

# «Innovazione digitale e terapeutica per la salute mentale »

Roma, 17 maggio 2024

Dott.ssa Graziella Madeo

Direttrice Unità di Neuromodulazione e  
Ricerca Clinica



**BRAIN&CARE**  
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## Il gruppo di lavoro



Produzione, sviluppo e commercializzazione di beni e servizi innovativi ad alto valore tecnologico a sostegno della diagnosi e cura a favore di soggetti con condizioni psichiatriche e disagio psicologico.



La salute mentale da un angolo  
differente

# Il gruppo di lavoro



**BRAIN&CARE**  
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- ✓ Neurologo
- ✓ Psichiatra
- ✓ Internista



- ✓ Psicologo
- ✓ Psicoterapeuta

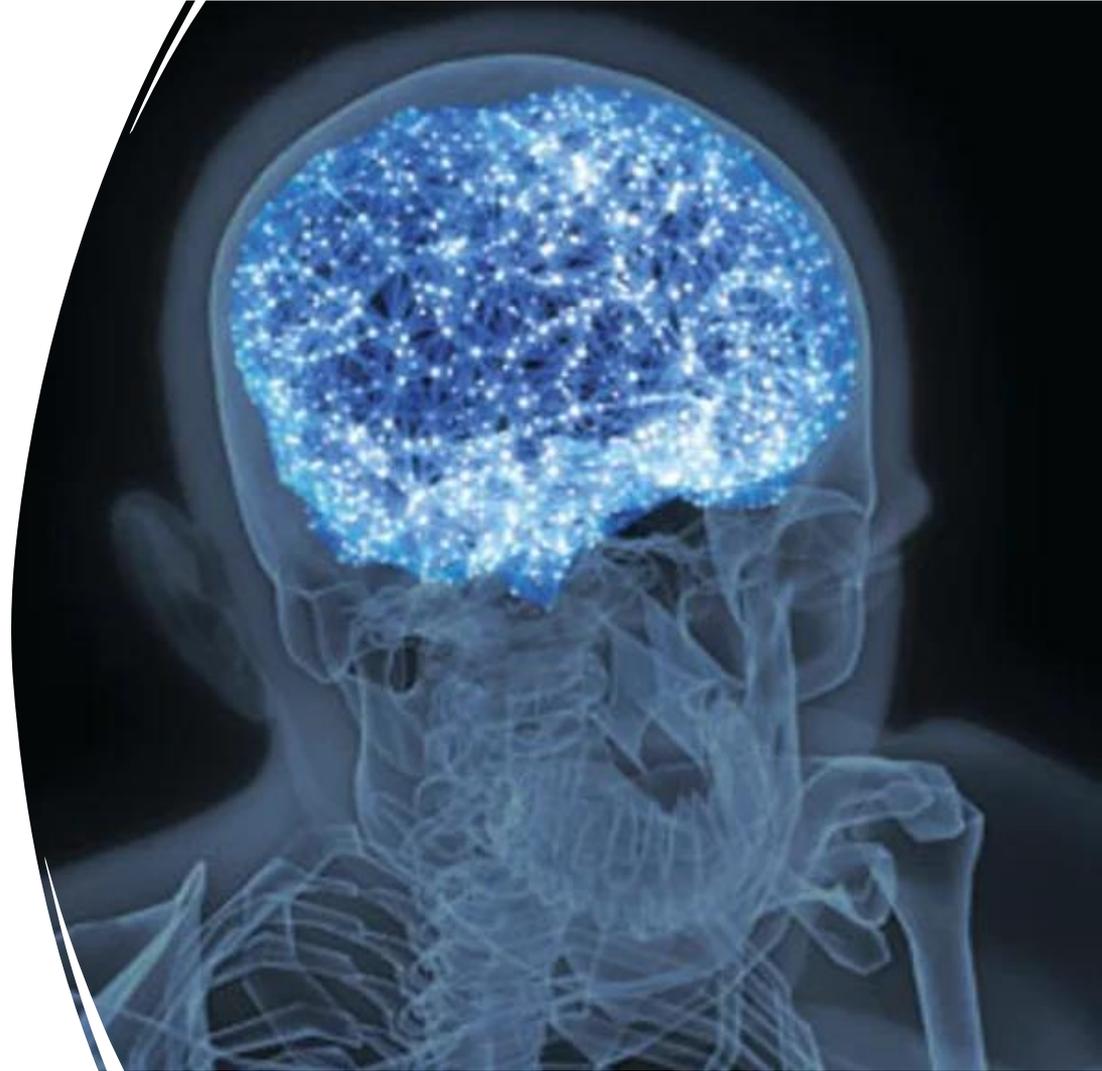


- ✓ Tecnico di Neurofisiopatologia
- ✓ Fisioterapista
- ✓ Tecnico della riabilitazione cognitiva e psichiatrica
- ✓ Nutrizionista



**How is our brain organized?**

100 trillion brain  
connections  
(synapses)

