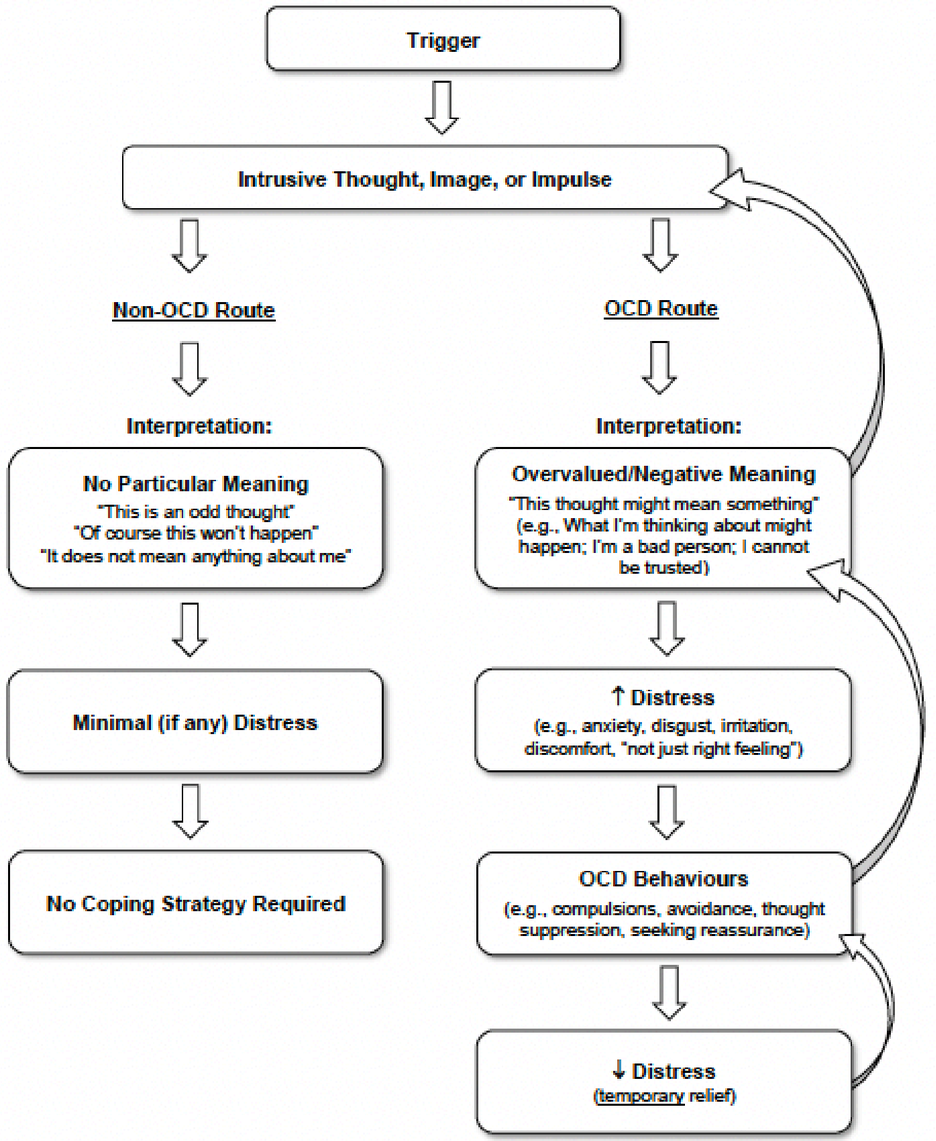


Graphics for Psychoeducation

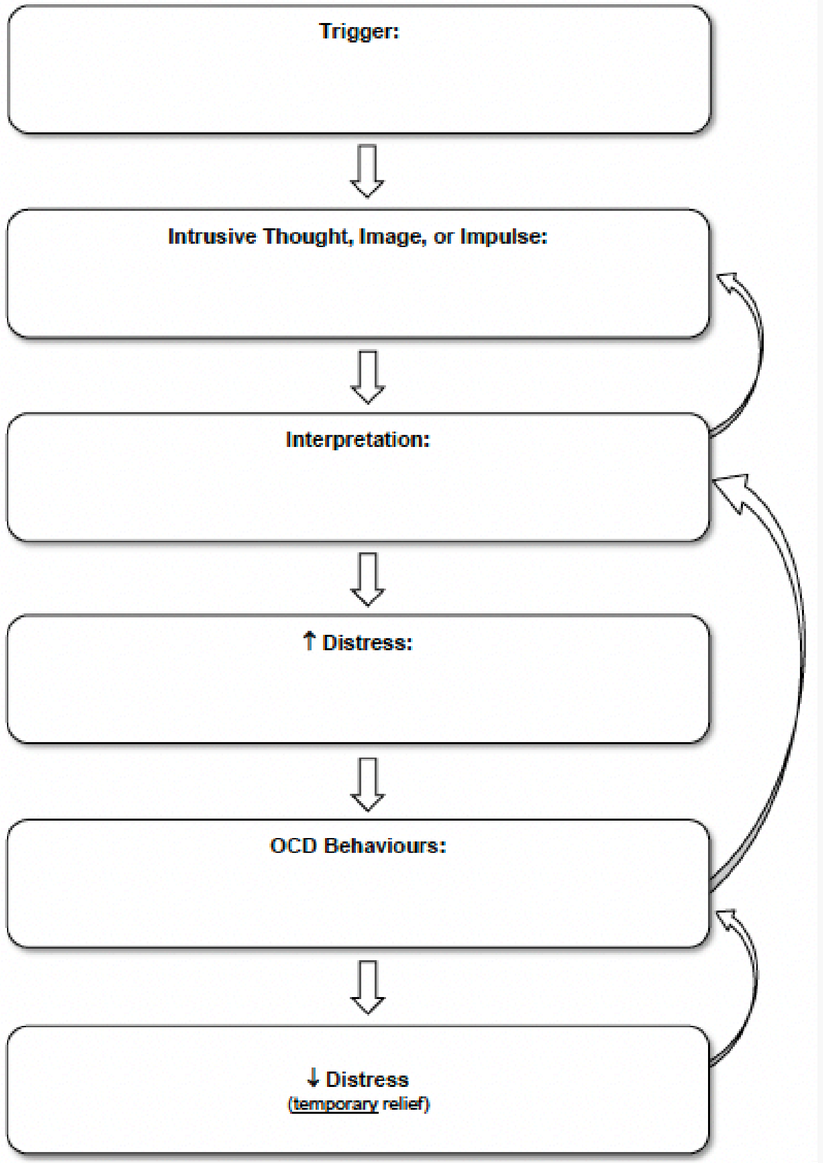
- Psychoeducation is the process of teaching clients and loved ones about the nature of mental illness
- Research suggests it can reduce relapse and promote treatment adherence

