Mindfulness, An Antidote to Addiction

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"I will quit drinking when I find something better than booze."

- An addict

Dual Process Model of Addiction

- Repeated drug use →
  1) atrophy in **prefrontally** mediated **cognitive control** networks
  2) hijacks **striatal natural rewards** circuits

→ compulsive seeking drug-related rewards

- Addiction → dys-regulated interactions between **bottom-up reward learning** neural processes(**VS**) and **top-down executive function**(**ACC, LPFC**)
  : Dual Process model

Garland, etc., Neuroscience and Neuroeconomics 2016:5 55-63

Two Cardinal Features of Addiction

- (1) impaired ability to regulate the drive to obtain and use drugs (i.e., relapse),
- (2) reduced drive to obtain natural rewards.

- Peter W Kalivas & Charles O'Brien

Drug Addiction as a Pathology of Staged Neuroplasticity

Neuropsychopharmacology volume 33, pages 166–180 (2008)

Neurobiological Action Mechanisms of Mindfulness to Addiction

- MBIs → regulating fronto-striatal circuits →

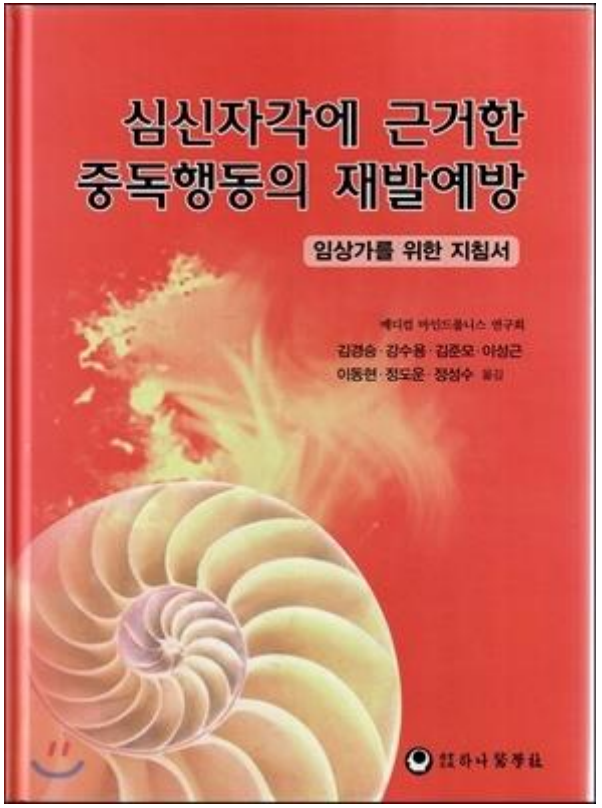
  1) facilitate cognitive control over drug-related automaticity, attentional bias, and drug-cue reactivity

  2) enhancing responsiveness to natural rewards

Garland, etc., Neuroscience and Neuroeconomics 2016:5 55-63

MBIs for Addictive Behaviors

- 1. Mindfulness-Based Relapse Prevention(MBRP)
- 2. Spiritual-self schema(3S) therapy
- 3. Mindfulness-Oriented Recovery Enhancement(MORE)
- 4. Mindfulness-Based Recovery from Addictive Disorders(MBRA)



