Effects of Mindfulness-Based Interventions on Obesogenic Eating Behaviors: A Systematic Review and Meta-analysis

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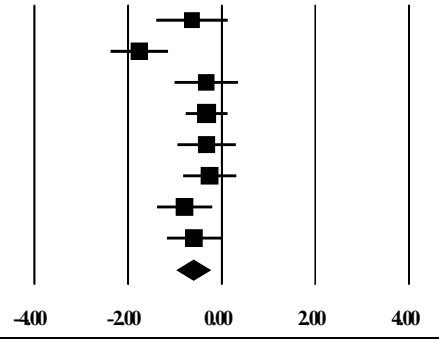
Supplemental Materials

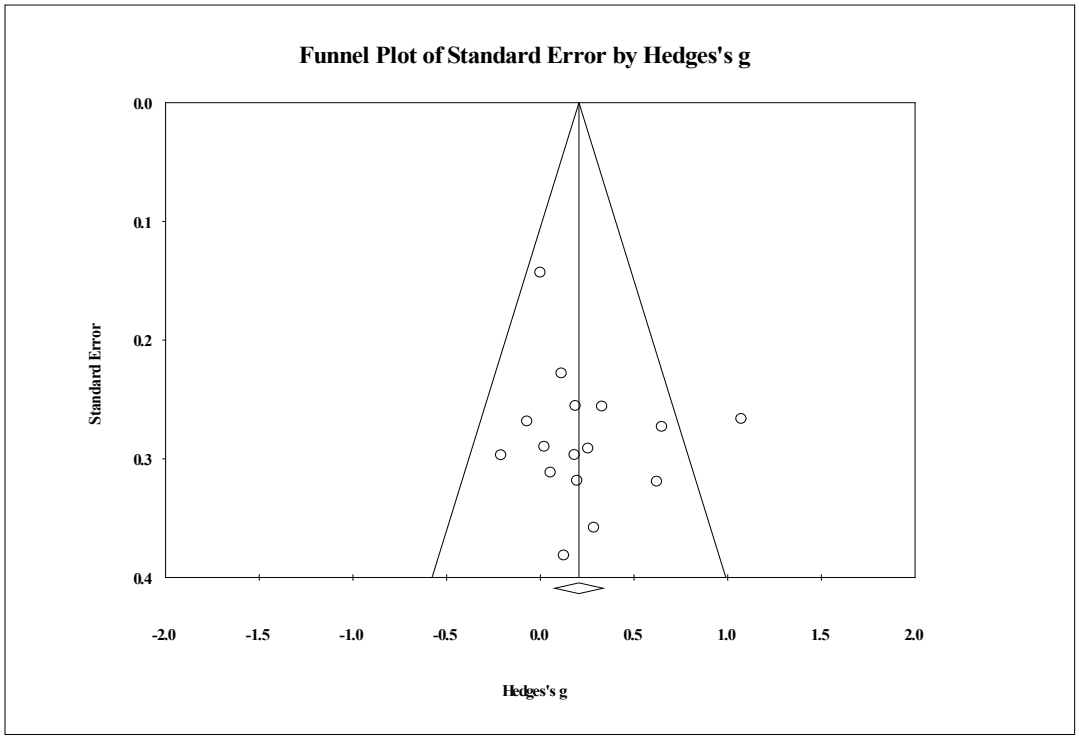
Supplemental Figure 1: Mindless-related Eating Habits: External Eating

Supplemental Figure 1.a. Forest plot for external eating

Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Alberts et al., 2012	-0.633	0.391	0.153	-1.399	0.133	-1.620	0.105
Sampaio 2021	-1.759	0.314	0.099	-2.375	-1.143	-5.595	0.000
Mercado, etal 2023	-0.328	0.347	0.120	-1.008	0.353	-0.944	0.345
Morillo-Sart0 etal 2023	-0.321	0.229	0.053	-0.770	0.129	-1.399	0.162
Jastreboff et al., 2018	-0.322	0.320	0.102	-0.949	0.304	-1.008	0.313
Tapper 2009	-0.255	0.291	0.085	-0.826	0.315	-0.878	0.380
Schnepper et al., 2019	-0.792	0.301	0.091	-1.382	-0.201	-2.627	0.009
Daubenmier,2011	-0.590	0.297	0.088	-1.171	-0.008	-1.989	0.047
	-0.617	0.175	0.031	-0.960	-0.275	-3.533	0.000



Supplemental Figure 1.b. Funnel plot for the external eating outcome

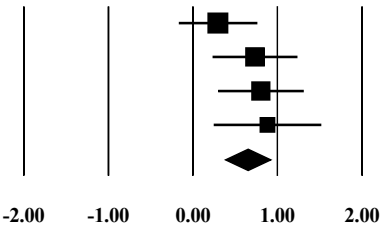


Note. Begg and Mazumdar rank correlation test (*Tau* = -0.43, p = .138), Egger's regression intercept test (β = -2.54, p = .554)

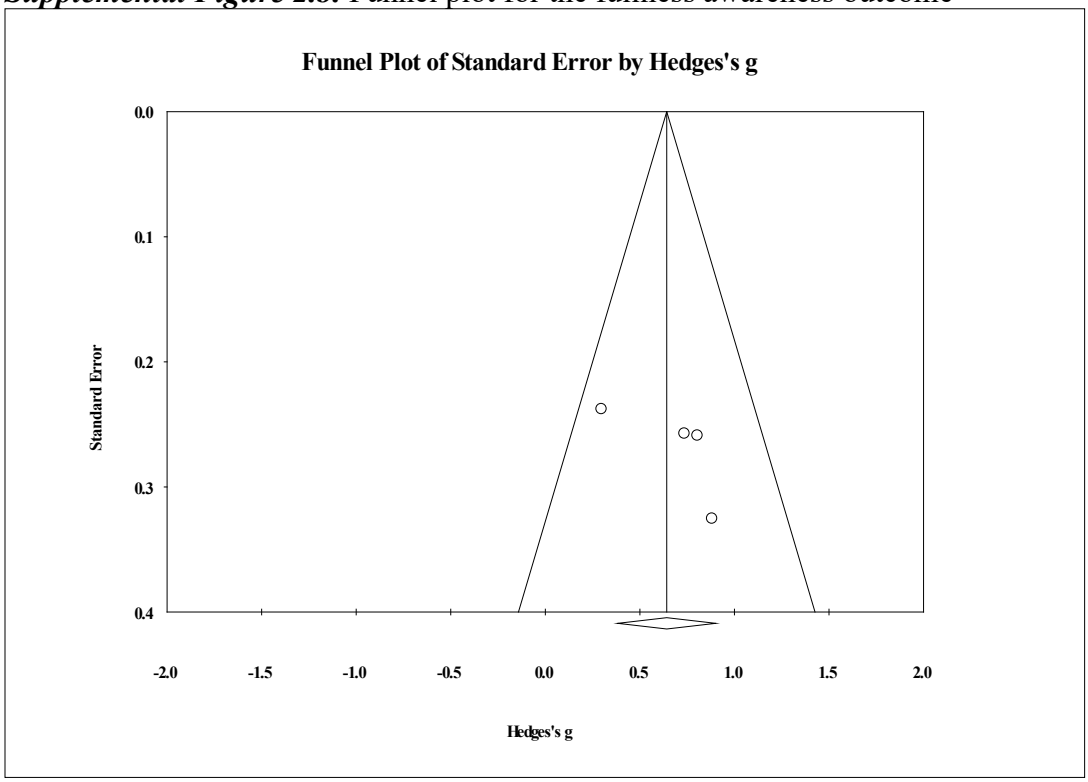
Supplemental Figure 2. Mindless-related Eating Habits: Fullness Awareness

Supplemental Figure 2.a. Forest plot for fullness awareness

Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Allirot et al., 2018	0.297	0.238	0.057	-0.169	0.763	1.249	0.212
Dunn,2018a	0.735	0.257	0.066	0.231	1.240	2.858	0.004
Dunn,2018b	0.804	0.259	0.067	0.297	1.312	3.107	0.002
Fisher et al., 2016	0.882	0.325	0.106	0.244	1.519	2.712	0.007
	0.644	0.136	0.019	0.377	0.911	4.725	0.000



