

SSI Megastudy Analyses

Benji Kaveladze

2025-07-26

These are the analyses for the megastudy of depression SSIs. For the pre-registered analysis plan, see https://cdn.clinicaltrials.gov/large-docs/68/NCT06856668/Prot_SAP_ICF_001.pdf. For the pre-registered analysis scripts, see <https://osf.io/agvh6/files/osfstorage#>.

Reach out to me at benjamin.kaveladze@northwestern.edu with any questions.

```
#### STEP 1: LOAD DATA ####
#loading all the packages.
if (!require("pacman")) install.packages("pacman")
pacman::p_load(
  lme4,sjPlot,tidyverse,effectsize,ggdist,gridExtra,ggcorrplot,
  broom.mixed,gtsummary,flextable,gt,emmeans,readxl,performance,
  rstatix,lmerTest,randomForest, car,psych,viridis,patchwork,
  kableExtra,plotrix)

theme_set(theme_ggdist())

#read in data
load("utw_selectvars.Rdata") #or utw_allvars if using the full data
mega_alltimes_complete <- mega_selectvars #or <- mega_allvars if using the full data

# Keep all rows from non-duplicate participants; For duplicates (based on matching
# IP/gender/race/age at baseline), keep only the first entry per timepoint.
# Then exclude any participants who never completed baseline.

mega_alltimes_preparation1 <- mega_alltimes_complete %>%
  group_by(IP_address_id, time) %>%
  arrange(StartDate, .by_group = TRUE) %>%
  filter( ip_gender_race_age_same_at_bl==0 |
    (ip_gender_race_age_same_at_bl==1 & row_number() == 1 )) %>%
  ungroup()

# above leaves some rows from people who completed wk4 on a different device,
# so here dropping people who didn't complete the baseline
mega_alltimes <- mega_alltimes_preparation1 %>% filter(time == "Baseline") %>%
  distinct(pid) %>%
  inner_join(mega_alltimes_preparation1, by = "pid")

#write_csv(mega_alltimes, 'utw_selectvars_analytic_sample_(n=7505).csv')

#function for calculating Cohen's D in a longitudinal mixed model
```

```

#based on Feingold, A. (2009). https://doi.org/10.1037/a0014699 thanks to Mike Russell for explaining
mixed_cohens_d <- function(model){
  #outcome sd at baseline:
  # u0i: person mean of outcome minus grand mean of outcome for person i (between residual; or the rand
  #eit : current outcome for person i at time t minus their person mean (within residual)
  outcome_sd <- sqrt(summary(model)$varcor$pid[1] +
                      summary(model)$sigma^2)
  (tidy_model <- broom.mixed::tidy(model,conf.int=T) %>%
    mutate(cohens_d= estimate/outcome_sd,
           cohens_d_2.5= conf.low/outcome_sd,
           cohens_d_97.5= conf.high/outcome_sd) %>%
    filter(effect=='fixed',term!='(Intercept)') %>%
    select(-c(group,effect,std.error,conf.low,conf.high)) %>%
    mutate(across(where(is.numeric),~round(.,digits=2))) %>%
    relocate(cohens_d,.after = 'term'))
}

add_cohens_d <- function(model, caption = NULL) {
  tidy(model) %>%
    mutate(p.value = ifelse(p.value < 0.001,
                           formatC(p.value, format = "e", digits = 2),
                           sprintf("%.3f", p.value))) %>%
    left_join(
      mixed_cohens_d(model) %>%
        select(term, starts_with('cohens_d')),
      by = 'term'
    ) %>%
    relocate(c(effect, group), .after = last_col()) %>%
    select(-std.error, -effect, -group,-df,-statistic) %>%
    kable(digits = 3, caption = caption)
}

```

Preliminary Analyses for the Primary Analysis

```
mega_alltimes %>% filter(time=='Baseline') %>% anova_test(phq9_score~group)
```

Depressive symptoms score across conditions at baseline

```
## ANOVA Table (type II tests)
##
##   Effect DFn  DFd    F      p p<.05   ges
## 1  group   12 7492 0.977 0.469      0.002
```

```
just_time_phq9 <- lmer(
  phq9_score ~ time + (1|pid), mega_alltimes %>%
  filter(group=='Passive Control'))
add_cohens_d(just_time_phq9, 'Depressive symptoms over time, Control Only')
```

Depressive symptoms score baseline to wk4 in passive control

Table 1: Depressive symptoms over time, Control Only

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	15.457	0.00e+00	NA	NA	NA
timeWeek 4	-2.989	1.46e-76	-0.58	-0.64	-0.52
sd__(Intercept)	3.465	NA	NA	NA	NA
sd__Observation	3.822	NA	NA	NA	NA

```
just_time_phq9 %>% tidy %>% select(term, statistic, df) %>% kable(digits = 3)
```

term	statistic	df
(Intercept)	116.197	2310.374
timeWeek 4	-19.759	1354.593
sd__(Intercept)	NA	NA
sd__Observation	NA	NA

```
icc(just_time_phq9)
```

```
## # Intraclass Correlation Coefficient
##
##   Adjusted ICC: 0.451
##   Unadjusted ICC: 0.417
```

```
mega_alltimes %>% filter(group=='Passive Control') %>%
  select(pid, phq9_score, time) %>%
  pivot_wider(names_from='time', values_from='phq9_score') %>%
  filter(!is.na(`Week 4`)) %>%
  cor_test(Baseline, `Week 4`)
```

Depressive symptoms score correlation across timepoints

```
## # A tibble: 1 x 8
##   var1      var2      cor statistic      p conf.low conf.high method
##   <chr>    <chr> <dbl>    <dbl>    <dbl>    <dbl>    <dbl> <chr>
## 1 Baseline Week 4  0.48      18.8 2.42e-69    0.431    0.519 Pearson
```

```
#df = n (1504) -2
```

```
#attrited before post-test measures
finished_post_test<- mega_alltimes$pid[!is.na(mega_alltimes$`Q559_Page Submit`)]
mega_alltimes <- mega_alltimes %>%
  mutate(attrited_b4_post_test= ifelse(pid %in% finished_post_test,0,1))

#attrited before follow-up measures
finished_followup<- mega_alltimes$pid[!is.na(mega_alltimes$`Q423_Page Submit`)]
mega_alltimes <- mega_alltimes %>%
  mutate(attrited_b4_followup= ifelse(pid %in% finished_followup,0,1))

mega_alltimes %>% filter(time=='Baseline') %>%
  count(attrited_b4_post_test) %>% mutate(prop=n/sum(n))
```

Differential attrition during the SSI or by follow-up

```
## # A tibble: 2 x 3
##   attrited_b4_post_test      n    prop
##           <dbl> <int>   <dbl>
## 1                0  7357  0.980
## 2                1   148  0.0197
```

```
mega_alltimes %>% filter(time=='Baseline') %>%
  count(attrited_b4_followup) %>% mutate(prop=n/sum(n))
```

```
## # A tibble: 2 x 3
##   attrited_b4_followup      n    prop
##           <dbl> <int>   <dbl>
## 1                0  5926  0.790
## 2                1  1579  0.210
```

```
paste('We dropped data from ',
  1-(round(mega_alltimes %>% filter(time=='Baseline') %>% nrow()/
    mega_alltimes_complete %>% filter(time=='Baseline') %>% nrow(),2)*100),
  '% of the sample due to responses coming from the same IP address, gender, age, and race at baseline.'
```

```
## [1] "We dropped data from -96 % of the sample due to responses coming from the same IP address, gender, age, and race at baseline."
```

```
paste('The sample used for analyses included',
  mega_alltimes %>% filter(time=='Baseline') %>% nrow(),
  'participants at baseline.')
```

```
## [1] "The sample used for analyses included 7505 participants at baseline."
```

```
paste(mega_alltimes %>% filter(time=='Baseline',!is.na(`Q1525_Page Submit`)) %>% nrow(),
  'Participants finished all post-test measures.')
```

```
## [1] "7338 Participants finished all post-test measures."

paste(mega_alltimes %>% filter(time=='Week 4',Progress==100) %>% nrow(),
      'Participants finished the Week Four follow-up.',
      (round(100*(mega_alltimes %>% filter(time=='Week 4',Progress==100) %>% nrow())/
            (mega_alltimes %>% filter(time=='Baseline') %>% nrow()),2)), "% of those who were randomized")

## [1] "5914 Participants finished the Week Four follow-up. 78.8 % of those who were randomized"

# Test 1 - Any Differential Attrition Rate?

# after completing post-test measures?
mega_alltimes %>%
  filter(time=='Baseline') %>%
  group_by(group) %>%
  summarise(
    Attrition_Rate_before_posttest = mean(attrited_b4_post_test) * 100) %>%
  arrange(desc(Attrition_Rate_before_posttest))

## # A tibble: 13 x 2
##   group                               Attrition_Rate_before_posttest
##   <fct>                                <dbl>
## 1 Mindful Acceptance                    6.2
## 2 Passive Control                      2.59
## 3 Interactive Cognitive Reappraisal    2.39
## 4 AI-assisted Personalized Narrative   2.01
## 5 Savoring Strategies                  1.99
## 6 Moral Elevation                      1.81
## 7 Dialectical Behavioral Therapy Skills 1.81
## 8 5 Habits to Beat Depression           1.63
## 9 Mindful Attention Skills              1.60
## 10 Reframing Negative Thoughts           1.19
## 11 Personalized Intervention Recommender 0.593
## 12 Inner Child Healing Walk              0.396
## 13 Behavioral Activation                 0.200

chisq.test(with(mega_alltimes %>% filter(time=='Baseline'),
               table(attrited_b4_post_test,group)))

##
## Pearson's Chi-squared test
##
## data:  with(mega_alltimes %>% filter(time == "Baseline"), table(attrited_b4_post_test,
## X-squared = 71.654, df = 12, p-value = 1.569e-10, group))

# before follow-up
mega_alltimes %>%
  filter(time=='Baseline') %>%
  group_by(group) %>%
  summarise(
    Attrition_Rate_before_Followup = mean(attrited_b4_followup) * 100) %>%
  arrange(desc(Attrition_Rate_before_Followup))
```

```
## # A tibble: 13 x 2
##   group                               Attrition_Rate_before_Followup
##   <fct>                               <dbl>
## 1 Interactive Cognitive Reappraisal      26.5
## 2 Personalized Intervention Recommender  24.1
## 3 Moral Elevation                       21.8
## 4 Dialectical Behavioral Therapy Skills  21.5
## 5 Mindful Attention Skills              21.2
## 6 5 Habits to Beat Depression            21.0
## 7 Reframing Negative Thoughts           20.6
## 8 AI-assisted Personalized Narrative     20.5
## 9 Mindful Acceptance                    20.4
## 10 Passive Control                      19.9
## 11 Behavioral Activation                 19.8
## 12 Inner Child Healing Walk              19.8
## 13 Savoring Strategies                  18.5
```

```
chisq.test(with(mega_alltimes %>% filter(time=='Baseline'),
               table(attrited_b4_followup,group)))
```

```
##
## Pearson's Chi-squared test
##
## data:  with(mega_alltimes %>% filter(time == "Baseline"), table(attrited_b4_followup, group))
## X-squared = 16.23, df = 12, p-value = 0.1809
```

```
mega_alltimes %>% filter(time=='Baseline') %>%
  count(att_check==4) %>% mutate(prop=n/sum(n))
```

Duration of survey and attention checks

```
## # A tibble: 2 x 3
##   'att_check == 4'      n      prop
##   <lgl>             <int>   <dbl>
## 1 FALSE             7494  0.999
## 2 TRUE              11  0.00147
```

```
mega_alltimes %>% filter(time=='Baseline') %>%
  count(`Duration (in seconds)`<300) %>% mutate(prop=n/sum(n))
```

```
## # A tibble: 2 x 3
##   '`Duration (in seconds)` < 300'      n      prop
##   <lgl>                               <int>   <dbl>
## 1 FALSE                             7491  0.998
## 2 TRUE                              14  0.00187
```

Primary Analysis (Pre-registered)

- A mixed-effects linear regression model to test if depressive symptoms change differently from baseline to four-week follow-up in each of the 12 active conditions compared to the passive control condition. Timepoint is a two-level factor (baseline and week 4 follow up). The model includes a participant identifier as a random intercept.
- Note that in this analysis each condition is compared to the **control condition**. That also means you can't use the error bars in the plot to compare SSIs to each other.

```
m1_phq9 <- lmer(phq9_score ~ time * group + (1|pid),
               data=mega_alltimes)

phq9_cohens_d <- mixed_cohens_d(m1_phq9)
add_cohens_d(m1_phq9, caption='Predicting: change in depressive symptoms over four weeks')
```

Table 3: Predicting: change in depressive symptoms over four weeks

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	15.457	0.00e+00	NA	NA	NA
timeWeek 4	-2.987	3.57e-84	-0.57	-0.63	-0.52
group5 Habits to Beat Depression	-0.205	0.449	-0.04	-0.14	0.06
groupAI-assisted Personalized Narrative	-0.226	0.401	-0.04	-0.14	0.06
groupBehavioral Activation	0.406	0.131	0.08	-0.02	0.18
groupDialectical Behavioral Therapy Skills	0.087	0.747	0.02	-0.08	0.12
groupInner Child Healing Walk	0.002	0.994	0.00	-0.10	0.10
groupInteractive Cognitive Reappraisal	0.166	0.536	0.03	-0.07	0.13
groupMindful Acceptance	-0.375	0.162	-0.07	-0.17	0.03
groupMindful Attention Skills	0.026	0.924	0.00	-0.10	0.11
groupMoral Elevation	0.079	0.770	0.02	-0.09	0.12
groupPersonalized Intervention Recommender	0.078	0.770	0.02	-0.09	0.12
groupReframing Negative Thoughts	-0.237	0.376	-0.05	-0.15	0.06
groupSavoring Strategies	-0.019	0.943	0.00	-0.10	0.10
timeWeek 4:group5 Habits to Beat Depression	-0.211	0.490	-0.04	-0.16	0.07
timeWeek 4:groupAI-assisted Personalized Narrative	-0.245	0.422	-0.05	-0.16	0.07
timeWeek 4:groupBehavioral Activation	-0.432	0.154	-0.08	-0.20	0.03
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.437	0.153	-0.08	-0.20	0.03
timeWeek 4:groupInner Child Healing Walk	-0.054	0.858	-0.01	-0.12	0.10
timeWeek 4:groupInteractive Cognitive Reappraisal	-0.762	0.014	-0.15	-0.26	-0.03
timeWeek 4:groupMindful Acceptance	-0.385	0.205	-0.07	-0.19	0.04
timeWeek 4:groupMindful Attention Skills	-0.723	0.018	-0.14	-0.25	-0.02
timeWeek 4:groupMoral Elevation	-0.398	0.194	-0.08	-0.19	0.04
timeWeek 4:groupPersonalized Intervention Recommender	-0.506	0.099	-0.10	-0.21	0.02
timeWeek 4:groupReframing Negative Thoughts	0.051	0.867	0.01	-0.10	0.12

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
timeWeek 4:groupSavoring Strategies	-0.103	0.731	-0.02	-0.13	0.09
sd__(Intercept)	3.529	NA	NA	NA	NA
sd__Observation	3.826	NA	NA	NA	NA

```
m1_phq9 %>% tidy %>% select(term, statistic, df) %>% kable(digits=3, caption='Model T score and df')
```