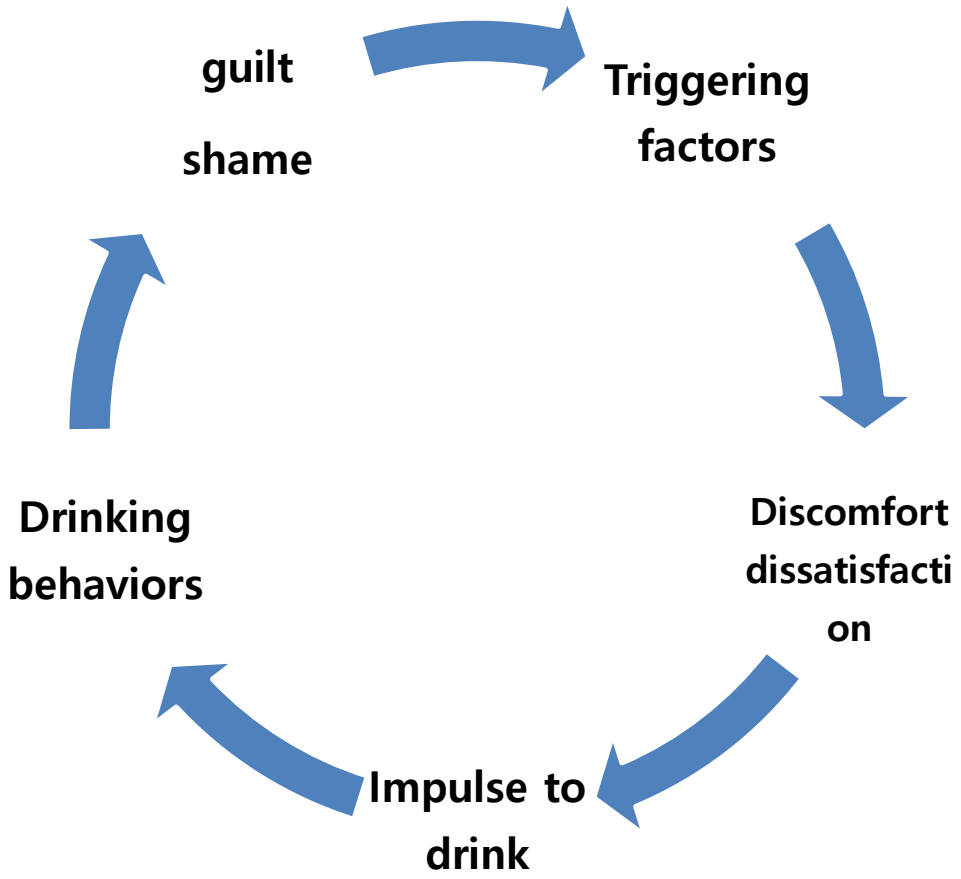
Mindfulness-Based Relapse Prevention : MBRP

- 2005, created by Drs. Marlatt , Witkiewitz, Walker at University of Washington
- 8-session group program
- Integrates **cognitive behavioral** relapse prevention skills & mindfulness practice
- "With **better awareness** of **triggering factors** for drug use and **habitual reactions** to these, one develops **new relationship** with these, and learn concrete skills to be used in high risk situations.

  (Marlatt, 2010)

"Autopilot Mode" → Awareness

S. Bowen, 2013



Sessions of MBRP Program

- Session 1: Automatic pilot and relapse
- Session 2: Awareness of triggers and craving
- Session 3: Mindfulness in daily life
- Session 4: Mindfulness in high-risk situations
- Session 5: Acceptance and skillful action
- Session 6: Seeing thoughts as thoughts
- Session 7: Self-care and life style balance
- Session 8: Social support and continuing practice

Spiritual Self-Schema Therapy

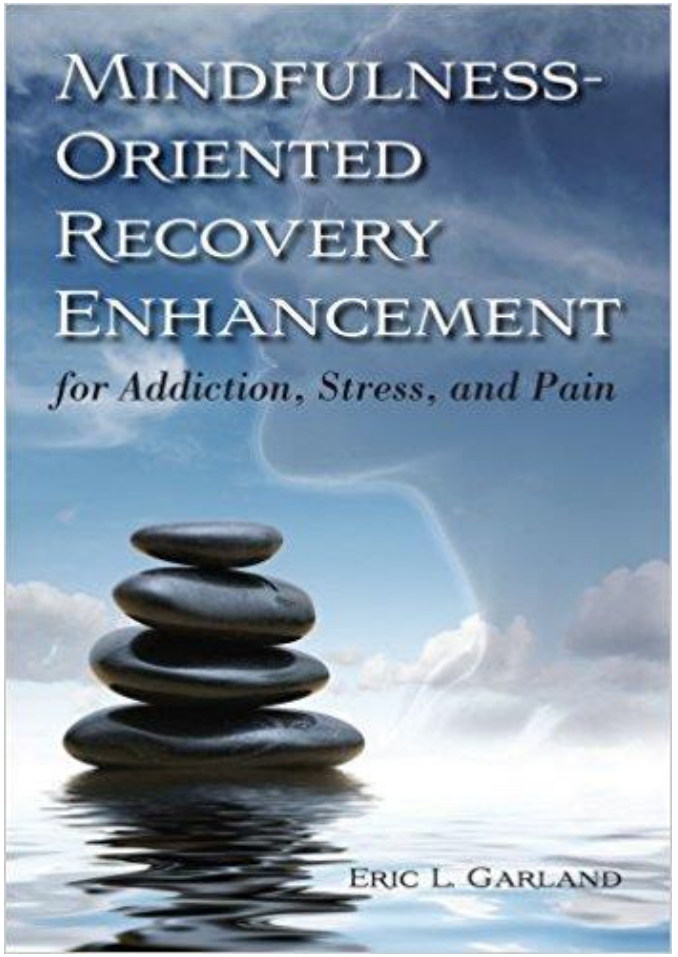
- Yale University, Avants SK, Margolin A.
- 8 session Group/Individual Program
- Making the shift from 'addict self' to 'spiritual self'
- Based on Noble Eightfold Path & Three Trainings (ethics, concentration, wisdom)
- 1. One realizes that **addict self** is not their true self, but a form of **habitual pattern** which is automatically activated to harm self and others based on the network of thought, emotion & behavior related to addictive behavior.
- 2. Make a shift from addict self to **spiritual self** and enrich it further.

