



Behind the Infamous “Sabu”: A Closer Look on Methamphetamine Use Disorder in Women’s Population

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Worldwide Substance Use Report

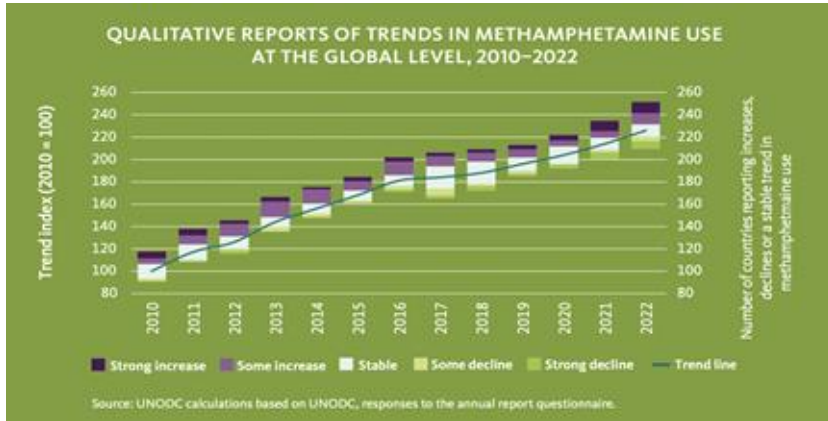
64 million ppl use drugs worldwide



Around **1/3** of people
who use drugs are
women

↑300%

Number of countries reporting increase
methamphetamine use



Women using drugs are **2x less likely**
to be in treatment



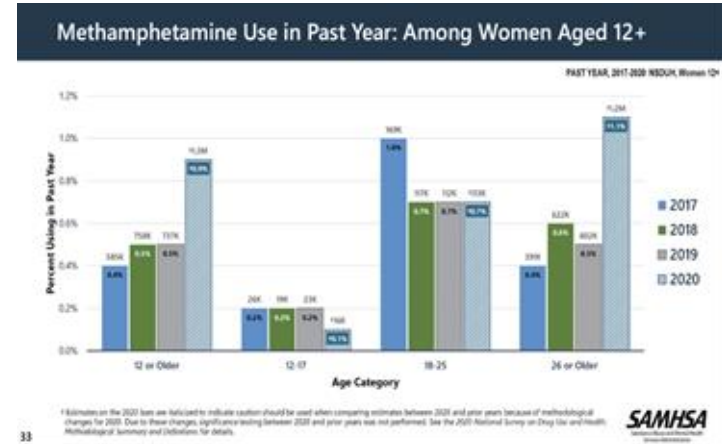
1 in 7 among men in
treatment



1 in 18 among women
in treatment

↑3x

Past-year meth use for women >26 years older
from 2017 to 2020



Methamphetamine Use in Indonesia

Prevalent methamphetamine use & increased vulnerability in Indonesian women



Most used
substance in major
cities in Indonesia



Prevalence of substance use disorder in Indonesia
1,95% (2021) → 2,11% (2025)

Women : 0.50 % (2019) → 1,46% (2021)

Methamphetamine :

National Narcotic Boards (2020) :

The **second highest** substance used (25.2%) in Indonesia

Most common substances used by **patients admitted to rehabilitation** facilities between 2015-2017

Septi et al (2020) – women inmates (4 prisons in Indonesia)

85% used multiple substances (methamphetamine + other substance) → **62.2% used methamphetamine (highest)**

Women and SUD:

Challenges in treatment due to uniqueness in **woman's biological, psychological and social aspects** → Treatment entry, retention and outcome → QoL

National Commission on Violence Against Women (2019):
80% women were incarcerated due to substance abuse

Poor condition; lack of psychiatric & harm-reduction services

Indonesia **ranked 4th** (Asia) for highest prison **occupancy rate**

Minimum facilities & human resources → **lack of safe space** in detention centers for **pregnant and nursing women**



More complex psychosocial problems in prison

Burdens and Harms of Illicit Stimulants & Other Drugs Use

Harms of MUD and Burden of Incarceration

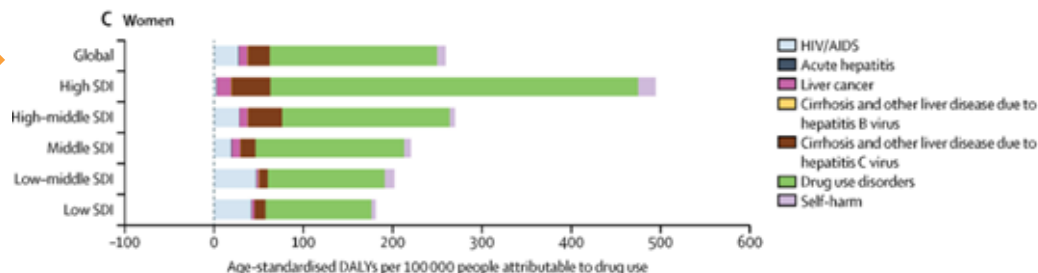


	Incidence (%)	Mortality (N)	DALY (%)
1990	22.7	4,852	29.6
2000	19.6	6,055	27.5
2010	15.2	6,162	20.9
2021	13.7	9,880	21.0



Progressive **decreasing trend** for **incidence & morbidity**, but **increased mortality numbers** in amphetamine use disorder

Drug use disorders accounts for the **largest DALY burden** in women



Impact of Women Incarceration on Exposed Children (All Cause)

