

The Effects of Three Mindfulness Skills on Chocolate Cravings



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Background and Current Study

- Food cravings are common and associated with maladaptive consequences (Gendall et al., 1998, Kemps et al., 2008).
- Mindfulness has been proposed as a relevant therapeutic approach to manage cravings based on its connection to Buddhism (Marlatt, 2003).
- There is accumulating evidence that mindfulness-based interventions are useful in reducing food cravings (e.g., Alberts et al., 2012). However, existing studies have applied many mindfulness skills together, rendering it unclear which skills are essential and which are unnecessary.
- The goal of the current study was to compare the efficacy of two-week mindfulness trainings, targeting different combinations of specific mindfulness skills at reducing trait and state chocolate cravings, and comparing them to an active control training. Based on existing mindfulness-based models (e.g., Bishop et al., 2004, Shapiro et al., 2006), we compared the efficacy of three mindfulness-based skills: **awareness: continuously monitoring one's momentary experiences**, **acceptance: letting these experiences come and go on their own without judging them**, and **disidentification: distinguishing oneself as separate from these experiences**.

Hypotheses

- Because acceptance and disidentification should decrease mental proliferation (Grabovac et al., 2011), developing these skills should result in a smaller increase in state craving intensity when exposed to chocolate, compared to distracting oneself or training in awareness alone without additional instruction.
- Based on mixed evidence for the efficacy of acceptance in reducing cravings (e.g., Alberts et al., 2013), we expected acceptance to be less effective than disidentification.
- With repeated practice disengaging from cravings, there should be a reduction in general desirability for chocolate (trait chocolate cravings), which should mediate the effect of acceptance and disidentification on state craving reactivity to being exposed to chocolate.
- Mindfulness skills targeted by the interventions should increase with training, and this increase should mediate the effects that the interventions have on reductions in trait cravings and state cravings when exposed to chocolate.

Methods

Conditions

We recruited university student "chocoholics" motivated to reduce chocolate cravings, which we randomly assigned to 1 of 5 conditions:

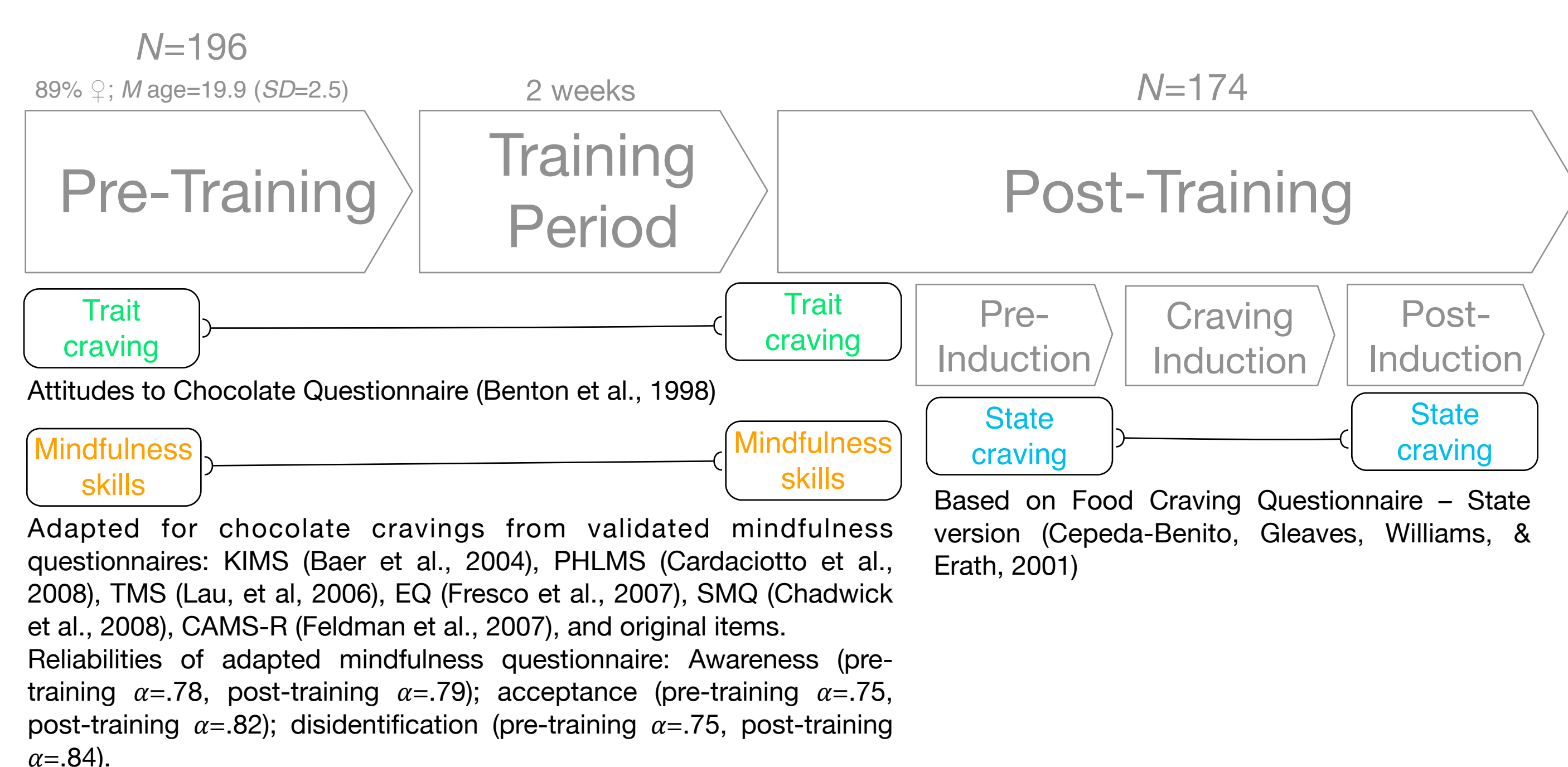
- Awareness (Aw)
- Awareness + Acceptance (Aw+Acc)
- Awareness + Disidentification (Aw+Dis)
- Awareness + Acceptance + Disidentification (Aw+Acc+Dis)
- Control (C)