Table 4: Model T score and df

term	statistic	df
(Intercept)	115.161	11405.789
timeWeek 4	-19.719	6669.987
group5 Habits to Beat Depression	-0.757	11405.789
groupAI-assisted Personalized Narrative	-0.839	11405.789
groupBehavioral Activation	1.511	11405.789
groupDialectical Behavioral Therapy Skills	0.322	11405.789
groupInner Child Healing Walk	0.007	11405.789
groupInteractive Cognitive Reappraisal	0.619	11405.789
groupMindful Acceptance	-1.397	11405.789
groupMindful Attention Skills	0.095	11405.789
groupMoral Elevation	0.293	11405.789
groupPersonalized Intervention Recommender	0.292	11405.789
groupReframing Negative Thoughts	-0.885	11405.789
groupSavoring Strategies	-0.072	11405.789
timeWeek 4:group5 Habits to Beat Depression	-0.690	6685.794
timeWeek 4:groupAI-assisted Personalized Narrative	-0.803	6684.716
timeWeek 4:groupBehavioral Activation	-1.426	6655.365
timeWeek 4:groupDialectical Behavioral Therapy Skills	-1.429	6707.077
timeWeek 4:groupInner Child Healing Walk	-0.178	6659.248
timeWeek 4:groupInteractive Cognitive Reappraisal	-2.461	6813.253
timeWeek 4:groupMindful Acceptance	-1.268	6677.292
timeWeek 4:groupMindful Attention Skills	-2.374	6704.049
timeWeek 4:groupMoral Elevation	-1.299	6713.855
timeWeek 4:groupPersonalized Intervention Recommender	-1.650	6764.516
timeWeek 4:groupReframing Negative Thoughts	0.168	6682.738
timeWeek 4:groupSavoring Strategies	-0.344	6626.055
sd__(Intercept)	NA	NA
sd__Observation	NA	NA

```
#tab_model(m1_phq9, p.val = "satterthwaite", show.df = TRUE, dv.labels = 'Depression Mixed Effects Model')

#plot showing Change in Depression over Four Weeks Compared to a passive control
wk4_int_terms <- m1_phq9 %>% tidy() %>% filter(str_detect(term, 'Week 4:')) %>% pull(term)

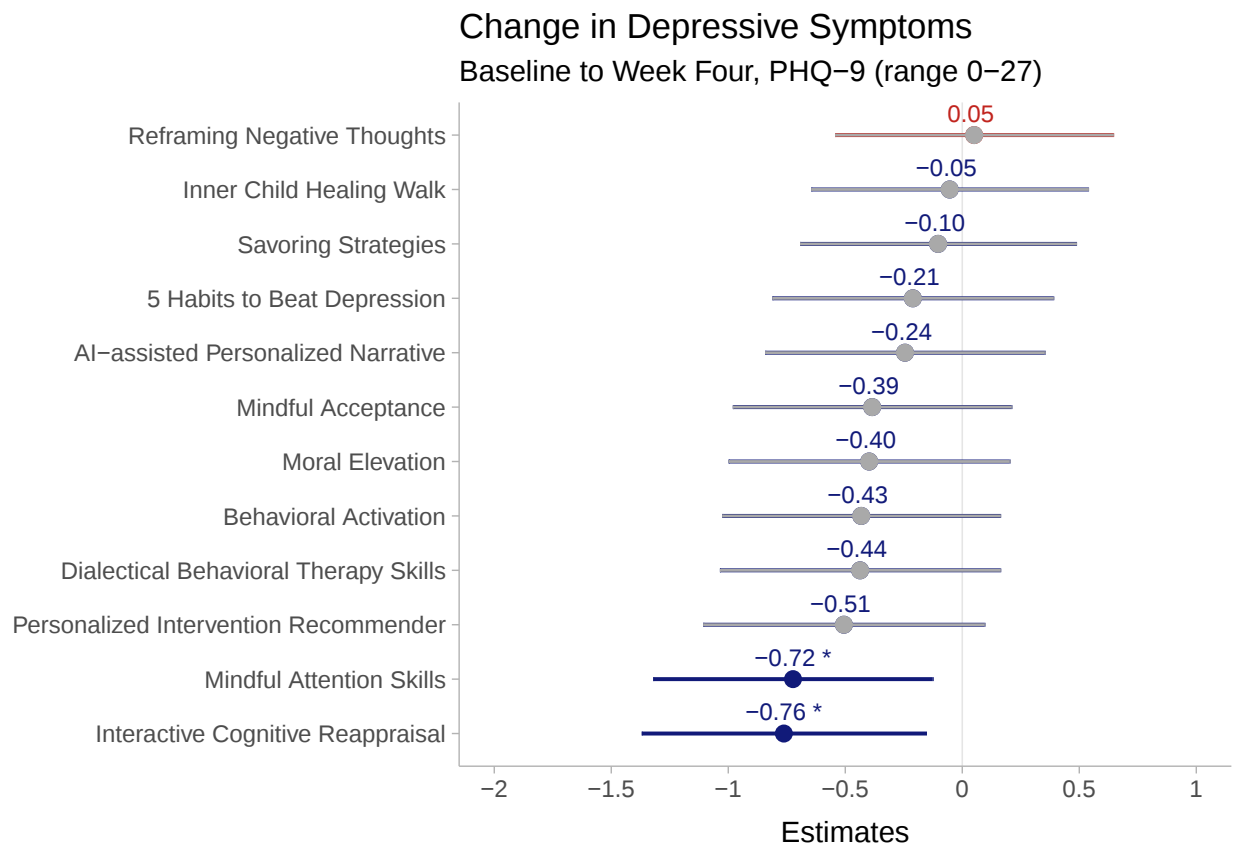
plot_data <- plot_model(m1_phq9, sort.est = T, terms = wk4_int_terms)$data
plot_data$color_override <- ifelse((plot_data$conf.low <= 0 & plot_data$conf.high >= 0), "darkgrey", NA)

(phq9_plot <- plot_model(
  m1_phq9, sort.est = T, terms = wk4_int_terms, auto_label = F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
```

```

scale_color_sjplot("circus", reverse = T) +
# Override colors for overlapping confidence intervals
geom_point(data = subset(plot_data, !is.na(color_override)),
  aes(x = term, y = estimate),
  color = "darkgrey", size = 2.5) +
geom_errorbar(data = subset(plot_data, !is.na(color_override)),
  aes(x = term, y = estimate,
    ymin = conf.low, ymax = conf.high),
  color = "darkgrey", width = 0) +
ggtitle('Change in Depressive Symptoms',
  'Baseline to Week Four, PHQ-9 (range 0-27)')

```



Secondary Analyses (Pre-registered)

H1: The experimental SSIs will differ from the active comparison SSI

- Redo the main analysis, except using the active comparison condition as the comparator.

```
#make active comparison SSI (abc project) the comparator
mega_alltimes_active_first <- mega_alltimes %>%
  mutate(group=fct_relevel(group, 'Behavioral Activation',after=0))

m1_phq9_activefirst <- lmer(phq9_score ~ time * group + (1|pid),
  data=mega_alltimes_active_first)

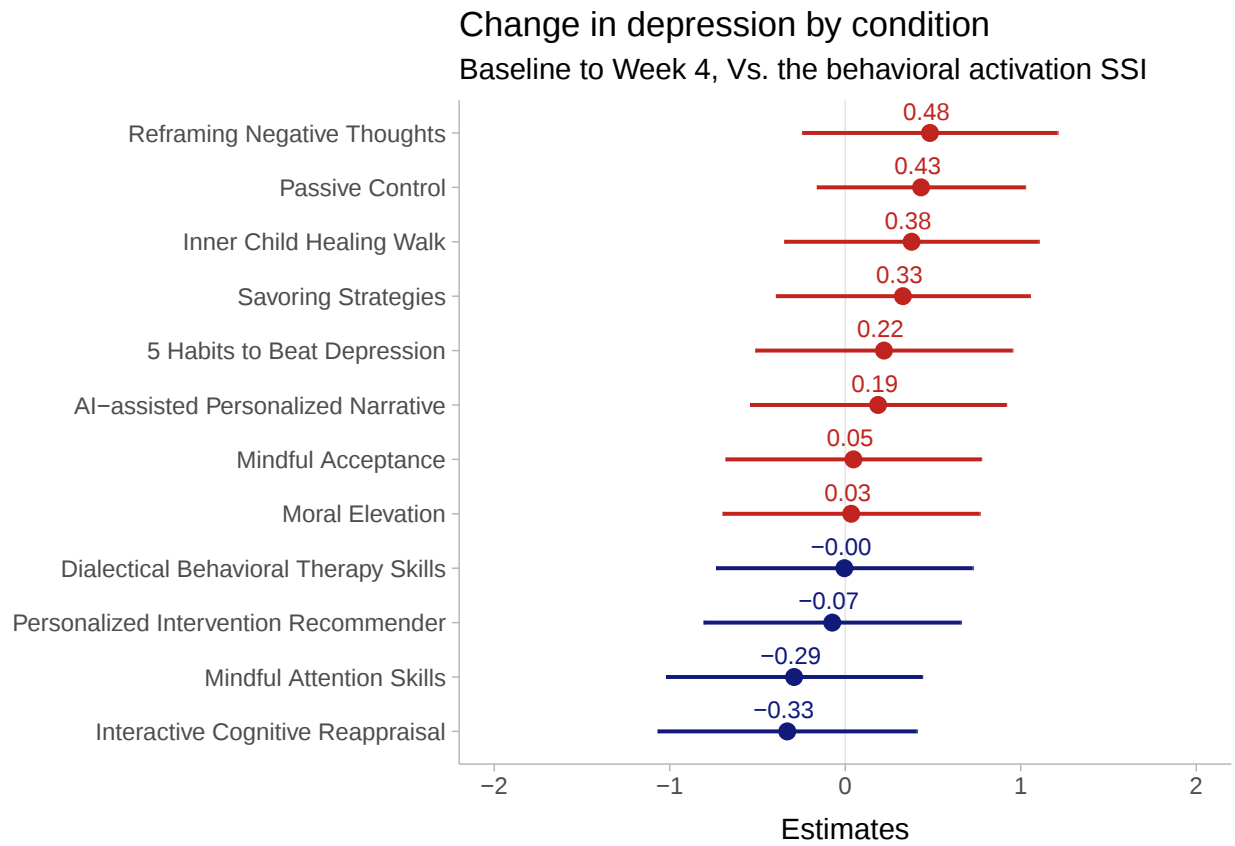
add_cohens_d(m1_phq9_activefirst, 'Predicting: change in depressive symptoms')
```

Table 5: Predicting: change in depressive symptoms

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	15.864	0.00e+00	NA	NA	NA
timeWeek 4	-3.419	2.15e-38	-0.66	-0.76	-0.56
groupPassive Control	-0.406	0.131	-0.08	-0.18	0.02
group5 Habits to Beat Depression	-0.611	0.065	-0.12	-0.24	0.01
groupAI-assisted Personalized Narrative	-0.632	0.055	-0.12	-0.25	0.00
groupDialectical Behavioral Therapy Skills	-0.320	0.332	-0.06	-0.19	0.06
groupInner Child Healing Walk	-0.404	0.219	-0.08	-0.20	0.05
groupInteractive Cognitive Reappraisal	-0.240	0.465	-0.05	-0.17	0.08
groupMindful Acceptance	-0.782	0.018	-0.15	-0.27	-0.03
groupMindful Attention Skills	-0.381	0.248	-0.07	-0.20	0.05
groupMoral Elevation	-0.327	0.321	-0.06	-0.19	0.06
groupPersonalized Intervention Recommender	-0.328	0.318	-0.06	-0.19	0.06
groupReframing Negative Thoughts	-0.643	0.050	-0.12	-0.25	0.00
groupSavoring Strategies	-0.425	0.196	-0.08	-0.21	0.04
timeWeek 4:groupPassive Control	0.432	0.154	0.08	-0.03	0.20
timeWeek 4:group5 Habits to Beat Depression	0.221	0.555	0.04	-0.10	0.18
timeWeek 4:groupAI-assisted Personalized Narrative	0.187	0.616	0.04	-0.10	0.18
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.005	0.989	0.00	-0.14	0.14
timeWeek 4:groupInner Child Healing Walk	0.378	0.307	0.07	-0.07	0.21
timeWeek 4:groupInteractive Cognitive Reappraisal	-0.331	0.380	-0.06	-0.21	0.08
timeWeek 4:groupMindful Acceptance	0.047	0.900	0.01	-0.13	0.15
timeWeek 4:groupMindful Attention Skills	-0.292	0.434	-0.06	-0.20	0.08
timeWeek 4:groupMoral Elevation	0.034	0.928	0.01	-0.13	0.15
timeWeek 4:groupPersonalized Intervention Recommender	-0.074	0.843	-0.01	-0.16	0.13
timeWeek 4:groupReframing Negative Thoughts	0.483	0.193	0.09	-0.05	0.23
timeWeek 4:groupSavoring Strategies	0.328	0.374	0.06	-0.08	0.20
sd__(Intercept)	3.529	NA	NA	NA	NA
sd__Observation	3.826	NA	NA	NA	NA

```
wk4_int_terms_activefirst <- m1_phq9_activefirst %>% tidy() %>% filter(str_detect(term, 'Week 4:')) %>%
plot_model(m1_phq9_activefirst, sort.est = T, terms=wk4_int_terms_activefirst,
  auto_label=F, show.values = T, value.offset = .4, value.size = 3.2)+
  scale_color_sjplot("circus", reverse=T) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x))+
```

```
ggtitle('Change in depression by condition',
        'Baseline to Week 4, Vs. the behavioral activation SSI')
```



H2: Secondary well-being outcomes will differ between each SSI and the passive control

- Replicate the primary analysis for each secondary outcome. For outcomes measured at three timepoints, compare baseline to each timepoint.

```
m1_agency <- lmer(agency_score ~ time * group + (1|pid), data=mega_alltimes)
agency_cohens_d <- mixed_cohens_d(m1_agency)
add_cohens_d(m1_agency, 'Predicting: change in agency')
```

Agency

Table 6: Predicting: change in agency

term	estimate	p.value	cohens_d	cohens_d_2.5%	cohens_d_97.5%
(Intercept)	14.521	0.00e+00	NA	NA	NA
timePost-test	0.153	0.095	0.03	-0.01	0.07
timeWeek 4	1.243	1.84e-36	0.27	0.23	0.31
group5 Habits to Beat Depression	0.037	0.875	0.01	-0.09	0.11
groupAI-assisted Personalized Narrative	0.423	0.074	0.09	-0.01	0.19
groupBehavioral Activation	-0.280	0.237	-0.06	-0.16	0.04
groupDialectical Behavioral Therapy Skills	-0.229	0.333	-0.05	-0.15	0.05
groupInner Child Healing Walk	-0.178	0.450	-0.04	-0.14	0.06
groupInteractive Cognitive Reappraisal	-0.576	0.015	-0.13	-0.23	-0.02
groupMindful Acceptance	-0.353	0.136	-0.08	-0.18	0.02
groupMindful Attention Skills	0.148	0.531	0.03	-0.07	0.13
groupMoral Elevation	0.189	0.425	0.04	-0.06	0.14
groupPersonalized Intervention Recommender	-0.163	0.489	-0.04	-0.14	0.07
groupReframing Negative Thoughts	-0.366	0.121	-0.08	-0.18	0.02
groupSavoring Strategies	0.023	0.922	0.01	-0.10	0.11
timePost-test:group5 Habits to Beat Depression	0.753	4.33e-05	0.16	0.09	0.24
timeWeek 4:group5 Habits to Beat Depression	0.339	0.088	0.07	-0.01	0.16
timePost-test:groupAI-assisted Personalized Narrative	0.906	7.85e-07	0.20	0.12	0.28
timeWeek 4:groupAI-assisted Personalized Narrative	0.066	0.740	0.01	-0.07	0.10
timePost-test:groupBehavioral Activation	1.092	2.08e-09	0.24	0.16	0.32
timeWeek 4:groupBehavioral Activation	0.273	0.165	0.06	-0.02	0.14
timePost-test:groupDialectical Behavioral Therapy Skills	0.899	9.15e-07	0.20	0.12	0.27
timeWeek 4:groupDialectical Behavioral Therapy Skills	0.590	0.003	0.13	0.04	0.21
timePost-test:groupInner Child Healing Walk	0.531	0.003	0.12	0.04	0.19
timeWeek 4:groupInner Child Healing Walk	0.387	0.048	0.08	0.00	0.17
timePost-test:groupInteractive Cognitive Reappraisal	1.687	4.02e-20	0.37	0.29	0.45
timeWeek 4:groupInteractive Cognitive Reappraisal	0.712	3.96e-04	0.16	0.07	0.24
timePost-test:groupMindful Acceptance	0.986	1.05e-07	0.22	0.14	0.29
timeWeek 4:groupMindful Acceptance	0.523	0.008	0.11	0.03	0.20
timePost-test:groupMindful Attention Skills	1.300	1.19e-12	0.28	0.21	0.36
timeWeek 4:groupMindful Attention Skills	0.341	0.085	0.07	-0.01	0.16
timePost-test:groupMoral Elevation	1.038	1.61e-08	0.23	0.15	0.31
timeWeek 4:groupMoral Elevation	0.470	0.018	0.10	0.02	0.19
timePost-test:groupPersonalized Intervention Recommender	0.309	0.089	0.07	-0.01	0.15
timeWeek 4:groupPersonalized Intervention Recommender	0.068	0.731	0.01	-0.07	0.10
timePost-test:groupReframing Negative Thoughts	1.177	1.10e-10	0.26	0.18	0.33

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
timeWeek 4:groupReframing Negative Thoughts	0.459	0.020	0.10	0.02	0.18
timePost-test:groupSavoring Strategies	0.751	4.06e-05	0.16	0.09	0.24
timeWeek 4:groupSavoring Strategies	0.090	0.646	0.02	-0.06	0.10
sd__(Intercept)	3.848	NA	NA	NA	NA
sd__Observation	2.486	NA	NA	NA	NA

```
m1_agency %>% tidy %>% select(term, statistic, df) %>% kable(digits=3, caption='Model T score and df')
```