7.06 times risk for substantiated child **maltreatment**

12.89 times risk for **out-of-home care**

Threatened mother-child & family relationship



49.3%*

Indonesian family members reported distance, time, and cost barriers to visit



26.6%*

reported challenges in communicating with their family & children

Treating Drug Use Disorder as Promising Approach

Appropriate therapy during incarceration period proved beneficial on larger scales

Cost of MUD



At least MUD costed
US\$4 billion in criminal-
justice court (US)



Money laundering
attributable to drug use
Rp 99 trillion
(~ US\$6.25 billion in 2024)

Call to Action

Treatment in prison should be delivered adequately as it becomes the **groundwork for post correction rehabilitation**

Major rehabilitative objective of prison-based treatment: during treatment improvements

Specialized SUD treatment program for women in prison □
↓ **relapse to substance use and criminal recidivism**

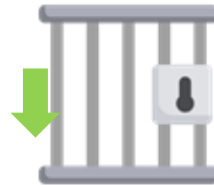
Evidence of Treatment Impact

No treatment

- 274 overdose deaths & 305 total deaths (1 year)
- 11.37 lifetime QALYs
- \$216,320 lifetime healthcare costs

CM Program*

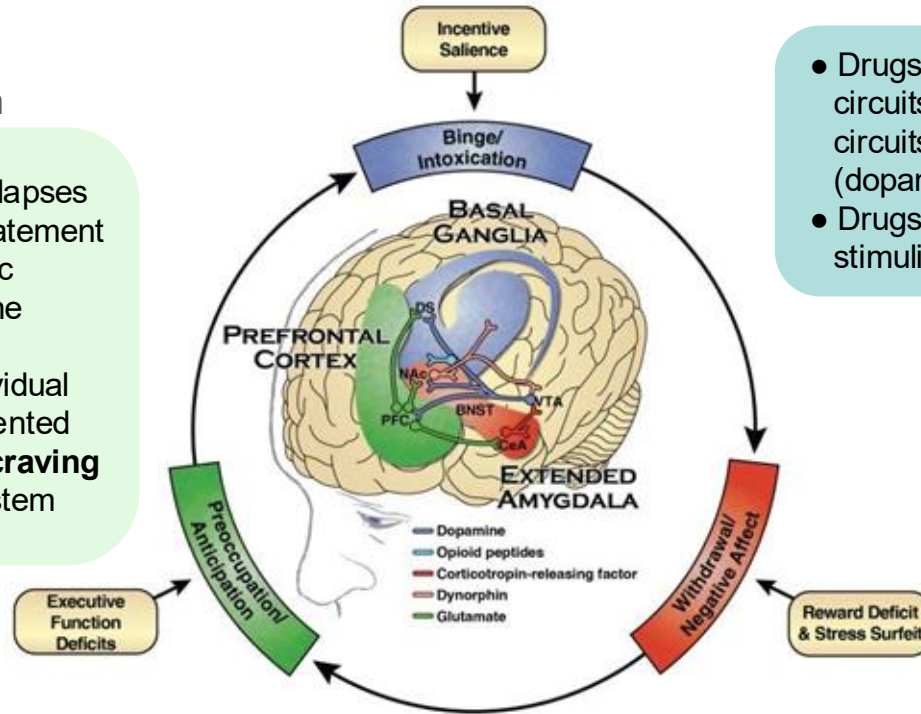
- 117 prevented deaths (1 year)
- Net gain of 0.70 lifetime QALYs
- Incremental cost-effectiveness ratio (ICER) \$9,830/QALY



42% reduction in
recidivism
(post-release programs)

Anticipation

- Proposed “key” to relapses
- **Cue-induced** reinstatement mediated by prelimbic prefrontal cortex to the ventral striatum
- Responsible for individual response when presented with cues/trigger → **craving**
- The “**Stop / Go**” system



Binge

- Drugs of abuse “**hijack**” executive function circuits, motivational circuits, and stress circuits; **marked by ↑ neurotransmitters** (dopamine, opioid peptides, serotonin)
- Drugs affect brain response to neutral stimuli → **incentive salience**

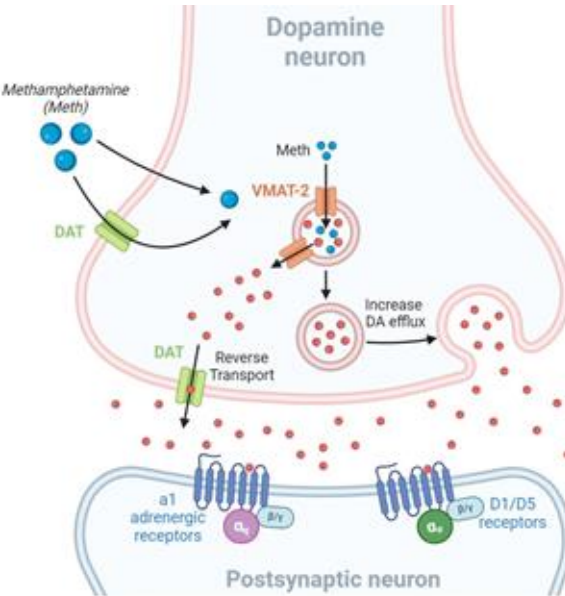
Withdrawal

- **Heightened symptoms** of irritability, stress, fatigue, loss of natural motivation
- Due to drug abstinence; **compensatory response to chronic neuroadaptation** of drug use, marked by abrupt drop in dopamine, serotonin