Training Instructions

We trained participants in their assigned condition for two weeks on a daily basis. In response to every chocolate craving, they were instructed to:

- Aw:** Notice how the craving affects thoughts, sensations, and emotions.
- Acc:** "Surf the wave" of craving, allowing it to be there for now.
- Dis:** Label craving-related thoughts with "I'm having the thought that..."
- C:** Recite the alphabet and count multiples of 2's until 100.

Participants, Procedure, Measures



Results

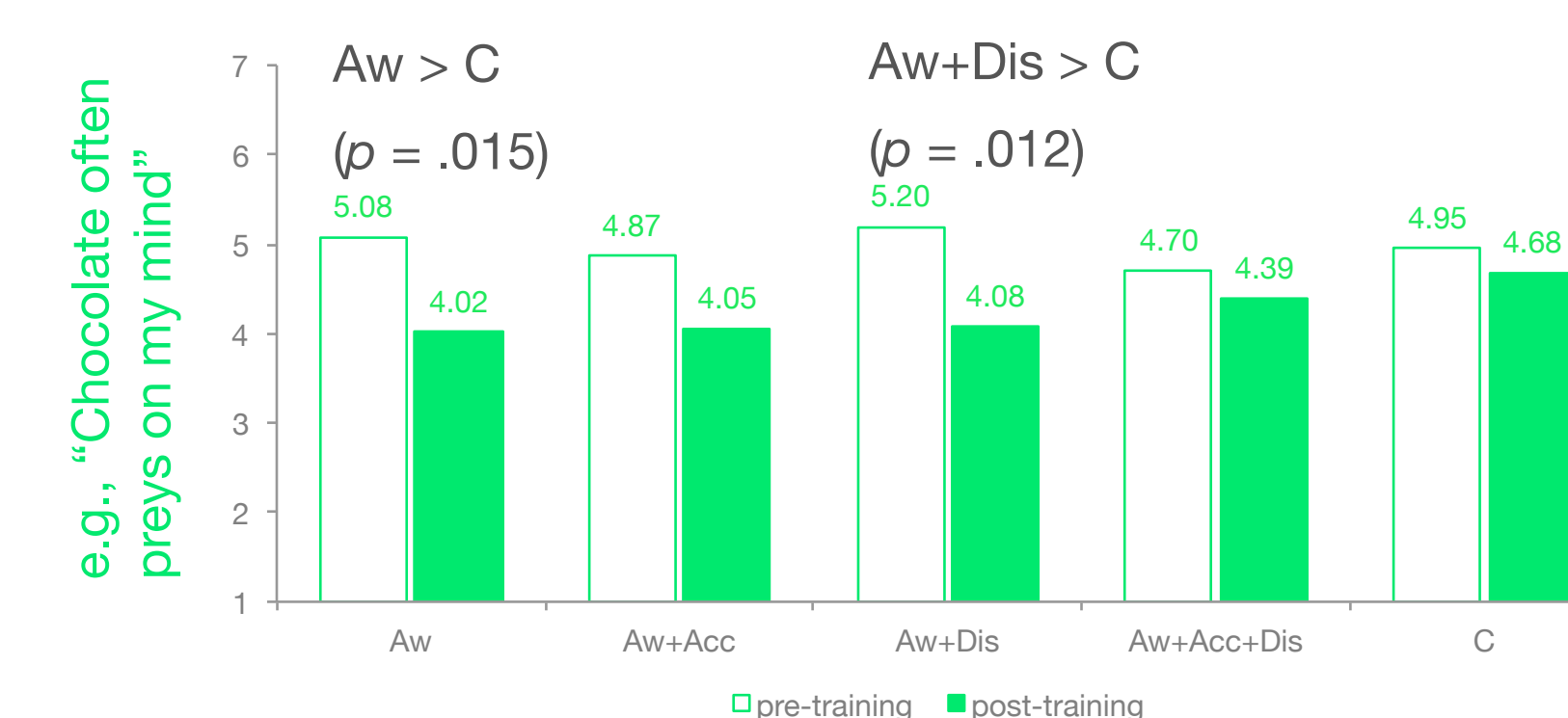
Exclusions

We excluded those who reported low adherence to training instructions during training period: below 2.3 (out of 4; bottom 25%) on adherence to instructions, resulting in $N=126$ for analyses. Same patterns of results was observed without exclusions.

Trait Craving

To test the decrease in trait cravings, we conducted a 2 (Time) by 5 (Condition) mixed ANOVA:

- Time: $F(1,121) = 44.06, p < .001, \text{partial } \eta^2 = .27$
- Time by Condition: $F(4,121) = 2.93, p = .024, \text{partial } \eta^2 = .09$