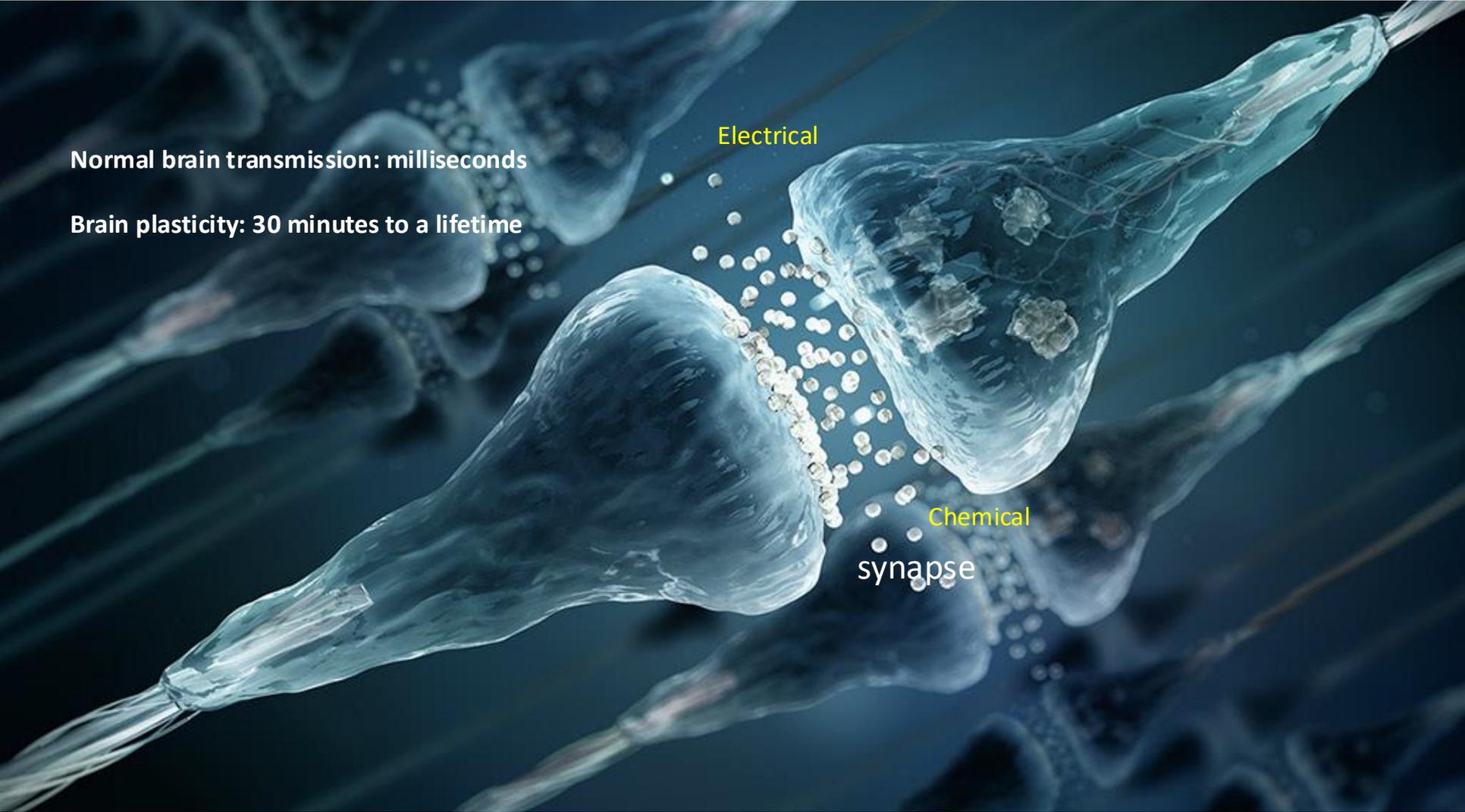


Normal brain transmission: milliseconds

Brain plasticity: 30 minutes to a lifetime

Electrical

Chemical  
synapse



# TMS

## Transcranial Magnetic Stimulation

**Non-invasive brain stimulation technique**

**Brought to the clinic in 1985**

**19,000 articles on TMS**

**FDA approved for depression,  
anxious depression,  
OCD, smoking cessation**

**CE approval in 2021  
for psychoactive substances use disorders**

*Courtesy of National Geographic*



# Neurobiological effects of rTMS

CHEMICAL/METABOLIC

VASCULAR

PLASTICITY

ANTI-INFLAMMATORY

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Changing Cerebral Blood Flow, Glucose Metabolism, and Dopamine Binding Through Transcranial Magnetic Stimulation: A Systematic Review of Transcranial Magnetic Stimulation-Positron Emission Tomography Literature

Kathie R. Kinney and Colleen A. Harlan  
Michael Potter, ASSOCIATE EDITOR  
Pharmacological Reviews October 2022, 74 (6) 919-932, DOI: <https://doi.org/10.1101/2022.08.12.200579>

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**A Review of Transcranial Magnetic Stimulation in Vascular Dementia**

Giovanni Pennisi<sup>a</sup>, Raffaele Ferri<sup>a</sup>, Mariagiovanna Cantone<sup>a</sup>, Giuseppe Lanza<sup>a</sup>,  
