Supplementary Materials

Supplementary Methods

Preregistration. Analyses were preregistered (https://osf.io/8u67t), except for the Group x PAI interaction and the two comparison models, which were added subsequently. The preregistered two-tailed *t*-tests are categorical evaluations of the PAI model (i.e., binning participants into *either* "mindfulness indicated" or "mood monitoring indicated" groups based on PAI scores being less than or greater than 0, respectively). In contrast, the Group x PAI interaction keeps PAI scores as continuous values to test whether they moderate intervention group differences in outcome. Finally, the comparison models were added to evaluate whether relatively complex, multivariable machine learning (ENR) approaches in fact outperform simple linear regression models (e.g., with only 1 predictor).

COVID. Due to the onset of the COVID-19 pandemic, the last 22 participants were enrolled virtually. The study protocol remained the same, except for the completion of virtual, rather than physical, consent and assent forms. This protocol change was approved by both NIMH and the local IRB.

Binary variable coding for ENR. Two subjects (1.3%) reported non-binary gender. For ENR modeling purposes, given this very small number and percentage, gender was coded as binary (-0.5, 0.5). For these two subjects, rather than imputing missing values via a multiple imputation procedure, we inputted parental-report of child gender (female for both).

Supplemental Table 1. *Additional Clinical Trial Information*

Participant Category	Number	Notes
Approached	Unknown	• 1,200 advertisement letters sent in the mail. • In-person advertisements at the local Boys and Girls Club, flyers distributed to adolescents, advertisements hung on the wall • Advertisements at grocery stores • Facebook advertisements • Word of mouth • Poster advertisements at the YMCA • We reached out to the director of youth programs at a church that offered services in both Spanish and English.
Assessed	205	• (152 eligible + 40 ineligible + 13 eligible but did not enroll)
Ineligible	40	• 40 adolescents screened out based on rumination score
Assessed as eligible but not enrolled	13	• 6 participants missed their appointment (or multiple appointments) and then could not be reached to reschedule. • 3 participants decided not to participate after realizing distance to our campus or issues with plans for transportation. • 1 participant declined to participate on the phone after asking follow-up questions about the time commitment of using the app (3x a day for three weeks). • 1 adolescent cancelled the day of the appointment due to other plans he had/no longer interested. His sister decided she was interested and was screened over the phone and enrolled instead (appointment kept) • 2 adolescents declined in-person since they did not want to participate because of the time commitment of using the app.

Additional JARS Information	
Sampling Procedures	Procedure for selecting participants: • **Recruitment:** We recruited participants by 1) sending letters to parents of all children enrolled in public schools in grades 6 – 9 advertising the study 2) in-person advertisements and flyers at the Boys and Girls Club 3) Flyers posted in local grocery stores 4) Facebook advertisements 5) word of mouth 6) Poster advertisements at the YMCA 7) reaching out to directors of youth programs at a local church. • **Self-selection**: Explicit self-selection did not occur in this study as participants were randomly assigned to condition. However, some degree of implicit self-selection may have occurred. The study was advertised a "study on how a mobile app may help adolescents cope with their emotions." Thus, parents of adolescents experiencing difficultly coping with their emotions may have been more inclined