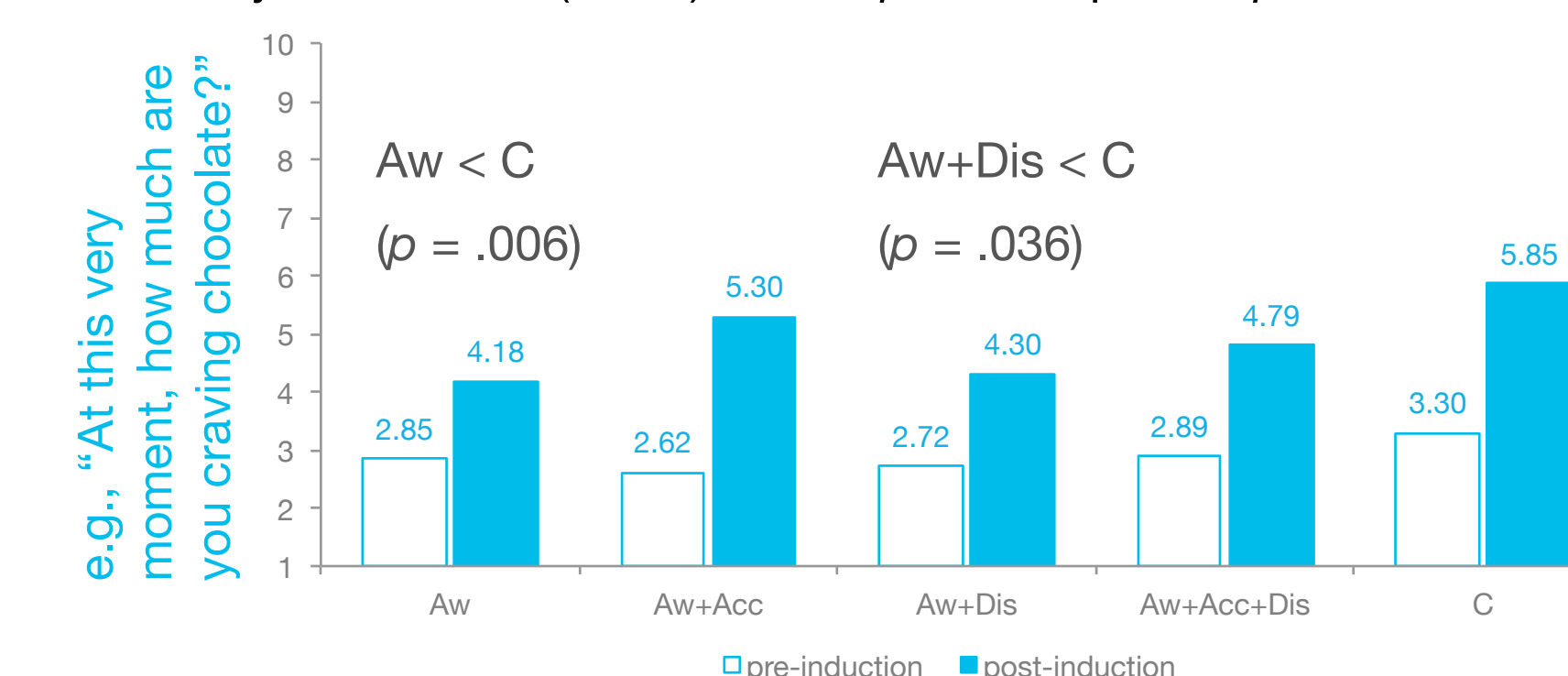


Those trained in Aw and in Aw+Dis reported greater reductions in trait chocolate cravings than those trained in C. Contrary to expectations, Aw+Acc and Aw+Acc+Dis conditions did not differ from C ($p = .111; p = .898$, respectively)

State Craving

To test whether state cravings increase to a lesser extent after being exposed to chocolate, we conducted a 2 (Time) by 5 (Condition) mixed ANOVA:

- Time: $F(1,121) = 178.37, p < .001, \text{partial } \eta^2 = .60$
- Time by Condition: $F(4,121) = 4.42, p = .016, \text{partial } \eta^2 = .10$



