Supplementary material

Exclusion criteria

Potential participants were excluded prior to enrollment if they were not incoming college freshman aged 18-19 years, planning to live on campus, or possessed other exclusion criteria (i.e., left handedness; pregnancy; presence of neurological, mood, or eating disorders; presence of MRI contraindications).

Neuroimaging scan sequence parameters

High resolution anatomical volumes were acquired using a T1-weighted 3D MP-RAGE pulse sequence (TR = 2500 ms, TE = 3.41 ms, matrix size = 256 x 256, voxel size = 1 mm^3, sagittal slices = 176, FOV = 256). Functional volumes were acquired using a T2*-weighted echo-planar sequence (TR = 2000 ms, TE = 25.0 ms, flip angle = 90˚, matrix size = 100 x 100, voxel size = 2 mm^3, axial slices = 72, FOV = 200).

Percentage of regulation trials in the Choice condition

To ensure there were enough trials in each condition, within the Choice condition, participants were instructed to try to regulate and look approximately equally. Although most individuals were within one standard deviation from the mean, individuals varied in the degree to which they choose to regulate. The average percentage of regulation trials in the Choice condition was 49.4% (*SD* = 5.4%; range = 38.1% to 61.0%). The percentage of regulation trials was negatively correlated with regulation success (the mean difference between craving ratings in the look and regulate conditions), such that the more trials individuals choose to regulate, the worse regulation success they had. This was true for both no-choice, r = -.41, 95%CI [-.67, -.05],

$t(29) = 2.32$, $p = .028$, and yes-choice trials, $r = -.40$, 95%CI [-.67, -.04], $t(29) = 2.24$, $p = .032$ (see Figure S1).