Supplemental Figure 2.b. Funnel plot for the fullness awareness outcome

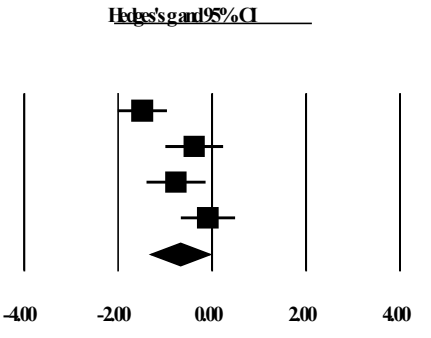


Note. Begg and Mazumdar rank correlation test (*Tau* = 1.00, p = .042), Egger's regression intercept test (β = 5.70, p = .295)

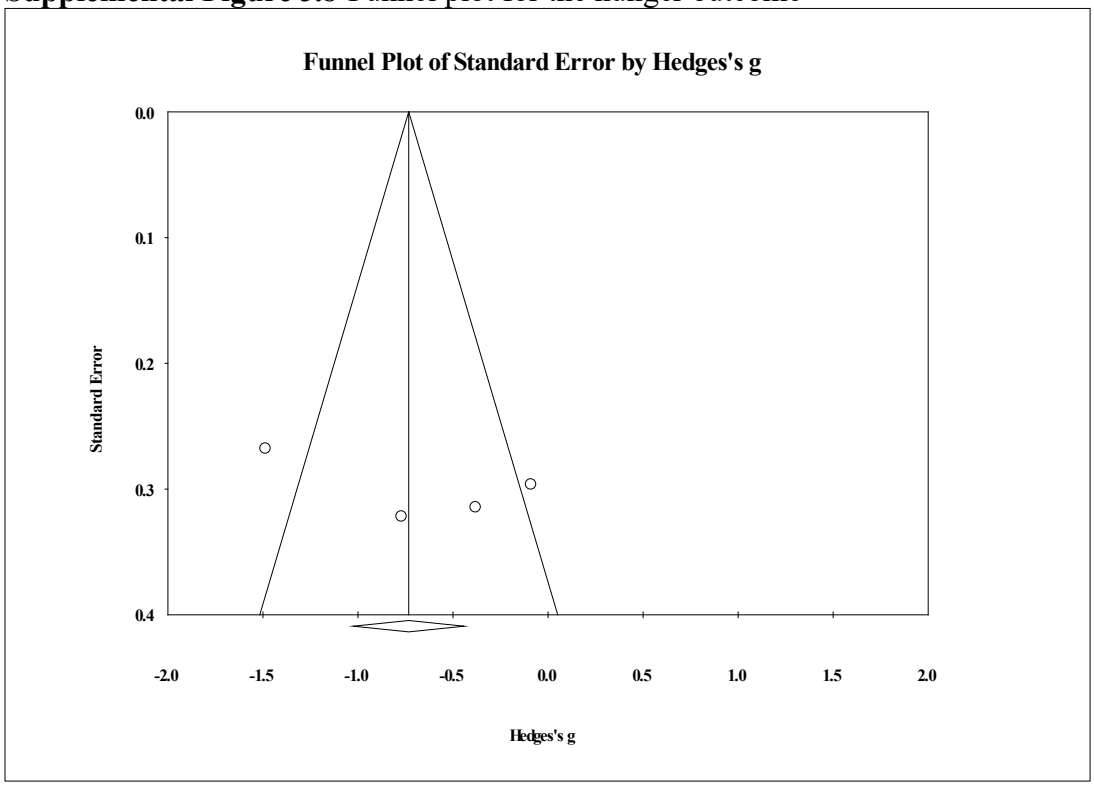
Supplemental Figure 3. Mindless-related Eating Habits: Hunger

Supplemental Figure 3.a. Forest plot for hunger

Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Allirot et al., 2018	-1.486	0.268	0.072	-2.011	-0.962	-5.553	0.000
Barnes et al., 2016	-0.381	0.314	0.099	-0.998	0.235	-1.213	0.225
Fisher et al., 2016	-0.771	0.322	0.104	-1.402	-0.141	-2.397	0.017
Spadaro et al., 2018	-0.090	0.296	0.088	-0.670	0.491	-0.303	0.762
	-0.692	0.322	0.104	-1.323	-0.061	-2.148	0.032



Supplemental Figure *3.b* Funnel plot for the hunger outcome

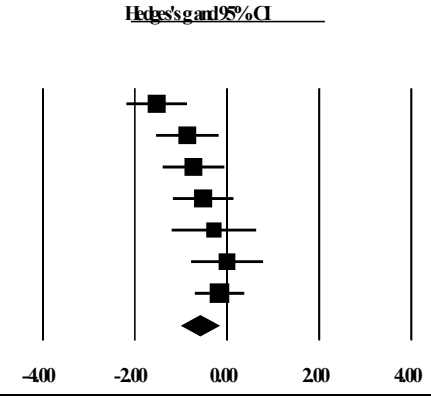


Note. Begg and Mazumdar rank correlation test (*Tau* = 0.00, p = 1.0), Egger's regression intercept test (β = 16.96, p = .342)

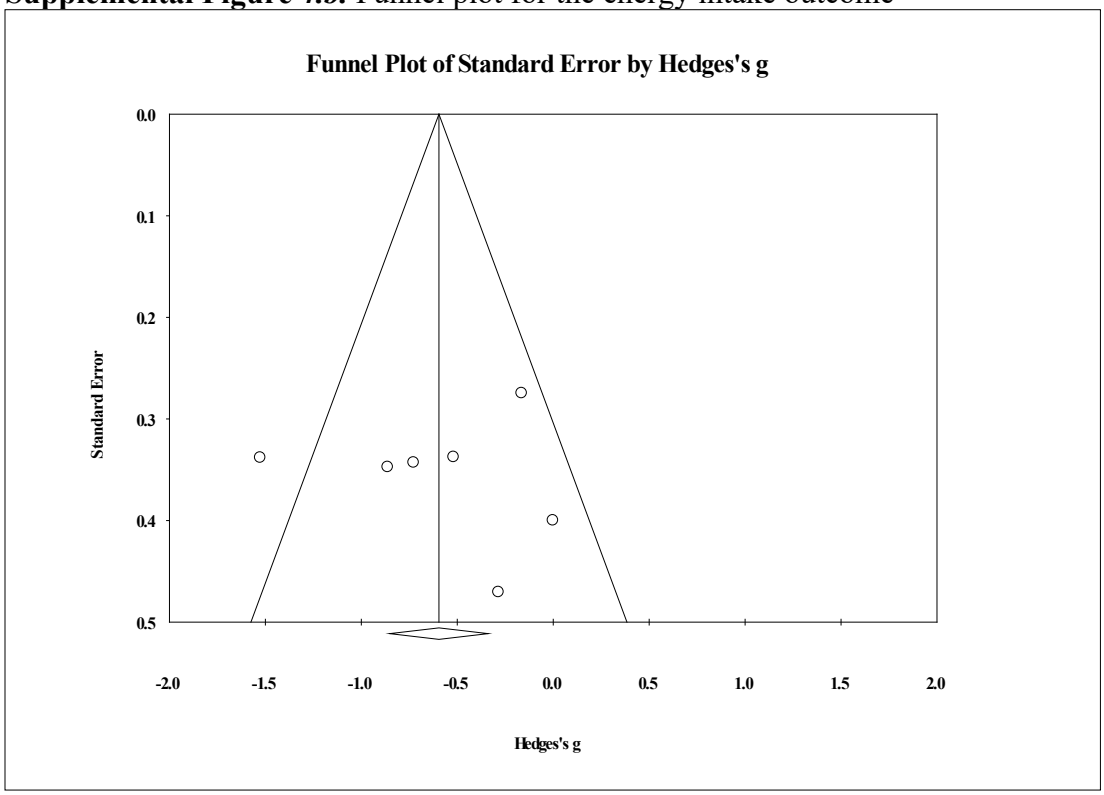
Supplemental Figure 4. Mindless-related Eating Habits: Energy Intake