Table 7: Model T score and df

term	statistic	df
(Intercept)	122.933	10965.92
timePost-test	1.670	13310.23
timeWeek 4	12.648	13510.97
group5 Habits to Beat Depression	0.157	10965.92
groupAI-assisted Personalized Narrative	1.785	10965.92
groupBehavioral Activation	-1.184	10965.92
groupDialectical Behavioral Therapy Skills	-0.969	10965.92
groupInner Child Healing Walk	-0.756	10965.92
groupInteractive Cognitive Reappraisal	-2.441	10965.92
groupMindful Acceptance	-1.491	10965.92
groupMindful Attention Skills	0.627	10965.92
groupMoral Elevation	0.797	10965.92
groupPersonalized Intervention Recommender	-0.692	10965.92
groupReframing Negative Thoughts	-1.552	10965.92
groupSavoring Strategies	0.098	10965.92
timePost-test:group5 Habits to Beat Depression	4.091	13308.30
timeWeek 4:group5 Habits to Beat Depression	1.705	13522.12
timePost-test:groupAI-assisted Personalized Narrative	4.941	13300.19
timeWeek 4:groupAI-assisted Personalized Narrative	0.332	13510.11
timePost-test:groupBehavioral Activation	5.996	13282.16
timeWeek 4:groupBehavioral Activation	1.389	13498.28
timePost-test:groupDialectical Behavioral Therapy Skills	4.911	13295.38
timeWeek 4:groupDialectical Behavioral Therapy Skills	2.978	13520.46
timePost-test:groupInner Child Healing Walk	2.928	13280.72
timeWeek 4:groupInner Child Healing Walk	1.980	13495.58
timePost-test:groupInteractive Cognitive Reappraisal	9.202	13319.26
timeWeek 4:groupInteractive Cognitive Reappraisal	3.544	13574.65
timePost-test:groupMindful Acceptance	5.322	13366.63
timeWeek 4:groupMindful Acceptance	2.649	13540.82
timePost-test:groupMindful Attention Skills	7.113	13295.29
timeWeek 4:groupMindful Attention Skills	1.724	13517.27
timePost-test:groupMoral Elevation	5.653	13306.50
timeWeek 4:groupMoral Elevation	2.366	13527.08
timePost-test:groupPersonalized Intervention Recommender	1.702	13285.58
timeWeek 4:groupPersonalized Intervention Recommender	0.344	13540.90
timePost-test:groupReframing Negative Thoughts	6.458	13296.62
timeWeek 4:groupReframing Negative Thoughts	2.334	13514.63
timePost-test:groupSavoring Strategies	4.105	13307.80

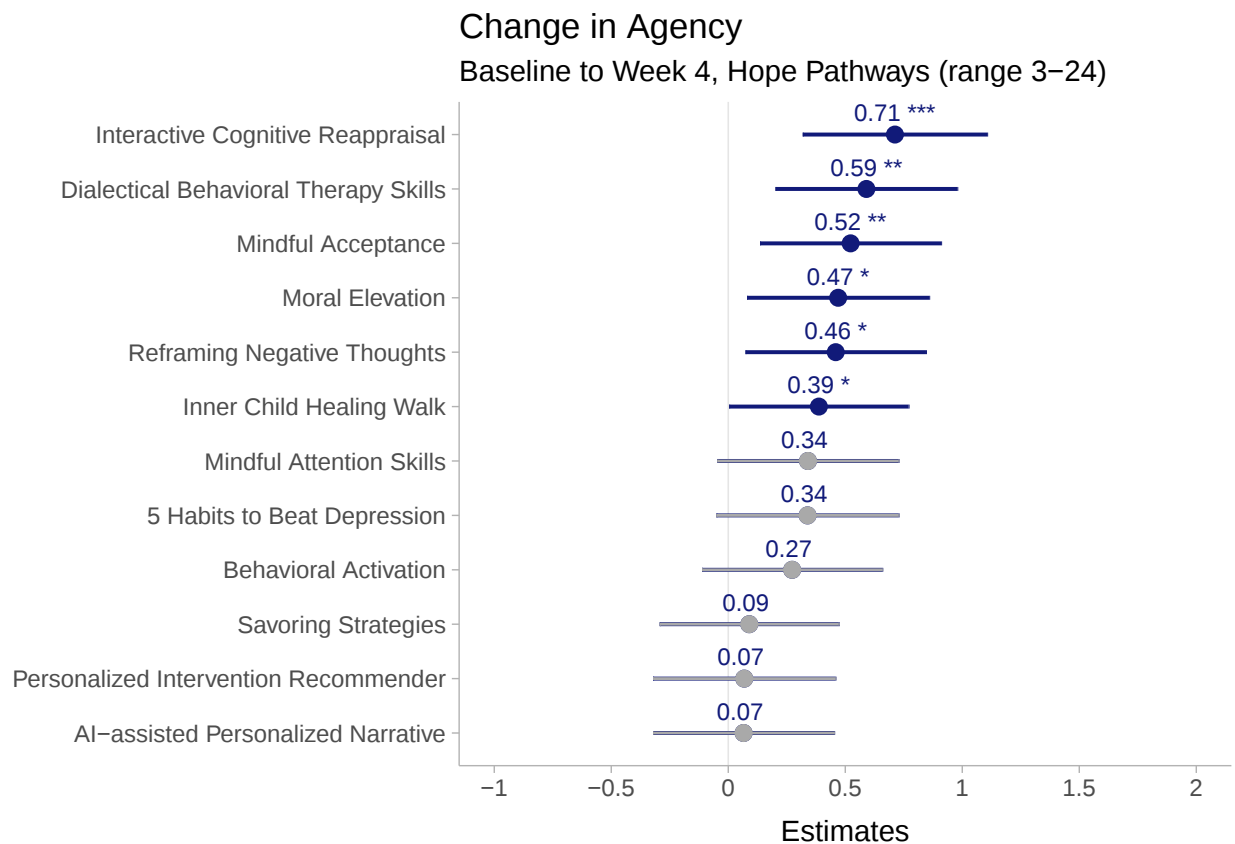
term	statistic	df
timeWeek 4:groupSavoring Strategies	0.459	13494.96
sd__(Intercept)	NA	NA
sd__Observation	NA	NA

```

plot_data <- plot_model(m1_agency, sort.est = T, terms = wk4_int_terms)$data
plot_data$color_override <- ifelse((plot_data$conf.low <= 0 & plot_data$conf.high >= 0), "darkgrey", NA)

(agency_wk4_plot <- plot_model(
  m1_agency, sort.est = T, terms = wk4_int_terms, auto_label = F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_color_sjplot("circus", reverse = T) +
  # Override colors for overlapping confidence intervals
  geom_point(data = subset(plot_data, !is.na(color_override)),
    aes(x = term, y = estimate),
    color = "darkgrey", size = 2.5) +
  geom_errorbar(data = subset(plot_data, !is.na(color_override)),
    aes(x = term, y = estimate,
        ymin = conf.low, ymax = conf.high),
    color = "darkgrey", width = 0) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Change in Agency',
    'Baseline to Week 4, Hope Pathways (range 3-24)'))

```



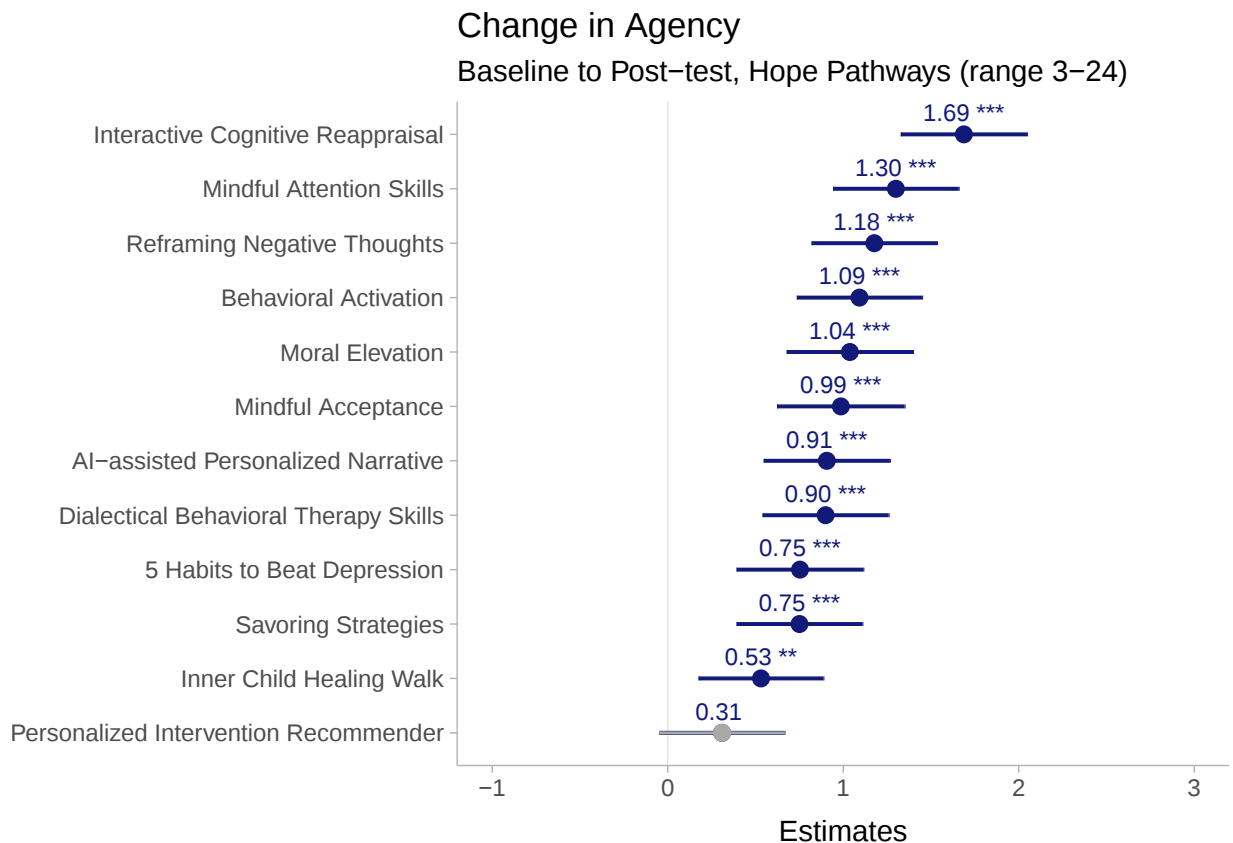
```

posttest_int_terms <- m1_agency %>% tidy() %>% filter(str_detect(term, 'Post-test:')) %>% pull(term)

plot_data <- plot_model(m1_agency, sort.est = T, terms = posttest_int_terms)$data
plot_data$color_override <- ifelse((plot_data$conf.low <= 0 & plot_data$conf.high >= 0), "darkgrey", NA)

(agency_posttest_plot <- plot_model(
  m1_agency, sort.est = T, terms = posttest_int_terms, auto_label = F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_color_sjplot("circus", reverse = T) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  # Override colors for overlapping confidence intervals
  geom_point(data = subset(plot_data, !is.na(color_override)),
    aes(x = term, y = estimate),
    color = "darkgrey", size = 2.5) +
  geom_errorbar(data = subset(plot_data, !is.na(color_override)),
    aes(x = term, y = estimate,
        ymin = conf.low, ymax = conf.high),
    color = "darkgrey", width = 0) +
  ggtitle('Change in Agency',
    'Baseline to Post-test, Hope Pathways (range 3-24)'))

```



```

m1_hopeless <- lmer(hopeless_score ~ time * group + (1|pid), data=mega_alltimes)

```

```
hopeless_cohens_d <- mixed_cohens_d(m1_hopeless)
add_cohens_d(m1_hopeless, 'Predicting: change in hopelessness')
```

Hopelessness

Table 8: Predicting: change in hopelessness

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	7.138	0.00e+00	NA	NA	NA
timePost-test	-0.338	1.03e-08	-0.12	-0.16	-0.08
timeWeek 4	-1.171	8.57e-76	-0.41	-0.45	-0.36
group5 Habits to Beat Depression	-0.184	0.218	-0.06	-0.17	0.04
groupAI-assisted Personalized Narrative	-0.335	0.025	-0.12	-0.22	-0.01
groupBehavioral Activation	-0.009	0.950	0.00	-0.10	0.10
groupDialectical Behavioral Therapy Skills	0.105	0.480	0.04	-0.06	0.14
groupInner Child Healing Walk	-0.146	0.326	-0.05	-0.15	0.05
groupInteractive Cognitive Reappraisal	0.237	0.111	0.08	-0.02	0.18
groupMindful Acceptance	0.030	0.838	0.01	-0.09	0.11
groupMindful Attention Skills	-0.249	0.094	-0.09	-0.19	0.01
groupMoral Elevation	-0.148	0.323	-0.05	-0.15	0.05
groupPersonalized Intervention Recommender	-0.053	0.722	-0.02	-0.12	0.08
groupReframing Negative Thoughts	0.003	0.983	0.00	-0.10	0.10
groupSavoring Strategies	-0.122	0.413	-0.04	-0.14	0.06
timePost-test:group5 Habits to Beat Depression	-0.188	0.112	-0.07	-0.15	0.02
timeWeek 4:group5 Habits to Beat Depression	0.038	0.769	0.01	-0.07	0.10
timePost-test:groupAI-assisted Personalized Narrative	-0.368	0.002	-0.13	-0.21	-0.05
timeWeek 4:groupAI-assisted Personalized Narrative	0.111	0.383	0.04	-0.05	0.12
timePost-test:groupBehavioral Activation	-0.322	0.006	-0.11	-0.19	-0.03
timeWeek 4:groupBehavioral Activation	0.072	0.571	0.02	-0.06	0.11
timePost-test:groupDialectical Behavioral Therapy Skills	-0.159	0.177	-0.06	-0.14	0.02
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.039	0.761	-0.01	-0.10	0.07
timePost-test:groupInner Child Healing Walk	-0.394	7.41e-04	-0.14	-0.22	-0.06
timeWeek 4:groupInner Child Healing Walk	0.096	0.448	0.03	-0.05	0.12
timePost-test:groupInteractive Cognitive Reappraisal	-0.462	9.00e-05	-0.16	-0.24	-0.08
timeWeek 4:groupInteractive Cognitive Reappraisal	-0.223	0.085	-0.08	-0.16	0.01
timePost-test:groupMindful Acceptance	-0.454	1.43e-04	-0.16	-0.24	-0.08
timeWeek 4:groupMindful Acceptance	-0.016	0.898	-0.01	-0.09	0.08
timePost-test:groupMindful Attention Skills	-0.445	1.56e-04	-0.15	-0.23	-0.07
timeWeek 4:groupMindful Attention Skills	0.060	0.635	0.02	-0.07	0.11
timePost-test:groupMoral Elevation	-0.440	1.98e-04	-0.15	-0.23	-0.07

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
timeWeek 4:groupMoral Elevation	-0.203	0.111	-0.07	-0.16	0.02
timePost-test:groupPersonalized Intervention Recommender	-0.020	0.866	-0.01	-0.09	0.07
timeWeek 4:groupPersonalized Intervention Recommender	-0.029	0.818	-0.01	-0.10	0.08
timePost-test:groupReframing Negative Thoughts	-0.506	1.65e-05	-0.18	-0.26	-0.10
timeWeek 4:groupReframing Negative Thoughts	-0.218	0.084	-0.08	-0.16	0.01
timePost-test:groupSavoring Strategies	-0.334	0.004	-0.12	-0.20	-0.04
timeWeek 4:groupSavoring Strategies	-0.027	0.829	-0.01	-0.09	0.08
sd__(Intercept)	2.399	NA	NA	NA	NA
sd__Observation	1.600	NA	NA	NA	NA

```
m1_hopeless %>% tidy %>% select(term, statistic, df) %>% kable(digits=3, caption='Model T score and df')
```

Table 9: Model T score and df

term	statistic	df
(Intercept)	95.995	11160.18
timePost-test	-5.729	13325.42
timeWeek 4	-18.540	13532.32
group5 Habits to Beat Depression	-1.231	11160.18
groupAI-assisted Personalized Narrative	-2.244	11160.18
groupBehavioral Activation	-0.063	11160.18
groupDialectical Behavioral Therapy Skills	0.707	11160.18
groupInner Child Healing Walk	-0.981	11160.18
groupInteractive Cognitive Reappraisal	1.594	11160.18
groupMindful Acceptance	0.204	11160.18
groupMindful Attention Skills	-1.677	11160.18
groupMoral Elevation	-0.989	11160.18
groupPersonalized Intervention Recommender	-0.355	11160.18
groupReframing Negative Thoughts	0.022	11160.18
groupSavoring Strategies	-0.819	11160.18
timePost-test:group5 Habits to Beat Depression	-1.588	13321.03
timeWeek 4:group5 Habits to Beat Depression	0.294	13545.00
timePost-test:groupAI-assisted Personalized Narrative	-3.120	13312.75
timeWeek 4:groupAI-assisted Personalized Narrative	0.873	13530.53
timePost-test:groupBehavioral Activation	-2.742	13293.88
timeWeek 4:groupBehavioral Activation	0.567	13516.26
timePost-test:groupDialectical Behavioral Therapy Skills	-1.351	13307.77
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.304	13543.50
timePost-test:groupInner Child Healing Walk	-3.375	13292.45
timeWeek 4:groupInner Child Healing Walk	0.759	13519.31
timePost-test:groupInteractive Cognitive Reappraisal	-3.917	13332.57
timeWeek 4:groupInteractive Cognitive Reappraisal	-1.723	13598.21
timePost-test:groupMindful Acceptance	-3.804	13381.81
timeWeek 4:groupMindful Acceptance	-0.129	13560.23
timePost-test:groupMindful Attention Skills	-3.783	13307.68
timeWeek 4:groupMindful Attention Skills	0.475	13538.14
timePost-test:groupMoral Elevation	-3.723	13319.23