Sarkhel et al., 2020; Zhao et al., 2015

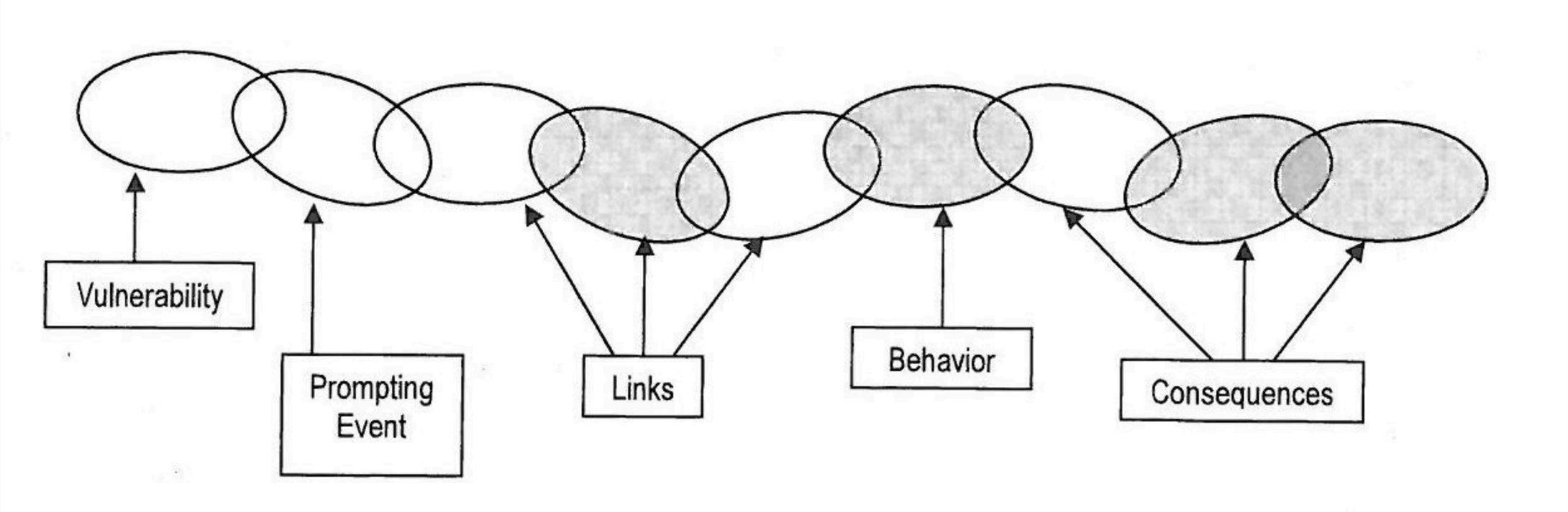
A Model for Understanding OCD



Your Model of OCD

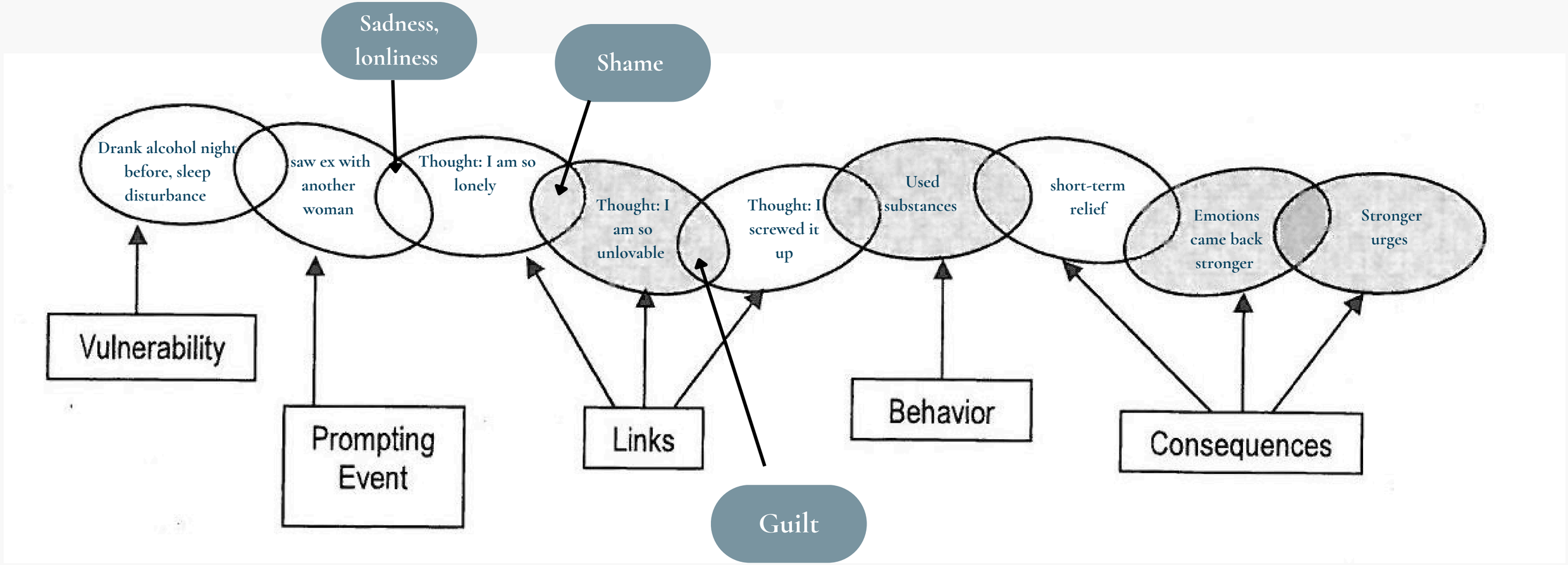


Guide Maps for Psychotherapy Process



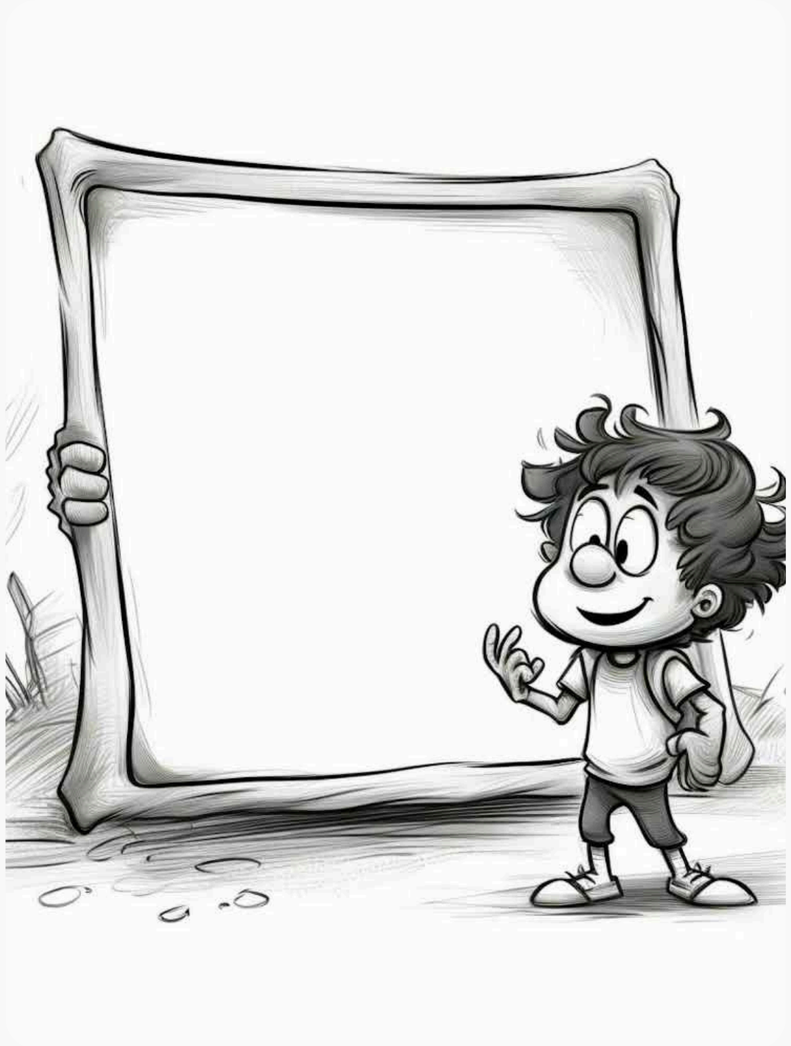
Linehan et al., 1993; Lynch et al., 2006