Substance-related cue → Attentional + Approach bias → Craving → Reduced cognitive control → Drug-seeking

Neurobiology of Methamphetamine Use Disorder

Acute Stimulant Mechanism



Meth enters the presynaptic neuron via DAT → induced **reverse transport** → releasing dopamine into the synaptic cleft

Meth **disrupts VMAT2** → dopamine move from synaptic vesicles into cytosol → increasing cytoplasmic dopamine available for reverse transport

Meth **inhibits monoamine reuptake** → prolonged and increased dopamine in the synaptic cleft

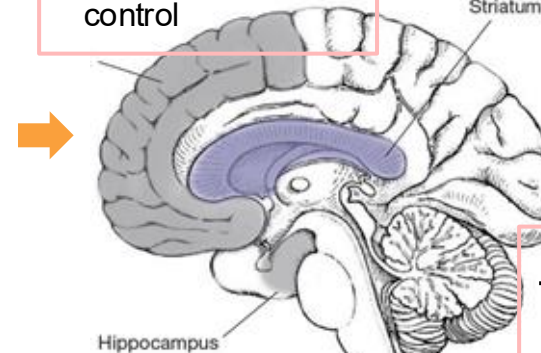
Chronic Brain Effects

Hypofrontality

- Reduced activity in prefrontal cortex
- Impaired executive control

↓ dopamine signaling

- Altered reward processing
- Decreased D2 receptor availability



Craving

- Altered cortico-striatal-limbic circuits
- Loss of control

Memory & learning deficit

- Impaired memory formation
- Cognitive dysfunction

Excess monoamine signaling → Neuroadaptation → Dopamine deficit & impaired control

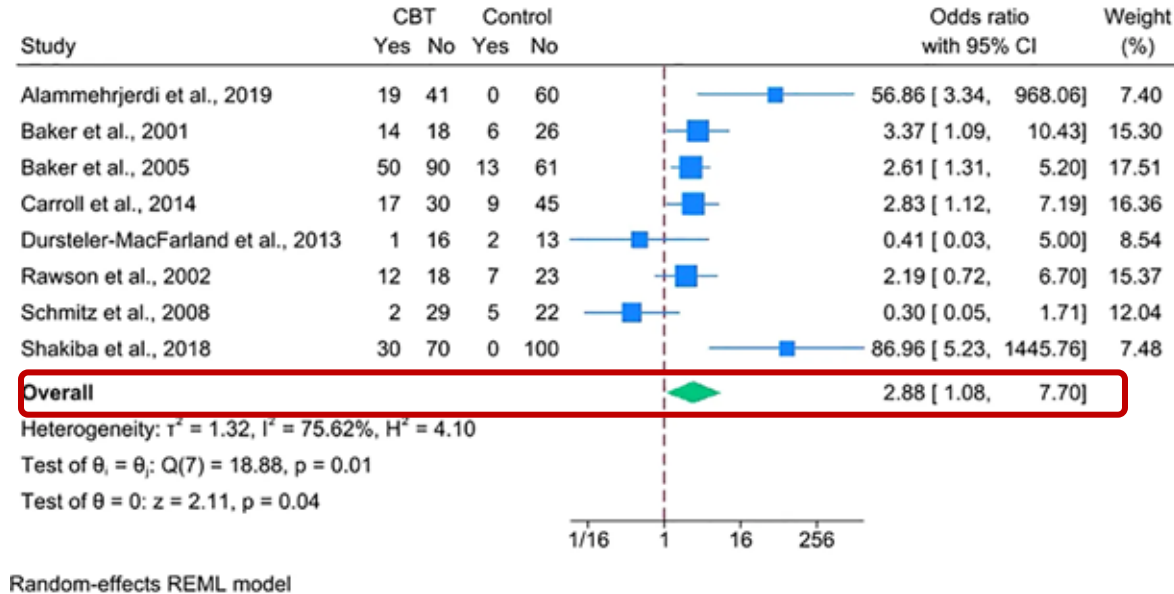
Efficacy of CBT for Stimulant Use Disorder

A 2025 meta-analysis
→ **significant CBT effect**
in methamphetamine /
amphetamine subgroup