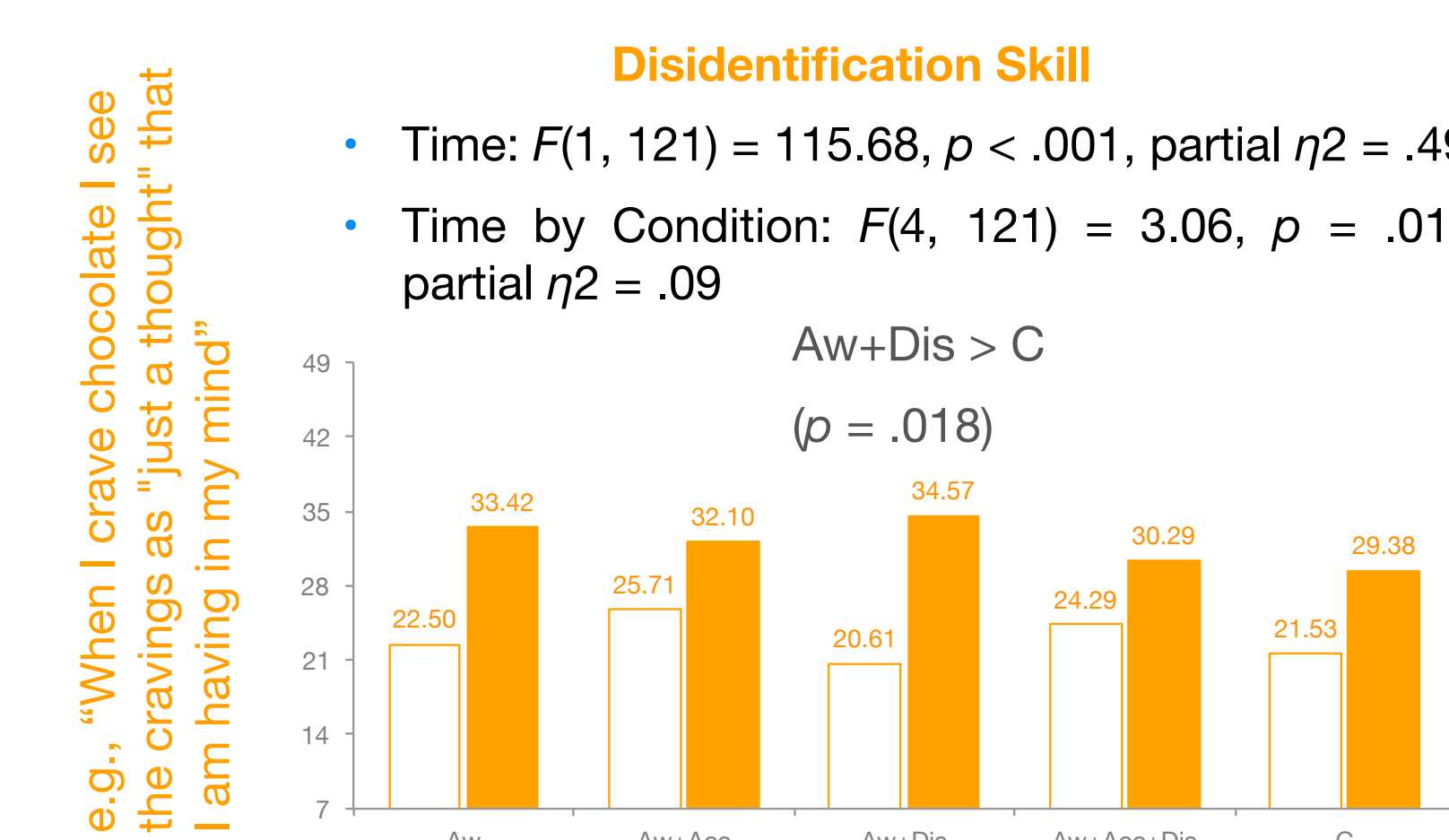
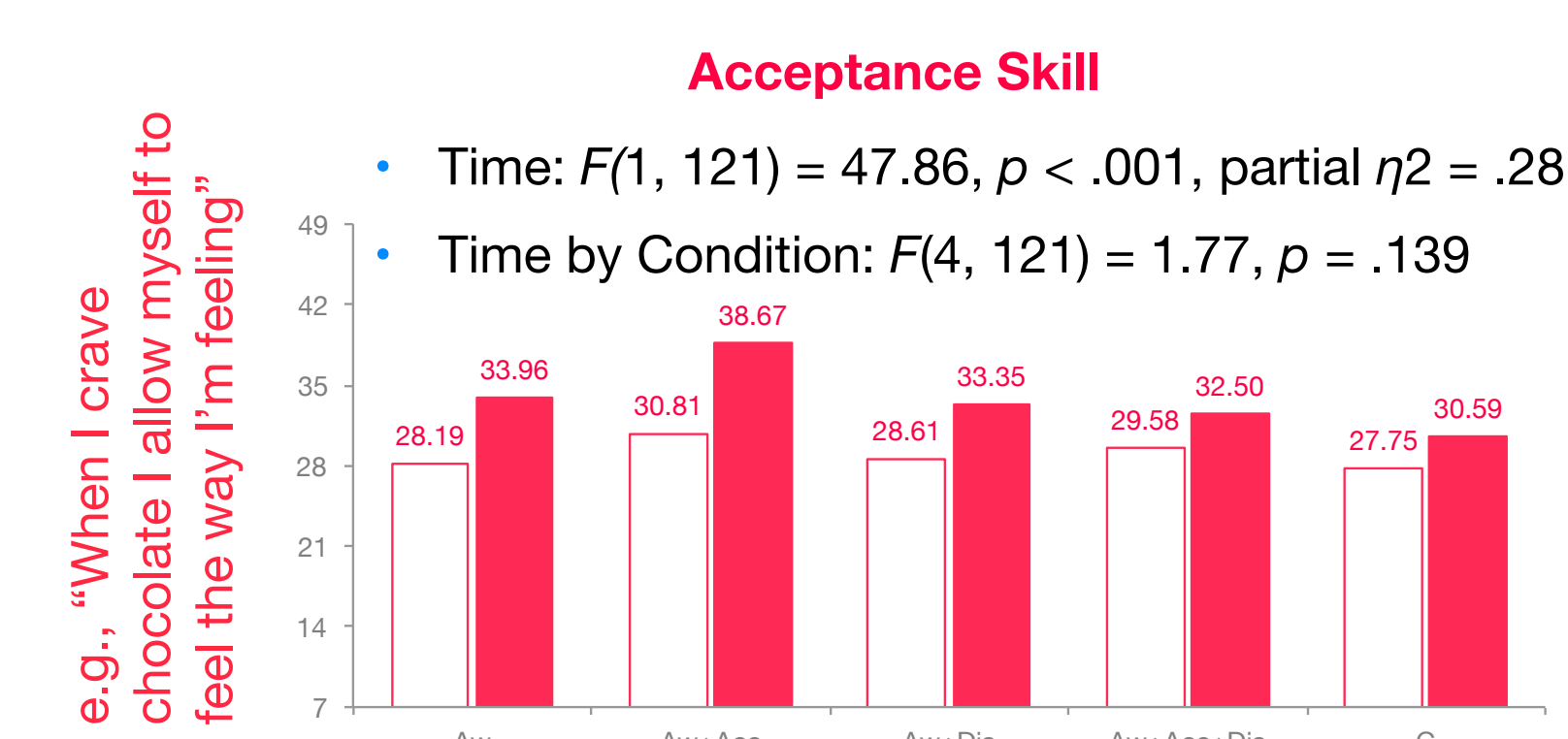
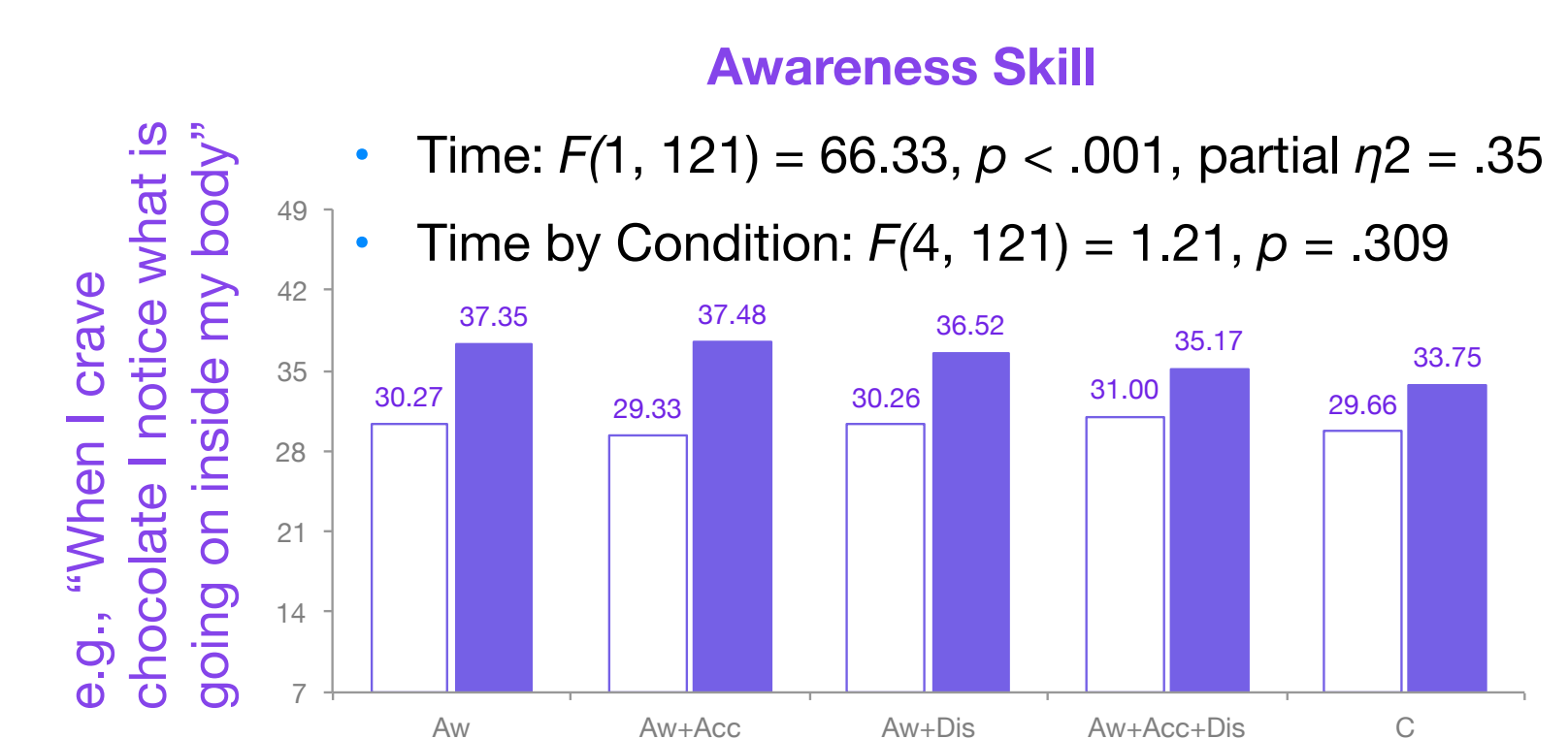
Those trained in Aw and in Aw+Dis reported experiencing smaller increases in state chocolate cravings after being exposed to chocolate than those trained in C. Unexpectedly, Aw+Acc and Aw+Acc+Dis did not differ from C ($p = .796; p = .151$, respectively)