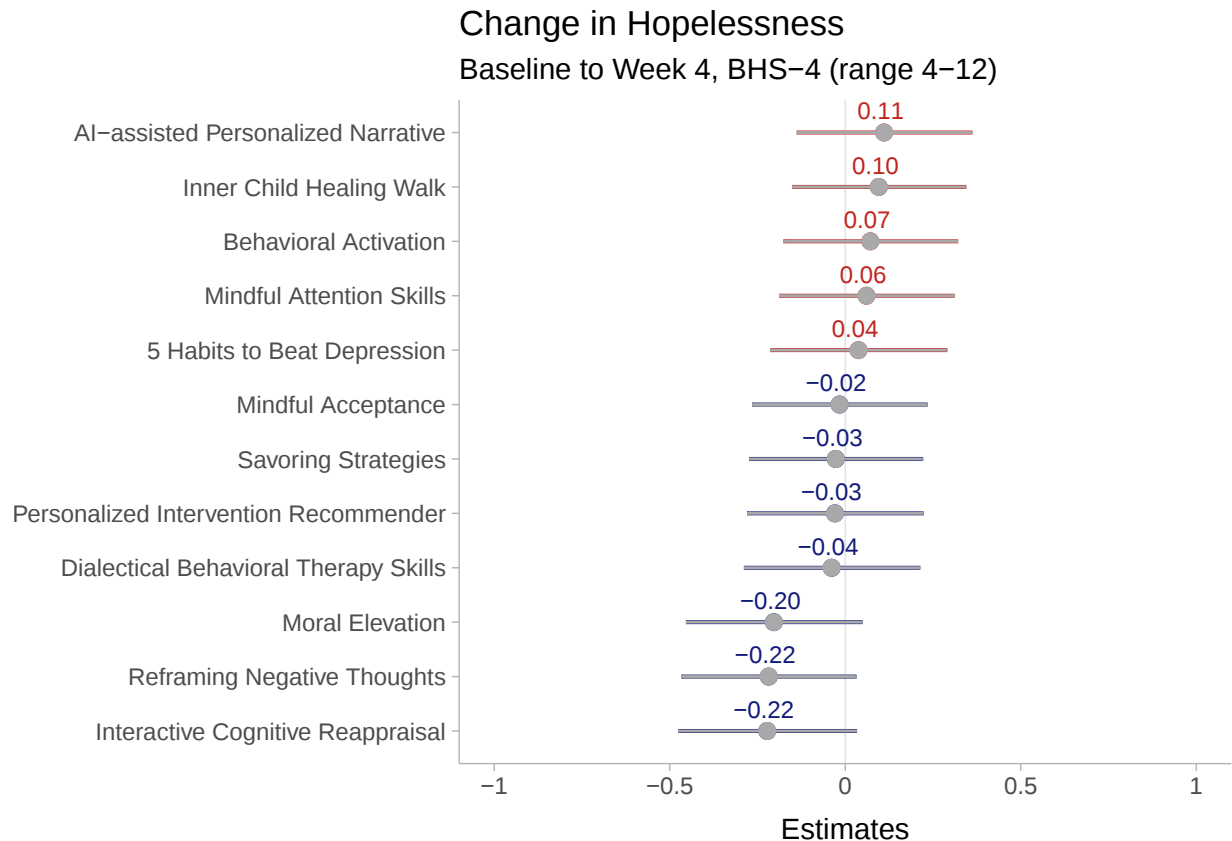
term	statistic	df
timeWeek 4:groupMoral Elevation	-1.593	13552.31
timePost-test:groupPersonalized Intervention Recommender	-0.169	13294.16
timeWeek 4:groupPersonalized Intervention Recommender	-0.230	13560.67
timePost-test:groupReframing Negative Thoughts	-4.310	13307.60
timeWeek 4:groupReframing Negative Thoughts	-1.725	13532.89
timePost-test:groupSavoring Strategies	-2.842	13318.87
timeWeek 4:groupSavoring Strategies	-0.216	13518.27
sd__(Intercept)	NA	NA
sd__Observation	NA	NA

```

plot_data <- plot_model(m1_hopeless, sort.est = T, terms = wk4_int_terms)$data
plot_data$color_override <- ifelse((plot_data$conf.low <= 0 & plot_data$conf.high >= 0), "darkgrey", NA)

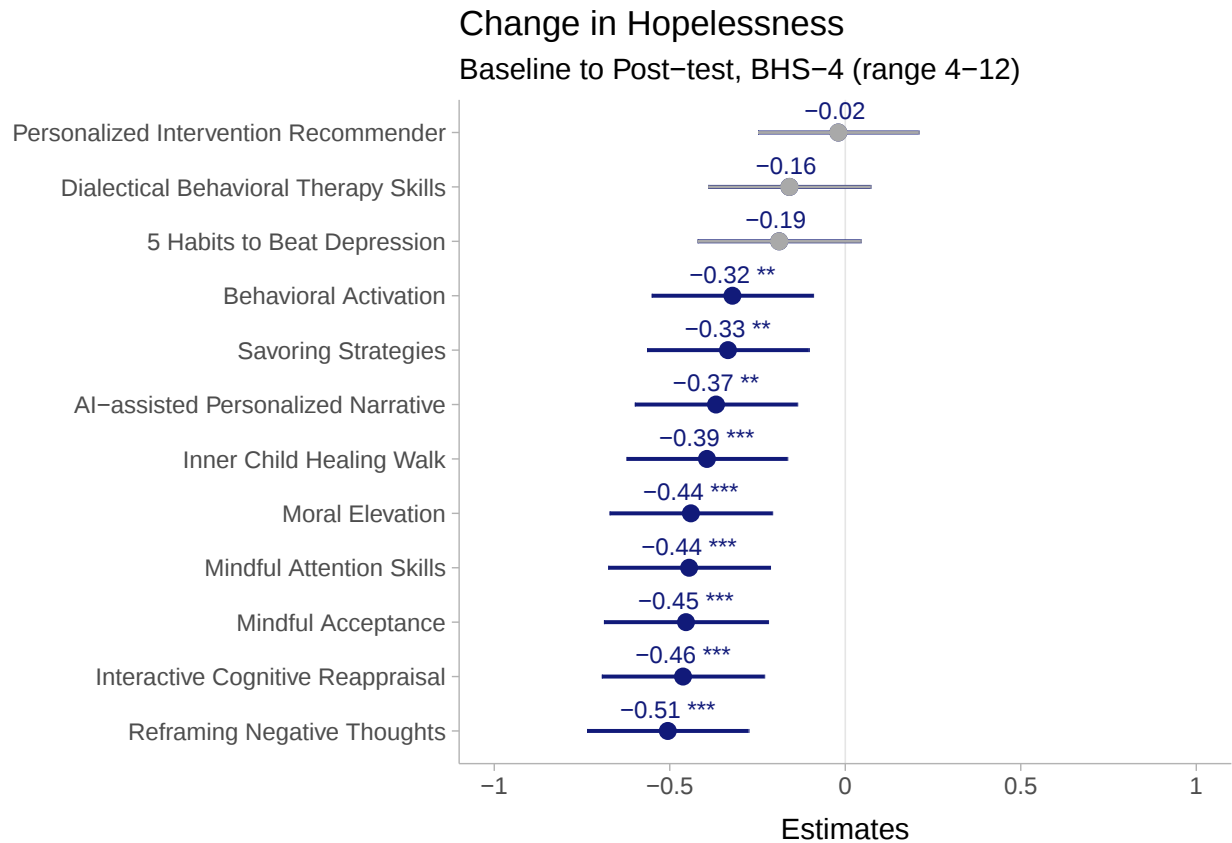
(hopelessness_wk4_plot <- plot_model(
  m1_hopeless, sort.est = T, terms = wk4_int_terms, auto_label = F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  scale_color_sjplot("circus", reverse = T) +
  # Override colors for overlapping confidence intervals
  geom_point(data = subset(plot_data, !is.na(color_override)),
    aes(x = term, y = estimate),
    color = "darkgrey", size = 2.5) +
  geom_errorbar(data = subset(plot_data, !is.na(color_override)),
    aes(x = term, y = estimate,
        ymin = conf.low, ymax = conf.high),
    color = "darkgrey", width = 0) +
  ggtitle('Change in Hopelessness',
    'Baseline to Week 4, BHS-4 (range 4-12)'))

```



```
plot_data <- plot_model(m1_hopeless, sort.est = T, terms = posttest_int_terms)$data
plot_data$color_override <- ifelse((plot_data$conf.low <= 0 & plot_data$conf.high >= 0), "darkgrey", NA)

(hopelessness_posttest_plot <- plot_model(
  m1_hopeless, sort.est = T, terms = posttest_int_terms, auto_label = F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  scale_color_sjplot("circus", reverse = T) +
  # Override colors for overlapping confidence intervals
  geom_point(data = subset(plot_data, !is.na(color_override)),
    aes(x = term, y = estimate),
    color = "darkgrey", size = 2.5) +
  geom_errorbar(data = subset(plot_data, !is.na(color_override)),
    aes(x = term, y = estimate,
      ymin = conf.low, ymax = conf.high),
    color = "darkgrey", width = 0) +
  ggtitle('Change in Hopelessness',
    'Baseline to Post-test, BHS-4 (range 4-12)'))
```



```
m1_fats <- lmer(fats_score ~ time * group + (1|pid), data=mega_alltimes)

fats_cohens_d <- mixed_cohens_d(m1_fats)
add_cohens_d(m1_fats, 'Predicting: change in positive actions and thoughts')
```

Frequency of Actions and Thoughts Scale (positive actions and thoughts)

Table 10: Predicting: change in positive actions and thoughts

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	17.219	0.00e+00	NA	NA	NA
timeWeek 4	3.454	4.85e-49	0.36	0.32	0.41
group5 Habits to Beat Depression	0.491	0.318	0.05	-0.05	0.15
groupAI-assisted Personalized Narrative	0.712	0.146	0.08	-0.03	0.18
groupBehavioral Activation	0.831	0.090	0.09	-0.01	0.19
groupDialectical Behavioral Therapy Skills	0.220	0.653	0.02	-0.08	0.12
groupInner Child Healing Walk	0.317	0.515	0.03	-0.07	0.13
groupInteractive Cognitive Reappraisal	-0.927	0.058	-0.10	-0.20	0.00
groupMindful Acceptance	0.051	0.918	0.01	-0.10	0.11
groupMindful Attention Skills	0.577	0.238	0.06	-0.04	0.16
groupMoral Elevation	0.363	0.459	0.04	-0.06	0.14

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
groupPersonalized Intervention Recommender	0.273	0.575	0.03	-0.07	0.13
groupReframing Negative Thoughts	0.223	0.647	0.02	-0.08	0.12
groupSavoring Strategies	0.187	0.702	0.02	-0.08	0.12
timeWeek 4:group5 Habits to Beat Depression	-0.340	0.470	-0.04	-0.13	0.06
timeWeek 4:groupAI-assisted Personalized Narrative	-0.340	0.467	-0.04	-0.13	0.06
timeWeek 4:groupBehavioral Activation	0.314	0.500	0.03	-0.06	0.13
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.041	0.930	0.00	-0.10	0.09
timeWeek 4:groupInner Child Healing Walk	-0.132	0.775	-0.01	-0.11	0.08
timeWeek 4:groupInteractive Cognitive Reappraisal	0.977	0.041	0.10	0.00	0.20
timeWeek 4:groupMindful Acceptance	0.462	0.322	0.05	-0.05	0.15
timeWeek 4:groupMindful Attention Skills	0.709	0.130	0.07	-0.02	0.17
timeWeek 4:groupMoral Elevation	-0.089	0.850	-0.01	-0.11	0.09
timeWeek 4:groupPersonalized Intervention Recommender	0.117	0.805	0.01	-0.09	0.11
timeWeek 4:groupReframing Negative Thoughts	-0.255	0.584	-0.03	-0.12	0.07
timeWeek 4:groupSavoring Strategies	0.303	0.511	0.03	-0.06	0.13
sd__(Intercept)	7.469	NA	NA	NA	NA
sd__Observation	5.829	NA	NA	NA	NA

```
m1_fats %>% tidy %>% select(term, statistic, df) %>% kable(digits=3, caption='Model T score and df')
```

Table 11: Model T score and df

term	statistic	df
(Intercept)	70.487	10051.200
timeWeek 4	14.847	6293.047
group5 Habits to Beat Depression	0.998	10051.200
groupAI-assisted Personalized Narrative	1.453	10051.200
groupBehavioral Activation	1.697	10051.200
groupDialectical Behavioral Therapy Skills	0.450	10051.200
groupInner Child Healing Walk	0.651	10051.200
groupInteractive Cognitive Reappraisal	-1.897	10051.200
groupMindful Acceptance	0.103	10051.200
groupMindful Attention Skills	1.181	10051.200
groupMoral Elevation	0.740	10051.200
groupPersonalized Intervention Recommender	0.560	10051.200
groupReframing Negative Thoughts	0.457	10051.200
groupSavoring Strategies	0.383	10051.200
timeWeek 4:group5 Habits to Beat Depression	-0.722	6312.350
timeWeek 4:groupAI-assisted Personalized Narrative	-0.728	6301.418
timeWeek 4:groupBehavioral Activation	0.675	6290.161
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.088	6320.848
timeWeek 4:groupInner Child Healing Walk	-0.286	6289.630
timeWeek 4:groupInteractive Cognitive Reappraisal	2.044	6407.435
timeWeek 4:groupMindful Acceptance	0.991	6299.409
timeWeek 4:groupMindful Attention Skills	1.515	6315.329

term	statistic	df
timeWeek 4:groupMoral Elevation	-0.189	6329.127
timeWeek 4:groupPersonalized Intervention Recommender	0.247	6365.441
timeWeek 4:groupReframing Negative Thoughts	-0.548	6306.617
timeWeek 4:groupSavoring Strategies	0.657	6259.198
sd__(Intercept)	NA	NA
sd__Observation	NA	NA

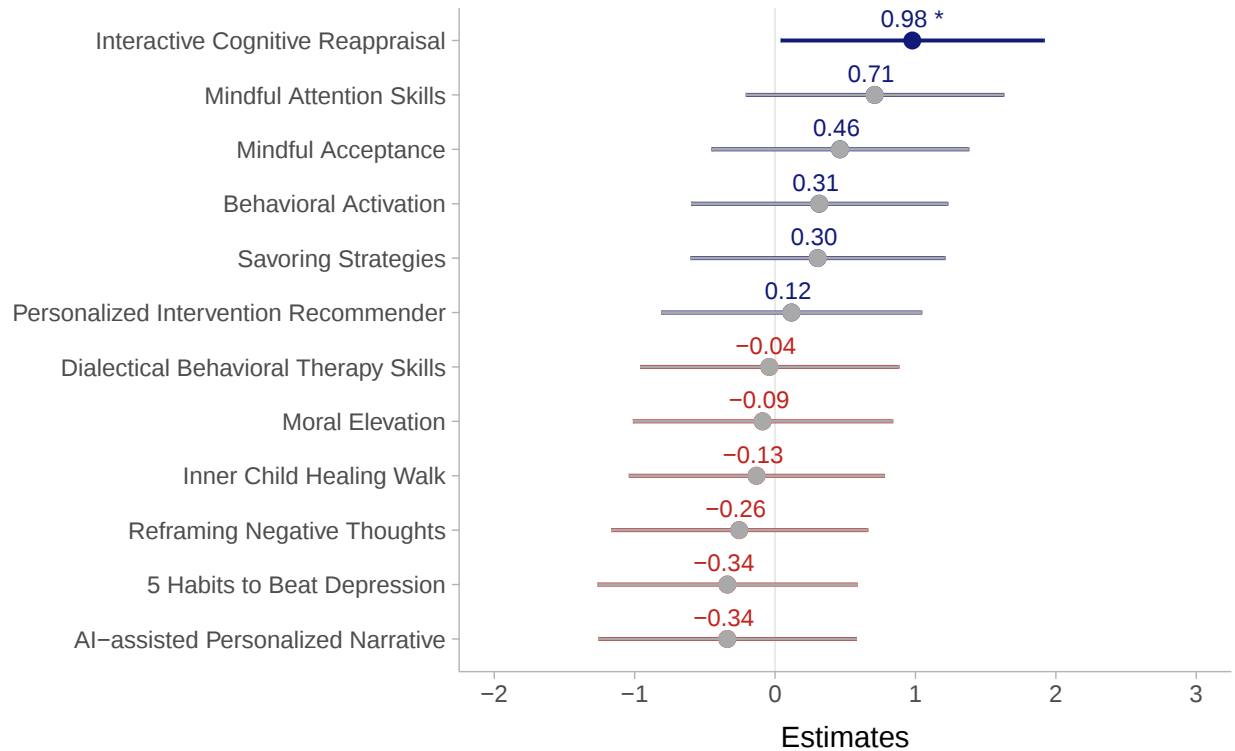
```

plot_data <- plot_model(m1_fats, sort.est = T, terms = wk4_int_terms)$data
plot_data$color_override <- ifelse((plot_data$conf.low <= 0 & plot_data$conf.high >= 0), "darkgrey", NA)

(fats_wk4_plot <- plot_model(
  m1_fats, sort.est = T, terms = wk4_int_terms, auto_label = F, show.values = T,
  value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  scale_color_sjplot("circus") +
  # Override colors for overlapping confidence intervals
  geom_point(data = subset(plot_data, !is.na(color_override)),
    aes(x = term, y = estimate),
    color = "darkgrey", size = 2.5) +
  geom_errorbar(data = subset(plot_data, !is.na(color_override)),
    aes(x = term, y = estimate,
        ymin = conf.low, ymax = conf.high),
    color = "darkgrey", width = 0) +
  ggtitle('Change in Positive Actions and Thinking', 'Baseline to Week 4, FATS (range 0-48)'))