Supplemental Figure 4.a. Forest plot for energy intake

Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Spadaro et al., 2018	-1.527	0.338	0.114	-2.190	-0.865	-4.520	0.000
Timmerman et al., 2012-a	-0.863	0.347	0.121	-1.544	-0.183	-2.486	0.013
Timmerman et al., 2012-b	-0.728	0.343	0.117	-1.400	-0.056	-2.124	0.034
Timmerman et al., 2012-c	-0.519	0.337	0.114	-1.181	0.142	-1.540	0.124
Herninger 2023a	-0.286	0.470	0.221	-1.207	0.636	-0.607	0.544
Herninger 2023b	-0.002	0.400	0.160	-0.785	0.782	-0.004	0.997
Sant'Anna 2022	-0.165	0.274	0.075	-0.703	0.373	-0.601	0.548
	-0.598	0.199	0.040	-0.988	-0.207	-3.000	0.003



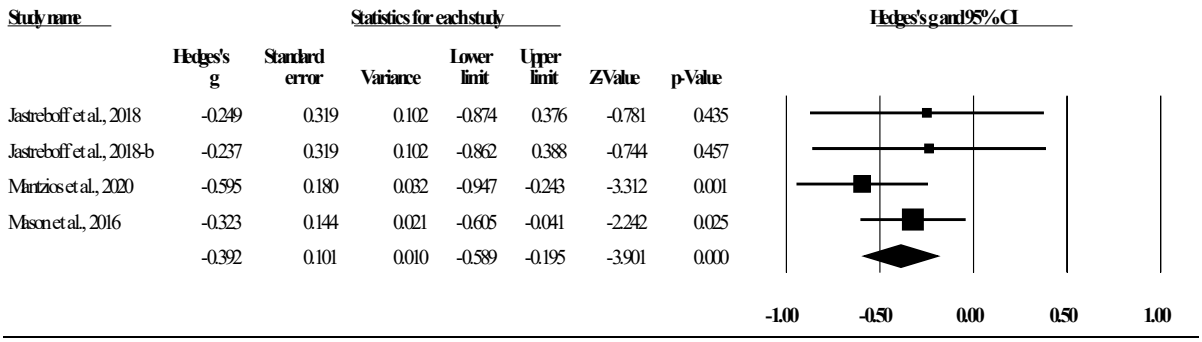
Supplemental Figure *4.b.* Funnel plot for the energy intake outcome



Note. Begg and Mazumdar rank correlation test (*Tau* = -0.05, p = .881), Egger's regression intercept test (β = 0.17, p = .970)

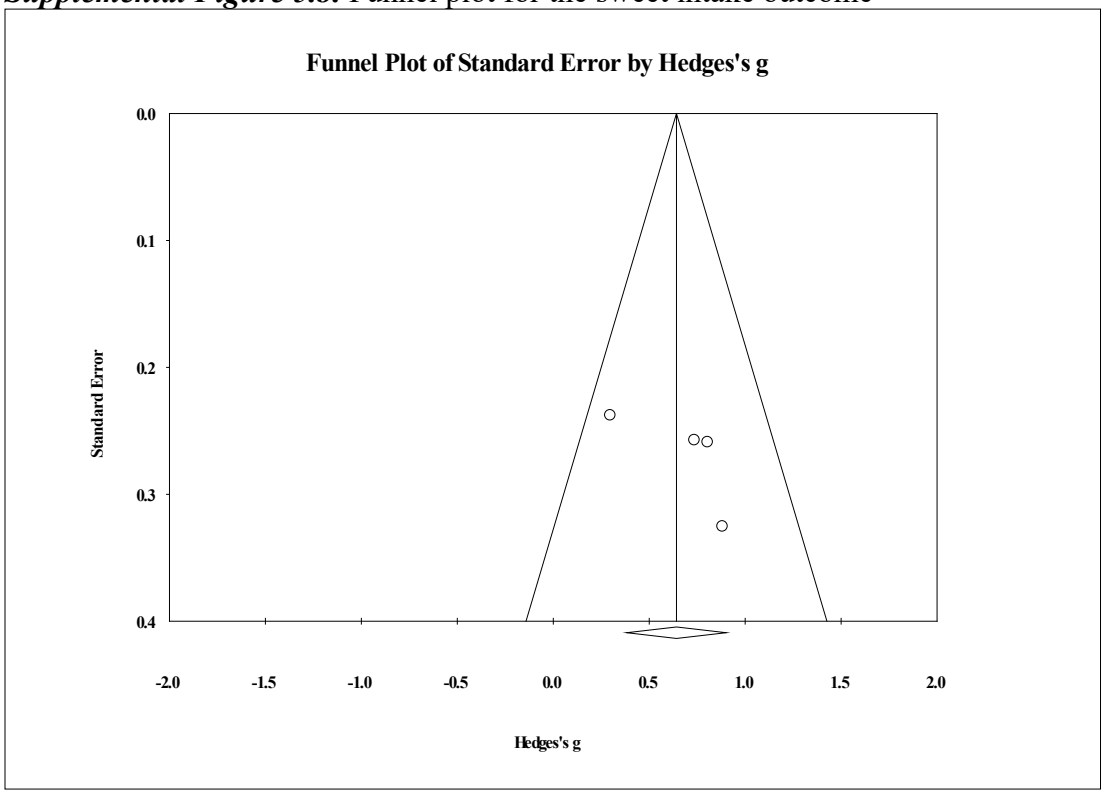
Supplemental Figure 5. Mindless-related Eating Habits: Sweet Intake

Supplemental Figure 5.a. Forest plot for sweet intake



Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Jastreboff et al., 2018	-0.249	0.319	0.102	-0.874	0.376	-0.781	0.435
Jastreboff et al., 2018-b	-0.237	0.319	0.102	-0.862	0.388	-0.744	0.457
Mantzios et al., 2020	-0.595	0.180	0.032	-0.947	-0.243	-3.312	0.001
Mason et al., 2016	-0.323	0.144	0.021	-0.605	-0.041	-2.242	0.025
	-0.392	0.101	0.010	-0.589	-0.195	-3.901	0.000

Supplemental Figure 5.b. Funnel plot for the sweet intake outcome

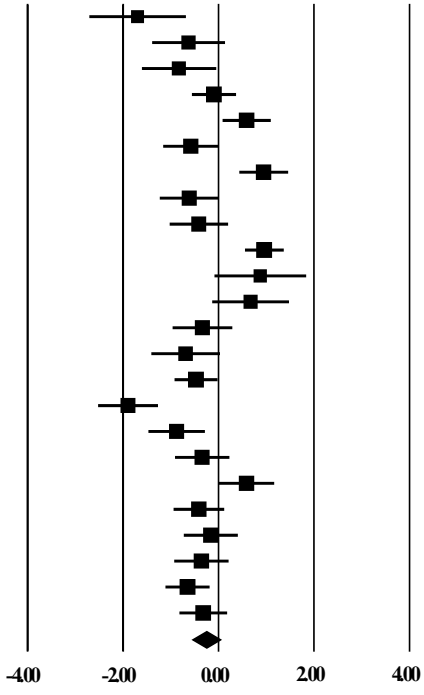


Note. Begg and Mazumdar rank correlation test (*Tau* = -0.33, p = .497), Egger's regression intercept test (β = -0.67, p = .684)