Manuela Pennisi<sup>a</sup>, Luisa Vinciguerra<sup>a</sup>, Giulia Malagumera<sup>a</sup>, Rita Bella<sup>a</sup>

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ARTICLE

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Link to this preprint OPEN

**Repetitive magnetic stimulation induces plasticity of inhibitory synapses**

Maximilian Lenz<sup>1</sup>, Christos Galanis<sup>1</sup>, Florian Müller-Dahlhaus<sup>2</sup>, Alexander Optič<sup>3,4</sup>, Corette J. Wierenga<sup>5</sup>,  
Gábor Szabó<sup>6</sup>, Ulf Ziemann<sup>7</sup>, Thomas Deller<sup>8</sup>, Klaus Fritke<sup>9</sup> & Andras Vlachos<sup>1</sup>

See it at: [Journal of Neuroinflammation](https://doi.org/10.1002/1522-2675.15616) (2024) 13:156

DOI: [10.1002/1522-2675.15616](https://doi.org/10.1002/1522-2675.15616) [Journal of Neuroinflammation](https://doi.org/10.1002/1522-2675.15616)

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SHORT REPORT Open Access

**Repetitive transcranial magnetic stimulation reduces remote apoptotic cell death and inflammation after focal brain injury**

Valeria Seno<sup>1</sup>, Elia Bischia<sup>1</sup>, Laura Latini<sup>1</sup>, Veronica Ghiglieri<sup>1,2</sup>, Fabrizio Cacace<sup>1</sup>, Valeria Corda<sup>1</sup>,  
Marco Molinari<sup>1,3</sup> and Maria Teresa Vicini<sup>1,4</sup>