**CBT does not “repair”
methamphetamine-related
brain changes directly**



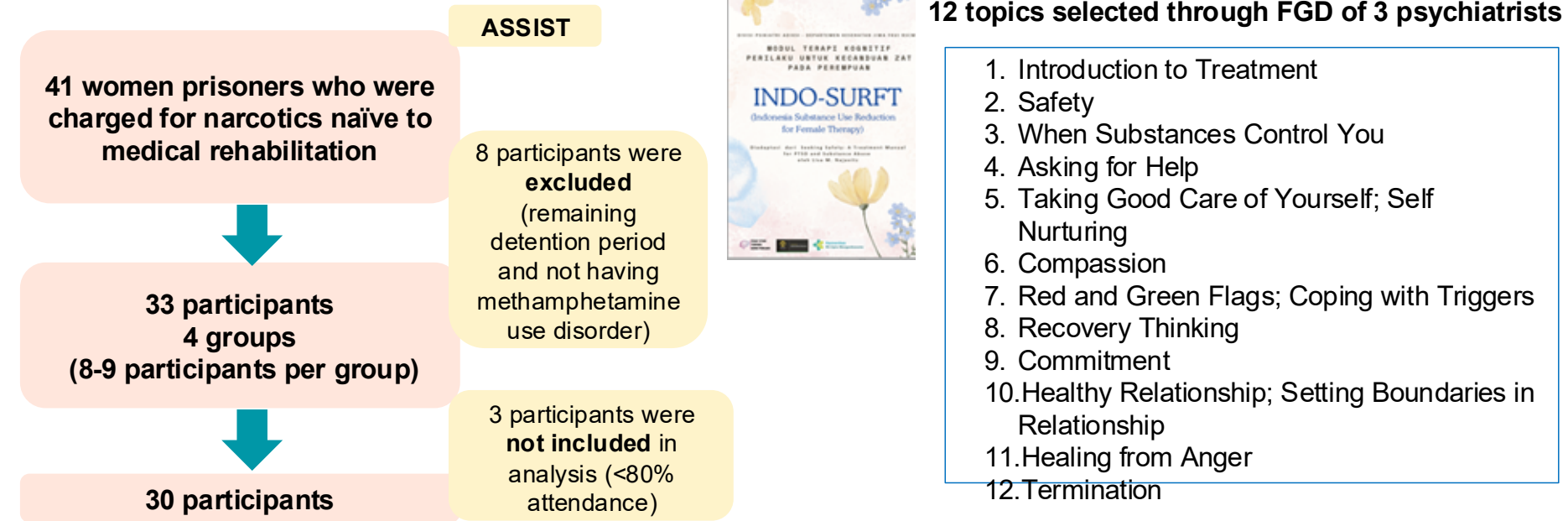
**It targets the cognitive & behavioral
consequences of these changes.
Helping patients develop better
control over craving, triggers,
decision-making, and relapse risk**



Bridging the gap for the vulnerable population

Indo-SURFT (Indonesia Substance Use Reduction for Female Therapy)

- Pilot study for women with **methamphetamine use disorder** in a **women prison in Jakarta, Indonesia**
- **12 group CBT sessions** – module was adapted from 25 topics from Seeking Safety Treatment Manual by Lisa Najavits (15 of 25 topics)
- **2 sessions per week**



Indo-SURFT : Demographic Characteristics

Mean age : 36.63 ± 1.68 years old (range 21-57 years old)

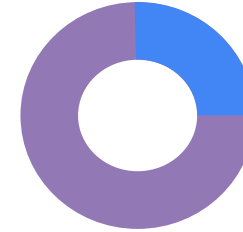
Subject Characteristics	Total (n = 30) n (%)
Level of education	
Elementary school	5 (16.7)
Junior high school	8 (26.7)
Senior high school	15 (50)
Diploma	2 (6.7)
Marital status	
Single	6 (20)
Married	12 (40)
Divorced	12 (40)
Occupation	
Housewife	16 (53.3)
Entrepreneur	5 (16.7)
Private employee	6 (20.0)
Other	3 (10.0)



- Recidivism rate
- Having family members incarcerated **33.3%**

History of
psychiatric disorder

26.7%



25% had
underwent
therapy prior to
incarceration

75% never seek
any therapy

None of them
continues
medication in
prison

100% respondents are both drug dealer and user

Mean sentence years : 6 years 7 months (± 5 months)

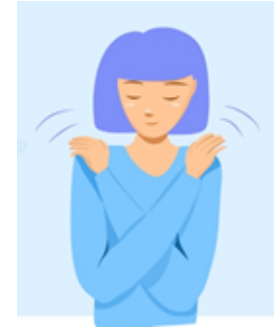


26.6% have history of
childhood trauma
(verbal/physical/both)

Indo-SURFT: Definition of Being Safe

Example of specific module content designed for women

1. Being surrounded by a **supportive network**, including a spouse, children, and family members.
2. Receiving **emotional and practical support** from family members.
3. Maintaining **good physical health**.
4. Having the capacity to engage in a variety of **meaningful activities**.
5. Being able to maintain **effective communication** with family members.
6. Exercising **self-control and emotional regulation**.
7. Engaging regularly in **religious or spiritual practices**.



Automatic Thoughts

- **Self-Blame:**

Attributing their substance use and related consequences to personal failures or **perceived inadequacies as parents or child**

- **Perception of a Hopeless Life:**

Belief that their **life circumstances are inherently negative** and unlikely to improve → hopelessness → keep using substances

- **Diminished Self-Worth:**

Deeply internalized belief of **worthlessness or inability to contribute positively to society** → demonstrated a lack of self-care and continued substance use

Alternative Thoughts

- **Accepting and adapting** to the current circumstances
- **Maintaining a positive outlook** and recognizing the opportunity to acquire new skills during incarceration.
- Developing **self-regulation skills**, acknowledging that control over others is fundamentally constrained.
- **Strengthening familial bonds** and fostering closer relationships with family members.
- **More self-care** (exercise, smoking cessation, safe sex, avoid multiple sexual partner)

Indo-SURFT: Commitment

To become a **better mother**, acknowledging that much time was lost in the past due to substance use and long periods of incarceration.

To **refrain from substance use** upon release from prison.

To improve **emotional regulation**, including managing anger and reducing self-harm behaviors.

To take on **greater personal responsibility in daily life**.

To be a more **trustworthy** individual, including keeping promises made to family members.