Guide Maps for Psychotherapy Process



Linehan et al., 1993; Lynch et al., 2006

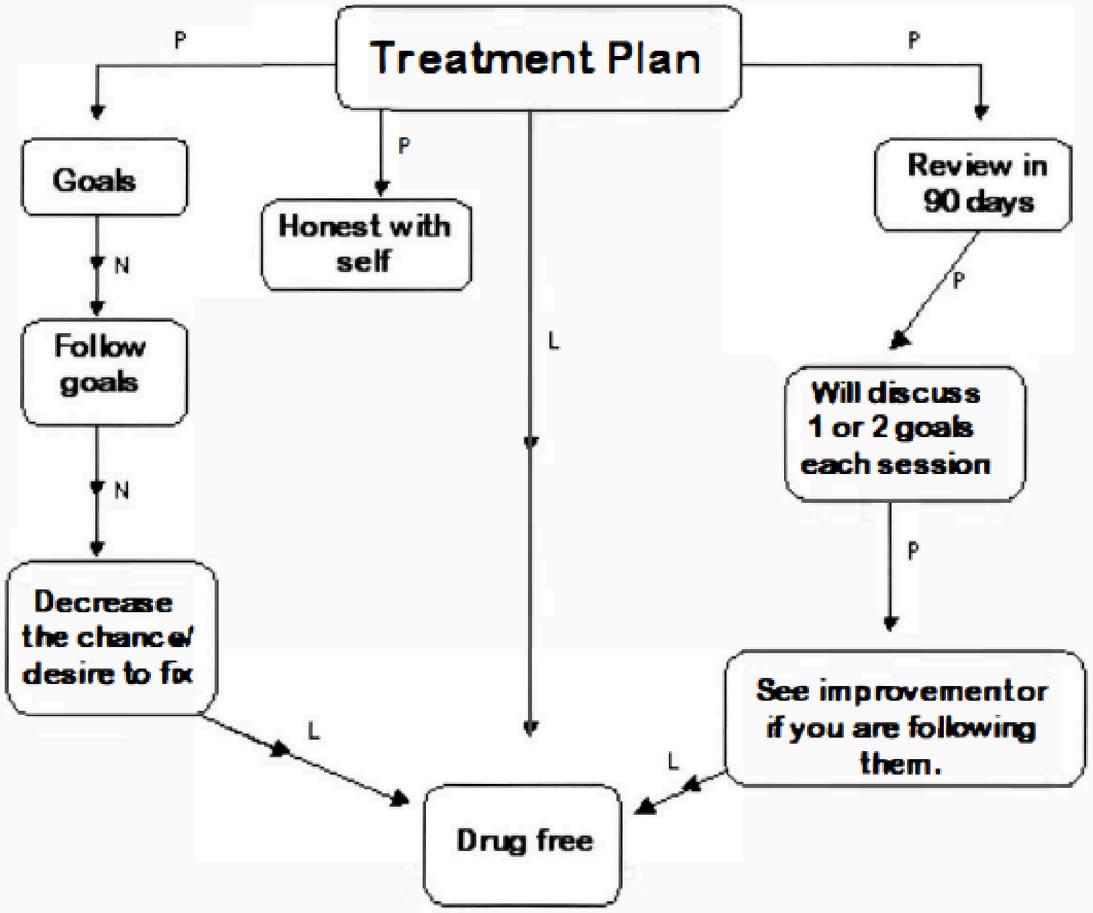
Freestyle Maps



- Produced from sctach as a note-taking technique or a vehicle for expressing and organizing personal knowledge
- Various computer programs available to help fascilitate this:
    - Smartdraw.com
    - Thinkmap.com
    - Cmap.ihmc.us
    -

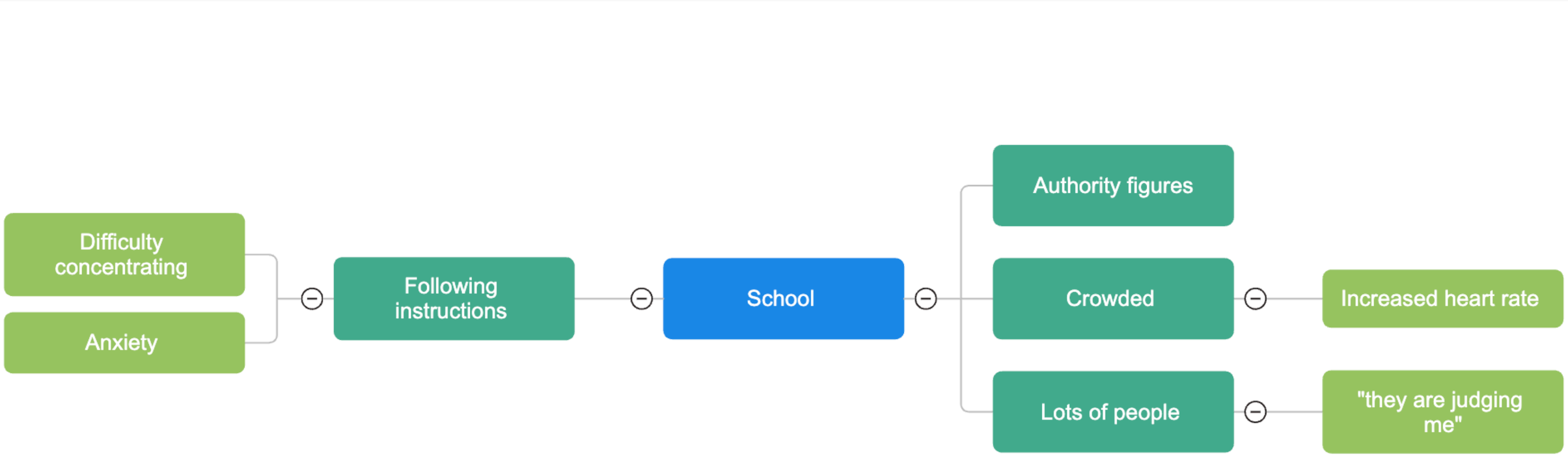
Dansereau & Simpson, 2009

FIGURE 1
An Example of a Free Map



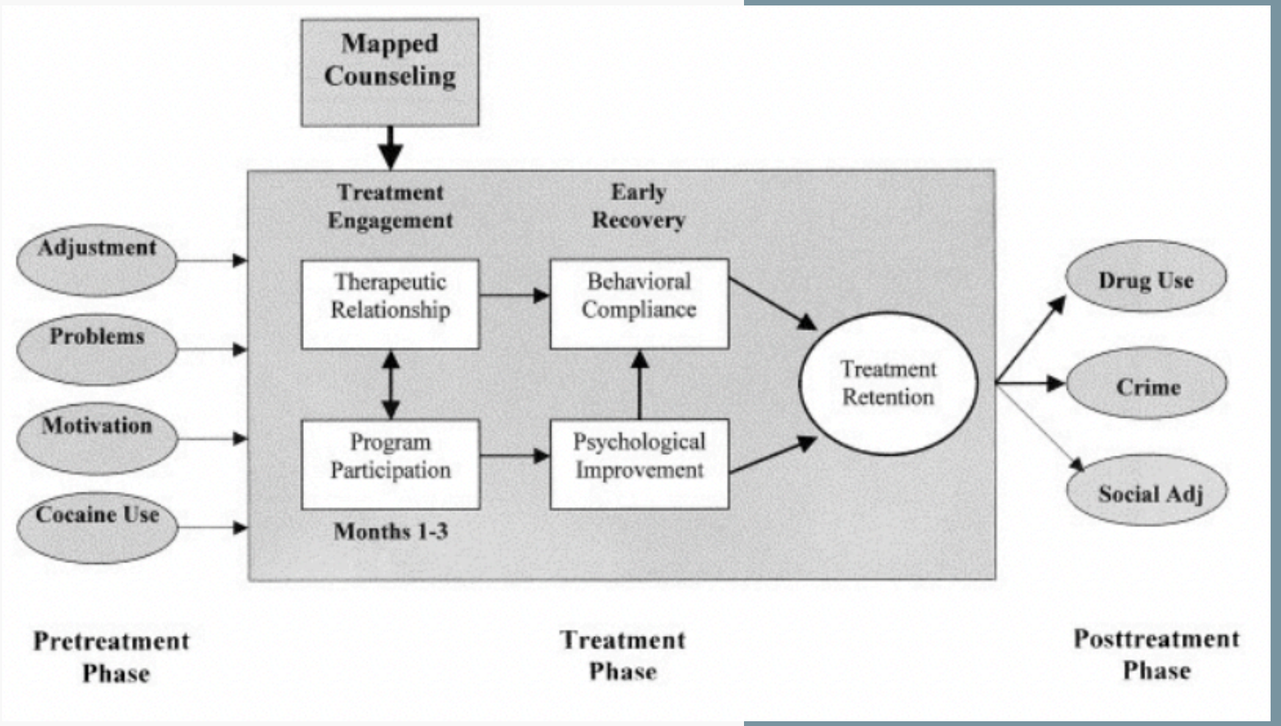
Note: original was handwritten by counselor

Czuchry et al., 2009


Difficulty concentrating
Anxiety
Following instructions
School
Authority figures
Crowded
Increased heart rate
Lots of people
"they are judging me"