From Addict Self to Spiritual Self

- **Training to become master of the mind (meditation)**
  - effort
  - concentration
  - awareness
- **Training of morality (ethics)**
  - cope with impulse for drink
  - morality in daily life
- **Training of wisdom (wisdom)**
  - thought (intention, craving)
  - understanding

Mindfulness-Oriented Recovery Enhancement Program

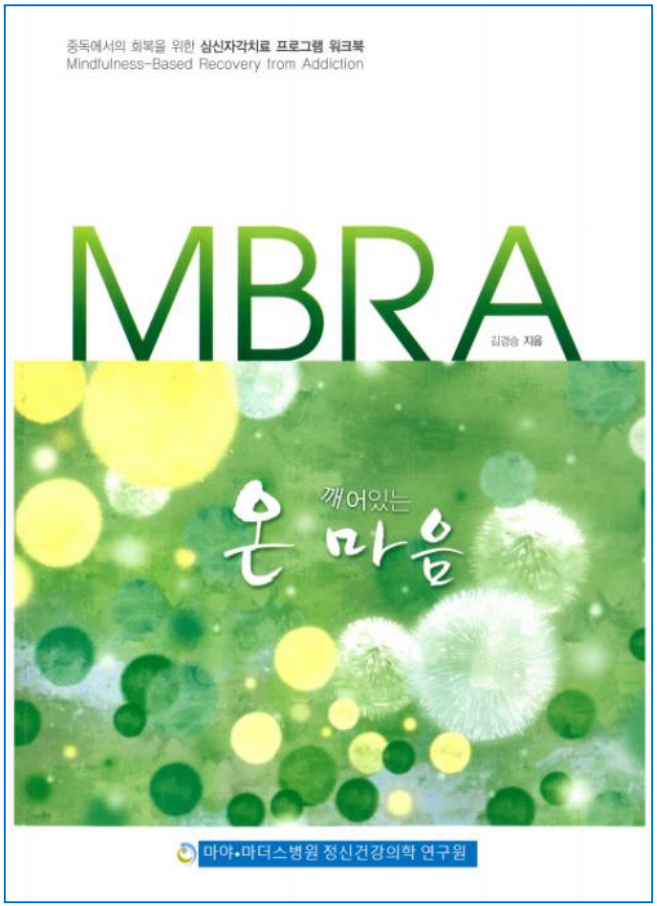
- Eric Garland, Utah College of Social Work
- 10 session group therapy
- **3 therapeutic bases**
  - mindfulness training
  - cognitive restructuring
  - positive psychological principles
- **Foundation of MORE**
  - mindfulness
  - reappraisal
  - savoring



MORE 10 Sessions

- 1. Mindfulness and the automatic habit of addiction
- 2. Mindful reappraisal
- 3. Savoring life with mindfulness
- 4. Mindfulness of craving
- 5. Overcoming craving by coping with stress
- 6. Walking the middle way between attachment and aversion
- 7. Mindfulness of the impermanent body
- 8. Defusing relationship triggers for relapse
- 9. Interdependence and meaning for recovery
- 10. Looking mindfully toward the future