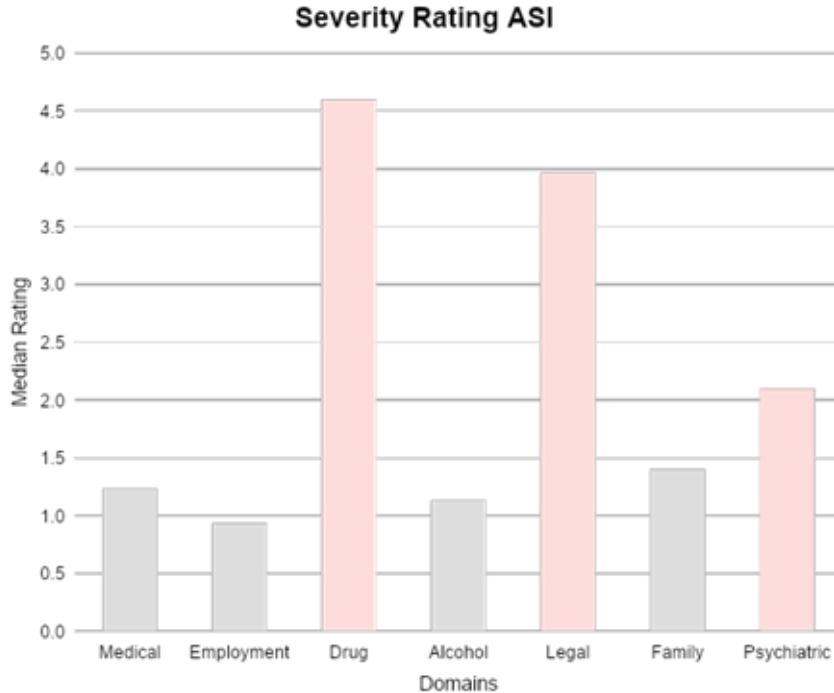
To adhere to a **positive and healthy lifestyle** → believing that staying on the right path (particularly by abstaining from drug use) will lead to other beneficial outcomes

To seek **spiritual growth** through the practice of **religious obligations** and engagement in **prosocial behaviors**.



Indo-SURFT: Addiction Severity Index – Severity Ratings

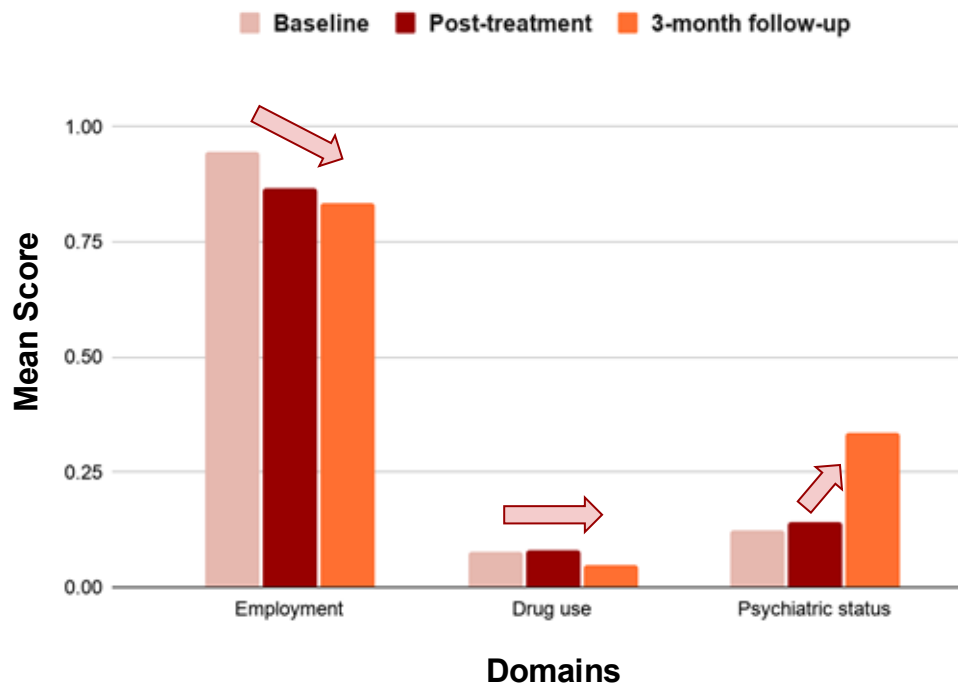
Perceived severity domain by participants



- The clients were particularly concerned regarding their **drug impact, legal counseling, and mental health problems**
- These three areas may represent **unmet needs** among female methamphetamine users in prisons

Indo-SURFT: Differential Changes in ASI Composite Scores Over Time

Enhancing self-efficacy to promote independence in women



- **Employment domain** improved significantly from baseline to **post-CBT** and remained improved at **3-month follow-up**
 - T2: ($B = -0.076$, 95% CI $[-0.125, -0.027]$, $p = 0.002$)
 - T3: ($B = -0.106$, 95% CI -0.179 to -0.034 , $p = 0.004$)