Add-on rTMS for the acute treatment of depressive symptoms is probably more effective in adolescents than in adults: Evidence from real-world clinical practice

Journal of Neurology (2022) 269:5283–5301  
https://doi.org/10.1007/s00415-022-11236-2

REVIEW



Transcranial magnetic stimulation treatment in Alzheimer's disease: a meta-analysis of its efficacy as a function of protocol characteristics and degree of personalization

Arianna Menardi<sup>1,2</sup> · Lisa Dotti<sup>3</sup> · Ettore Ambrosini<sup>1,2,3</sup> · Antonino Vallesi<sup>1,2</sup>

Received: 29 March 2022 / Revised: 14 June 2022 / Accepted: 14 June 2022 / Published online: 4 July 2022  
© The Author(s) 2022

Received: September 30, 2020 / Revised: January 15, 2021 / Accepted: February 1, 2021

(onlinelibrary.wiley.com) DOI: 10.1111/ner.13376

Multimodal Elements of Suicidality Reduction After Transcranial Magnetic Stimulation

Jennifer Barredo, PhD<sup>1,2,3</sup>; Yosef Berlow, MD, PhD<sup>1,2</sup>; Hannah R. Swearingen, BA<sup>2</sup>; Benjamin D. Greenberg, MD, PhD<sup>1,2,3</sup>; Linda L. Carpenter, MD<sup>1,3</sup>; Noah S. Philip, MD<sup>1,2,3</sup>

Received: 28 February 2019 | Accepted: 15 March 2019

DOI: 10.1002/brb3.1284

ORIGINAL RESEARCH

Transcranial magnetic stimulation in anxiety and trauma-related disorders: A systematic review and meta-analysis

Patricia Cirillo<sup>1,2,3</sup> | Alexandra K. Gold<sup>4,5</sup> | Antonio E. Nardi<sup>3</sup> | Ana C. Ornelas<sup>3</sup> | Andrew A. Nierenberg<sup>1,5,6</sup> | Joan Camprodon<sup>1,2,5</sup> | Gustavo Kinrys<sup>1,5,6</sup>

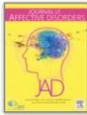
<sup>1</sup>Department of Psychiatry, Massachusetts General Hospital, Boston, Massachusetts

Abstract



Journal of Affective Disorders

Volume 276, 1 November 2020, Pages 305-311



Research paper

Comparative efficacy of add-on rTMS in treating the somatic and psychic anxiety symptoms of depression comorbid with anxiety in adolescents, adults, and elderly patients—A real-world clinical application

Ling Zhang<sup>a,1</sup>, Junjuan Zhu<sup>b,1</sup>, Tianhong Zhang<sup>b,✉</sup>, Qiufang Jia<sup>a</sup>, Li Hui<sup>a</sup>, Hongliang Zhu<sup>a</sup>, Yingying Tang<sup>b</sup>, Jijun Wang<sup>b,✉</sup>

## Obiettivi e destinatari del lavoro

L'obiettivo principale è di aumentare l'emersione e la consapevolezza della/e malattia/e psichica/he attraverso le seguenti attività:

- ✓ favorire lo **screening** per l'identificazione dei soggetti portatori del/i disturbo/i con questionari validati attraverso prodotti digitali (app, web, bot)
- ✓ facilitare il contatto con servizi idonei all'approfondimento diagnostico anche attraverso sistemi di **teleconsulto** (voip)
- ✓ facilitare l'accesso a **risorse tecnologiche e digitali** a supporto o in alternativa ai trattamenti tradizionali:
  - trattamenti psicoterapeutici erogati in remoto attraverso app/web con gamification
  - trattamenti di stimolazione cerebrale non invasiva (stimolazione magnetica transcranica – **TMS, stimolazione transcranica** a corrente diretta – tDCS)
  - trattamenti di neuromodulazione in ambienti arricchiti (virtual reality - VR).