```

Change in Positive Actions and Thinking Baseline to Week 4, FATS (range 0–48)



```
m1_dep_expect <- lmer(dep_expectancies_score ~ time * group + (1|pid), data=mega_alltimes)
dep_expect_cohens_d <- mixed_cohens_d(m1_dep_expect)
add_cohens_d(m1_dep_expect, 'Predicting: change in depression change expectancies')
```

Depression Change Expectancies

Table 12: Predicting: change in depression change expectancies

term	estimate	p.value	cohens_d	cohens_d_2.5%	cohens_d_97.5%
(Intercept)	8.650	0.00e+00	NA	NA	NA
timePost-test	0.253	1.99e-06	0.11	0.06	0.15
timeWeek 4	0.858	1.27e-50	0.36	0.31	0.41
group5 Habits to Beat Depression	0.368	0.003	0.15	0.05	0.26
groupAI-assisted Personalized Narrative	0.364	0.003	0.15	0.05	0.25
groupBehavioral Activation	0.001	0.993	0.00	-0.10	0.10
groupDialectical Behavioral Therapy Skills	0.002	0.985	0.00	-0.10	0.10
groupInner Child Healing Walk	-0.009	0.944	0.00	-0.10	0.10
groupInteractive Cognitive Reappraisal	-0.087	0.482	-0.04	-0.14	0.06
groupMindful Acceptance	0.074	0.549	0.03	-0.07	0.13

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
groupMindful Attention Skills	0.146	0.235	0.06	-0.04	0.16
groupMoral Elevation	-0.017	0.889	-0.01	-0.11	0.09
groupPersonalized Intervention Recommender	0.089	0.468	0.04	-0.06	0.14
groupReframing Negative Thoughts	0.249	0.043	0.10	0.00	0.21
groupSavoring Strategies	0.268	0.029	0.11	0.01	0.21
timePost-test:group5 Habits to Beat Depression	0.280	0.009	0.12	0.03	0.21
timeWeek 4:group5 Habits to Beat Depression	-0.050	0.662	-0.02	-0.12	0.07
timePost-test:groupAI-assisted Personalized Narrative	0.386	2.99e-04	0.16	0.07	0.25
timeWeek 4:groupAI-assisted Personalized Narrative	-0.011	0.921	0.00	-0.10	0.09
timePost-test:groupBehavioral Activation	0.682	1.33e-10	0.29	0.20	0.37
timeWeek 4:groupBehavioral Activation	0.210	0.066	0.09	-0.01	0.18
timePost-test:groupDialectical Behavioral Therapy Skills	0.446	2.91e-05	0.19	0.10	0.27
timeWeek 4:groupDialectical Behavioral Therapy Skills	0.203	0.078	0.09	-0.01	0.18
timePost-test:groupInner Child Healing Walk	0.338	0.001	0.14	0.06	0.23
timeWeek 4:groupInner Child Healing Walk	0.069	0.544	0.03	-0.06	0.12
timePost-test:groupInteractive Cognitive Reappraisal	0.827	9.93e-15	0.35	0.26	0.43
timeWeek 4:groupInteractive Cognitive Reappraisal	0.158	0.175	0.07	-0.03	0.16
timePost-test:groupMindful Acceptance	0.615	1.21e-08	0.26	0.17	0.35
timeWeek 4:groupMindful Acceptance	0.050	0.661	0.02	-0.07	0.12
timePost-test:groupMindful Attention Skills	0.751	1.76e-12	0.31	0.23	0.40
timeWeek 4:groupMindful Attention Skills	0.107	0.351	0.04	-0.05	0.14
timePost-test:groupMoral Elevation	0.501	2.78e-06	0.21	0.12	0.30
timeWeek 4:groupMoral Elevation	0.219	0.058	0.09	0.00	0.19
timePost-test:groupPersonalized Intervention Recommender	0.185	0.079	0.08	-0.01	0.16
timeWeek 4:groupPersonalized Intervention Recommender	0.063	0.583	0.03	-0.07	0.12
timePost-test:groupReframing Negative Thoughts	0.586	3.37e-08	0.25	0.16	0.33
timeWeek 4:groupReframing Negative Thoughts	-0.038	0.742	-0.02	-0.11	0.08
timePost-test:groupSavoring Strategies	0.503	2.25e-06	0.21	0.12	0.30
timeWeek 4:groupSavoring Strategies	0.139	0.222	0.06	-0.04	0.15
sd__(Intercept)	1.895	NA	NA	NA	NA
sd__Observation	1.447	NA	NA	NA	NA

```
m1_dep_expect %>% tidy %>% select(term, statistic, df) %>% kable(digits=3, caption='Model T score and df')
```

Table 13: Model T score and df

term	statistic	df
(Intercept)	140.681	12107.93
timePost-test	4.756	13352.10
timeWeek 4	15.026	13612.92
group5 Habits to Beat Depression	2.970	12107.93
groupAI-assisted Personalized Narrative	2.949	12107.93
groupBehavioral Activation	0.008	12107.93
groupDialectical Behavioral Therapy Skills	0.019	12107.93
groupInner Child Healing Walk	-0.071	12107.93
groupInteractive Cognitive Reappraisal	-0.704	12107.93
groupMindful Acceptance	0.599	12107.93
groupMindful Attention Skills	1.188	12107.93
groupMoral Elevation	-0.139	12107.93
groupPersonalized Intervention Recommender	0.725	12107.93
groupReframing Negative Thoughts	2.025	12107.93
groupSavoring Strategies	2.181	12107.93
timePost-test:group5 Habits to Beat Depression	2.613	13351.29
timeWeek 4:group5 Habits to Beat Depression	-0.437	13623.59
timePost-test:groupAI-assisted Personalized Narrative	3.618	13342.43
timeWeek 4:groupAI-assisted Personalized Narrative	-0.099	13614.29
timePost-test:groupBehavioral Activation	6.429	13319.71
timeWeek 4:groupBehavioral Activation	1.836	13604.32
timePost-test:groupDialectical Behavioral Therapy Skills	4.181	13336.75
timeWeek 4:groupDialectical Behavioral Therapy Skills	1.762	13625.68
timePost-test:groupInner Child Healing Walk	3.203	13318.36
timeWeek 4:groupInner Child Healing Walk	0.607	13598.79
timePost-test:groupInteractive Cognitive Reappraisal	7.749	13365.48
timeWeek 4:groupInteractive Cognitive Reappraisal	1.357	13694.19
timePost-test:groupMindful Acceptance	5.702	13423.01
timeWeek 4:groupMindful Acceptance	0.439	13644.58
timePost-test:groupMindful Attention Skills	7.059	13336.64
timeWeek 4:groupMindful Attention Skills	0.932	13621.57
timePost-test:groupMoral Elevation	4.688	13349.52
timeWeek 4:groupMoral Elevation	1.896	13640.46
timePost-test:groupPersonalized Intervention Recommender	1.754	13322.53
timeWeek 4:groupPersonalized Intervention Recommender	0.549	13655.02
timePost-test:groupReframing Negative Thoughts	5.525	13336.52
timeWeek 4:groupReframing Negative Thoughts	-0.329	13612.67
timePost-test:groupSavoring Strategies	4.731	13349.09
timeWeek 4:groupSavoring Strategies	1.222	13591.26
sd__(Intercept)	NA	NA
sd__Observation	NA	NA

```

plot_data <- plot_model(m1_dep_expect, sort.est = T, terms = wk4_int_terms)$data
plot_data$color_override <- ifelse((plot_data$conf.low <= 0 & plot_data$conf.high >= 0), "darkgrey", NA)

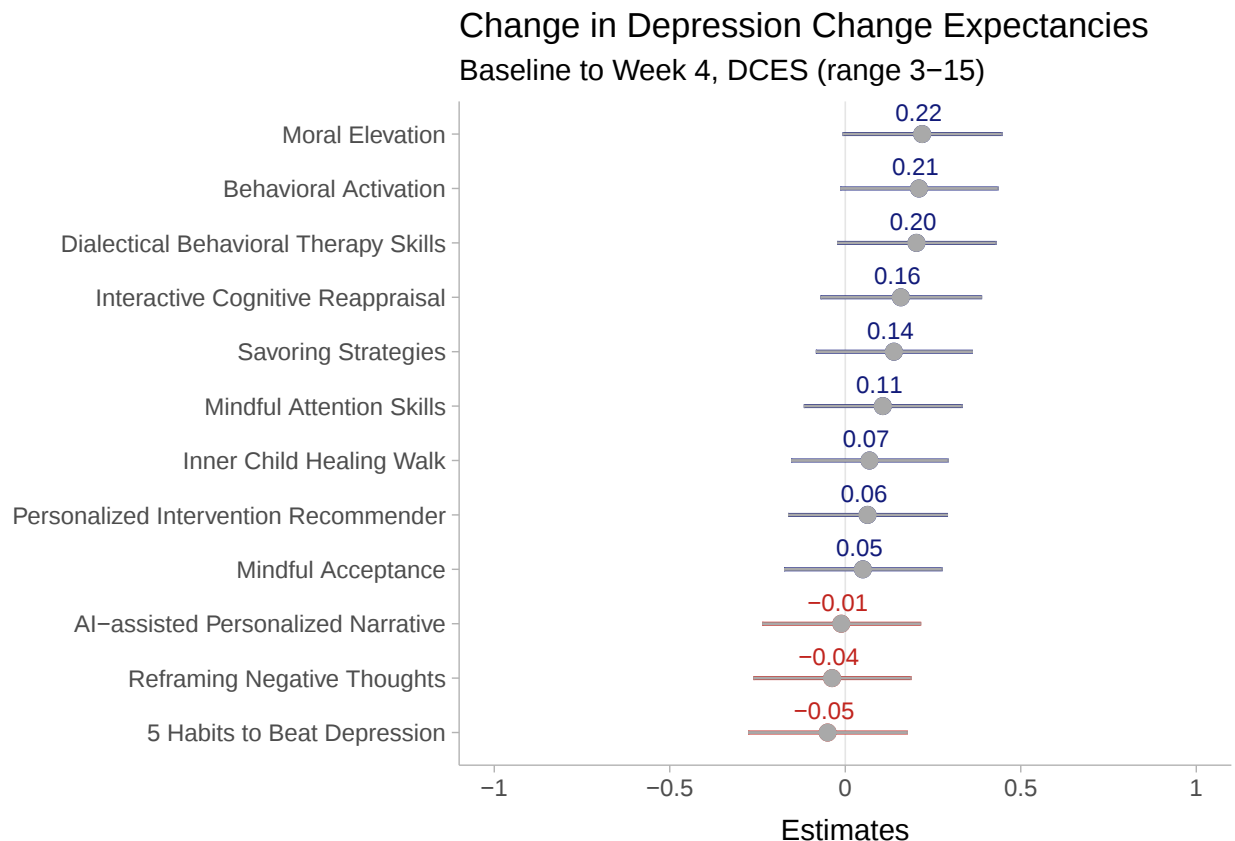
(dep_expect_wk4_plot <- plot_model(
  m1_dep_expect, sort.est = T, terms = wk4_int_terms, auto_label = F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  scale_color_sjplot("circus") +

```

```

# Override colors for overlapping confidence intervals
geom_point(data = subset(plot_data, !is.na(color_override)),
  aes(x = term, y = estimate),
  color = "darkgrey", size = 2.5) +
geom_errorbar(data = subset(plot_data, !is.na(color_override)),
  aes(x = term, y = estimate,
    ymin = conf.low, ymax = conf.high),
  color = "darkgrey", width = 0) +
ggtitle('Change in Depression Change Expectancies', 'Baseline to Week 4, DCES (range 3-15)')

```



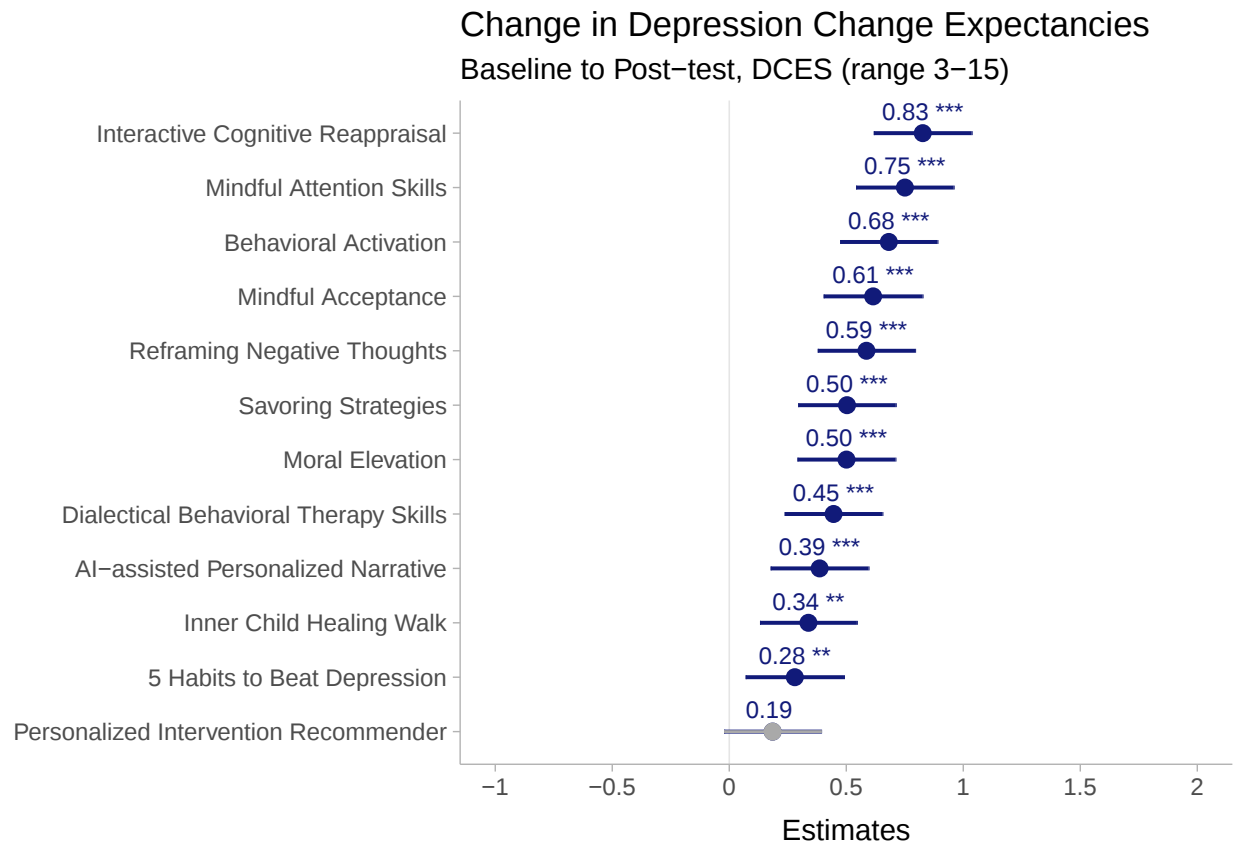
```

plot_data <- plot_model(m1_dep_expect, sort.est = T, terms = posttest_int_terms)$data
plot_data$color_override <- ifelse((plot_data$conf.low <= 0 & plot_data$conf.high >= 0), "darkgrey", NA)

(dep_expect_posttest_plot <- plot_model(
  m1_dep_expect, sort.est = T, terms = posttest_int_terms, auto_label = F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  scale_color_sjplot("circus", reverse = T) +
  # Override colors for overlapping confidence intervals
  geom_point(data = subset(plot_data, !is.na(color_override)),
    aes(x = term, y = estimate),
    color = "darkgrey", size = 2.5) +
  geom_errorbar(data = subset(plot_data, !is.na(color_override)),
    aes(x = term, y = estimate,
      ymin = conf.low, ymax = conf.high),

```

```
color = "darkgrey", width = 0) +
ggtitle('Change in Depression Change Expectancies', 'Baseline to Post-test, DCES (range 3-15)'))
```



```
m1_readiness <- lmer(readiness_score ~ time * group + (1|group/pid), data=mega_alltimes)
readiness_cohens_d <- mixed_cohens_d(m1_readiness)
add_cohens_d(m1_readiness, 'Predicting: change in readiness for change')
```

Depression Readiness for change

Table 14: Predicting: change in readiness for change

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	5.166	0.00e+00	NA	NA	NA
timePost-test	0.056	0.050	0.04	0.00	0.09
timeWeek 4	0.221	4.00e-13	0.17	0.12	0.22
group5 Habits to Beat Depression	0.058	0.399	0.04	-0.06	0.15
groupAI-assisted Personalized Narrative	0.029	0.672	0.02	-0.08	0.13
groupBehavioral Activation	0.124	0.068	0.10	-0.01	0.20
groupDialectical Behavioral Therapy Skills	0.077	0.261	0.06	-0.04	0.16