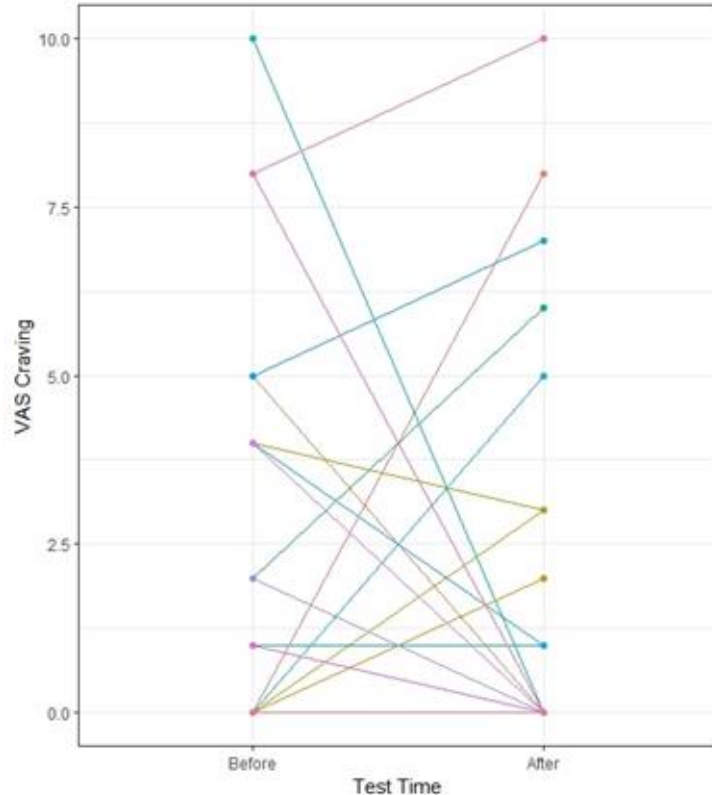
Participants in the correctional facility were able to engage in work activities and earn a **modest income**
- **Drug use domain** remained stable across treatment and follow-up

Key finding:

Psychiatric domain remained stable during CBT, but worsened after follow-up ($p < 0.001$) → aligns with previously identified **psychiatric unmet needs** + highlights the need for ongoing psychiatric care, maintenance, or **booster sessions**

Indo-SURFT: Craving

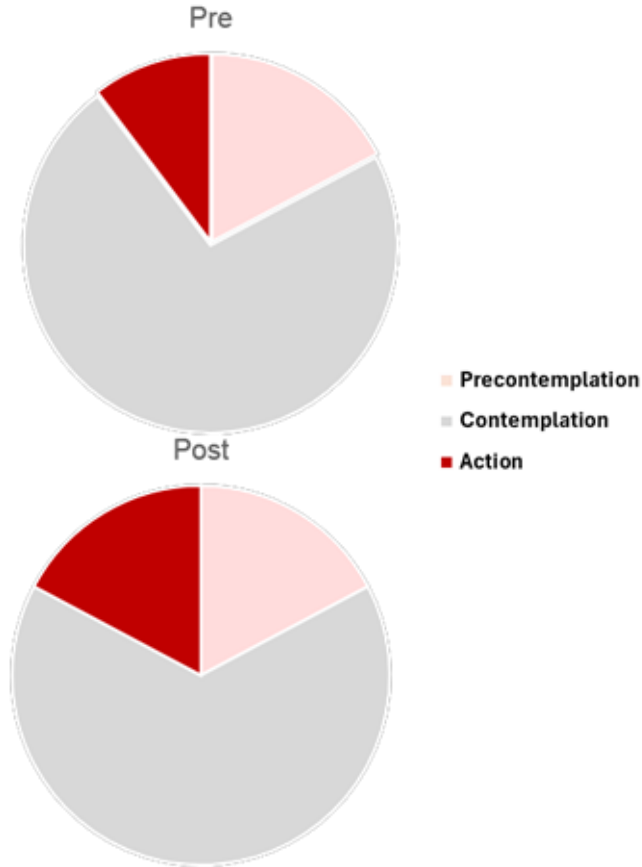
Using VAS score of 1-10



- On average **tonic craving decreases** (2.2 vs 1.7)
- Among clients, the variability of craving is high
- Some clients report **high tonic craving** → might require more **internal regulation**
- Future implementation **phasic craving and cue-exposure** → may be helpful for those with already low tonic craving

Indo-SURFT: URICA Stage of Change

Increased transitioners to either contemplation or action stage



- 4/30 (13.3%) **transitioned into Action**
- 3/30 (10%) **transitioned into Contemplation**
- 3/30 (10%) regressed to Precontemplation
- 2/30 (6.7%) regressed to Contemplation
- Significant change of URICA stages (χ^2 : 9.80, p : 0.007)*

*compared to equal distribution

Benefits from Group CBT



Participants' most favored session during CBT

- Healthy Relationship; Setting Boundaries in Relationship
- Commitment
- Compassion



- Better emotional regulation: anger management, adequate self boundaries, respect others → less conflict among inmates and family, feel better about herself
- Better knowledge regarding negative impact of substance use, craving, triggers and how to handle craving
- Know that there is such treatment for substance use disorder

However, CBT has its limitations..



Sterile environment in prison
≠/≠ outside world



May require booster
sessions

CBT targets cognitive and behavioral processes,
but may not fully **normalize altered neural circuits**
→ may need **adjunctive treatment**