	to respond to the advertisement. Similarly, adolescents who were experiencing emotional difficulties may have been more likely to participate
Inclusion and exclusion criteria	Adolescent between the ages of 12 and 15 years old during the active intervention period (assessed during phone screen with parent) and exhibiting at least moderate levels of rumination (i.e., an average score of 2 on a 1-4 scale on our two screening questions (CRSQ; see main text) assessed during phone screen with adolescent). Exclusion criteria include serious physical or cognitive disability that prevents using a mobile device and inadequate English proficiency to complete outcome measures (assessed during phone screen) or imminent suicide concerns.
Participant Characteristics	• See Table 1 in main text
Setting and Location of Data Collection	**Location:** *Omitted for Masked Review* **Setting:** Psychology Research Lab
Dates of data collection	• **Participant enrollment dates**: 6/19 – 8/20 • **Active data collection**: 6/19 – 2/21
Agreements and payments made to participants	**Brief description**: Parents read our informed consent form; adolescents had the assent form read to them out loud by a research assistant. Participants that provided assent/consent and were enrolled in the study agreed to try to use the app three times a day for three weeks and complete follow-up online questionnaires at 3-weeks, 6-weeks, 12-weeks, and 6 months. Adolescents and parents were each paid ($15) in cash during the initial visit. Adolescents were guaranteed $20 during the intervention period, but they could also get a $5 bonus each week that they use the app 3 times each day. All other payments were sent through checks in the mail. Adolescents were paid $10 each time they completed questionnaires and parents were paid $5 each time they completed questionnaires.
Sample size, power, and precision	• Intended sample size: 150 (75 in each group) • Achieved sample size: 152 (80 in control, 72 experimental) • See Determination of Sample Size in main text
Module A: Reporting Standards for Studies Using Random Assignment (from JARS)	
Randomization	Participants were randomly assigned to condition using simple randomization. Research assistants were unaware of the condition that participants would be in during informed consent and when describing the study to participants. When participants were completing the online surveys (parents/children were in separate rooms from each other and the RA), a research assistant randomized the participant.
Masking	We did not use masking. Research assistants were aware of which condition a participant was assigned to but only after the participants gave informed consent and completed the surveys. Thus, all participants were treated exactly the same until they were taught to use the app (since the apps were different and required different explanations for how to use

	it). During informed consent, participants were aware that they would be randomly assigned to one of two versions of an app. Participants were aware that one version contained mindfulness exercises and one version involved mood monitoring/answering a series of questions about one's emotions. The outcome measure was self-reported state rumination assessed via EMA (see main text for details).

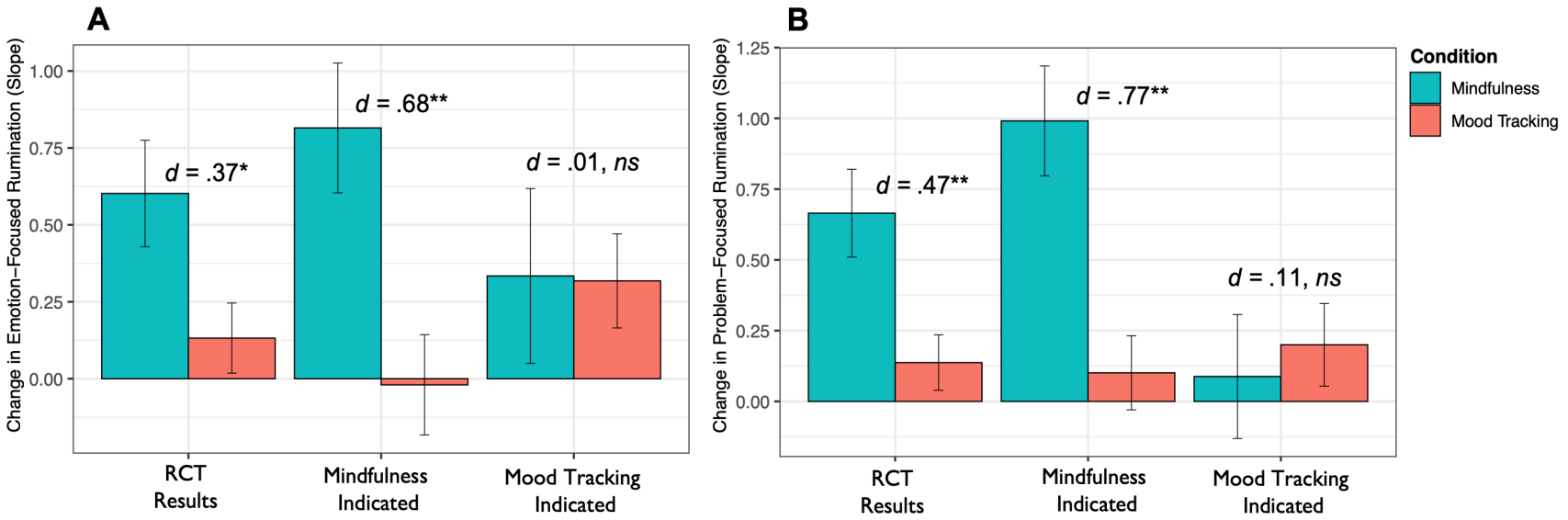
Adverse Events During the Intervention Period (from post-intervention survey)
Six adverse events were reported by adolescents and parents by the end of the 3-week intervention period. Two adolescents (one in each condition) reported the onset of self-injurious thoughts or behaviors (i.e., passive ideation and nonsuicidal self-injury) following the intervention. These events are unlikely to be related to participation in the study. Four adolescent participants (2 mindfulness, 2 mood monitoring) reported upsetting experiences with the app (e.g., increased awareness of negative feelings).