Overview



- 8-sessioned group therapy
  - available also as individual therapy
- weekly, 90 min.
- Session format
  - Prologue :
    Reading ‘What is mindfulness?’,
    ‘Mindfulness 10 Commandments’,
    5 Behavioral principles of mindfulness
  - Review of previous session and homework
  - Theme Lecture
  - Learning formal & informal practices
  - Homework assignment

Structure of MBRA according to practices

- Session 1 : overviews
  - Mindfulness 10 commendament
  - **Breathing awareness**
- Session 2 : negative emotions
  - **mindfulness trio technique**
  - **body scan**
- Session 3 : stress
  - **mindfulness 5-steps exercises**
  - **sitting meditation,** breath and body awareness
- Session 4 : craving and urge
  - **surfing urge**
- Session 5 : pain and suffering
  - **sitting meditation, sounds and mind awareness**
- Session 6 : participation and connection
  - **mindful yoga**
- Session 7 : self-soothing, self-love
  - **loving-kindness meditation**
- Session 8 : happiness
  - **walking meditation**

KT LTE 오후 2:31 62%

마음의 달인

MindMaster

심신자각과 명상을 통한 스트레스 완화와
정신건강증진 어플리케이션

무료 명상 앱(APP)

마음의 달인

MindMaster

몸과 마음의 쉼표, 명상을 만나다.

마음의 달인에서는 스트레스, 불안, 불면, 우울 등의
다양한 정신건강 문제의 완화와 심신의 안정을 위한
100여종의 명상이 준비되어 있습니다.

아래의 다운로드 방법을 참고하여 스마트폰에 다운 받으세요.

보건복지부 울산광역시 울산광역정신건강복지센터

MindMaster

- Application for stress reduction and mental health enhancement based on mind-body awareness and meditation
- Restful Pause for Body and Mind, an encounter with meditation
- MindMaster has prepared 100 plus meditation methods to give relief to your diverse mental health issues and to relax your body and mind.

Mindfulness State, Trait, Practice

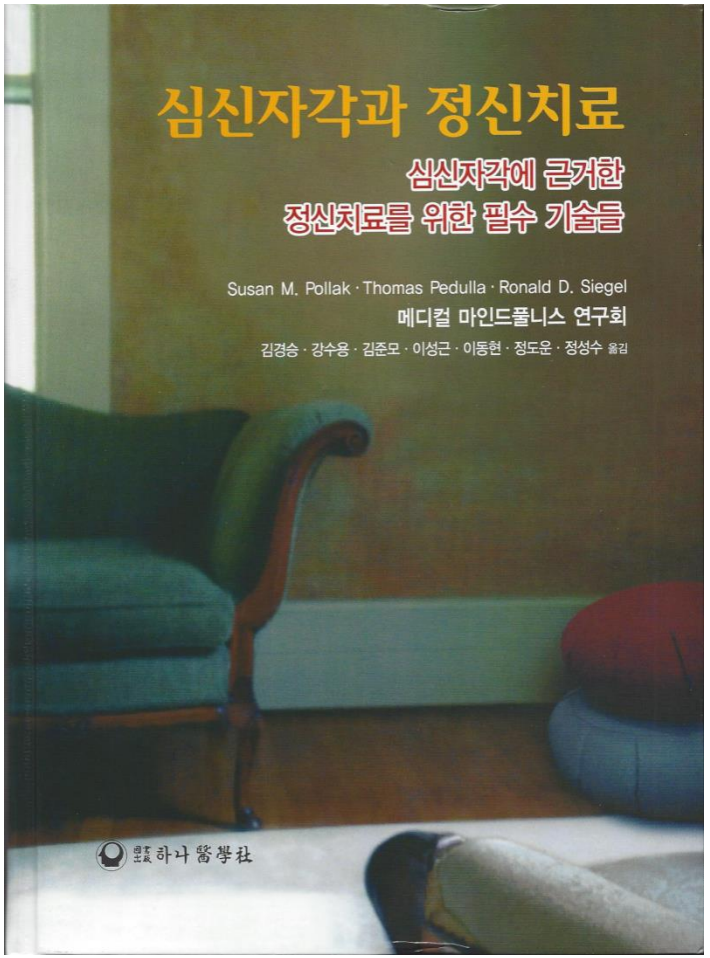
- **Mindfulness state**
  - a state of metacognitive awareness (Garland, etc., 2018)
  - optimal state of mind (D. Siegel, 2018)
  - Calm and clear (Huineng, *Platform Sutra*)
  - Tranquil emptiness and subtle awareness (Jinul, *Straight Talk on the True Mind*)