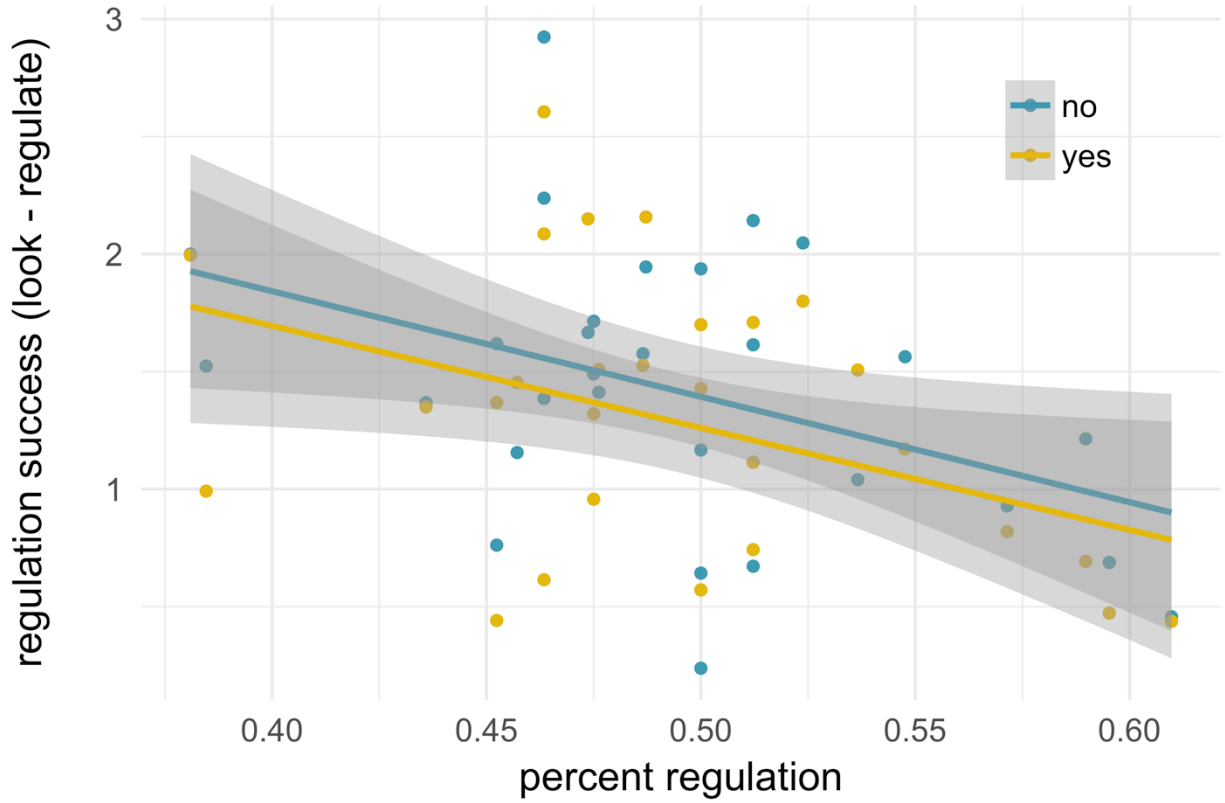

Figure S1. Correlation between the percentage of trials on which participants chose to regulate and regulation success, defined as the mean difference in craving ratings on look and regulate trials. The correlations are plotted separately for each level of Choice (blue = no, yellow = yes). Data points represent subjects.

Dividing individuals based on whether they chose to regulate more (> 50% regulate trials), look more (> 50% look trials), or look and regulate equally revealed that those that chose to look more rated their cravings higher on look trials and lower on regulate trials (see Figure S2). This relationship was slightly blunted in the no-choice relative to the yes-choice condition.

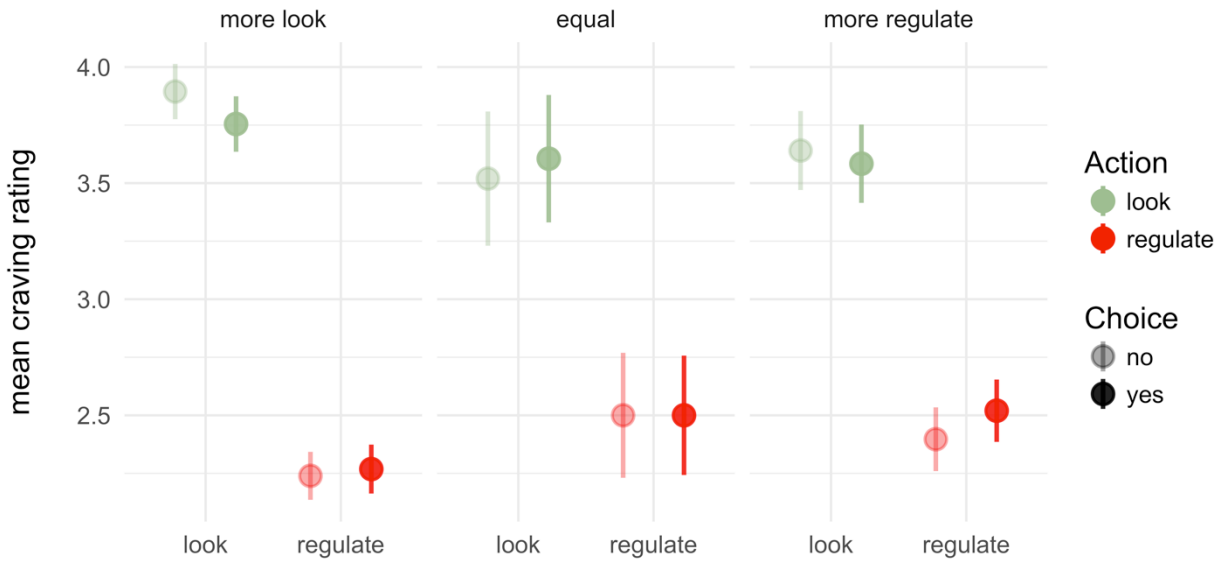

Figure S2. The relationship between the percentage of trials on which participants chose to regulate and mean craving ratings as a function of Action and Choice. The "equal" group consists of participants that chose to look and regulate equally, the "more look" group consists of participants that chose to look > 50% of trials, and the "more regulate" group consists of participants that chose to regulate > 50% of trials.

With respect to neural activity, we extracted mean parameter estimates from clusters in the regulate > look contrast (FWE-corrected at $p < .05$ to separate clusters, k = 108) and correlated them with percentage of regulation trials. No correlations were statistically significant, rs = -.16 to -.04, ps > .44 (Figure S3).