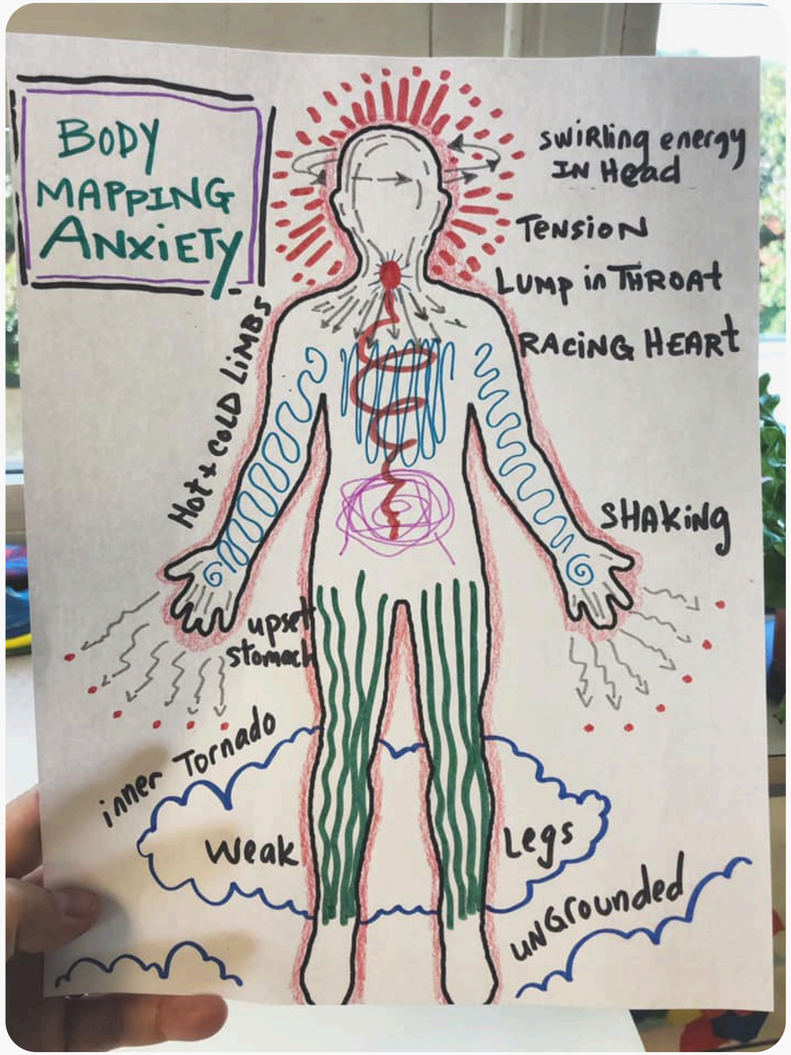
Evidence for Node-Mapping

- Guide maps and free maps in particular have been examined frequently in addiction treatment
- Therapy + node mapping is associated with decreased drug use both immediately after treatment and at 6-month follow up compared to therapy alone



Czuchry et al., 2009

Body Mapping



- Therapeutic tool that brings together bodily experience and visual expression
- Clients map out psychosomatic symptoms, body images, aches and pains onto a body map
- Utilize various colours, pictures, symbols and words
- Benefits include exploration of difficult-to-access emotions and engagement of children and young people

Murray et al., 2023

Graphics for Treatment Outcomes

1. Visualizing changes in the therapeutic alliance

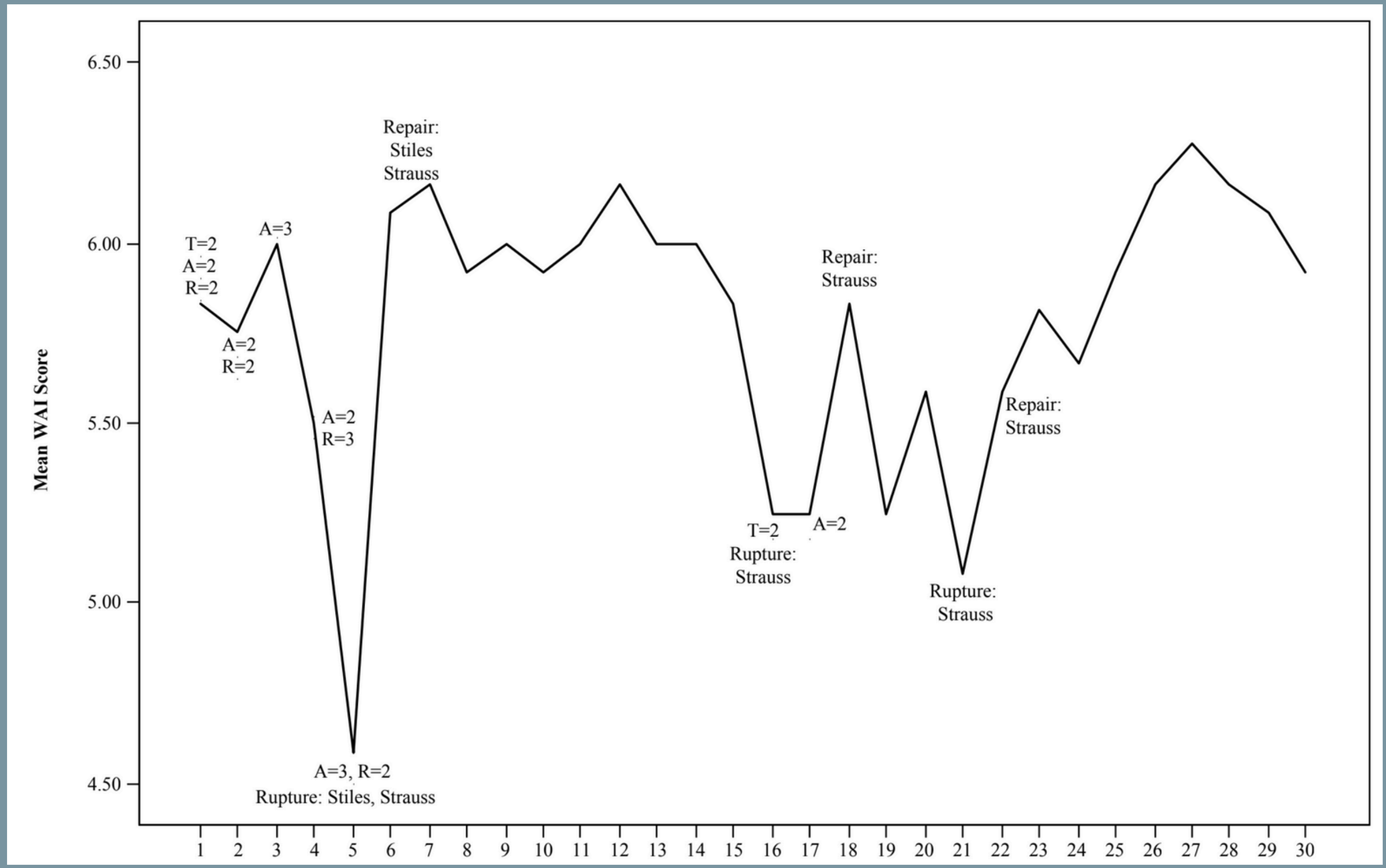
2. Visualizing symptom severity over time

Sarkhel et al., 2020; Zhao et al., 2015

Therapeutic Alliance Outcomes

Line Graphs

- **Working Alliance Inventory (WAI) -** measures quality of the working alliance between client and therapist
- Allows for appropriate metacommunication and improving therapeutic relationship