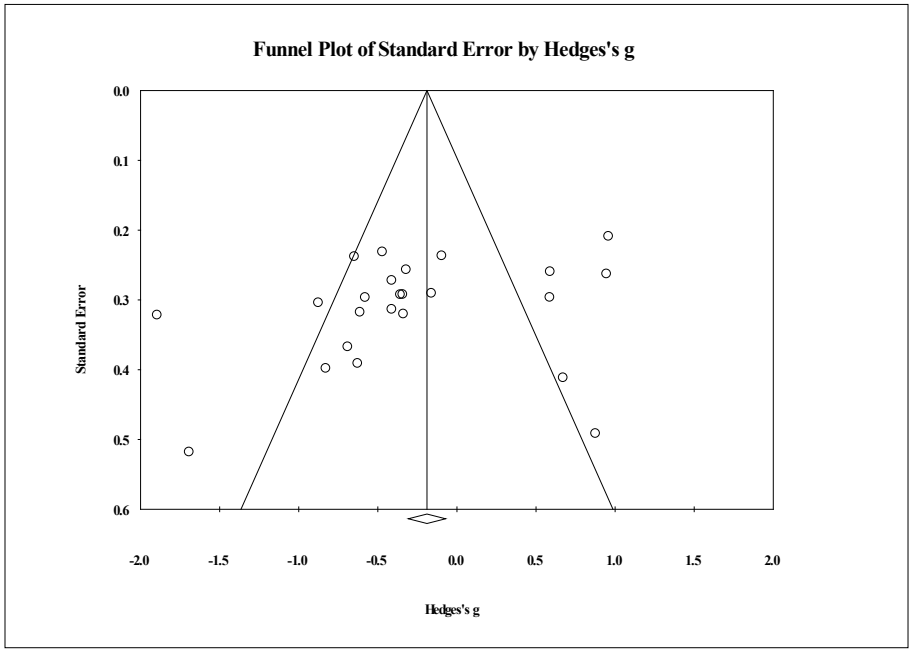
Supplemental Figure 6. Stress-related Eating Habits: Emotional Eating

Supplemental Figure 6.a. Forest plot for emotional eating

Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Alberts et al., 2010	-1.693	0.518	0.268	-2.708	-0.678	-3.270	0.001
Alberts et al., 2012a	-0.628	0.391	0.153	-1.394	0.138	-1.606	0.108
Alberts et al., 2012b	-0.829	0.398	0.158	-1.609	-0.049	-2.083	0.037
Allirot et al., 2018	-0.096	0.237	0.056	-0.559	0.368	-0.405	0.685
Carpenter et al., 2019	0.589	0.259	0.067	0.081	1.098	2.272	0.023
Daubenmier et al., 2011	-0.580	0.296	0.088	-1.161	0.001	-1.958	0.050
Dunn et al., 2018	0.946	0.263	0.069	0.431	1.460	3.602	0.000
Fisher et al., 2016a	-0.613	0.317	0.101	-1.235	0.009	-1.931	0.054
Fisher et al., 2016b	-0.412	0.313	0.098	-1.026	0.202	-1.315	0.188
Gayoso et al., 2021	0.958	0.209	0.044	0.549	1.367	4.591	0.000
Henninger et al., 2023a	0.876	0.491	0.241	-0.087	1.839	1.783	0.075
Henninger et al., 2023b	0.671	0.411	0.169	-0.135	1.478	1.632	0.103
Jastreboff et al., 2018	-0.338	0.320	0.102	-0.966	0.289	-1.058	0.290
Mercado et al., 2023	-0.691	0.367	0.135	-1.410	0.029	-1.881	0.060
Morillo-Sarto et al., 2022	-0.471	0.231	0.053	-0.924	-0.019	-2.040	0.041
Sampaio et al., 2021	-1.895	0.321	0.103	-2.525	-1.265	-5.895	0.000
Schnepper et al., 2019a	-0.876	0.304	0.092	-1.472	-0.281	-2.883	0.004
Schnepper et al., 2019b	-0.343	0.292	0.085	-0.915	0.229	-1.175	0.240
Schnepper et al., 2019c	0.587	0.296	0.088	0.006	1.168	1.982	0.048
Shomaker et al., 2019	-0.412	0.272	0.074	-0.945	0.121	-1.516	0.130
Tapper et al., 2009 DEBQ	-0.161	0.290	0.084	-0.730	0.408	-0.555	0.579
Tapper et al., 2009 EEQ	-0.358	0.292	0.085	-0.931	0.215	-1.225	0.221
Palmiera et al., 2017	-0.649	0.238	0.057	-1.115	-0.183	-2.728	0.006
Unicket al., 2023	-0.321	0.257	0.066	-0.823	0.182	-1.250	0.211
	-0.266	0.146	0.021	-0.553	0.021	-1.815	0.070



Supplemental Figure 6.b. Funnel plot for the emotional eating outcome

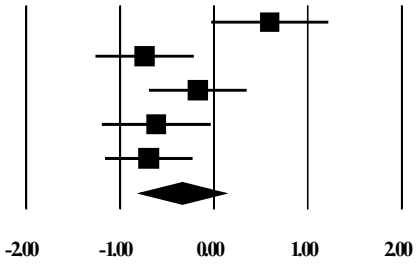


Note. Begg and Mazumdar rank correlation test (*Tau* = -0.28, p = .123), Egger's regression intercept test (β = -3.68, p = .123)

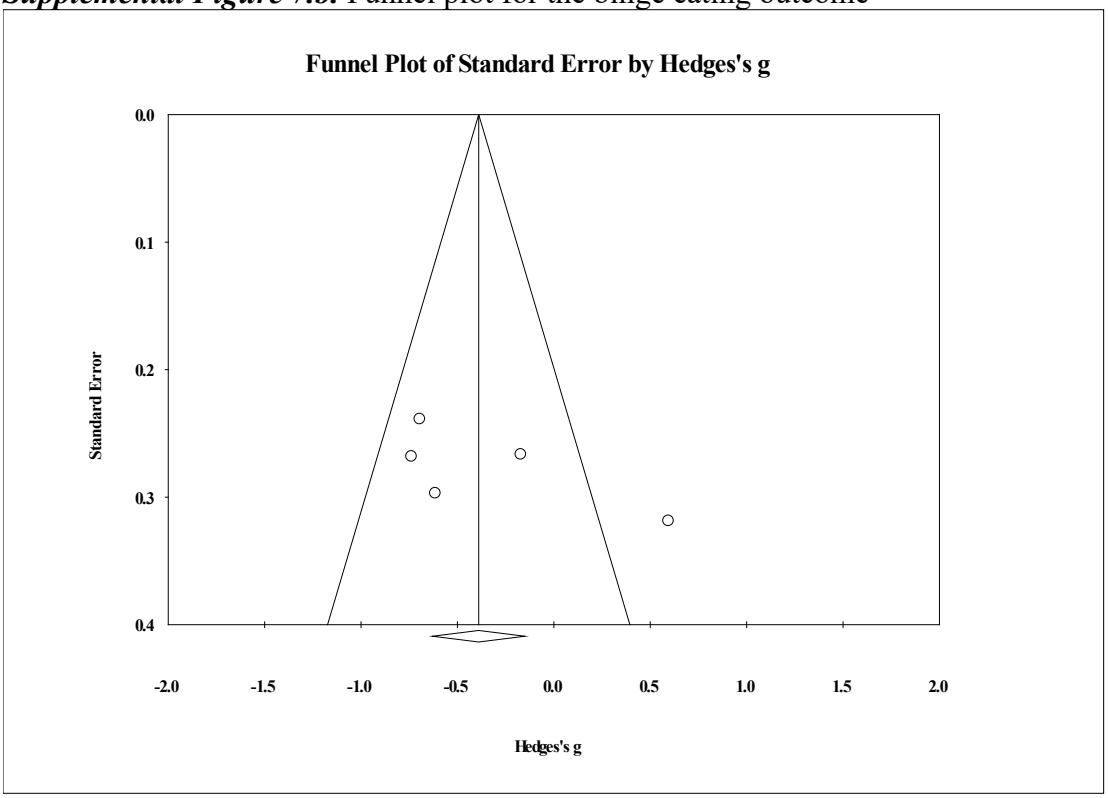
Supplemental Figure 6. Stress-related Eating Habits: Binge Eating

Supplemental Figure 7.a. Forest plot for binge eating

Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Barnes et al., 2016	0.595	0.319	0.101	-0.030	1.219	1.867	0.062
Carpenter et al., 2019	-0.739	0.268	0.072	-1.264	-0.213	-2.755	0.006
Sampaio 2021	-0.171	0.266	0.071	-0.694	0.351	-0.644	0.520
Tapper 2009	-0.615	0.297	0.088	-1.197	-0.033	-2.071	0.038
Palmiera, 2017	-0.695	0.239	0.057	-1.163	-0.227	-2.912	0.004
	-0.345	0.232	0.054	-0.799	0.109	-1.489	0.136