When CBT Alone Is Not Enough, Adjunctive Neuromodulation Fills The Gap

Current Strategies



Psychotherapy

Targets **cognition, beliefs, coping skills, decision strategies, motivations**



Drugs

Most acts on **neurotransmitters** and peripheral signals

Potential Strategy



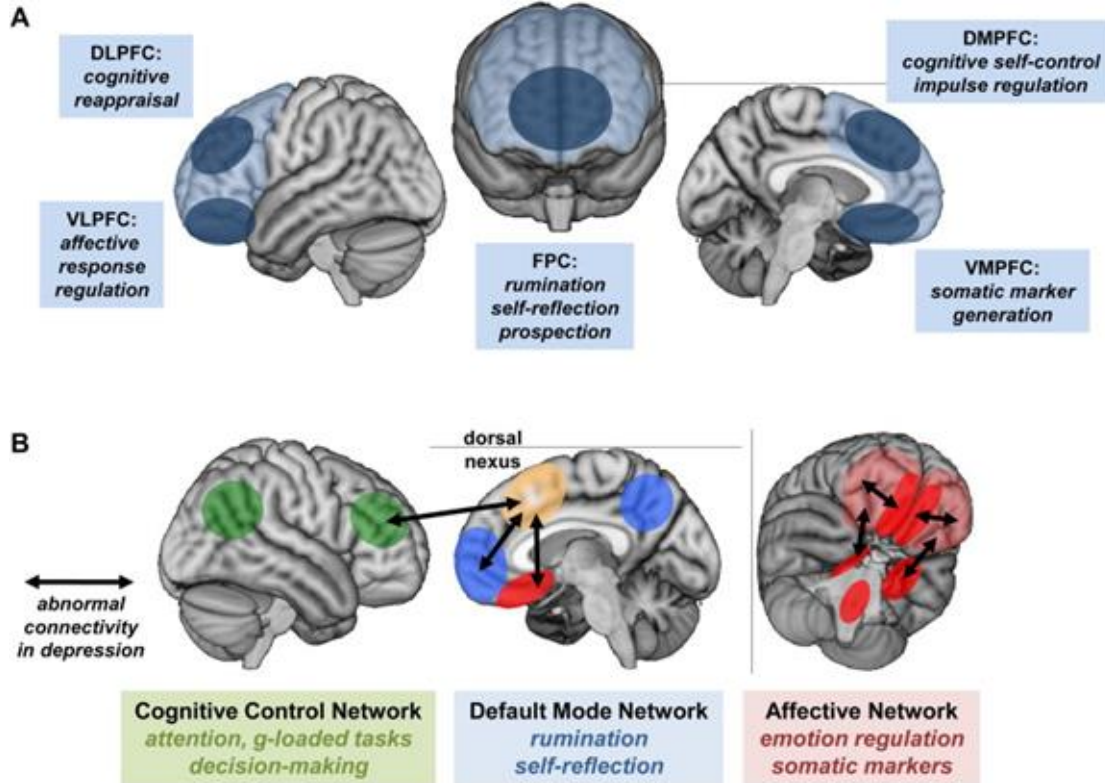
Circuit Interventions

Targets **Cue and Stress-Induced Craving**

Potential **synergistic** effect with current treatment modalities

Circuit interventions →
promising adjunct
particularly where
standard
psychosocial and
pharmacological care
is insufficient