Eubanks-Carter et al., 2012

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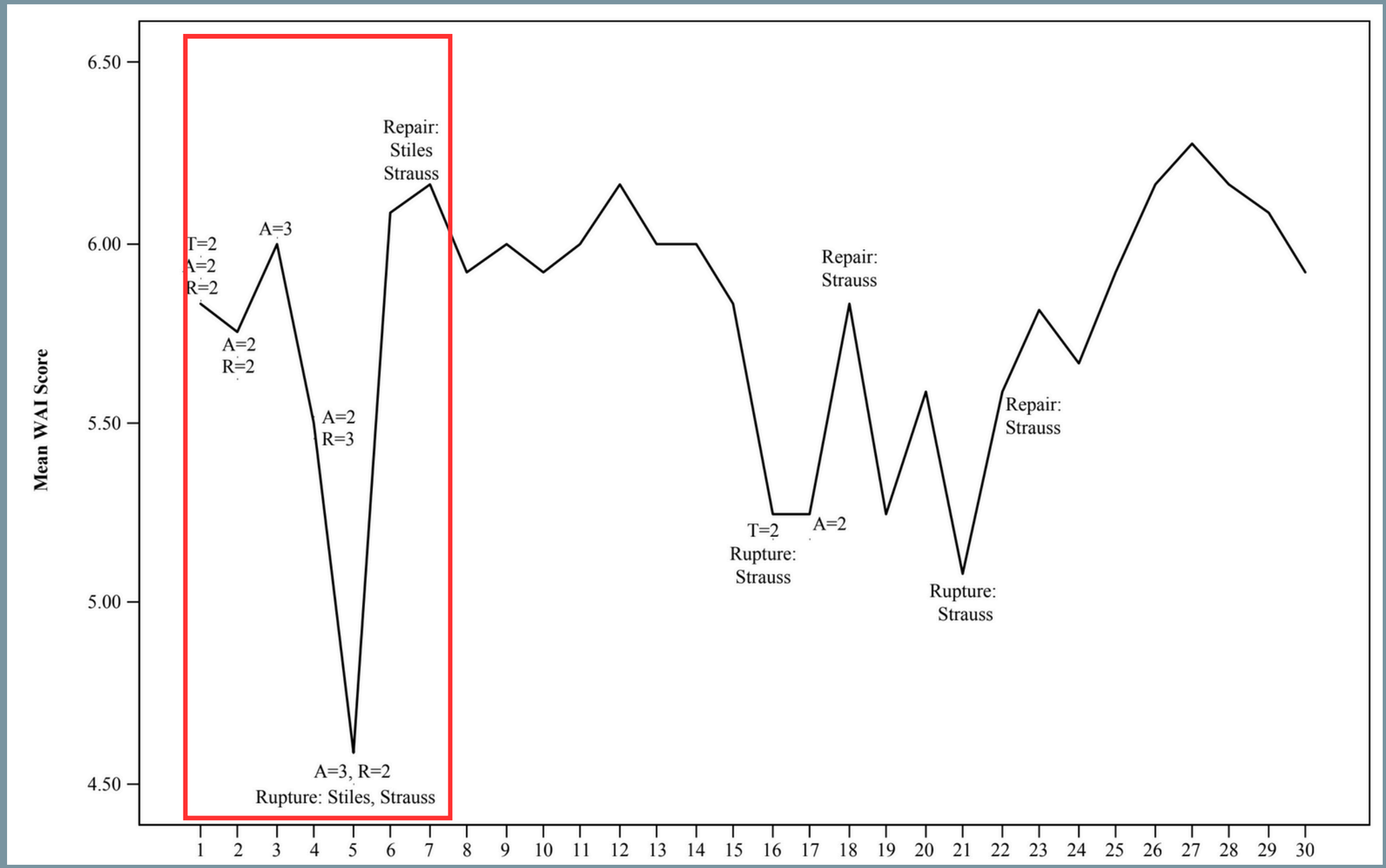
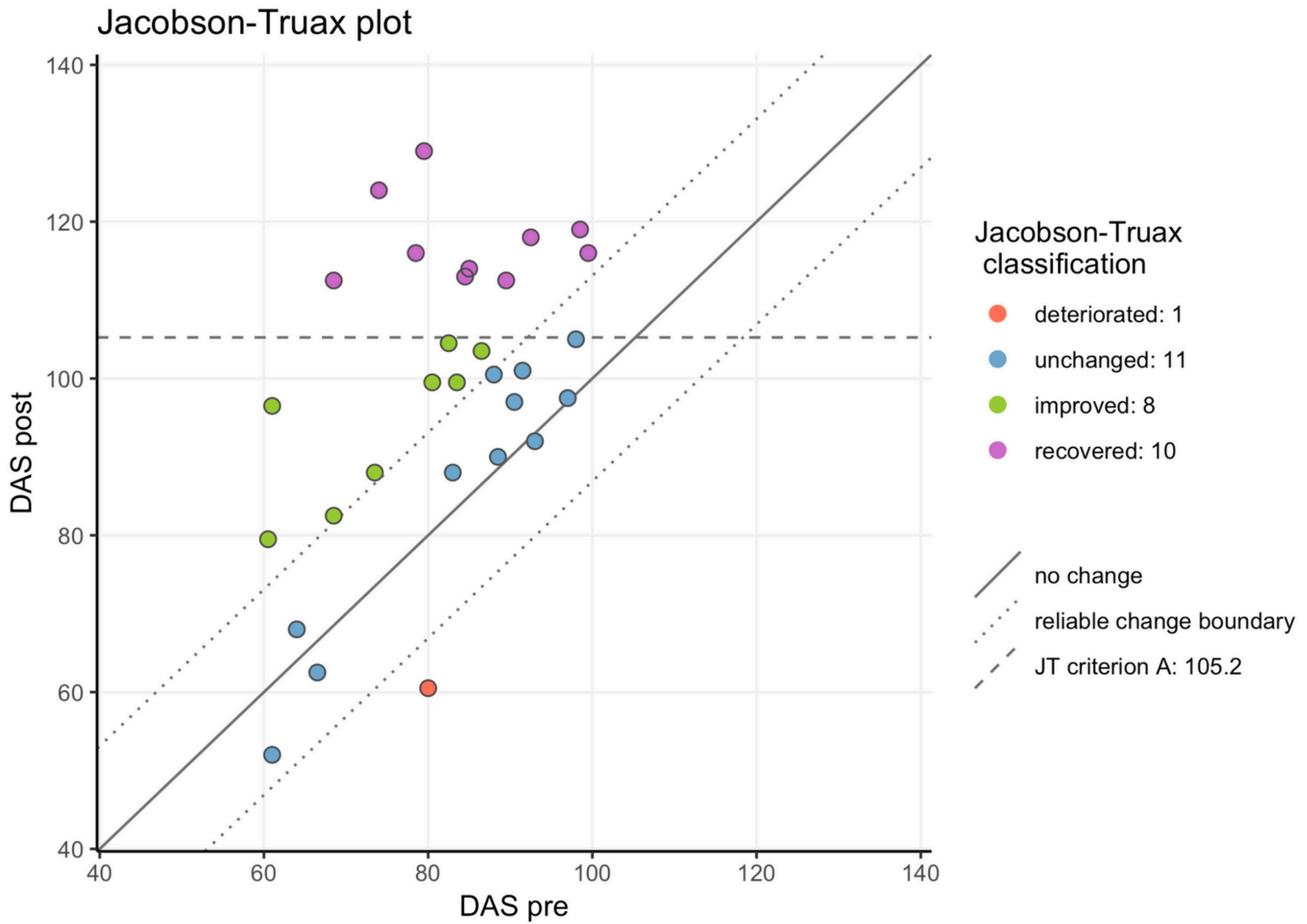


Eubanks-Carter et al., 2012

Jacobson-Truax Plot

- Reports reliable and clinically significant change
- **Dyadic Adjustment Scale (DAS)** - measures therapeutic relationship satisfaction



AWKrujit, n.d.