Supplemental Figure 7.b. Funnel plot for the binge eating outcome



Note. Begg and Mazumdar rank correlation test (*Tau* = 0.60, p = .142), Egger's regression intercept test (β = 11.72, p = .200)

Supplemental Table 1. Article Summary

	Authors (Year) Location	Design (Control)	Baseline: Size, Mean Age, BMI; Female %	Focus (Measure)	Duration (Sessions)	Targeted Outcomes	Key findings	QA
1	**Alberts et al. (2010)** Netherlands	RCT Control: no ME added	N = 19, M = 51.88, BMI = 31.3±4.1; 47%	ME +PA acceptance awareness (G-FCQ-T)	7 weeks (Audio & daily email)	Loss of control, Emotional craving	7-week ME manual added to 10 weekly meetings of 1.5 h PA each. Sig b/t group Δ (interaction effect [condition*G-FCQ-T] with ↓preoccupation of food, ↓Loss of control, positive outcome expectancy (p <.05) but non-sig Δ with emotional craving. Regardless, experimental group had ↓emotional craving while control had ↑emotional craving.	0.71
2	**Alberts et al. (2012)** Netherlands	RCT Control: waitlist	N = 26, M = 48.5, BMI = 32.7±6.1 100%	MBSR ME (KIMS-E; DEB-Q; DTS; G-FCQ-T)	8 weekly sessions of 2.5 hours	Controlled eating, Emotional eating, External eating	Targeting self-reported eating problems excluding clinically diagnosed eating disorders. ↑Controlled eating in both groups (Experimental: from 3.09±0.39 to 3.30±0.49; Control: from 2.71±0.74 to 2.84±0.71). ↓Emotional eating and ↓External eating in Experimental group from 3.63±0.92 to 3.19±0.70 and from 3.32±0.49 to 3.03±0.48 respectively, while external eating remained the same and ↑emotional eating from 3.69±0.87 to 3.78±0.72 in the Control group.	0.71
3	**Allirot et al. (2018)** Spain	RCT Control; Nothing	N = 70, M = 35.27, BMI = 22.79±0.44 ; 100%	ME (VAS; DEB-Q)	1 session (ME videos)	Food choice; Energy intake; Hunger; Emotional; Fullness awareness	Buffet-style snacks were offered (15 minutes) after tasting sessions. No sig b/t group difference in liking 4 types of finger food or mindfulness state. Sig moderation effects noted (interactions b/t condition**mindful state* [MS] and condition*external eating [EE]) on the total number of snacks [R^2 = 19.3%] and on energy intake [R^2 = 26.9%]). ↑MS negatively associated with ↓EE with energy intake or finger food eaten. ↓Hunger and Emotional eating in both groups. ↑Fullness awareness in both groups.	0.85

4	**Barnes et al. (2016)** U.S.	RCT Control: health Education	N = 40, M = 16.2, BMI = 32.4±9.0 65%	ME MM (BES; BASC)	12 weekly sessions	Hunger eating; Controlled (disinhibition) eating; binge eating	At 3 mos posttest, ↑binge eating in experimental (from 9.9±7.2 to 10.9±7.3) vs.↓binge eating in Control group (from 15.2±10.2 to 10.6±10.9). ↓Controlled eating in both groups; (Experimental: from 9.2±3.7 to 9.1±4.6; Control: from 6.6±3.0 to 6.3±3.0). ↓perceived hunger in both groups (Experimental: from 5.6±3.0 to 3.4±1.8; Control: from 5.8±3.6 to 4.8±3.2)	0.71
5	**Berkel et al. 2014** Netherlands	RCT exercise only	N = 257, M = 45.6 BMI = 18.5–25; 67%	MM PA (SFVQ)	8 weekly sessions; (90 mins)	PA (accelerometer) Fruit intake Impulsive food choice	8 weeks of mindfulness training with homework exercises followed by 8 sessions of e-coaching. No significant change in fruit intake for both groups. Women in Intervention group have improved PA (↑246 mins/week per accelerometer) compared to women in Control group. Certified trainer.	0.78
6	**Carpenter et al. (2019)** U.S.	RCT Control: Weight Talk (WT)	N = 75, M = 47.3, BMI = 31.5; 92%	MBSR ME (MEQ; FFMQ; BES)	11 weeks 11 WT calls + mindful activities	MEQ; Controlled; Emotional, Binge eating	Sig ↑MEQ summary score in Mind Your Weight (MYW) vs. Weight Talk (WT) group (g = .71). Sig ↑disinhibition (g = .51), ↑emotional eating (g = .53), ↑awareness (g = .66) in MYW group. Non-sig Δ in external eating (p = .26). ↓Binge eating in both groups.	0.85
7	**Daubenmier et al. (2011)** U.S.	RCT Control: waitlist	N = 47, M = 40.9, BMI = 31.2; 100%	MBSR ME (KIMS; DEBQ)	16 weeks	Controlled; Emotional; External eating	Sig b/t group Δ in external eating (*p* = .02 ES = -.70). non-sig b/t group Δ in controlled and emotional eating. ↑Controlled eating increased in Experimental group and decreased in Control group. ↓Emotional eating for both groups.	0.71
8	**Dunn et al. (2018)** U.S.	RCT Control-waitlist	N = 80, M = 47.9, BMI = 35.4; 86%	ME (MEQ)	15 weeks	Controlled; Emotional; External; Fullness awareness	↑Controlled eating in Experimental group by 0.59±0.6 and in Control group by 0.05±0.4. ↑Emotional eating in Experimental group by 0.47±0.7 but ↓ in Control group by -0.1± 0.5. Control group had sig higher emotional eating at baseline. ↑External eating in Experimental group by 0.17±0.5 but ↓ in Control group by -0.1± 0.6. ↑Fullness awareness in Experimental group by 0.4± 0.6 and in Control group by 0.03± 0.4. Experimental group had sig ↑ in summed MEQ at 15 weeks and 6 months as compared to the Control group.	0.89

9	**Fisher et al. (2016)** U.K.	RCT Attention control: reading	N = 40, M = 30.65, BMI = 25.40±4.0; 100%	ME (FFMQ; TFEQ; FCQ)	1 session	Hunger; Emotional; Fullness awareness; State craving (cookies)	*Mindfulness State*. 1 session of Mindful Attention Induction using breath as an objective of focus. At posttest, Sig↓craving (cookies eaten) in Mindful group; Sig time by group effects on fullness awareness. ↑Fullness awareness in the Experimental group (from 28.7±21.9 to 48.0±25.1 vs. ↓fullness in the Control group (from 36.4±22.5 to 35.4; Sig Δ (ES=.28) on ↓hunger eating in experimental: from 54.8 ± 30.1 to 47.0±26.6 vs. ↑hunger eating in the Control (from 44.9±25.2 to 57.9±22.6). ↓Emotional eating in the Experimental group (from 70.5±17.8 to 63.0±24.3) vs. ↑emotional eating in the Control group (from 57.3±25.0 to 63.8±20.2).	0.75
10	**Gayoso et al. (2021)** Spain	QE Control: Nut Ed	N = 96, M = 8.83, BMI = 16.90; 54% 8–9 years	ME (MEQ: Kidmed; EBQ)	4 weeks 3 sessions	MEQ; calorie intake	Intervention group had sig lower energy intake (*d* = .56; *p* =.02) unhealthy food (*d* = .35; *p* = .03) as compared to Control group. Sig interaction (time*condition) showed sig difference between Intervention and Control groups in terms of MEQ.	0.78
11	**Henninger et al. (2023)** Denmark	4-group RCT with waitlist control	N = 61, M = 41, BMI = 27; 100%	ME; YD; ME+YD; waitlist control (EI; IES-2)	8 weeks	Energy Intake; Intrinsic (emotional) eating;	8 weeks of ME, YD, and ME+YD intervention. There were no significant differences in energy intake compared with Control group (p >.05). Sig ↑IES-2 scores in ME (0.5 [.1, .9], *p* = .01) and ME+YD (0.4 [.1, .7], *p* = .01) groups as compared to waitlist Control group. No sig Δ b/t YD and Control group.	0.68
12	**Hsu et al. (2021)** U.S.	RCT Control: reading	N = 126, M = 20.91, BMI = 23.24±5.84 ; 70%	MM (FFMQ; TFEQ)	1 session guided body scan	Energy intake. Awareness; Emotional; Uncontrolled	Targeted undergraduate students. Experimental group had significantly higher emotional eating at baseline. No sig b/t group difference in energy intake. Positive and negative affects sig mediated the association b/t condition and total caloric intake.	0.71
13	**Hussain et al. (2021)** U.K.	RCT 3 groups: Nothing control	N = 120, BMI = 22.30±8.48 ; 75%	MM (MCD; SMS; PANAS)	Film excerpt	Sweet intake (chocolate) Hunger	3 groups: Self-immersed, Self-distanced, and Control. Sig higher emotional eating in Self-distanced group vs. Control group at the baseline. Control group had ↑hunger rating but not sig at baseline. No sig Δ in	0.75