Mindfulness Practice

- **3 Major Skills of Therapeutic Mindfulness**

1. Focused attention (concentrative attention)
2. Open monitoring (receptive attention)
3. Compassionate acceptance

- Sitting Together, Susan M. Pollack, etc., 2014



Mindfulness Trait

- Mindfulness practice → repeated activation of the state of mindfulness → kindling neuro-cognitive plasticity → enhanced mindfulness trait
- Ability to **observe** internal-external experiences, recognize emotional state, and become **aware** automatic reactions
- Ability to be **nonreactive** to distressful thoughts and emotion, and dwell in **receptive** state
- **Clinical impacts** of MBIs are mediated by increase of trait mindfulness (Fox KC, et al. 2014)
- **Trait mindfulness is an antidote to addictive behavior**

Garland and Howard *Addict Sci Clin Pract (2018) 13:14*

Five Facets Mindfulness Questionnaire : FFMQ

- *Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. Assessment, 13(1), 27-45.*
- **1. Observing**
  - "Walking down the street, I am intentionally aware the sensation of my body moving."
- **2. Describing**
  - "I am good at finding words to describe my emotion."
- **3. Acting with awareness**
  - "I am rarely attentive to what I do due to daydreaming, worries, or distractions."
- **4. Non-judging inner experience**
  - "I criticize myself when I feel irrational or inappropriate emotions."
- **5. Nonreactivity**
  - "I watch my emotions without being swept into them."

  (39 questions in total)

Mindfulness Trait is An Antidote to Addictive behavior

- Mindfulness trait was significantly inversely associated with substance use; Karyadi KA, VanderVeen JD, Cyders MA. A meta-analysis of the relationship between trait mindfulness and substance abuse behavior. *Drug Alcohol Depend. 2014 October 1; 143: 1–10.*

- With cravings;

  Katie Witkiewitz, Sarah Bowen, PHD, Haley Douglas, and Sharon H. Hsu. Mindfulness-Based Relapse Prevention for Substance Craving. *Addict Behav. 2013 Feb; 38(2): 1563–1571*

- **Craving** was negatively associated with the **total trait mindfulness score** and the mindfulness facets of **nonreactivity, nonjudging, describing emotional experience, and acting with awareness**, but was not associated with the **observing** facet of mindfulness.

Garland EL, Roberts-Lewis A, Kelley K, Tronnier C, Hanley A. Cognitive and affective mechanisms linking trait mindfulness to craving among individuals in addiction recovery. *Subst Use Misuse. 2014;49(5):525–35.*

Mindfulness Trait is An Antidote to Addictive behavior

- Mindfulness trait was positively associated with the ability to **disengage attention** and recover autonomic function following exposure to **addiction-related cues**

Garland EL. Trait mindfulness predicts attentional and autonomic regulation of alcohol cue-reactivity. *J Psychophysiol. 2011;25(4):180–9.*

Garland EL, Boettiger CA, Gaylord S, Chanon VW, Howard MO. Mindfulness is inversely associated with alcohol attentional bias among recovering alcohol-dependent adults. *Cognit Ther Res. 2012;36(5):441–50.*

1. Natural reward enhancement thru savoring → Restructuring reward

- MBIs → Enhanced sensation of reward by **paying attention to pleasant objects & experiences (e.g. nature, food)** → increase of positive emotion (Quoiback, etc., 2010) & reverse action to reward pathway's allostatic effect (Koob & Le Moal, 2001)

- MBIs (= savoring) → Reinforce top-down & bottom-up functional connectivity of brain circuits → Reverse allostatic process which hijacks normal reward learning → From drug-related reward to natural reward

보상 재구조화 가설을 지지하는 증거들

- Short mindfulness exercise at meal leads to increased enjoyment of the meal

Hong PY, Lishner DA, Han KH, Huss EA. The positive impact of mindful eating on expectations of food liking. Mindfulness. 2011;2(2):103–13.
Hong PY, Lishner DA, Han KH. Mindfulness and eating: an experiment examining the effect of mindful raisin eating on the enjoyment of sampled food. Mindfulness. 2014;5(1):80–7.