Symptom Severity Outcomes

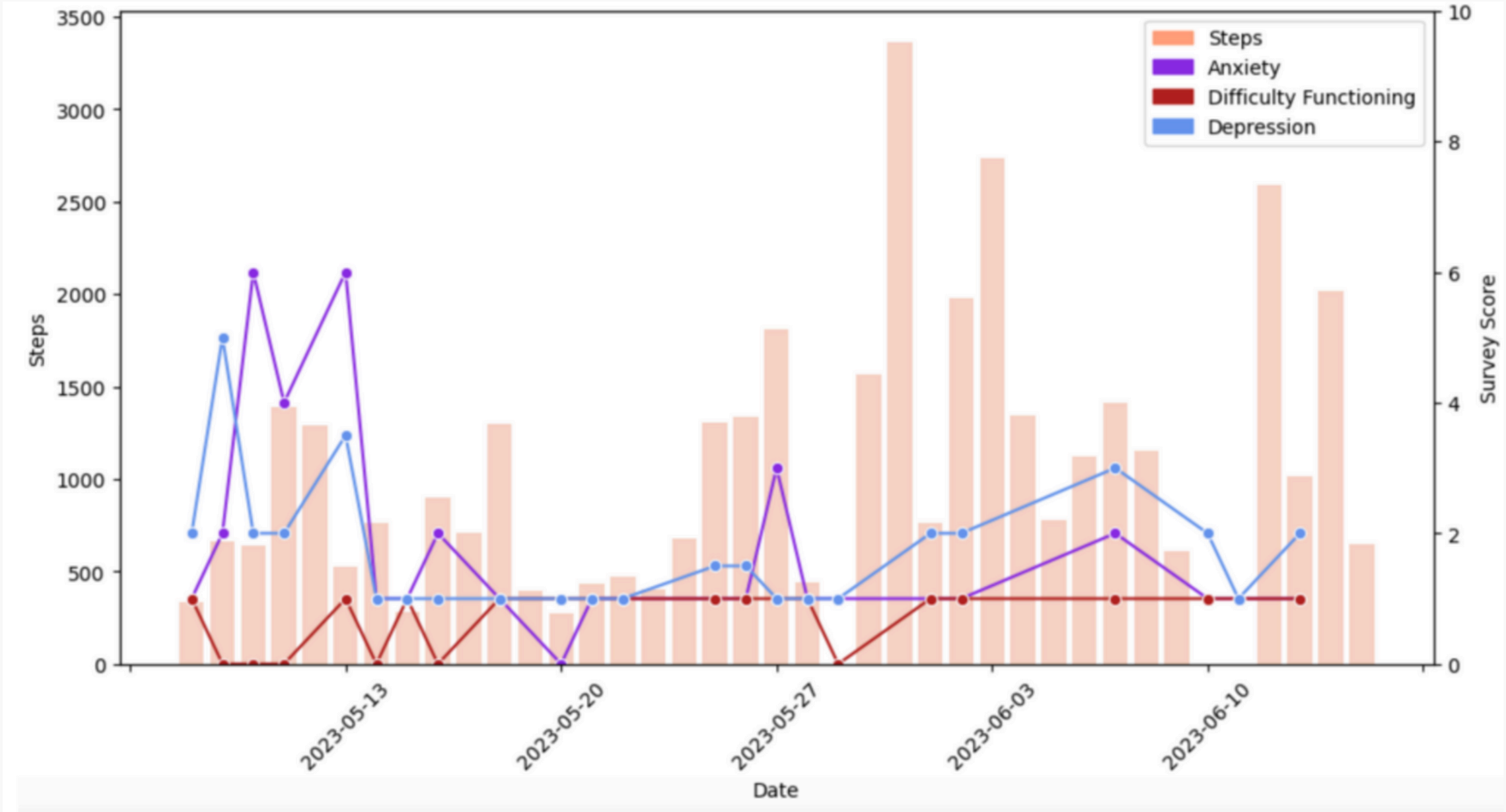
Line Graphs

- Change in anxiety and depression symptoms over time
- Such graphs can elucidate client's progress and improve client's expectations, hope, and motivation

Chang et al., 2023

Bar / Line Graphs

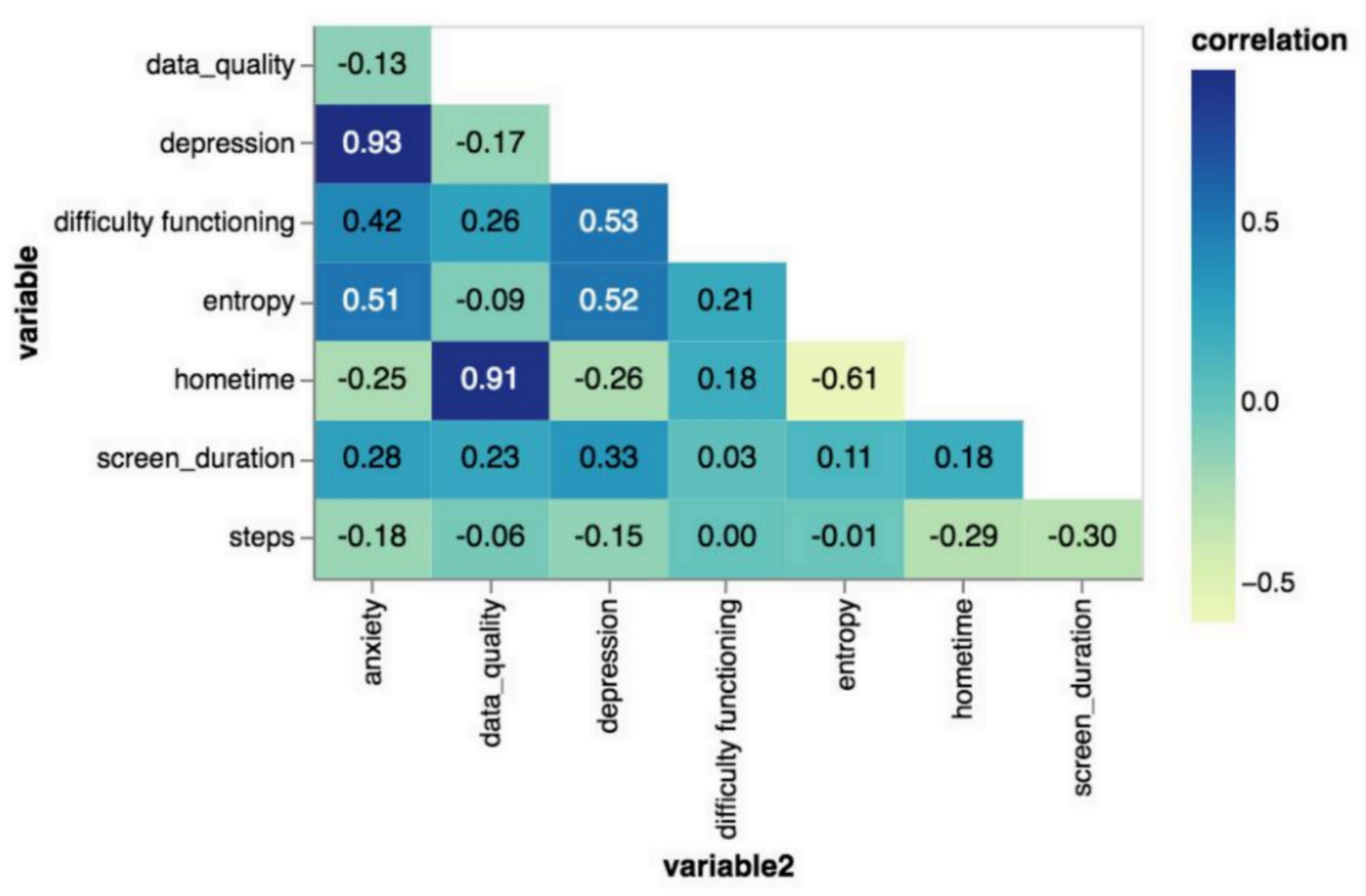
- Shows relationship between physical activity and psychological symptoms
- Highlights impact of behaviours on emotions and vice versa