							↑state of mindfulness or ↓state negative affect. But Control group had sig ↑sweet intake compared to other two groups.	
14	**Jastreboff et al. (2018)** U.S.	RCT Control-Nut Ed	N = 42, M = 31.7, BMI = 35.8±8.1(P) 67% tile(C); 98%	MBSR ME (TWT; NQ; DEBQ)	8 weeks	Controlled; Emotional; Sweet intake; External eating; Impulsive food choice	8-week Parenting mindfully for health (PMH+N) high risk (low income + ↑PSS score) parent-child dyad program (child aged 2–5). Both groups improved healthy food. Sig parental ↓Emotional eating ($p < .01$) in Experimental group from 33.7±14.4 to 28.9±13.1 but ↑ in Control group from 33±17.2 to 33.5±16.2. ↑Controlled eating in both groups. ↓Sweet intake in both groups. ↓External eating in both groups.	0.75
15	**Mantzios et al. (2020)** U.K.	RCT Control: reading	N = 128, M = 20.56, BMI = 24.73±4.07; 65%	ME (SMS)	1 session Raisin exercise via video	Sweet intake (chocolate) Impulsive food choice	Targeting college students' *mindfulness state*. Mindfulness group had lower food consumption during the mindless video activity compared to the Control condition. No sig b/t difference at post experiment. Mindfulness group had 1.3g less sweet intake than those in the Control group.	0.75
16	**Marchiori et al. (2014)** Netherlands	RCT Control: reading	N = 110, M = 20.9, BMI: 22.3; college students	Body scan (FFMQ; WEB-SG; PSRS)	1 session	Sweet intake; Calorie intake; hunger	*Mindfulness (satiated) state*. Taste test using cookies. Participants were served with larger portion of cookies consumed more calories as compared to those with smaller portion. Mindful group had lower calorie intake, but no sig b/t group difference in calorie intake. Control group who had a higher self-reported hunger at baseline had ↑calories as compared to Mindful group. Males consumed more calories than females.	0.71
17	**Mason et al. (2016)** U.S.	RCT Attention Control: diet and PA	N = 194, M = 47, BMI = 35.3; 79.9%	ME and PA (MEQ; FFQ)	22 weeks; 16 sessions	Sweet intake MEQ mean; Impulsive food choice	As compared to Control, Mindful group had ↑mindful eating from baseline to 6 months ($p = .097$) and sig ↑mindful eating from baseline to 12 months ($p = .036$). After adjusting for baseline eating, Mindful group had sig ↓sweet intake from 6–12 months as compared to Control group. ↑MEQ mean score in Experimental group from 2.7±0.3 to 2.9±0.3 and in Control group from 2.6±0.3 to 2.8±0.4.	0.78

18	**Mercado et al. (2023)** U.K.	3-group RCT (MT, ABMT, waitlist Control)	N = 45, M = 32±13, BMI = 34.3±6.57; 78%	MT, ABMT, and control (MEQ; PFS)	8 weeks	Emotional; Controlled; Awareness; External eating	Mindfulness training (MT) had a sig ↓ in controlled/disinhibition eating (d = −0.90 [95%CI= −1.68 to −0.1]) compared with ABMT. Compared with waitlist Control, MT group had a sig ↓ in emotional (d = − 0.94 [−1.80 to −0.06]) and external eating (d = 1.27 [0.04 to 2.46]). No group differences were found with awareness. MT group had sig ↓ in hedonic hunger (d = 0.94 [.18 to 1.7]) b/t baseline and post-intervention.	0.71
19	**Morillo-Sarto et al. (2022)** Spain	Cluster RCT; Control: TAU-alone	N = 76, M = 58.50±7.58, BMI = 32.19±4.65; 48%	ME+TAU vs. TAU-alone (DEBQ)	7 weeks of ME at baseline, post-Tx, and F/U	Emotional; Controlled; External eating	ME+TAU had a sig↓ in emotional eating (B = -.27 z = -2.78, p = 0.006, d = .35) at post-Tx and (B = -.53, p <.001, d = .69) at 12 months F/U; sig ↓ in external eating (z = -2.11, p=0.035) at post-Tx and (z = -5.68, p <.001) at F/U, compared to TAU-alone. No sig Δ in controlled eating.	0.89
20	**Palmiera et al. (2017)** Portugal	RCT; Control: Tx as usual	N = 73, M = 42.3, BMI = 34.2; 100%	MBSR+ (WSSQ; ORWELL; TFEQ)	12 weeks	Emotional eating; Binge eating	Intervention group received 10 weekly sessions plus 2 boosters (2.5 hours each). Intervention group showed a significant change in emotional eating -0.32±0.54 (f =8.003, p=.006) and binge eating -0.28±0.37 (f =10.245, p=.002).	0.85
21	**Sampaio et al. (2021)** Brazil	RCT; Control: std wt. loss Tx	N = 55, M = 49, BMI = 31.4; 100%	MBSR ME (PSS; DEBQ; BES)	8 weeks	Controlled; Emotional; External eating	Intervention group received Std wt. loss plus 8-week MM program. ↑Controlled eating in experimental group by 14±15.16 and in Control group by 5.5 ± 10.29. ↓Emotional eating in Experimental group by -13±7.58 and in Control group by -1.5±3.86. ↓External eating in Experimental group by -12±5.05 and in Control group by -4±3.86.	0.65
22	**Sant'Anna et al. (2022)** Brazil	RCT; waitlist Control	N = 52, M = 37.2, BMI = 32.3; 100%	MBP vs. control (MetaCheck)	8 weeks	Energy intake	Targeted OB/OW women with infertility problems. Sig ↓ energy intake (within group Δ) in MBP (MD = -430 Kcal/day, p = .01) but not in Control group. No sig Δ between groups (p = .053). About 42% dropout.	0.89
23	**Schnepper et al. (2019)** Austria	RCT; Control: waitlist	N =46,	ME prolonged chewing	8 weeks (4 sessions)	Craving; External eating	2-group and 2-personal sessions. Sig ↓Craving b/t baseline and T2 (ES = .254; p <.001) as well as b/t baseline and T3 in Intervention group (MD = 22.3 p	0.68