Figure Captions

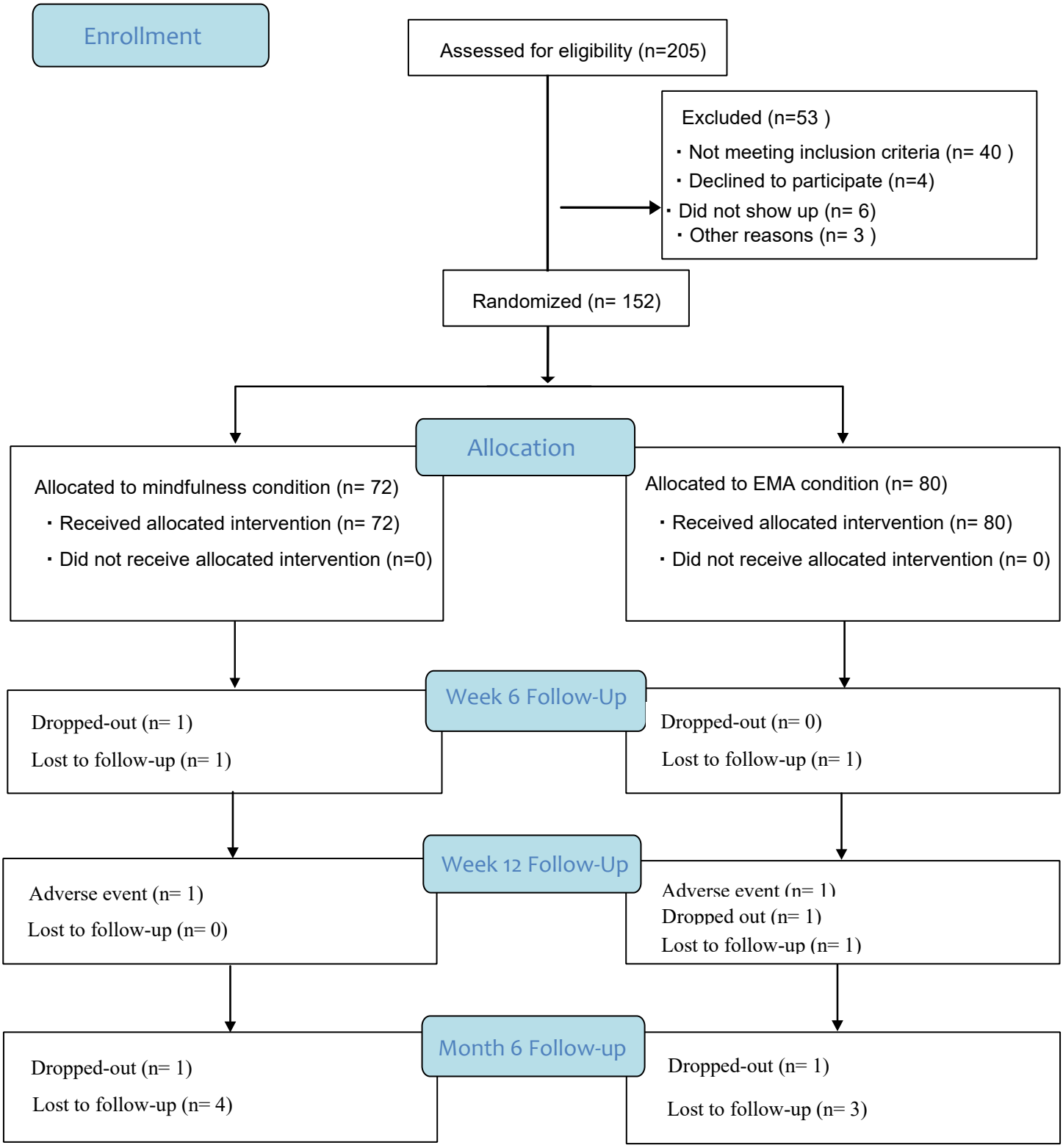
Supplemental Figure 1. Comparison of change in rumination for participants randomized to the mindfulness app vs. control (leftmost bars labeled "RCT Results"). Comparison of change in state rumination for participants randomly assigned to their PAI-indicated condition vs. those assigned to their PAI-contraindicated condition (middle and rightmost bars). For this bar plot, outcomes (slopes) were multiplied by -1 so that positive scores reflect rumination reduction. Error bars represent standard error. * $p < .05$, ** $p < .01$.