Chang et al., 2023

Correlation Matrices

- Use of colour
- Understand relationship between behaviour and emotion

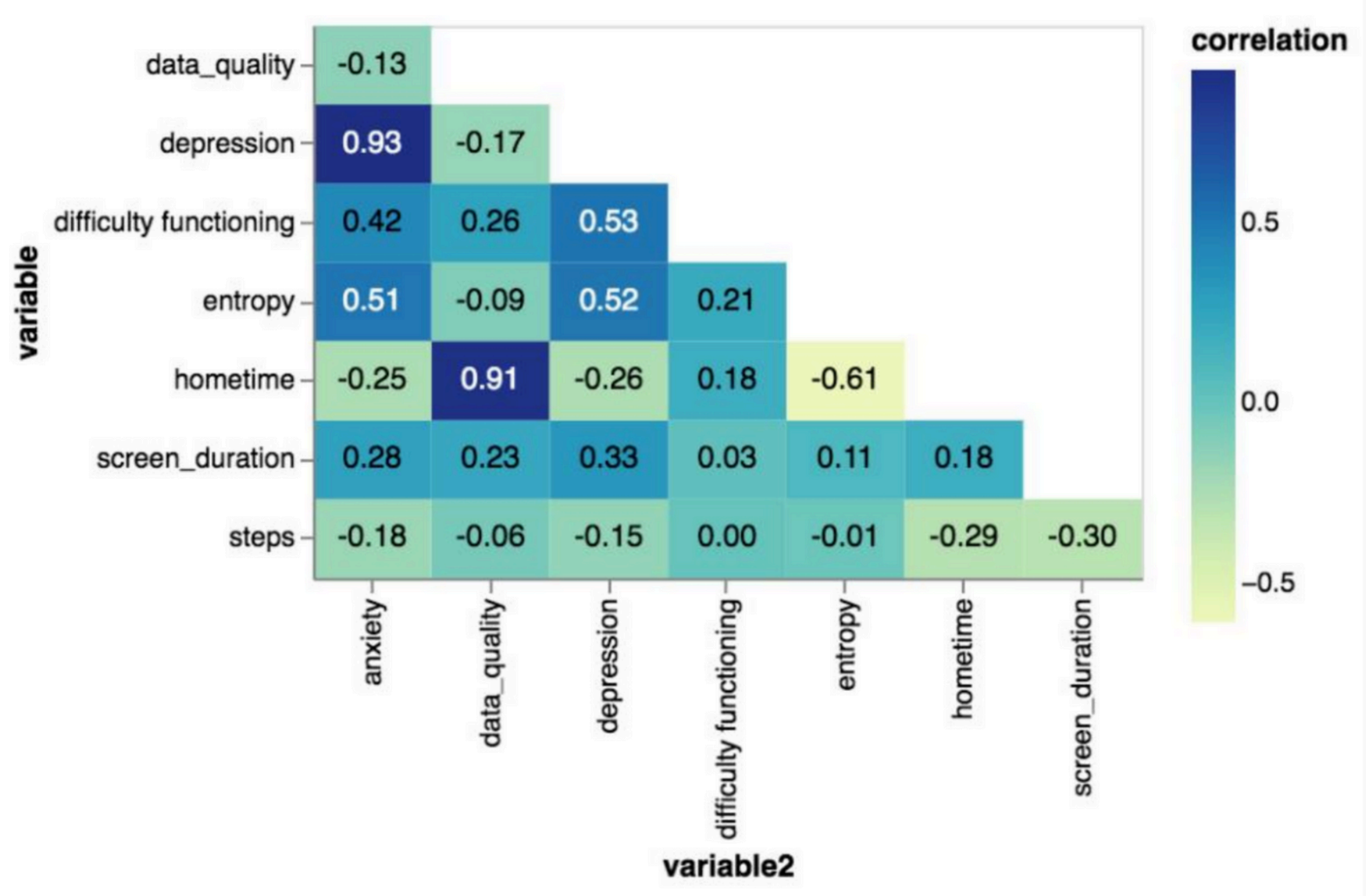


Chang et al., 2023

Correlation Matrices

- Use of colour
- Understand relationship between behaviour and emotion

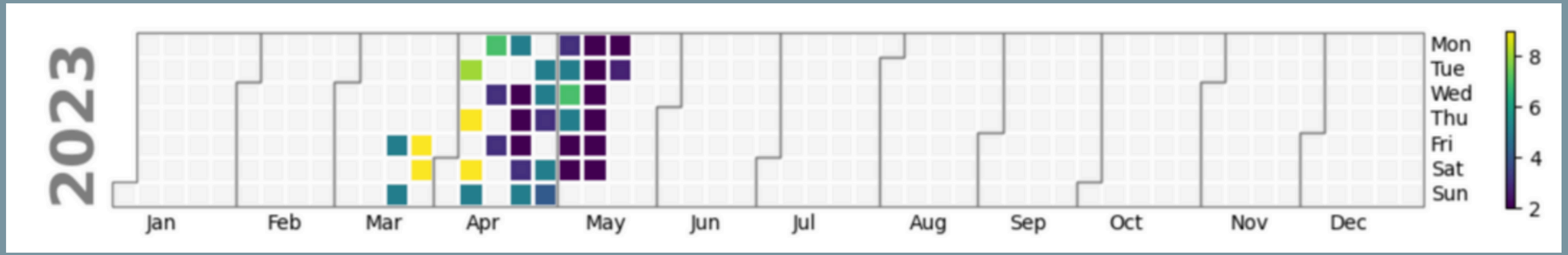
Any issues with this correlation matrix?



Chang et al., 2023

Calendar Charts

- Uses colour, timelines, etc.

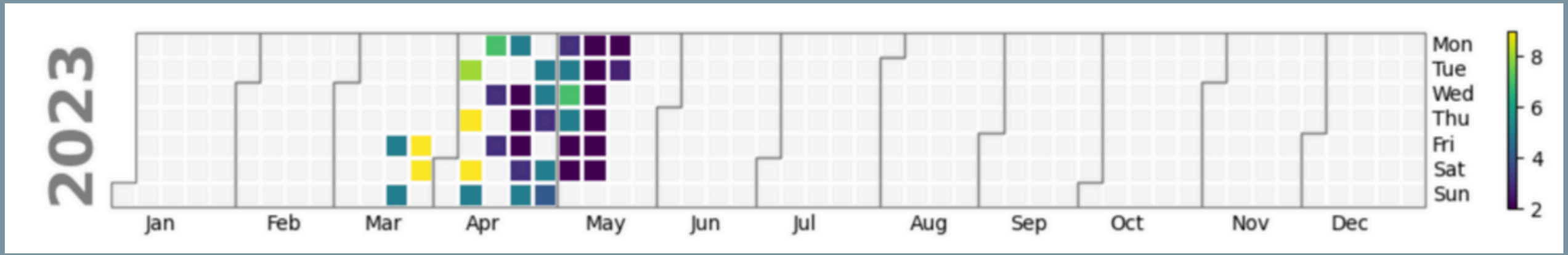


Chang et al., 2023; Esri, n.d.

Calendar Charts

- Uses colour, timelines, etc.

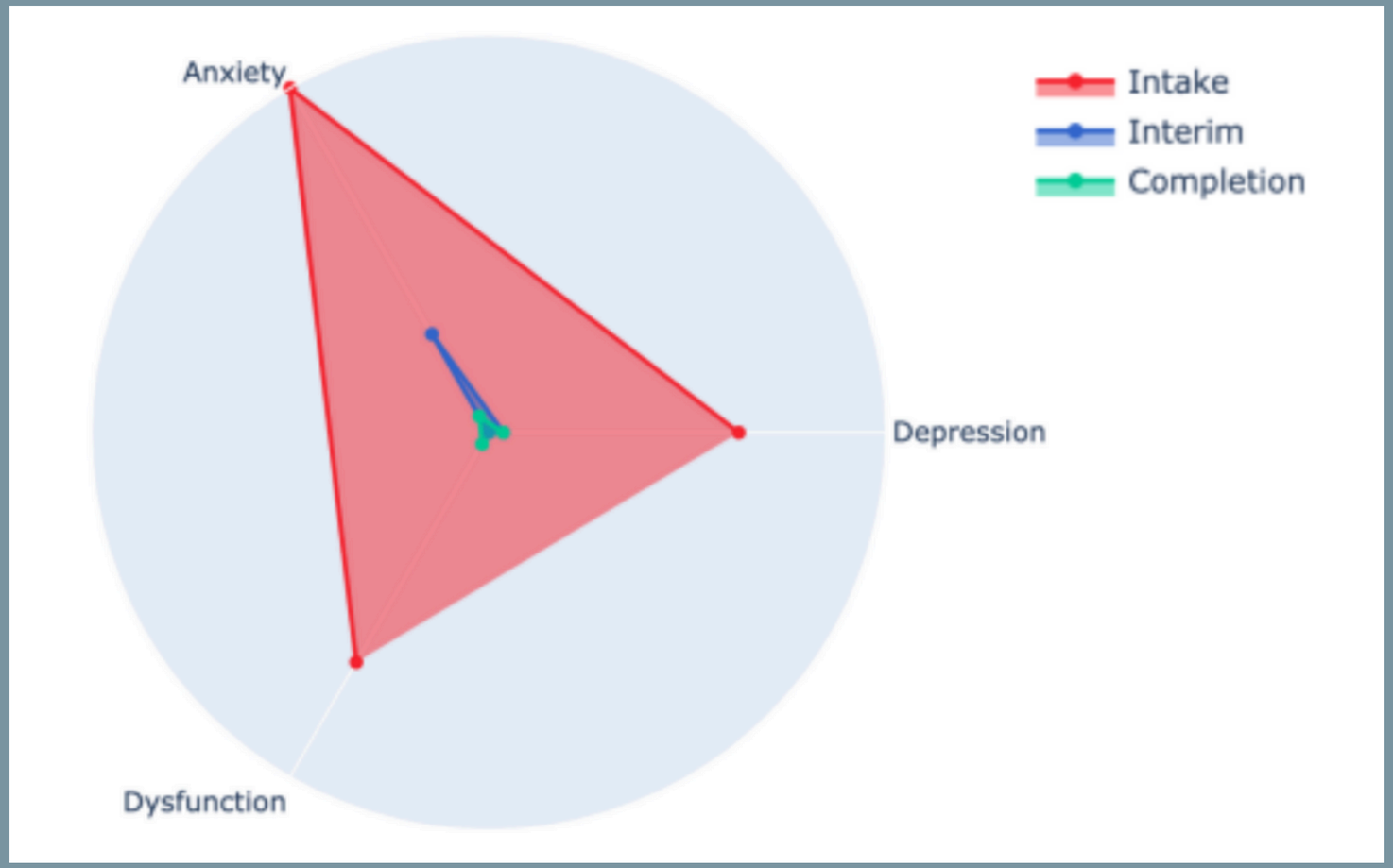
Any some issues with this chart?