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
groupInner Child Healing Walk	0.048	0.483	0.04	-0.07	0.14
groupInteractive Cognitive Reappraisal	0.029	0.670	0.02	-0.08	0.12
groupMindful Acceptance	0.038	0.579	0.03	-0.07	0.13
groupMindful Attention Skills	0.013	0.844	0.01	-0.09	0.11
groupMoral Elevation	0.060	0.383	0.05	-0.06	0.15
groupPersonalized Intervention Recommender	0.134	0.048	0.10	0.00	0.21
groupReframing Negative Thoughts	0.036	0.594	0.03	-0.07	0.13
groupSavoring Strategies	0.039	0.567	0.03	-0.07	0.13
timePost-test:group5 Habits to Beat Depression	0.227	6.78e-05	0.17	0.09	0.26
timeWeek 4:group5 Habits to Beat Depression	-0.091	0.137	-0.07	-0.16	0.02
timePost-test:groupAI-assisted Personalized Narrative	0.255	7.53e-06	0.20	0.11	0.28
timeWeek 4:groupAI-assisted Personalized Narrative	-0.073	0.231	-0.06	-0.15	0.04
timePost-test:groupBehavioral Activation	0.246	1.37e-05	0.19	0.10	0.27
timeWeek 4:groupBehavioral Activation	-0.095	0.116	-0.07	-0.16	0.02
timePost-test:groupDialectical Behavioral Therapy Skills	0.139	0.014	0.11	0.02	0.19
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.071	0.247	-0.05	-0.15	0.04
timePost-test:groupInner Child Healing Walk	0.109	0.053	0.08	0.00	0.17
timeWeek 4:groupInner Child Healing Walk	-0.061	0.316	-0.05	-0.14	0.04
timePost-test:groupInteractive Cognitive Reappraisal	0.367	1.11e-10	0.28	0.20	0.37
timeWeek 4:groupInteractive Cognitive Reappraisal	0.030	0.624	0.02	-0.07	0.12
timePost-test:groupMindful Acceptance	0.199	5.23e-04	0.15	0.07	0.24
timeWeek 4:groupMindful Acceptance	-0.115	0.061	-0.09	-0.18	0.00
timePost-test:groupMindful Attention Skills	0.363	1.51e-10	0.28	0.19	0.36
timeWeek 4:groupMindful Attention Skills	-0.055	0.366	-0.04	-0.13	0.05
timePost-test:groupMoral Elevation	0.249	1.22e-05	0.19	0.11	0.28
timeWeek 4:groupMoral Elevation	-0.069	0.263	-0.05	-0.15	0.04
timePost-test:groupPersonalized Intervention Recommender	0.089	0.114	0.07	-0.02	0.15
timeWeek 4:groupPersonalized Intervention Recommender	-0.178	0.004	-0.14	-0.23	-0.04
timePost-test:groupReframing Negative Thoughts	0.263	3.28e-06	0.20	0.12	0.29
timeWeek 4:groupReframing Negative Thoughts	-0.029	0.637	-0.02	-0.11	0.07
timePost-test:groupSavoring Strategies	0.161	0.004	0.12	0.04	0.21
timeWeek 4:groupSavoring Strategies	-0.016	0.788	-0.01	-0.10	0.08
sd__(Intercept)	1.048	NA	NA	NA	NA
sd__(Intercept)	0.008	NA	NA	NA	NA
sd__Observation	0.770	NA	NA	NA	NA

```
m1_readiness %>% tidy %>% select(term,statistic,df) %>% kable(digits=3,caption='Model T score and df')
```

Table 15: Model T score and df

term	statistic	df
(Intercept)	149.763	12873.29
timePost-test	1.960	13319.36
timeWeek 4	7.263	13561.17
group5 Habits to Beat Depression	0.843	12333.43
groupAI-assisted Personalized Narrative	0.424	12338.29
groupBehavioral Activation	1.825	12339.91
groupDialectical Behavioral Therapy Skills	1.125	12339.10
groupInner Child Healing Walk	0.702	12344.73
groupInteractive Cognitive Reappraisal	0.426	12342.32
groupMindful Acceptance	0.555	12340.71
groupMindful Attention Skills	0.197	12341.52
groupMoral Elevation	0.872	12337.48
groupPersonalized Intervention Recommender	1.979	12345.53
groupReframing Negative Thoughts	0.532	12343.93
groupSavoring Strategies	0.573	12342.32
timePost-test:group5 Habits to Beat Depression	3.985	13313.84
timeWeek 4:group5 Habits to Beat Depression	-1.487	13574.87
timePost-test:groupAI-assisted Personalized Narrative	4.480	13301.71
timeWeek 4:groupAI-assisted Personalized Narrative	-1.199	13555.94
timePost-test:groupBehavioral Activation	4.351	13283.52
timeWeek 4:groupBehavioral Activation	-1.570	13544.70
timePost-test:groupDialectical Behavioral Therapy Skills	2.457	13299.64
timeWeek 4:groupDialectical Behavioral Therapy Skills	-1.157	13571.75
timePost-test:groupInner Child Healing Walk	1.936	13282.14
timeWeek 4:groupInner Child Healing Walk	-1.004	13546.22
timePost-test:groupInteractive Cognitive Reappraisal	6.457	13325.23
timeWeek 4:groupInteractive Cognitive Reappraisal	0.490	13636.67
timePost-test:groupMindful Acceptance	3.469	13382.49
timeWeek 4:groupMindful Acceptance	-1.875	13595.38
timePost-test:groupMindful Attention Skills	6.409	13299.53
timeWeek 4:groupMindful Attention Skills	-0.903	13570.21
timePost-test:groupMoral Elevation	4.375	13312.06
timeWeek 4:groupMoral Elevation	-1.120	13586.02
timePost-test:groupPersonalized Intervention Recommender	1.582	13286.09
timeWeek 4:groupPersonalized Intervention Recommender	-2.902	13594.62
timePost-test:groupReframing Negative Thoughts	4.654	13302.79
timeWeek 4:groupReframing Negative Thoughts	-0.473	13566.81
timePost-test:groupSavoring Strategies	2.844	13311.67
timeWeek 4:groupSavoring Strategies	-0.269	13541.75
sd__(Intercept)	NA	NA
sd__(Intercept)	NA	NA
sd__Observation	NA	NA

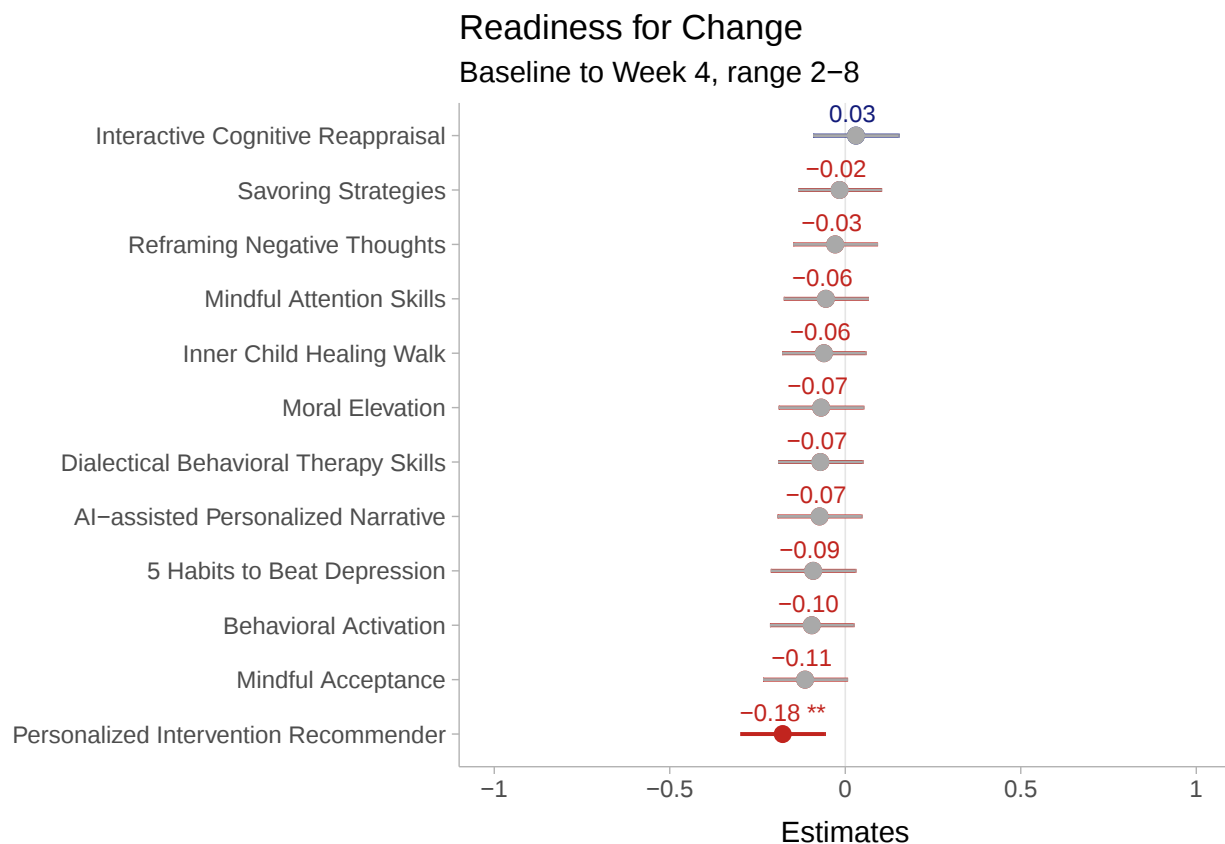
```
plot_data <- plot_model(m1_readiness, sort.est = T, terms = wk4_int_terms)$data
plot_data$color_override <- ifelse((plot_data$conf.low <= 0 & plot_data$conf.high >= 0), "darkgrey", NA)

(readiness_wk4_plot <- plot_model(
```

```

m1_readiness,sort.est = T,terms=wk4_int_terms,auto_label=F,show.values = T,
value.offset = .4,value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  scale_color_sjplot("circus") +
  # Override colors for overlapping confidence intervals
  geom_point(data = subset(plot_data, !is.na(color_override)),
    aes(x = term, y = estimate),
    color = "darkgrey", size = 2.5) +
  geom_errorbar(data = subset(plot_data, !is.na(color_override)),
    aes(x = term, y = estimate,
      ymin = conf.low, ymax = conf.high),
    color = "darkgrey", width = 0) +
  ggtitle('Readiness for Change', 'Baseline to Week 4, range 2-8')

```



```

plot_data <- plot_model(m1_readiness, sort.est = T, terms = posttest_int_terms)$data
plot_data$color_override <- ifelse((plot_data$conf.low <= 0 & plot_data$conf.high >= 0), "darkgrey", NA)

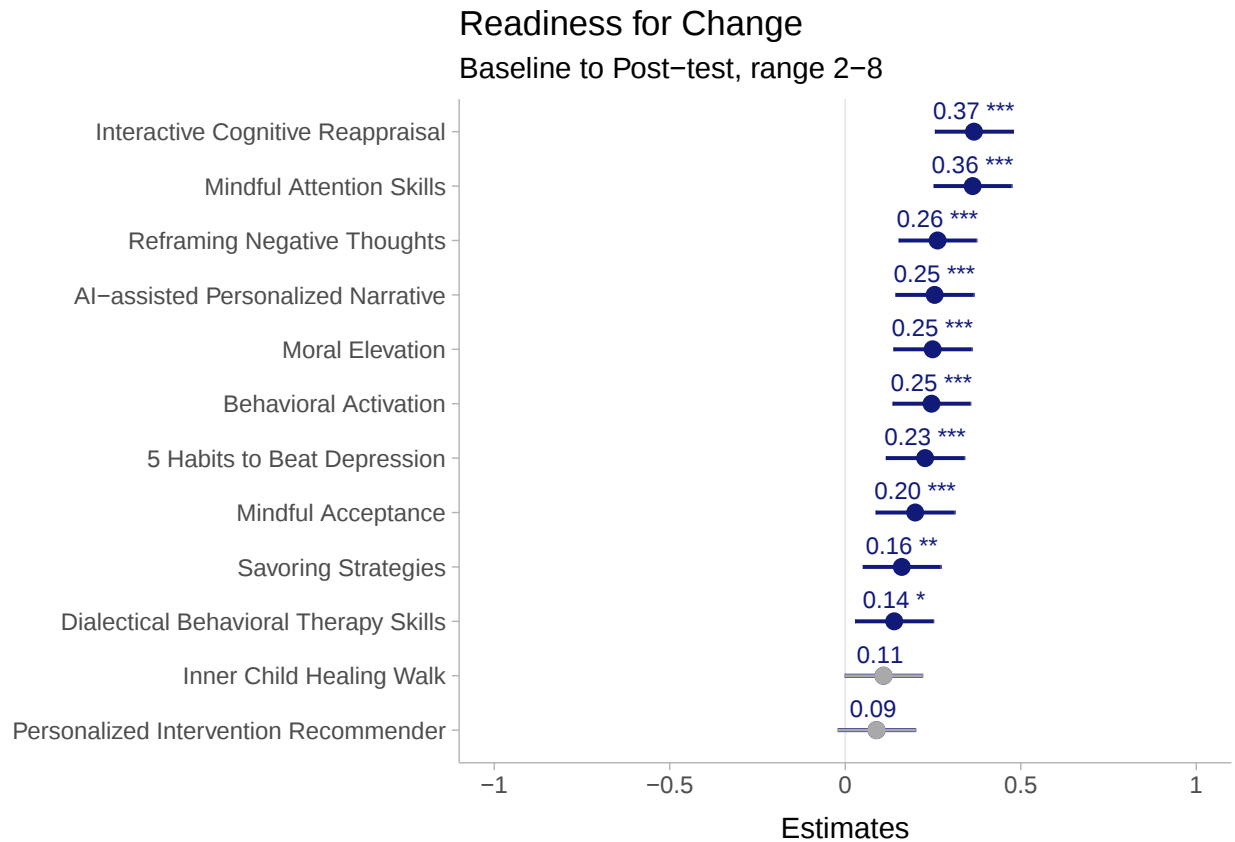
(readiness_posttest_plot <- plot_model(
  m1_readiness,sort.est = T,terms=posttest_int_terms,auto_label=F,
  show.values = T, value.offset = .4,value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  scale_color_sjplot("circus",reverse=T) +
  # Override colors for overlapping confidence intervals
  geom_point(data = subset(plot_data, !is.na(color_override)),
    aes(x = term, y = estimate),

```

```

color = "darkgrey", size = 2.5) +
geom_errorbar(data = subset(plot_data, !is.na(color_override)),
aes(x = term, y = estimate,
ymin = conf.low, ymax = conf.high),
color = "darkgrey", width = 0) +
ggtitle('Readiness for Change', 'Baseline to Post-test, range 2-8'))

```



H3: Change in secondary well-being outcomes will differ between each experimental SSI condition and the active comparison SSI

- Redo the above analysis (*H2*), but with the active comparison SSI as the comparison condition.

```

m1_agency_activefirst <- lmer(agency_score ~ time * group + (1|pid), data=mega_alltimes_active_first)
(agency_cohens_d_activefirst <- add_cohens_d(m1_agency_activefirst, 'Predicting: change in agency'))

```

Agency

Table 16: Predicting: change in agency

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	14.240	0.00e+00	NA	NA	NA
timePost-test	1.245	2.85e-15	0.27	0.20	0.34
timeWeek 4	1.516	5.64e-19	0.33	0.26	0.40
groupPassive Control	0.280	0.237	0.06	-0.04	0.16
group5 Habits to Beat Depression	0.318	0.275	0.07	-0.06	0.19
groupAI-assisted Personalized Narrative	0.703	0.015	0.15	0.03	0.28
groupDialectical Behavioral Therapy Skills	0.051	0.861	0.01	-0.11	0.14
groupInner Child Healing Walk	0.102	0.724	0.02	-0.10	0.15
groupInteractive Cognitive Reappraisal	-0.296	0.306	-0.06	-0.19	0.06
groupMindful Acceptance	-0.072	0.803	-0.02	-0.14	0.11
groupMindful Attention Skills	0.428	0.139	0.09	-0.03	0.22
groupMoral Elevation	0.469	0.106	0.10	-0.02	0.23
groupPersonalized Intervention Recommender	0.117	0.685	0.03	-0.10	0.15
groupReframing Negative Thoughts	-0.086	0.767	-0.02	-0.14	0.11
groupSavoring Strategies	0.303	0.295	0.07	-0.06	0.19
timePost-test:groupPassive Control	-1.092	2.08e-09	-0.24	-0.32	-0.16
timeWeek 4:groupPassive Control	-0.273	0.165	-0.06	-0.14	0.02
timePost-test:group5 Habits to Beat Depression	-0.339	0.131	-0.07	-0.17	0.02
timeWeek 4:group5 Habits to Beat Depression	0.066	0.786	0.01	-0.09	0.12
timePost-test:groupAI-assisted Personalized Narrative	-0.186	0.405	-0.04	-0.14	0.06
timeWeek 4:groupAI-assisted Personalized Narrative	-0.207	0.390	-0.05	-0.15	0.06
timePost-test:groupDialectical Behavioral Therapy Skills	-0.193	0.388	-0.04	-0.14	0.05
timeWeek 4:groupDialectical Behavioral Therapy Skills	0.317	0.190	0.07	-0.03	0.17
timePost-test:groupInner Child Healing Walk	-0.561	0.012	-0.12	-0.22	-0.03
timeWeek 4:groupInner Child Healing Walk	0.114	0.634	0.02	-0.08	0.13
timePost-test:groupInteractive Cognitive Reappraisal	0.595	0.008	0.13	0.03	0.23
timeWeek 4:groupInteractive Cognitive Reappraisal	0.439	0.072	0.10	-0.01	0.20
timePost-test:groupMindful Acceptance	-0.106	0.638	-0.02	-0.12	0.07
timeWeek 4:groupMindful Acceptance	0.250	0.301	0.05	-0.05	0.16
timePost-test:groupMindful Attention Skills	0.207	0.353	0.05	-0.05	0.14
timeWeek 4:groupMindful Attention Skills	0.068	0.780	0.01	-0.09	0.12
timePost-test:groupMoral Elevation	-0.055	0.807	-0.01	-0.11	0.08
timeWeek 4:groupMoral Elevation	0.197	0.417	0.04	-0.06	0.15
timePost-test:groupPersonalized Intervention Recommender	-0.783	4.26e-04	-0.17	-0.27	-0.08
timeWeek 4:groupPersonalized Intervention Recommender	-0.205	0.399	-0.04	-0.15	0.06
timePost-test:groupReframing Negative Thoughts	0.084	0.705	0.02	-0.08	0.11
timeWeek 4:groupReframing Negative Thoughts	0.186	0.439	0.04	-0.06	0.14
timePost-test:groupSavoring Strategies	-0.342	0.126	-0.07	-0.17	0.02