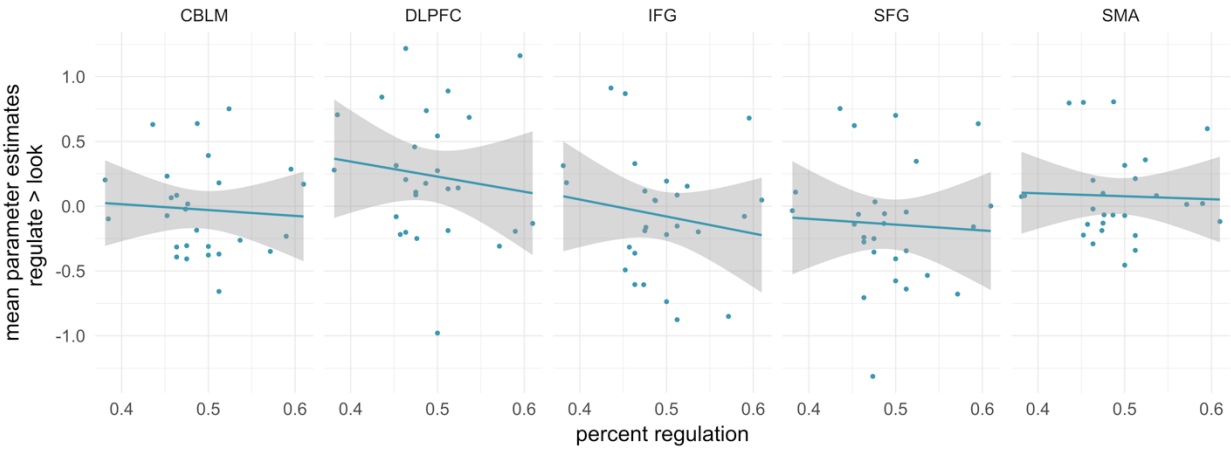

Figure S3. Correlations between the percentage of trials on which participants chose to regulate and mean parameter estimates extracted from the regulate > look contrast, thresholded at FWE-corrected $p < .05$, $k = 108$. CBLM = right cerebellum, DLPFC = left dorsolateral prefrontal cortex, IFG = left inferior frontal gyrus, SFG = left superior frontal gyrus, SMA = left supplementary motor area. Data points represent subjects.

Model selection

Multilevel modeling was used to test the effects of Action and Choice on self-reported craving ratings and the best fitting model was selected via model comparison. In the null model, fixed and random effects were estimated for the intercept as well as for Action, Choice, and post-task craving ratings. In each subsequent model, random effects were removed sequentially in the following order: Choice, post-task craving ratings, Action. In the final model, the fixed effect of post-task craving ratings was removed, and therefore only the fixed effects of Action and Choice and the random effects of the intercept were estimated. Comparing these models revealed that including fixed effects for Action, Choice, the interaction between Action and Choice, and post-task craving ratings, and random effects for Action, post-task craving ratings, and the intercept, produced the best fit (see Table S1 for full results). Consequently, results from this model are reported in the paper. The equation for this model is:

First level equation:

Y_{ij}(Task craving rating of image *i* by person *j*) = β_{0j} + β_{1j}(Choice$_i$) + β_{2j}(Action$_i$) +

β_{3j}(Choice$_i$*Action$_i$) + β_{4j}(post-task craving ratings $_i$) + ε_{ij}

Second level equations:

$\beta_{0j} = \gamma_{00} + \mu_{0j}$
$\beta_{1j} = \gamma_{10}$
$\beta_{2j} = \gamma_{20} + \mu_{2j}$
$\beta_{3j} = \gamma_{30}$
$\beta_{4j} = \gamma_{40} + \mu_{4j}$

Table S1. Model comparison for behavioral analysis

Model	Model *df*	AIC	BIC	Deviance	χ^2 *df*	χ^2	*p*
Model 4	6	6778.71	6813.22	6766.71	–	–	–
Model 3	7	6214.95	6255.22	6200.95	1	565.75	.000
Model 2	9	6058.93	6110.70	6040.93	2	160.03	.000
Model 1	**12**	**5979.64**	**6048.67**	**5955.64**	**3**	**85.29**	**.000**
Null model	16	5986.66	6078.70	5954.66	4	0.98	.913

Note. Null Model = includes fixed and random effects for the intercept as well as for Action, Choice and post-task craving ratings; Model 1 = removed random effect of Choice; Model 2 = removed random effect of post-task craving ratings; Model 3 = removed random effect of Action; Model 4 = removed fixed effect of post-task craving ratings. Model 1 (bolded) was selected as the best fitting model.