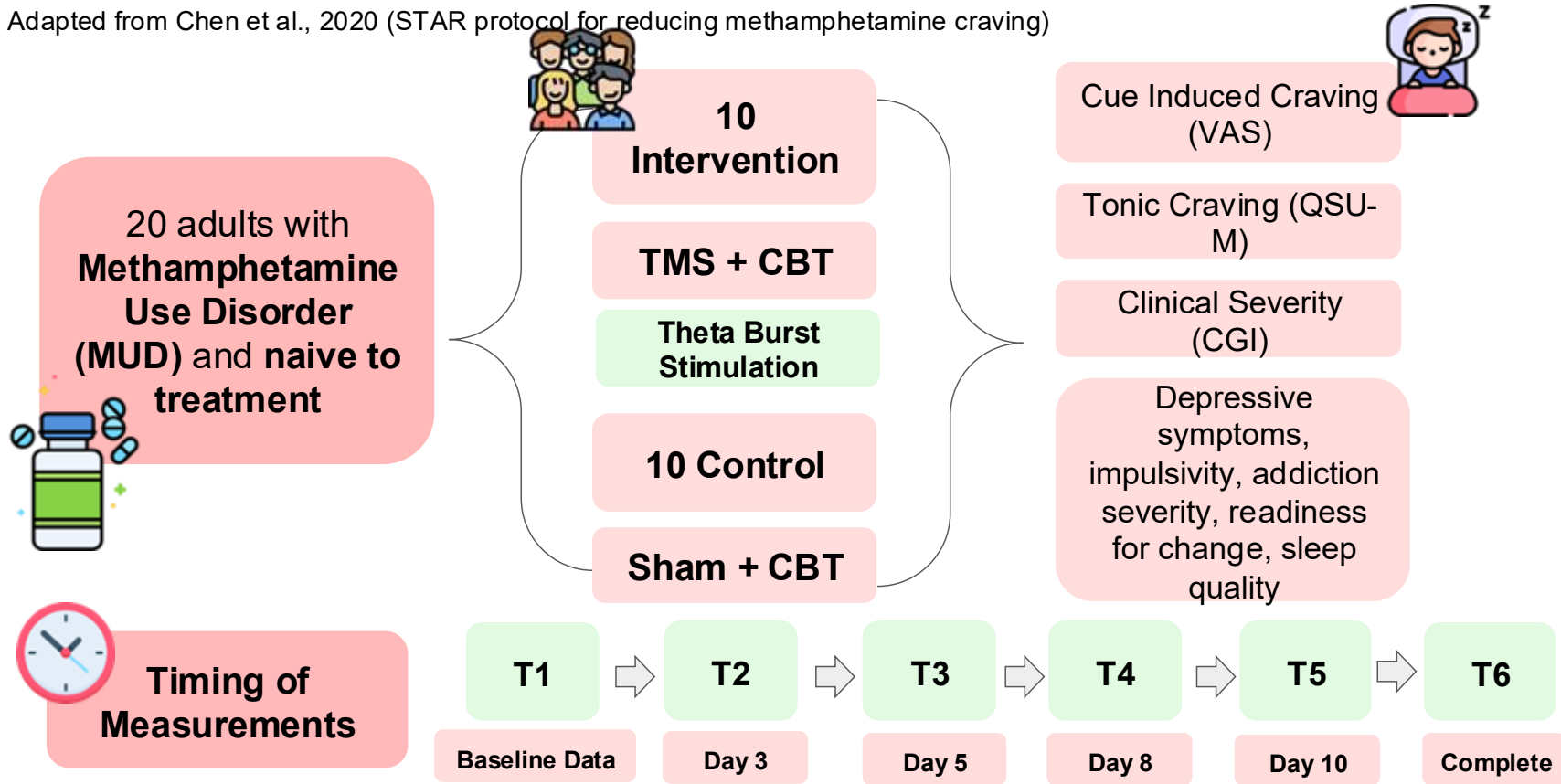
Adjunctive TMS effect on the brain



- Activation of DLPFC → strengthens cognitive reappraisal and the overall CEN network → **improved decision and executive processing**
- Allows for **better absorption and learning of CBT material**
- Possible mechanism to ameliorate participants with worse GRCS-GE

Effectiveness of Theta Burst Stimulation for Methamphetamine Use Disorder in Indonesia: A Randomized Controlled Trial

Adapted from Chen et al., 2020 (STAR protocol for reducing methamphetamine craving)



Theta Burst Stimulation (TBS)

Adapted from Chen et al., 2020 (STAR protocol for reducing methamphetamine craving)

DLPFC

iTBS (excitatory TMS)



DLPFC →
node in the
Central
Executive
Network

Stimulation Parameters

100% rMT for DLPFC, 110% for VMPFC

Schedule

5x/week, 2 weeks (10 session total), by trained medical doctors

VMPFC

cTBS (inhibitory TMS)



VMPFC →
valuation hub in
Salience
Network

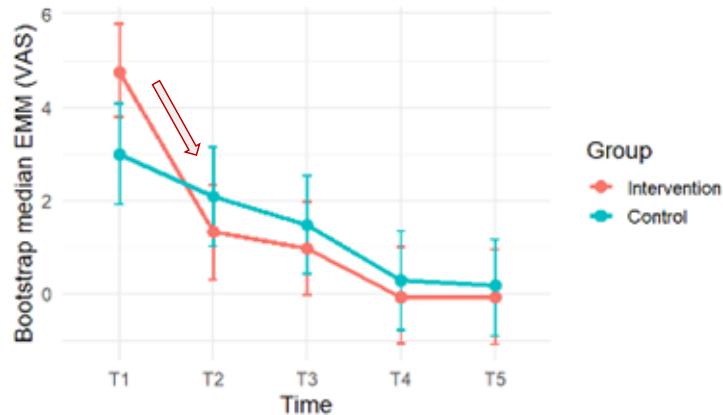
CBT

All patients receive standard CBT module

Effectiveness of Theta Burst Stimulation for Methamphetamine Use Disorder in Indonesia: A Randomized Controlled Trial



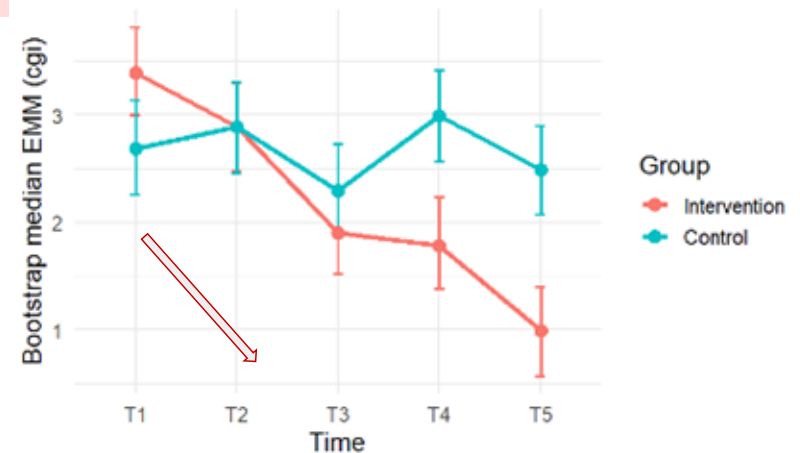
Visual Analog Scale (VAS)



- Decreased over time in the intervention group → 5.02 at baseline to 1.61 at T5 ($p < 0.001$)
- Group-by-time → **greater and faster VAS reduction** in the intervention group over time



Clinical Global Impression (CGI)



- Group-by-time interaction → greater improvement of CGI score compared to the Sham group over time ($p < 0.001$)

Take Home Message

1. Women with MUD in prison have **complex treatment needs with poorer prognosis if untreated**
2. CBT can improve **coping, functioning (self-efficacy), craving, and trigger awareness**
3. CBT benefits may not last forever, and **craving and relapse risk** persist
4. **TMS (iTBS & cTBS)** may be useful as adjunctive to CBT → targeting brain circuits involved in **craving and control**
5. Best care should combine **biological, psychological, and social approaches**

THANK YOU!



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