- 8-week mindfulness training increased reward from pleasant activities in daily life

Geschwind N, Peeters F, Drukker M, van Os J, Wichers M. Mindfulness training increases momentary positive emotions and reward experience in adults vulnerable to depression: a randomized controlled trial. *J Consult Clin Psychol. 2011;79(5):618.*

Increase of natural reward & decrease of craving

- MBIs → increasing natural reward → reduce craving and addictive behavior
- MORE → significant increase in cardiac- autonomic and elctrocortical responses to natural reward stimuli → associated with decreased opioid craving

Garland EL, Froeliger B, Howard MO. Effects of mindfulness-oriented recovery enhancement on reward responsiveness and opioid cue-reactivity. *Psychopharmacology. 2014;231(16):3229–38. 31.*

Garland EL, Froeliger B, Howard MO. Neurophysiological evidence for remediation of reward processing deficits in chronic pain and opioid misuse following treatment with mindfulness-oriented recovery enhancement: exploratory ERP findings from a pilot RCT. *J Behav Med. 2015;38(2):327–36.*

2. Improving Executive Function

- MBIs → strengthening top-down cognitive control
  → improving self-control over automatic habits, decision-making, response inhibition
  →deautomatization of addictive responses
  →reducing drug use and maintaining abstinence

Brief meditation training induces smoking reduction

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Contributed by Michael I. Posner, June 25, 2013 (sent for review June 1, 2013)

More than 5 million deaths a year are attributable to tobacco smoking, but attempts to help people either quit or reduce their smoking often fail, perhaps in part because the intention to quit activates brain networks related to craving. We recruited participants interested in general stress reduction and randomly assigned them to meditation training or a relaxation training control. Among smokers, 2 wk of meditation training (5 h in total) produced a significant reduction in smoking of 60%; no reduction was found in the relaxation control. Resting-state brain scans showed increased activity for the meditation group in the anterior cingulate and prefrontal cortex, brain areas related to self-control. These results suggest that brief meditation training improves self-control capacity and reduces smoking.

addiction | anterior cingulate cortex | brain state | integrative body–mind training | mindfulness

Smoking harms nearly every organ of the body, causing many diseases and compromising smokers' health (1). Despite the negative consequences, many smokers have difficulty quitting or even reducing tobacco use (2). In addition, many teenagers are added to the smoking roll each year and may be at risk for abuse of other substances (2). Because tobacco use is often thought of as a gateway to other drug use, reducing smoking might reduce the vulnerability of youths to cocaine and other drugs (3). Al-

Moreover, these positive changes were accompanied by increased brain changes of ACC and parasympathetic activity associated with a brain state of increased self-control (20, 30–33).

Because addictions, including smoking, involve ACC and adjacent PFC function related to self-control (12, 17), we hypothesize that improved self-control through short-term IBMT would reduce craving and smoking. To test this hypothesis, we advertised for volunteers wishing to reduce stress and improve performance. Among those who responded were 27 cigarette smokers and 33 nonsmokers. We then randomly assigned both smokers and nonsmokers to IBMT or RT groups. Both groups received 2 wk of training for a total of 5 h (*Materials and Methods*).

Results

We used objective measures of smoking amount (carbon monoxide level in parts per million), and ANOVAs were conducted with group (IBMT and RT) and training session (before and after) as factors. Before training, no differences in smoking amount were found among smokers in the two groups ($P > 0.05$). After training, the main effect of the training session was significant [$F(1,24) = 16.635$; $P = 0.000$], and the group–session interaction was also significant [$F(1,24) = 9.099$; $P = 0.006$]. Subsequent t tests indicated there was significant smoking reduction in the IBMT group ($P < 0.01$) but no significant reduction in the RT group ($P > 0.05$). Fig. 1 shows the amount of