Baseline Characteristics

Participants in different conditions did not differ on any baseline (e.g., age, gender, BMI, dieting status, dietary restraint, affect, meditation experience) and pre-training variables (all p 's $< .05$).

Mindfulness Skills

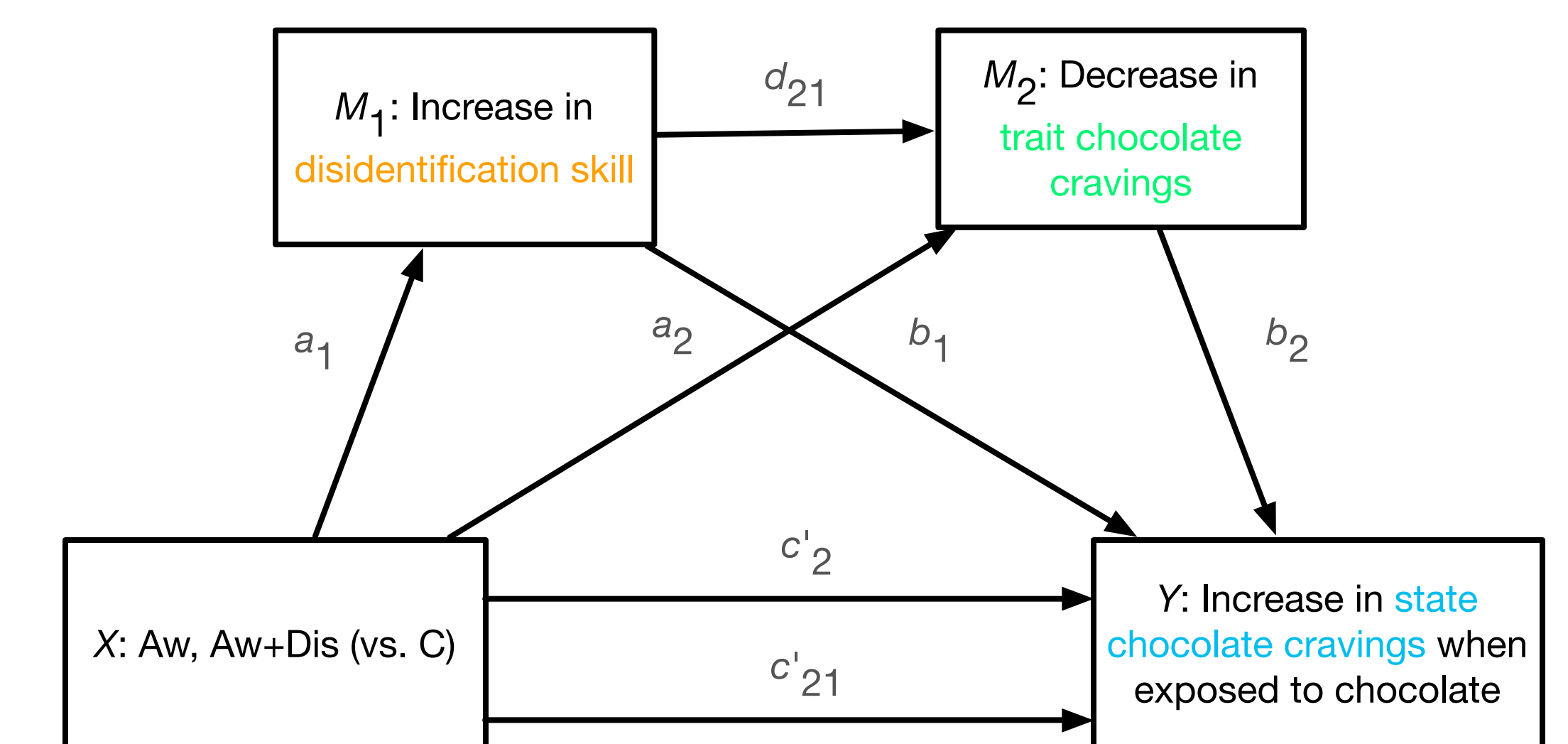
To test whether the training regimens were successful in teaching participants their respective mindfulness skills, we conducted three separate 2 (Time) by 5 (Condition) mixed ANOVAs:



Mediation Analyses

Based on the evidence that the Aw and the Aw+Dis interventions were more efficacious than C at reducing trait chocolate cravings and reactivity to chocolate exposure, and that the Aw+Dis intervention led to a significantly greater increase in the disidentification skill, we tested whether the increase in the disidentification skill explained the decrease trait chocolate cravings, and that this decrease in trait cravings subsequently explained the smaller increase in state craving when exposed to chocolate.

We conducted mediation analyses using Preacher and Hayes' (2008) bootstrapping method, using 5000 bootstrap samples and 95% confidence intervals (CIs).



Tested Path	Aw (vs. C)	Aw+Dis (vs. C)
	$\beta, 95\% \text{ CI [LL, UL]}$	$\beta, 95\% \text{ CI [LL, UL]}$
a, d_{21}	n/a	0.25 [.03, .67]*
a_2	n/a	0.59 [-.08, 1.26]
a, b_1	n/a	-.07 [-.41, .22]
b_1	n/a	-.91 [-1.81, -.00]*
a_2, b_2	-.22 [-.69, .01]	-.27 [-.73, -.02]*
c'_2	-1.00 [-1.90, -.11]*	.70 [-1.58, .18]
a, d_{21}, b_2	n/a	.08 [-.34, -.01]*
c'_{21}	n/a	-.71 [-1.62, .20]

* $p < .05$

Multi-mediation analyses supported our hypothesis that a reason why Aw+Dis led to smaller increases in state cravings when exposed to chocolate compared to C, was that it first increased participants' ability to disidentify from cravings, which subsequently led to an attitude change whereby chocolate was generally perceived to be less desirable.

Conclusions

- Disidentification seems to be a crucial mindfulness skill that can prevent the development of intense cravings when exposed to temptation by changing one's perception of the craved substance. Furthermore, disidentification can be taught in a relatively short timeframe, and is thus an ideal candidate as a strategy that can be included in real-world interventions designed to help people better manage their food cravings.
- One reason Aw+Dis led to the greatest increases in the disidentification skill is perhaps that disidentifying from cravings reduces the aversiveness of the craving experience and is thus easier to learn than accepting one's cravings, which involves fully experiencing the aversiveness of cravings.
- The ineffectiveness of the Aw+Acc and Aw+Acc+Dis interventions can perhaps be explained by the finding that these interventions did not seem to successfully teach participants acceptance. Longer-term or more rigorous interventions are likely necessary to teach acceptance to a greater extent (Alberts, Thewissen, & Middelweerd, 2013).
- It is not clear what what was responsible for the benefits of Aw, as participants did not show greater increases in the awareness skill than the C condition and the decrease in trait cravings did not explain the diminished reactivity when exposed to chocolate. Future investigations could clarify the mechanisms underlying the efficacy of Aw with cravings.

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