## Obiettivi e destinatari del lavoro

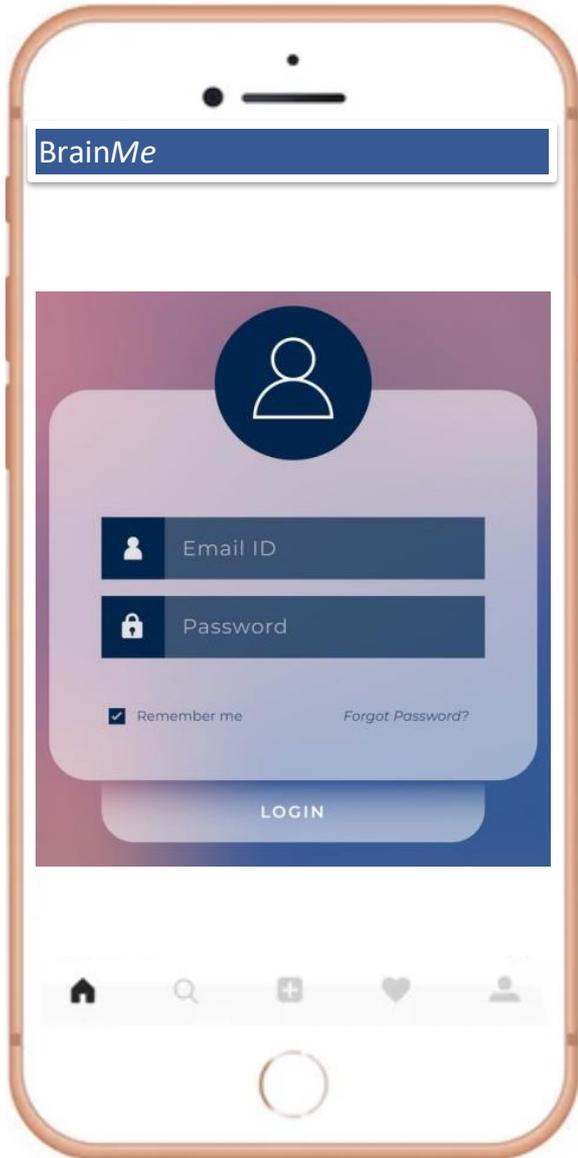
Persone con malattie psichiatriche o condizioni di disagio psicologico e/o I loro caregivers:

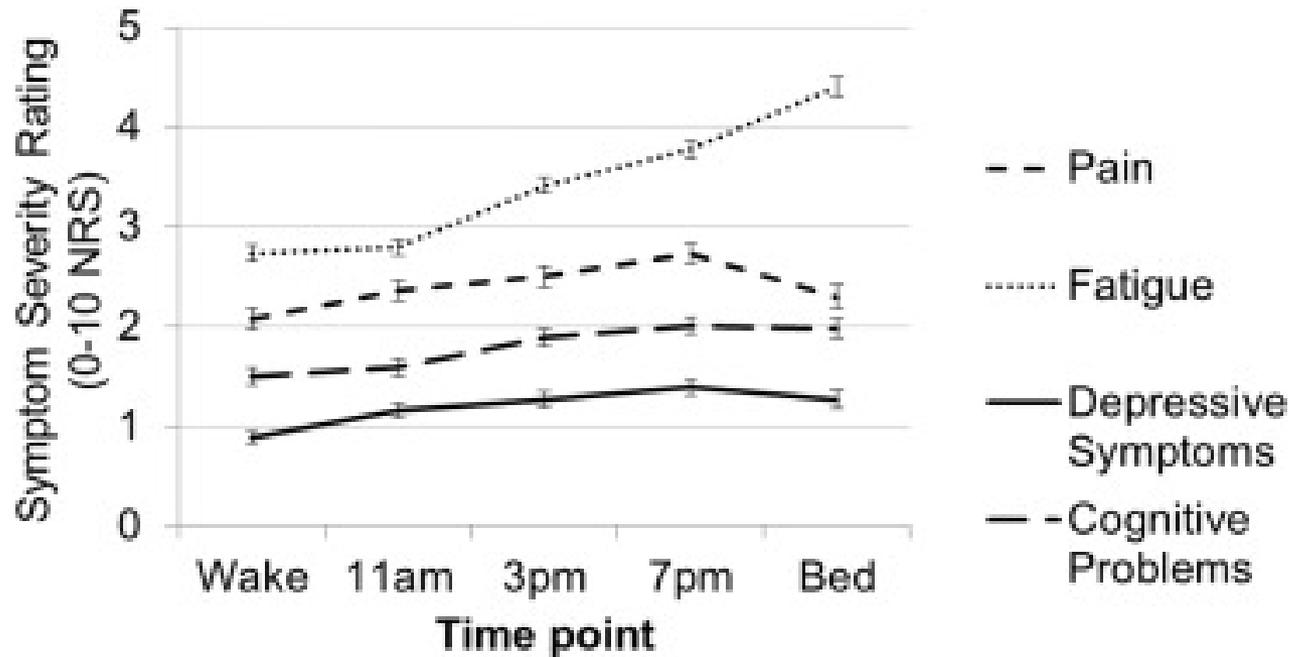
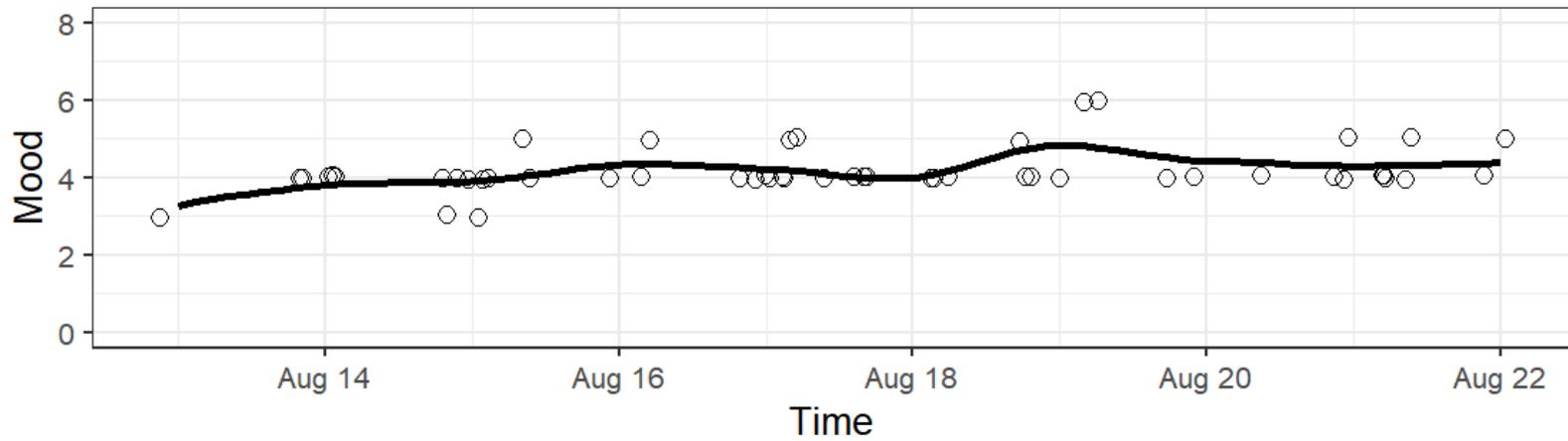
- ✓ Dipendenze da sostanze e comportamentali
- ✓ Depressione unipolare e bipolare
- ✓ Ansia
- ✓ Insonnia
- ✓ Disturbi della nutrizione e dell'alimentazione

Sommerso difficilmente contattabile con la tradizionale modalità di offerta.

Nella maggior parte dei casi l'esordio di questi disturbi, spesso associati tra loro, si colloca nell'età adolescenziale o in giovani adulti i quali hanno un approccio favorevole all'utilizzo di sistemi digitali e connessi.









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