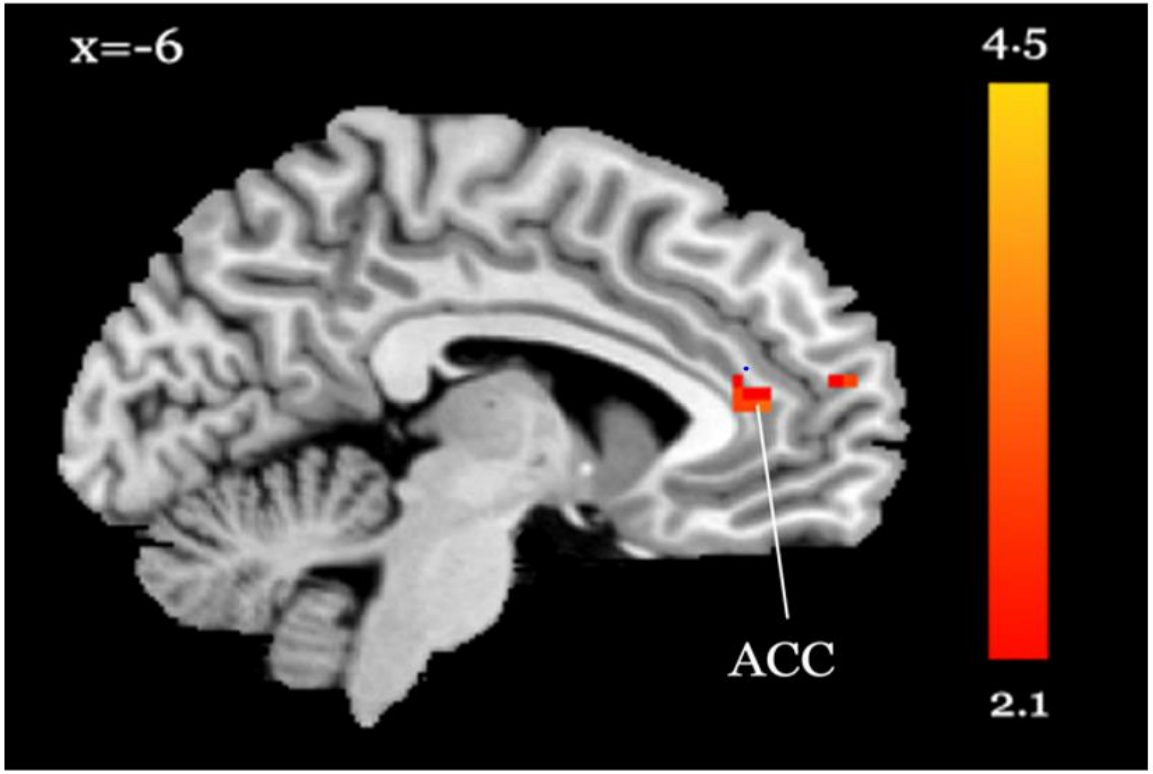


Fig. 2. Increased ACC activity after 2 wk of IBMT. After 2 wk of IBMT, we found significantly increased activity at ACC/medial PFC, orbitofrontal cortex, and inferior frontal gyrus/ ventrolateral PFC (displayed at *P*corrected < 0.05).

4. Decreasing Stress Reactivity and Augmenting Stress Recovery

- MT → **Reduce information processing distortion** in depression patients (De Raedt et al., 2011)
- 부정적 감정 신호에 대한 편도 반응도 감소 (Taylor et al., 2011)
- Amygdala volume reduction after 8-week mindfulness training. Greater volume reduction leads to greater stress reduction (Hoelzel et al., 2010)

5. Craving and Cue-reactivity

- MBIs → decreasing subjective craving and drug cue-reactivity → reducing addictive behavior
- MORE → reduced striatal response to cigarette cues

Froeliger B, Mathew AR, McConnell PA, Eichberg C, Saladin ME, Carpenter MJ, et al. Restructuring reward mechanisms in nicotine addiction: a pilot fMRI study of mindfulness-oriented recovery enhancement for cigarette smokers. *Evid Based Complement Alternat Med. 2017;8(2017):e7018014.*