Chang et al., 2023; Esri, n.d.

Radar Plots

- Show multivariate data on same axis with central point
- Displays multiple quantitative variales
- Variables called radii
- Uses colour, timelines, etc.



But what are some issues with this chart?

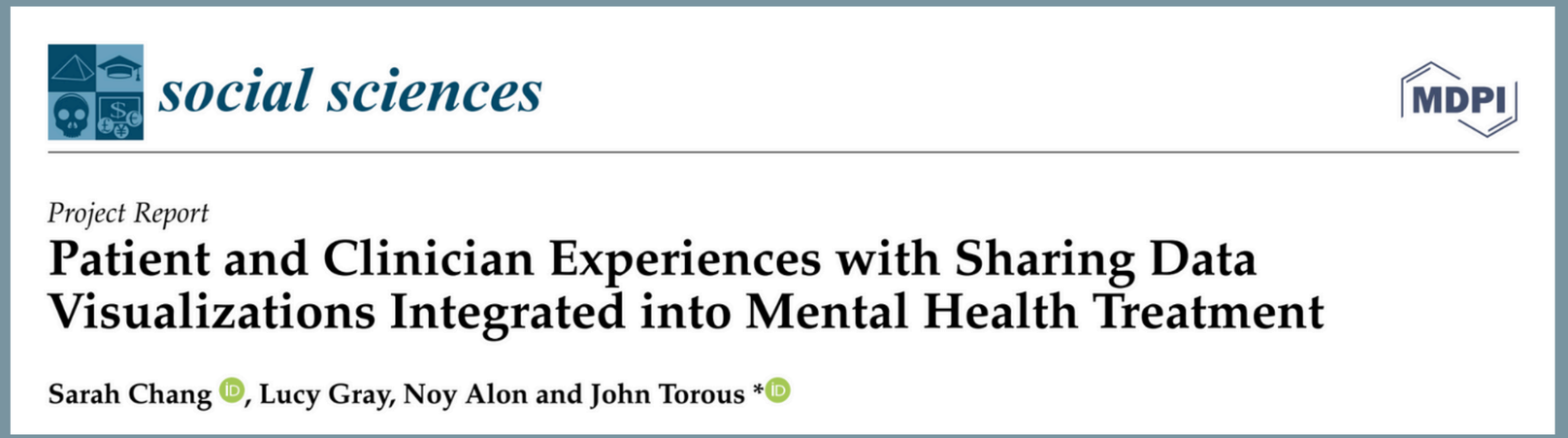
Chang et al., 2023; Jaspersoft, n.d.

Why do we need multiple ways to visually present outcome data to clients?

Chang et al., 2023

Chang et al., 2023

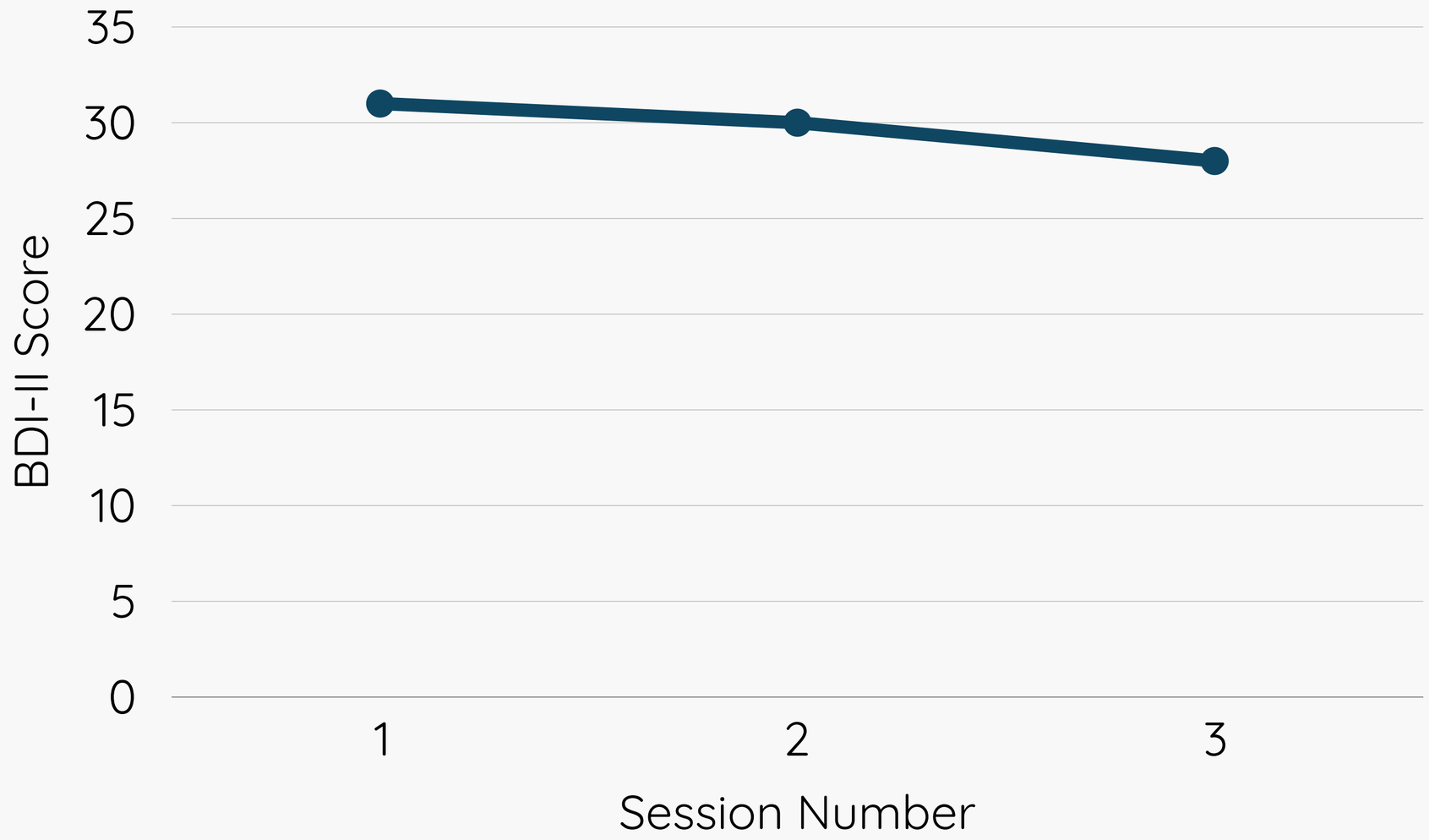
- 90% of clients understood visualizations and found them meaningful and accurate
- Visualizations (1) prompted reflection, (2) validated emotions, (3) clarified progress, (4) outlined associations, (5) highlighted new trends, & (6) enhanced emotional and behavioural awareness



Chang et al., 2023

Statistical vs Clinical Significance

- A non-significant statistical change does not necessarily equate to a non-significant clinical change



Advantages of Graphic Representations in Therapeutic Contexts

- Improves comprehension and affective understanding
- Enhances client-therapist communication and relationship
- Improves memory and recall
- Enhances self-perceptions & perception of quality of sessions
- Improves attendance & increase client readiness and motivation for treatment
- Cost-effective

Chang et al., 2023; Czuchry et al., 2009; Dansereau & Simpson, 2009

Who are visuals most beneficial for?

- Auditory learning limitations
- Difficulties with attention
- Anxiety
- Gaps in thinking

Explanations from clinicians are important!

Dansereau & Simpson, 2009

Potential Risks of Graphic Representations in Therapeutic Contexts

- Misinterpretation
- Oversimplification
- Could increase symptom severity
- Impact therapeutic relationship / rapport

Chang et al., 2023

Thank you

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