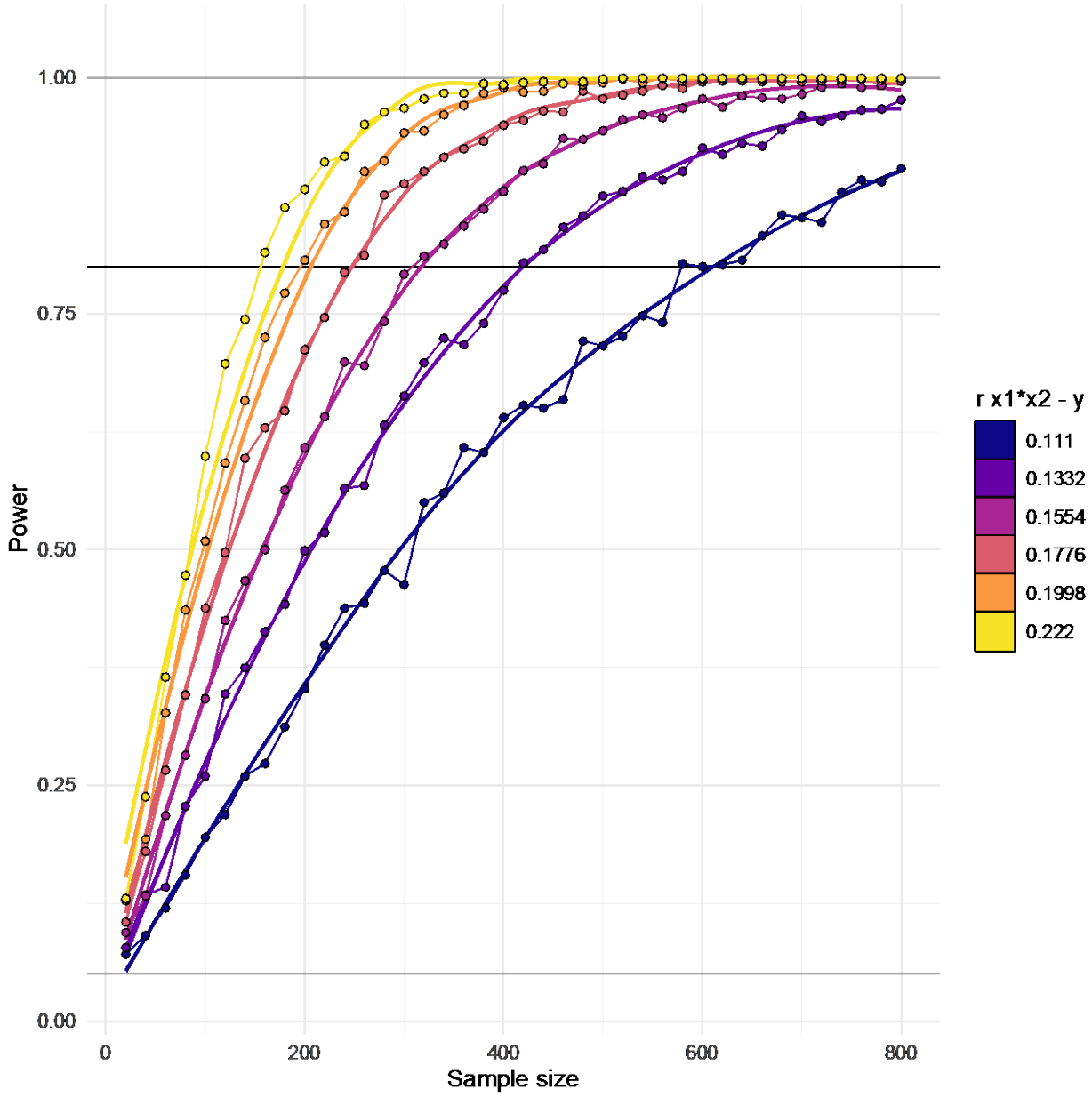
Supplemental Figure 2. Consort flow diagram for randomized clinical trial