- MORE → significantly reduce attentional bias toward opioid-cues

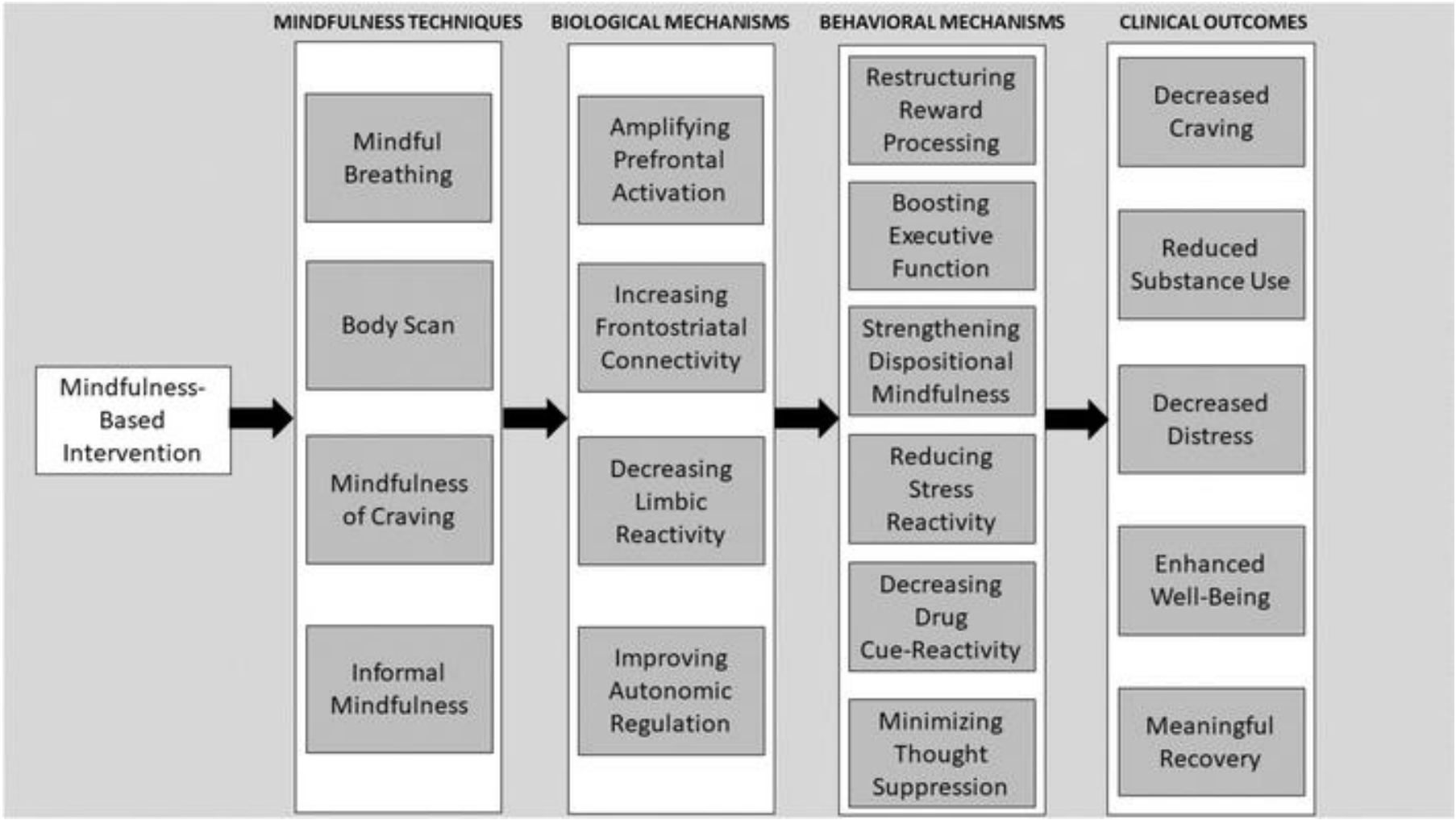
Garland EL, Baker AK, Howard MO. Mindfulness-oriented recovery enhancement reduces opioid attentional bias among prescription opioid-treated chronic pain patients. *J Soc Soc Work Res. 2017;28:493–509.*

Interception of drug use automatic behavior schema

- Inattention to drug-cue → increased drug consumption
- MT → **Increased attention to inducing factors** and existence of **craving** → Automatic decrease in drug consumption
- MT → **Increased awareness about activation of drug use automatic behavior schema** induced by drug-cue or negative emotions → Intercepting and coping with automatic addiction habit
- MT → **Increased access to unconscious process** (Strick etc., 2012), reduction in cognitive behavioral habit (Greenberg, etc., 2005) → **Increased awareness of automatic addictive behavioral tendency** & boost of conscious regulation

Conclusion : Mechanisms of Mindfulness on Addictive Diseases

Garland & Howard, 2018



Thank You for Listening