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
timeWeek 4:groupSavoring Strategies	-0.183	0.444	-0.04	-0.14	0.06
sd__(Intercept)	3.848	NA	NA	NA	NA
sd__Observation	2.486	NA	NA	NA	NA

```
m1_agency_activefirst %>% tidy %>% select(term, statistic, df) %>% kable(digits=3, caption='Model T score and df')
```

Table 17: Model T score and df

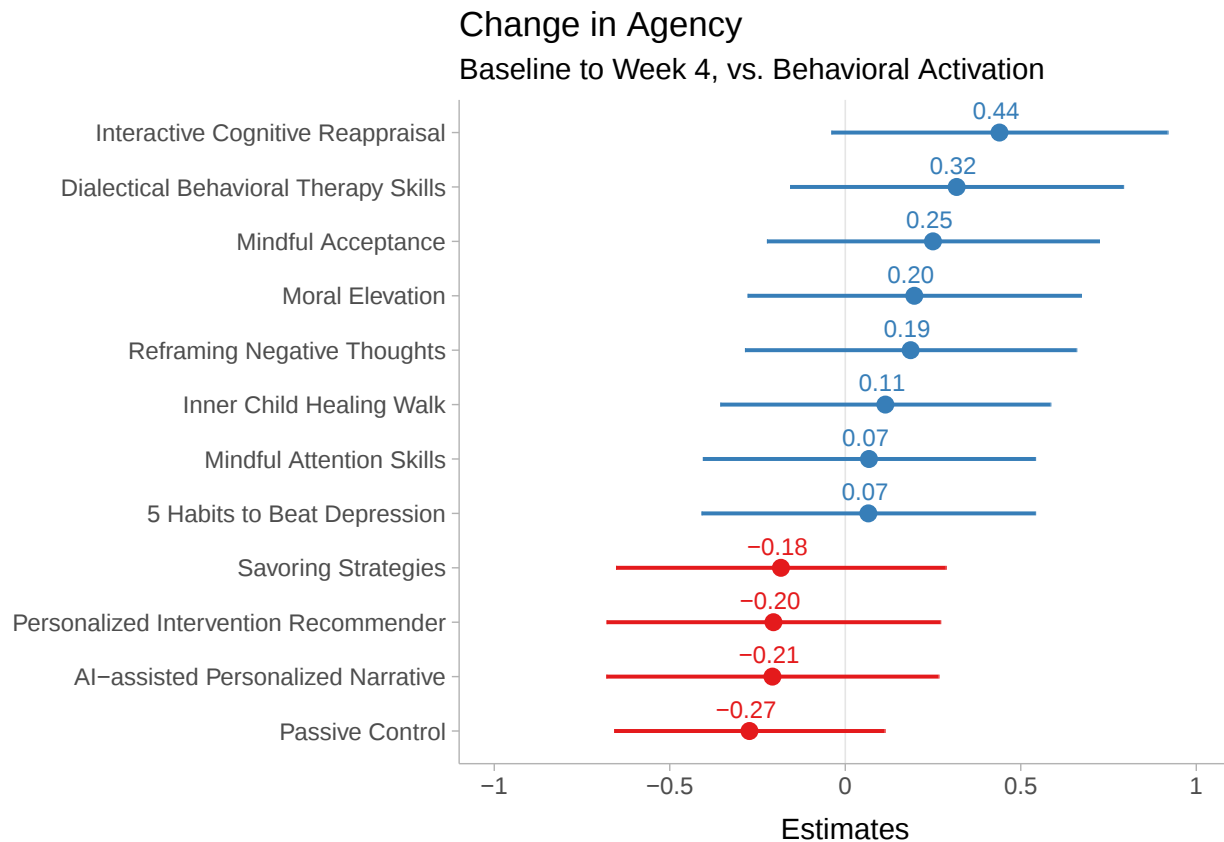
term	statistic	df
(Intercept)	69.444	10965.92
timePost-test	7.907	13272.68
timeWeek 4	8.912	13494.05
groupPassive Control	1.184	10965.92
group5 Habits to Beat Depression	1.091	10965.92
groupAI-assisted Personalized Narrative	2.422	10965.92
groupDialectical Behavioral Therapy Skills	0.175	10965.92
groupInner Child Healing Walk	0.353	10965.92
groupInteractive Cognitive Reappraisal	-1.023	10965.92
groupMindful Acceptance	-0.250	10965.92
groupMindful Attention Skills	1.478	10965.92
groupMoral Elevation	1.615	10965.92
groupPersonalized Intervention Recommender	0.406	10965.92
groupReframing Negative Thoughts	-0.296	10965.92
groupSavoring Strategies	1.048	10965.92
timePost-test:groupPassive Control	-5.996	13282.16
timeWeek 4:groupPassive Control	-1.389	13498.28
timePost-test:group5 Habits to Beat Depression	-1.511	13290.42
timeWeek 4:group5 Habits to Beat Depression	0.271	13510.13
timePost-test:groupAI-assisted Personalized Narrative	-0.833	13284.87
timeWeek 4:groupAI-assisted Personalized Narrative	-0.860	13501.99
timePost-test:groupDialectical Behavioral Therapy Skills	-0.864	13281.61
timeWeek 4:groupDialectical Behavioral Therapy Skills	1.311	13508.97
timePost-test:groupInner Child Healing Walk	-2.526	13271.66
timeWeek 4:groupInner Child Healing Walk	0.476	13492.23
timePost-test:groupInteractive Cognitive Reappraisal	2.659	13297.67
timeWeek 4:groupInteractive Cognitive Reappraisal	1.798	13545.84
timePost-test:groupMindful Acceptance	-0.471	13329.99
timeWeek 4:groupMindful Acceptance	1.035	13522.52
timePost-test:groupMindful Attention Skills	0.929	13281.51
timeWeek 4:groupMindful Attention Skills	0.280	13506.79
timePost-test:groupMoral Elevation	-0.244	13289.13
timeWeek 4:groupMoral Elevation	0.812	13513.43
timePost-test:groupPersonalized Intervention Recommender	-3.524	13274.92
timeWeek 4:groupPersonalized Intervention Recommender	-0.844	13522.74
timePost-test:groupReframing Negative Thoughts	0.379	13282.35
timeWeek 4:groupReframing Negative Thoughts	0.773	13504.97
timePost-test:groupSavoring Strategies	-1.531	13289.91
timeWeek 4:groupSavoring Strategies	-0.765	13491.81
sd__(Intercept)	NA	NA
sd__Observation	NA	NA

```

posttest_int_terms_activefirst <- m1_agency_activefirst %>% tidy() %>% filter(str_detect(term, 'Post-test

(agency_wk4_activefirst_plot <- plot_model(
  m1_agency_activefirst, sort.est = T, terms=wk4_int_terms_activefirst, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Change in Agency', 'Baseline to Week 4, vs. Behavioral Activation'))

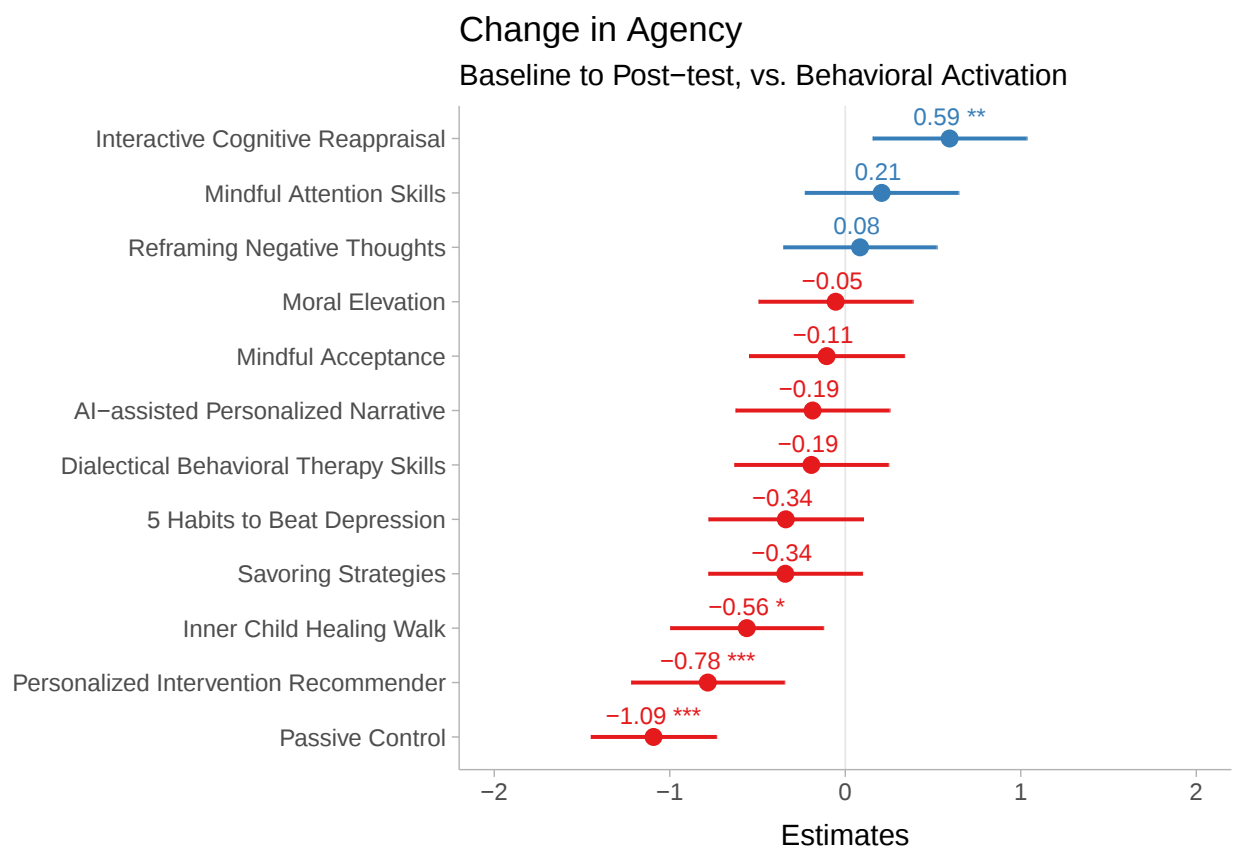
```



```

(agency_posttest_activefirst_plot <- plot_model(
  m1_agency_activefirst, sort.est = T,
  terms=posttest_int_terms_activefirst, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Change in Agency', 'Baseline to Post-test, vs. Behavioral Activation'))

```



```
m1_hopeless_activefirst <- lmer(hopeless_score ~ time * group + (1|pid),data=mega_alltimes_active_first,
(hopeless_cohens_d_activefirst <- add_cohens_d(m1_hopeless_activefirst,'Predicting: change in hopelessness'))
```

Hopelessness

Table 18: Predicting: change in hopelessness

term	estimate	p.value	cohens_d	cohens_d_2.5%	cohens_d_97.5%
(Intercept)	7.128	0.00e+00	NA	NA	NA
timePost-test	-0.659	8.04e-11	-0.23	-0.30	-0.16
timeWeek 4	-1.100	9.39e-24	-0.38	-0.46	-0.31
groupPassive Control	0.009	0.950	0.00	-0.10	0.10
group5 Habits to Beat Depression	-0.175	0.339	-0.06	-0.19	0.06
groupAI-assisted Personalized Narrative	-0.325	0.075	-0.11	-0.24	0.01
groupDialectical Behavioral Therapy Skills	0.115	0.530	0.04	-0.08	0.16
groupInner Child Healing Walk	-0.136	0.454	-0.05	-0.17	0.08
groupInteractive Cognitive Reappraisal	0.246	0.177	0.09	-0.04	0.21
groupMindful Acceptance	0.040	0.828	0.01	-0.11	0.14
groupMindful Attention Skills	-0.240	0.188	-0.08	-0.21	0.04
groupMoral Elevation	-0.138	0.449	-0.05	-0.17	0.08

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
groupPersonalized Intervention Recommender	-0.043	0.812	-0.02	-0.14	0.11
groupReframing Negative Thoughts	0.013	0.945	0.00	-0.12	0.13
groupSavoring Strategies	-0.112	0.538	-0.04	-0.16	0.08
timePost-test:groupPassive Control	0.322	0.006	0.11	0.03	0.19
timeWeek 4:groupPassive Control	-0.072	0.571	-0.02	-0.11	0.06
timePost-test:group5 Habits to Beat Depression	0.133	0.356	0.05	-0.05	0.14
timeWeek 4:group5 Habits to Beat Depression	-0.034	0.828	-0.01	-0.12	0.09
timePost-test:groupAI-assisted Personalized Narrative	-0.047	0.746	-0.02	-0.11	0.08
timeWeek 4:groupAI-assisted Personalized Narrative	0.039	0.800	0.01	-0.09	0.12
timePost-test:groupDialectical Behavioral Therapy Skills	0.162	0.259	0.06	-0.04	0.15
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.110	0.478	-0.04	-0.14	0.07
timePost-test:groupInner Child Healing Walk	-0.073	0.611	-0.03	-0.12	0.07
timeWeek 4:groupInner Child Healing Walk	0.024	0.876	0.01	-0.10	0.11
timePost-test:groupInteractive Cognitive Reappraisal	-0.141	0.328	-0.05	-0.15	0.05
timeWeek 4:groupInteractive Cognitive Reappraisal	-0.294	0.061	-0.10	-0.21	0.00
timePost-test:groupMindful Acceptance	-0.132	0.362	-0.05	-0.14	0.05
timeWeek 4:groupMindful Acceptance	-0.088	0.571	-0.03	-0.14	0.07
timePost-test:groupMindful Attention Skills	-0.123	0.390	-0.04	-0.14	0.05
timeWeek 4:groupMindful Attention Skills	-0.011	0.942	0.00	-0.11	0.10
timePost-test:groupMoral Elevation	-0.118	0.412	-0.04	-0.14	0.06
timeWeek 4:groupMoral Elevation	-0.275	0.078	-0.10	-0.20	0.01
timePost-test:groupPersonalized Intervention Recommender	0.302	0.035	0.10	0.01	0.20
timeWeek 4:groupPersonalized Intervention Recommender	-0.101	0.517	-0.03	-0.14	0.07
timePost-test:groupReframing Negative Thoughts	-0.184	0.199	-0.06	-0.16	0.03
timeWeek 4:groupReframing Negative Thoughts	-0.290	0.061	-0.10	-0.21	0.00
timePost-test:groupSavoring Strategies	-0.013	0.930	0.00	-0.10	0.09
timeWeek 4:groupSavoring Strategies	-0.099	0.522	-0.03	-0.14	0.07
sd__(Intercept)	2.399	NA	NA	NA	NA
sd__Observation	1.600	NA	NA	NA	NA

```
m1_hopeless_activefirst %>% tidy %>% select(term, statistic, df) %>% kable(digits=3, caption='Model T score and df')
```

Table 19: Model T score and df

term	statistic	df
(Intercept)	55.221	11160.18
timePost-test	-6.505	13283.22
timeWeek 4	-10.067	13510.89
groupPassive Control	0.063	11160.18
group5 Habits to Beat Depression	-0.955	11160.18
groupAI-assisted Personalized Narrative	-1.781	11160.18

term	statistic	df
groupDialectical Behavioral Therapy Skills	0.628	11160.18
groupInner Child Healing Walk	-0.748	11160.18
groupInteractive Cognitive Reappraisal	1.351	11160.18
groupMindful Acceptance	0.218	11160.18
groupMindful Attention Skills	-1.316	11160.18
groupMoral Elevation	-0.757	11160.18
groupPersonalized Intervention Recommender	-0.238	11160.18
groupReframing Negative Thoughts	0.069	11160.18
groupSavoring Strategies	-0.616	11160.18
timePost-test:groupPassive Control	2.742	13293.88
timeWeek 4:groupPassive Control	-0.567	13516.26
timePost-test:group5 Habits to Beat Depression	0.923	13301.66
timeWeek 4:group5 Habits to Beat Depression	-0.218	13530.31
timePost-test:groupAI-assisted Personalized Narrative	-0.324	13295.98
timeWeek 4:groupAI-assisted Personalized Narrative	0.253	13520.49
timePost-test:groupDialectical Behavioral Therapy Skills	1.129	13292.61
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.709	13529.26
timePost-test:groupInner Child Healing Walk	-0.508	13282.20
timeWeek 4:groupInner Child Healing Walk	0.156	13512.91
timePost-test:groupInteractive Cognitive Reappraisal	-0.977	13309.28
timeWeek 4:groupInteractive Cognitive Reappraisal	-1.874	13566.54
timePost-test:groupMindful Acceptance	-0.912	13342.89
timeWeek 4:groupMindful Acceptance	-0.567	13540.33
timePost-test:groupMindful Attention Skills	-0.859	13292.51
timeWeek 4:groupMindful Attention Skills	-0.072	13525.59
timePost-test:groupMoral Elevation	-0.821	13300.36
timeWeek 4:groupMoral Elevation	-1.766	13535.22
timePost-test:groupPersonalized Intervention Recommender	2.111	13283.34
timeWeek 4:groupPersonalized Intervention Recommender	-0.648	13540.82
timePost-test:groupReframing Negative Thoughts	-1.284	13292.40
timeWeek 4:groupReframing Negative Thoughts	-1.873	13522.01
timePost-test:groupSavoring Strategies	-0.088	13300.00
timeWeek 4:groupSavoring Strategies	-0.640	13512.20
sd__(Intercept)	NA	NA
sd__Observation	NA	NA