			M = 35.45; 74%; BMI = 27.7			Emotional eating	<.001). However, no sig Δ in Waitlist group. Sig ↓external b/t baseline and T2 (MD = 6.17 p = .005) and b/t baseline and T3 (*MD* = 6.13, p = .002) for ME group. No sig Δ in the Waitlist group. Sig ↓Emotional eating b/t baseline and T2 (MD = 6.04 p = .001) and b/t baseline and T3 (*MD* = 9.13, p <.001) but no sig Δ in the Waitlist group.	
24	**Seguias et al. (2018)** U.K.	RCT; Control: silent	N = 58, M = 24.22, BMI = 23; 53%	ME (PANAS; RST-PQ)	1 session Audio clip	Calorie intake (snack)	An audio ME clip and food tasting in lunch and snack sessions. No sig b/t group different in lunch intake. But sig ↓ snack intake in Experimental group vs Control (*d* = 1.14). No sig gender difference. More females in Control group. Experimental group had sig ↓snack as compared to Control group (ES = .27, p <.001).	0.57
25	**Seguias et al. (2022)** U.K.	RCT; Control: eat w/o distraction	N = 99, M = 22.4, BMI = 22.3; 100%	ME vs no distraction	3 days	Energy intake	No sig Δ on energy intake. No sig association b/t energy intake and strategy adherence in ME group. But a trend of negative association b/t energy intake and strategy adherence was observed in Control group (*r*= -.31, *p* = .08).	0.82
26	**Shomaker et al. (2019)** U.K.	RCT; Control: Ed	N = 51, M = 24.22, 12–17 years; BMI = 27.3; 53%	MM Breath (PSS; TSST)	6 weekly sessions	Food reward sensitivity; Stress eating (Kcal); perceived stress	Sig Δ in food reward sensitivity for Mindful group (*d* = .64, *p* <.01). No sig Δ in stress-eating change between baseline and 6-wk for Intervention and Control groups, (*p* = .57); but in 6-month follow-up, sig b/t group differences were noted (*p* = .05) with no Δ in the Intervention while the Control group had ↑kcal (*d* = .49). No sig b/t group difference in perceived stress.	0.64
27	**Simonson et al. (2020)** U.S.	RCT, 3-group Control: as usual	N = 24, M = 24; BMI = 29.1; 50%;	ME (PANAS: VAS)	1 time Audio	Energy intake; Satiety; hunger; Impulsive food choice	Mind, slow, and control groups with libitum access to test meal. Stratify by sex and BMI (<30kg/m^2). No sig b/t difference among 3 groups in energy intake. However, Mindful group had a trend of ↓energy intake while the slow and Control group had ↑energy intake between 2 test sessions. No sig Δ in satiety among 3 conditions. Sig effect of eating time on ↓hunger rating (p <.0001).	0.78

28	**Spadaro et al. (2018)** U.S.	RCT; Control: std Wt. loss	N = 46, M = 45.2, BMI = 32.5±3.7; 87%	ME (FFQ-Block; EBI; EI; MAAS)	24 weeks	Hunger eating, Controlled eating, Energy intake; Impulsive food choice	Intervention group received std behavioral wt. loss program plus MM training (30 min/wk). Sig b/t group Δ in ↑eating behaviors (p = .02) and dietary restraint (p = .02). At 6 mos post, ↓hunger eating for both groups (Experimental: from 7.6±0.7 to 4.4±0.7; Control: from 8.1±0.7 to 6.9±0.7). ↑controlled eating for both groups. ↓Energy intake for both groups; (Experimental: from 2253.4±181.2 to 1380.4±143.9; Control: from 2088.3±185.5 to 1602.7±147.3)	0.71
29	**Tapper et al. (2009)** U.K.	RCT; Weight loss program	N = 62, M = 41, BMI = 31.57; 100%	MM PA	12 weeks (4, 2-hr sessions)	External; Binge eating; Emotional eating	PA and BMI as primary outcome. The Intervention group had a significant decrease in binge eating: -1.70±3.87 (F = 4.47, p <.50). No sig b/t group difference in emotional eating or external eating for both groups. However, ↓emotional eating (EEQ) was -0.30±0.94 in Experimental, while in Control group ↑EEQ was noted (0.13±1.38)	0.75
30	**Timmerman et al. (2012)** U.S.	RCT; waitlist Control	N = 35, M = 49.6, BMI = 31.8; 100%	ME restaurant (EES)	6 weekly 2 hrs group sessions	Energy intake; Fat intake; emotional eating; Impulsive food choice	7–9 participants per group in 3 cohorts. Mean eating out = 5.6/wk (±3.4). Average ↓ energy (calorie) intake 1417.1±330.1 (p = .002) and ↓fat (p=.001) compared to the Control; however, no sig b/t group differences noted in the energy or fat intake per restaurant eating episodes in T2. No sig b/t group differences in Emotional Eating Scale (p = .59).	0.71
31	**Unick et al. (2023)** U.S.	RCT; Control: nutrition class	N = 60, M = 48.1, BMI = 34.3± 3.9 100%	12 wk Yoga	12 wks (2x/wk)	Emotional eating; Loss control of eating	Examine the effect of yoga on dietary behaviors f/u with a 12-wk weight Tx program. Yoga group has sig ↓ in emotional eating (b = -.21, SE = .07, p = .002) and less loss of control when eating (b = -.25, SE = .08, p <.001) at 24 weeks F/U.	0.75
32	**Zervos et al. (2021)** Greece	RCT; Control: waitlist	N = 57, M = 45.8, BMI = 34.3±7.9; 84%	ME (MAAS; SCS; Eat-26)	8 weeks 2 hrs/wk (Daily diaries)	Controlled eating	Sig b/t group Δ in mindfulness scale (group*time interaction; p = .034) with MD=.36 in Experimental group and MD= -.17 in Control group. ↓eating attitude/controlled eating in Experimental group from 11.11±5.57 to 9.87±5.07 and in Control group from 7.71±5.55 to 6.86±5.82	0.71

Note. Measurements: BASC = Basic Assessment System for Children; BES = Binge Eating Scale; DEBQ = Dutch Eating Behaviour Questionnaire; DTS = The Dichotomous Thinking Scale; Eat-26 = The Eating Attitudes Test for eating disorder; EBI = Eating Behavior Inventory; EI = Eating Inventory-51; EEQ = Emotional Eating Questionnaire; EES = Emotional Eating Scale; FCQ = Food Craving Questionnaire; FFMQ = Five Facet Mindfulness Questionnaire; FFQ = Food Frequency Questionnaire; G-FCQ-T = General Food Craving Questionnaire Trait; GHQ = General Health Questionnaire; IES-2 = Overall Intuitive Eating Scale-2; KIM-E = Kentucky Inventory Mindfulness Skills extended; MCD = Mindful Construal Diaries; MAAS = Mindfulness Awareness Scale; MetaCheck™ = an open-circuit calorimeter; MEQ = Mindfulness Eating Questionnaire; ORWELL= Obesity Related Well-being Questionnaire; PANAS = Positive and Negative Affect Schedule; PFS = Power of Food Scale; PSRS = Perceived Self-Regulatory Success in dieting; RST-PQ = The Reinforcement Sensitivity Theory Personality Questionnaire; SFVQ = Short Fruit and Vegetable Questionnaire; SMS = State Mindfulness Scale: SCS = Self-Compassion Scale; TAU = treatment as usual; TFEQ = Three-Factor Eating Questionnaire; TSST = Trier Social Stress Test; TWT = Toy Wait Task: VAS = visual analogue scale for hunger and satiety; WEB-SG =Weight- and Body-Related Shame and Guilt scale; WSSQ = Weight Self-stigma Questionnaire.
Abbreviations: ABMT = Attention Bias Modification Training; b/t = between; Ed = Education; hrs= hours; MM = Mindfulness Meditation; ME = Mindfulness Eating; MT = Mindfulness Training; NQ = Nutritional Questionnaires; Nut = Nutrition; PA = physical activity; sig = significant; Std = standard; Tx = treatment; ; YD = Yoga Dance.

Supplemental Table 2. Quality Appraisal: Assessment Questions, Domains, and Quality Appraisal Scores

Risk of Bias Assessment Q*uestions and Domains*	
Domains	**Appraisal Questions**
Study Design	Question/objective sufficiently described?
	Study design evident and appropriate?
	Sample size appropriate?
	Analytic methods described/justified and appropriate?
	Controlled for confounding?
Selection bias	Method of subject/comparison group selection or source of information/input variables described and appropriate?
	Subject and comparison group (if applicable) characteristics sufficiently described?
Randomization	If interventional and random allocation was possible, was it described?
Blinding	If interventional and blinding of investigators was possible, was it reported?
	If interventional and blinding of subjects was possible, was it reported?
Reporting	Outcome and (if applicable) exposure measure(s) well defined and robust to measurement/misclassification bias? Means of assessment reported?
	Some estimate of variance is reported for the main results?
	Results reported in sufficient detail?
	Conclusions supported by the results?