Supplemental Figure 3. Monte Carlo simulation results (1,000 iterations; implement via InteractionPowerR package in R). To generate these simulations, we inputted four *r*-type effect sizes representing the correlation between the interaction term (Group x PAI) and outcome ($r = .22$), the correlation between Group and PAI scores ($r = -.12$) and their respective main effects ($r = -.21$; $r = .15$). The yellow curve plots power at varying sample sizes (80% power at n = 158). Five additional sets of simulations were conducted assuming an interaction effect size 90% (orange; 80% power at n = 197), 80% (salmon; 80% power at n = 245), 70% (light purple; 80% power at n = 317), 60% (dark purple; 80% power at n = 420) and 50% (blue; 80% power at n = 604) the magnitude of the above effect size. The black horizontal line represents 80% power.


A
Change in Emotion–Focused Rumination (Slope)
1.00
0.75
0.50
0.25
0.00
d = .37*
d = .68**
d = .01, ns
RCT Results
Mindfulness Indicated
Mood Tracking Indicated
B
Change in Problem–Focused Rumination (Slope)
1.25
1.00
0.75
0.50
0.25
0.00
d = .47**
d = .77**
d = .11, ns
RCT Results
Mindfulness Indicated
Mood Tracking Indicated
Condition
Mindfulness
Mood Tracking

* $p < .05$, ** $p < .01$


Enrollment
Assessed for eligibility (n=205)
Excluded (n=53)
・Not meeting inclusion criteria (n= 40)
・Declined to participate (n=4)
・Did not show up (n= 6)
・Other reasons (n= 3)
Randomized (n= 152)
Allocation
Allocated to mindfulness condition (n= 72)
・Received allocated intervention (n= 72)
・Did not receive allocated intervention (n=0)
Allocated to EMA condition (n= 80)
・Received allocated intervention (n= 80)
・Did not receive allocated intervention (n= 0)
Week 6 Follow-Up
Dropped-out (n= 1)
Lost to follow-up (n= 1)
Dropped-out (n= 0)
Lost to follow-up (n= 1)
Week 12 Follow-Up
Adverse event (n= 1)
Lost to follow-up (n= 0)
Adverse event (n= 1)
Dropped out (n= 1)
Lost to follow-up (n= 1)
Month 6 Follow-up
Dropped-out (n= 1)
Lost to follow-up (n= 4)
Dropped-out (n= 1)
Lost to follow-up (n= 3)


1.00
0.75
0.50
0.25
0.00
Power
0
200
400
600
800
Sample size
r x1*x2 - y
0.111
0.1332
0.1554
0.1776
0.1998
0.222