Quality Appraisal: Risk of Bias by Study

Study (author/year)	Study Design (0–10)	Selection Bias (0–4)	Randomization (0–2)	Blinding (0–4)	Reporting (0–8)	Total Score (0–28)	QA
Alberts, 2010	6	4	2	0	8	20	0.714285714
Alberts, 2012	6	4	2	0	8	20	0.714285714
Allirot, 2018	9	4	2	2	8	25	0.892857143
Barnes, 2016	6	4	2	0	8	20	0.714285714
Berkel, 2014	9	4	2	0	8	23	0.821428571
Carpenter, 2019	8	4	2	0	8	22	0.785714286
Daubenmier, 2011	6	4	2	0	8	20	0.714285714

Dunn, 2018	7	4	2	2	8	23	0.821428571
Fisher, 2016	6	4	2	2	8	22	0.785714286
Gayoso, 2021	8	4	2	0	8	22	0.785714286
Henninger et al., 2023	8	4	2	0	6	20	0.714285714
Hsu, 2021	6	4	2	0	8	20	0.714285714
Hussain, 2021	7	4	2	0	8	21	0.75
Jastreboff, 2018	6	4	2	4	8	24	0.857142857
Mantzios, 2020	8	3	2	0	8	21	0.75
Marchiori, 2014	7	3	2	0	8	20	0.714285714
Mason, 2016	8	4	2	0	8	22	0.785714286
Mercado et al., 2023	7	4	2	0	8	21	0.75
Morillo-Sarto et al., 2022	8	4	2	3	8	25	0.892857143
Palmeria, 2017	8	4	2	2	8	24	0.857142857
Sampaio, 2021	8	3	2	2	8	23	0.821428571
Sant'Anna et al., 2022	6	4	2	2	8	22	0.785714286
Schnepper, 2019	7	2	2	0	8	19	0.678571429
Seguias et al., 2022	8	4	2	2	8	24	0.857142857
Seguias, 2018	6	2	0	0	8	16	0.571428571
Shomaker, 2019	4	4	2	0	8	18	0.642857143
Simonson, 2020	8	4	2	0	8	22	0.785714286
Spadaro, 2018	7	3	2	0	8	20	0.714285714
Tapper, 2009	5	3	2	0	8	18	0.642857143
Timmerman, 2012	6	2	2	2	8	20	0.714285714
Unick et al., 2023	7	4	2	0	8	21	0.75
Zervos, 2021	7	3	0	0	8	18	0.642857143

Notes: 0= not met; 1= partially met; 2= met: QA= total score/28

Supplemental Table 3. Moderators for the intervention effects on controlled eating

Continuous Moderator	***k***	***Slope B***	***SE***	***Tau²***	***p-value*** *(slope)*
Number of MM sessions	16	-0.01	0.01	0.02	.579
Intervention duration	16	-0.01	0.01	0.02	.290
Mean age (years)	16	-0.002	0.01	0.03	.794
Moderator	***k***	***Hedge's g***	***95%CI of g***	***Q***	***p-value***
MBI focus				9.30	**.010**
Mindful eating	5	-0.01	-0.21, 0.19		
Movements	4	0.50	0.22, 0.78		
Stress reduction	7	0.28	0.07, 0.50		
Gender				0.05	.820
Mixed	12	0.22	0.03, 0.40		
Female	4	0.26	-0.08, 0.60		
Intervention delivery				0.11	.740
Remote	1	0.33	-0.29, 0.95		
In-person	15	0.22	0.05, 0.39		
TX fidelity				0.01	.932
Yes	1	0.20	-0.53, 0.92		
No	15	0.23	0.06, 0.40		
Age ranges				0.187	.665
≤16 years	14	0.22	0.04, 0.39		
>16 years	2	0.33	-0.17, 0.84		
Setting				0.223	.637
School-based	4	0.15	-0.20, 0.50		
Clinic-based	12	0.25	0.06, 0.43		
MM as an add-on component				1.15	.283
Yes	9	0.16	-0.04, 0.36		
No	7	0.34	0.08, 0.59		
Baseline weight				0.03	.869
No limit	4	0.26	-0.12, 0.63		
OW+OB	12	0.22	0.04, 0.40		
Behavioral focus				0.025	.875
Diet	4	0.21	-0.13, 0.54		
Both (Diet and PA)	12	0.24	0.05, 0.43		
Intervenor				1.87	.172
Certified intervenor	7	0.10	-0.15, 0.34		
Research assistant	9	0.32	0.11, 0.53		

Note. OW= overweight; OB= obese; PA= physical activity; TX= treatment

Supplemental Table 4. Moderators for the intervention effects on impulsive food choices

Continuous Moderator	***k***	***Slope B***	***SE***	***Tau*^{2}**	***p-value*** *(slope)*
Number of MM sessions	12	-0.01	0.02	0.12	.751
Intervention duration	12	-0.005	0.02	0.12	.799
Mean age	12	-0.01	0.01	0.12	.636
Moderator	***k***	***Hedge's g***	***95%CI of g***	***Q***	***p-value***
MBI Focus				1.48	.224
Mindful eating	9	-0.53	-0.85, -0.21		
Stress reduction	3	-0.12	-0.70, 0.46		
Gender				0.93	.336
Mixed	8	-0.34	-0.66, -0.03		
Female	4	-0.63	-1.12, -0.14		
TX fidelity				1.48	.224
Yes	3	-0.12	-0.70, 0.46		
No	9	-0.53	-0.85, -0.21		
Setting				0.02	.900
School-based	4	-0.46	-0.96, 0.05		
Clinic-based	8	-0.42	-0.76, -0.08		
MM as an add-on component				1.52	.218
Yes	2	-0.81	-1.46, -0.15		
No	10	-0.35	-0.66, -0.03		
Baseline weight				1.52	.218
No limit	10	-0.35	-0.66, -0.03		
OW+OB	2	-0.81	-1.46, -0.15		
Behavioral focus				5.82	.055
Diet	6	-0.60	-0.93, -0.27		
PA	1	0.19	-0.36, 0.74		
Both	5	-0.41	-0.74, -0.08		
Intervenor				0.01	.916
Certified intervenor	3	-0.41	-0.93, 0.12		
Research assistant	9	-0.44	-0.76, -0.12		

Note. OW= overweight; OB= obese; PA= physical activity; TX= treatment

Supplemental Table 5. Moderators for the intervention effects on emotional eating

Continuous Moderator	***k***	***Slope B***	***SE***	***Tau²***	***p-value*** *(slope)*
Number of MM sessions	24	-0.001	0.03	0.40	.987
Intervention duration	24	0.01	0.04	0.39	.760
Mean age (years)	24	-0.02	0.01	0.36	.153
Moderator	***k***	***Hedge's g***	***95%CI of g***	***Q***	***p-value***
MBI focus				3.73	.155
Mindful eating	14	-0.16	-0.52, 0.21		
Movements	2	0.31	-0.63, 1.25		
Stress reduction	8	-0.61	-1.10, -0.13		
Gender				1.24	.266
Mixed	11	-0.10	-0.50, -0.30		
Female only	13	-0.41	-0.79, -0.03		
Intervention delivery				1.62	.203
Remote	1	0.59	-0.76, 1.94		
In-person	23	-0.31	-0.60, -0.36		
TX fidelity				0.05	.822
Yes	2	-0.38	-1.38, 0.63		
No	22	-0.26	-0.56, 0.05		
Age ranges				1.59	.208
≤16 years	22	-0.32	-0.61, -0.03		
>16 years	2	0.30	-0.62, 1.21		
Setting				4.31	**.038**
Clinic-based	23	-0.32	-0.59, -0.06		
School-based	1	0.96	-0.22, 2.14		
MM as an add-on component				0.02	.899
Yes	11	-0.25	-0.67, 0.18		
No	13	-0.28	-0.69, 0.12		
Baseline weight				0.01	.921
No limit	11	-0.25	-0.68, 0.18		
OW+OB	13	-0.28	-0.68, 0.12		
Behavioral focus				0.98	.614
Diet	10	-0.41	-0.88, 0.05		
PA	1	-0.58	-2.03, 0.87		
Both	13	-0.13	-0.54, 0.27		
Intervenor				1.19	.276
Certified intervenor	7	-0.03	-0.54, 0.48		
Research assistant	17	-0.37	-0.71, -0.03		

Note. OW= overweight; OB= obese; PA= physical activity; TX= treatment

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