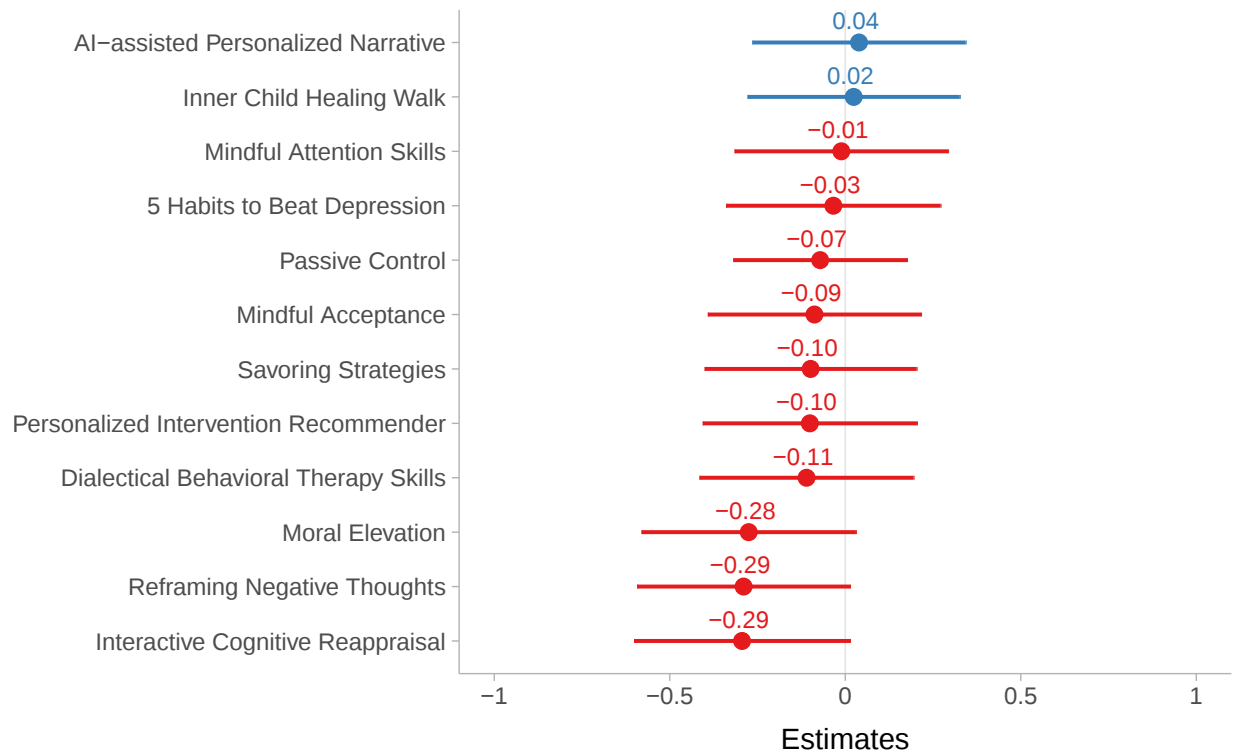
```
(hopeless_wk4_activefirst_plot <- plot_model(
  m1_hopeless_activefirst, sort.est = T, terms=wk4_int_terms_activefirst, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Change in Hopelessness', 'Baseline to Week 4, vs. Behavioral Activation'))
```

```
## Scale for x is already present.
```

```
## Adding another scale for x, which will replace the existing scale.
```

Change in Hopelessness

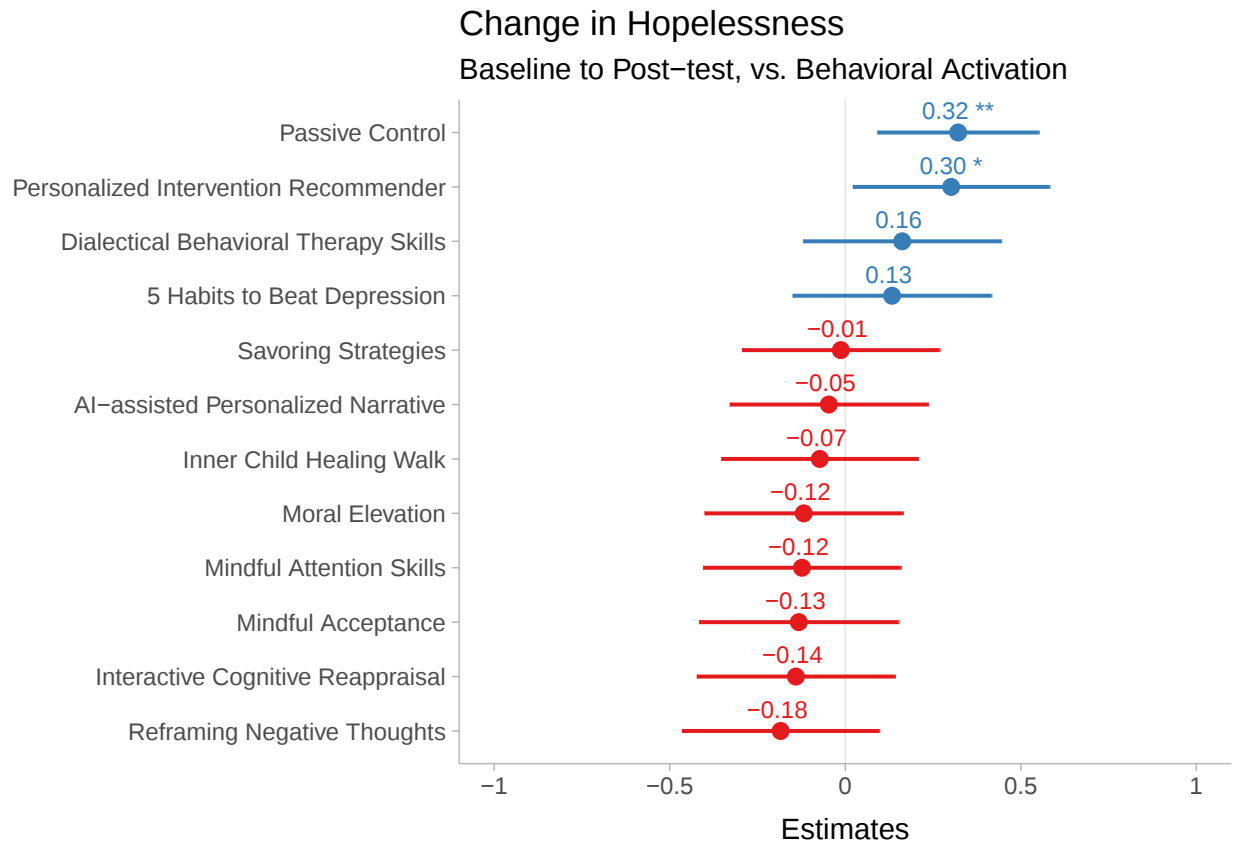
Baseline to Week 4, vs. Behavioral Activation



```
(hopeless_posttest_activefirst_plot <- plot_model(
  m1_hopeless_activefirst, sort.est = T,
  terms=posttest_int_terms_activefirst, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Change in Hopelessness', 'Baseline to Post-test, vs. Behavioral Activation'))
```

Scale for x is already present.

Adding another scale for x, which will replace the existing scale.



```
m1_fats_activefirst <- lmer(fats_score ~ time * group + (1|pid),data=mega_alltimes_active_first)
add_cohens_d(m1_fats_activefirst,'Predicting: change in thoughts and actions')
```

Positive Actions and Thoughts (FATS)

Table 20: Predicting: change in thoughts and actions

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	18.050	0.00e+00	NA	NA	NA
timeWeek 4	3.768	1.32e-20	0.40	0.31	0.48
groupPassive Control	-0.831	0.090	-0.09	-0.19	0.01
group5 Habits to Beat Depression	-0.339	0.573	-0.04	-0.16	0.09
groupAI-assisted Personalized Narrative	-0.119	0.844	-0.01	-0.14	0.11
groupDialectical Behavioral Therapy Skills	-0.610	0.309	-0.06	-0.19	0.06
groupInner Child Healing Walk	-0.513	0.391	-0.05	-0.18	0.07
groupInteractive Cognitive Reappraisal	-1.757	0.003	-0.19	-0.31	-0.06
groupMindful Acceptance	-0.780	0.193	-0.08	-0.21	0.04
groupMindful Attention Skills	-0.254	0.672	-0.03	-0.15	0.10
groupMoral Elevation	-0.467	0.436	-0.05	-0.17	0.07
groupPersonalized Intervention Recommender	-0.558	0.351	-0.06	-0.18	0.06
groupReframing Negative Thoughts	-0.608	0.310	-0.06	-0.19	0.06

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
groupSavoring Strategies	-0.644	0.282	-0.07	-0.19	0.06
timeWeek 4:groupPassive Control	-0.314	0.500	-0.03	-0.13	0.06
timeWeek 4:group5 Habits to Beat Depression	-0.654	0.255	-0.07	-0.19	0.05
timeWeek 4:groupAI-assisted Personalized Narrative	-0.655	0.252	-0.07	-0.19	0.05
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.356	0.535	-0.04	-0.16	0.08
timeWeek 4:groupInner Child Healing Walk	-0.447	0.432	-0.05	-0.16	0.07
timeWeek 4:groupInteractive Cognitive Reappraisal	0.663	0.254	0.07	-0.05	0.19
timeWeek 4:groupMindful Acceptance	0.148	0.796	0.02	-0.10	0.13
timeWeek 4:groupMindful Attention Skills	0.394	0.491	0.04	-0.08	0.16
timeWeek 4:groupMoral Elevation	-0.403	0.483	-0.04	-0.16	0.08
timeWeek 4:groupPersonalized Intervention Recommender	-0.198	0.731	-0.02	-0.14	0.10
timeWeek 4:groupReframing Negative Thoughts	-0.570	0.318	-0.06	-0.18	0.06
timeWeek 4:groupSavoring Strategies	-0.011	0.984	0.00	-0.12	0.12
sd__(Intercept)	7.469	NA	NA	NA	NA
sd__Observation	5.829	NA	NA	NA	NA

```
m1_fats_activefirst %>% tidy %>% select(term, statistic, df) %>% kable(digits=3, caption='Model T score and df')
```

Table 21: Model T score and df

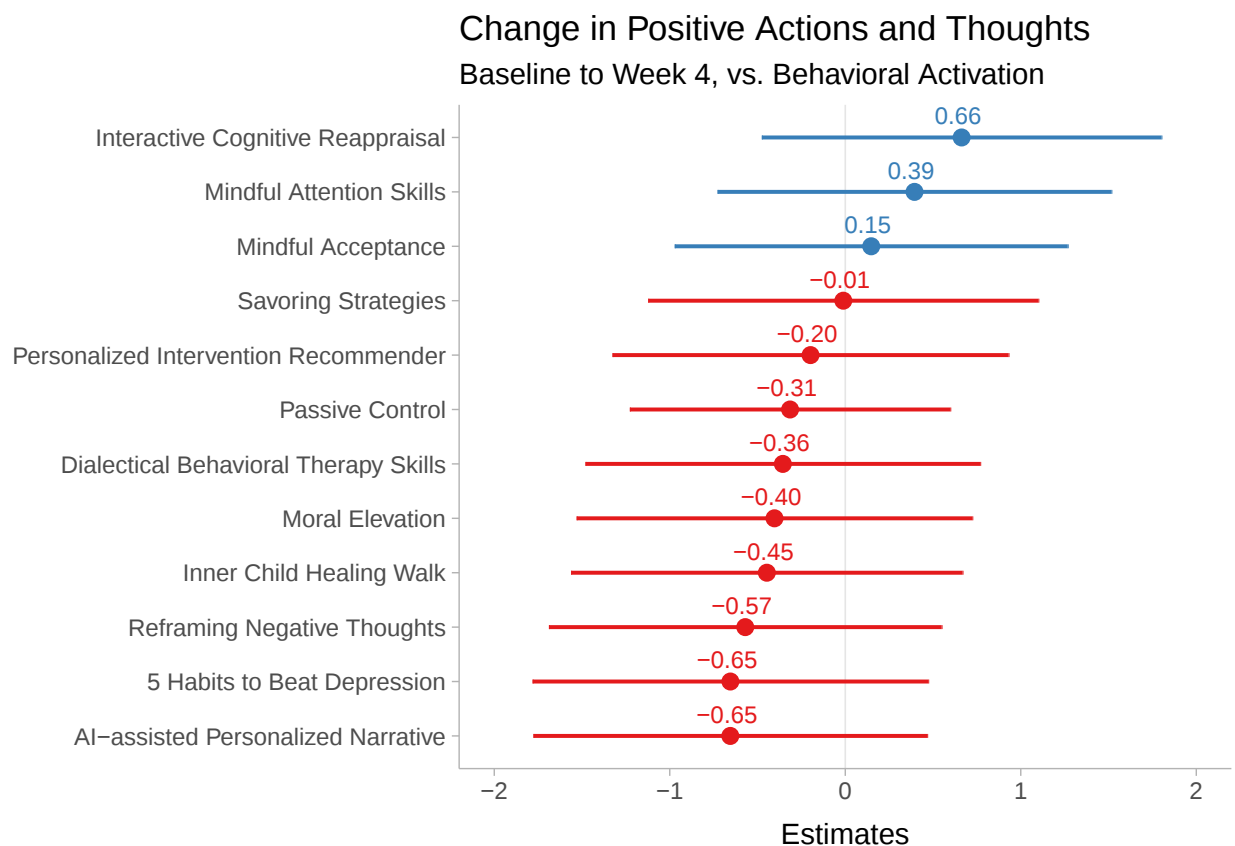
term	statistic	df
(Intercept)	42.560	10051.200
timeWeek 4	9.339	6289.202
groupPassive Control	-1.697	10051.200
group5 Habits to Beat Depression	-0.563	10051.200
groupAI-assisted Personalized Narrative	-0.197	10051.200
groupDialectical Behavioral Therapy Skills	-1.017	10051.200
groupInner Child Healing Walk	-0.859	10051.200
groupInteractive Cognitive Reappraisal	-2.934	10051.200
groupMindful Acceptance	-1.301	10051.200
groupMindful Attention Skills	-0.423	10051.200
groupMoral Elevation	-0.778	10051.200
groupPersonalized Intervention Recommender	-0.934	10051.200
groupReframing Negative Thoughts	-1.016	10051.200
groupSavoring Strategies	-1.075	10051.200
timeWeek 4:groupPassive Control	-0.675	6290.161
timeWeek 4:group5 Habits to Beat Depression	-1.138	6304.099
timeWeek 4:groupAI-assisted Personalized Narrative	-1.145	6296.724
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.620	6309.745
timeWeek 4:groupInner Child Healing Walk	-0.786	6288.843
timeWeek 4:groupInteractive Cognitive Reappraisal	1.142	6368.459
timeWeek 4:groupMindful Acceptance	0.259	6295.368
timeWeek 4:groupMindful Attention Skills	0.689	6306.011
timeWeek 4:groupMoral Elevation	-0.701	6315.344
timeWeek 4:groupPersonalized Intervention Recommender	-0.344	6339.689

term	statistic	df
timeWeek 4:groupReframing Negative Thoughts	-0.999	6300.160
timeWeek 4:groupSavoring Strategies	-0.020	6268.680
sd__(Intercept)	NA	NA
sd__Observation	NA	NA

```
(fats_wk4_activefirst_plot <- plot_model(
  m1_fats_activefirst, sort.est = T, terms=wk4_int_terms_activefirst, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Change in Positive Actions and Thoughts', 'Baseline to Week 4, vs. Behavioral Activation'))
```

```
## Scale for x is already present.
```

```
## Adding another scale for x, which will replace the existing scale.
```



```
m1_dep_expect_activefirst <- lmer(dep_expectancies_score ~ time * group + (1|pid), data=mega_alltimes_ac
dep_expect_cohens_d_activefirst <- add_cohens_d(m1_dep_expect_activefirst, 'Predicting: change in depres
```

Depression Change Expectancies

Table 22: Predicting: change in depression change expectancies

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	8.651	0.00e+00	NA	NA	NA
timePost-test	0.935	2.45e-24	0.39	0.32	0.47
timeWeek 4	1.068	5.46e-27	0.45	0.37	0.53
groupPassive Control	-0.001	0.993	0.00	-0.10	0.10
group5 Habits to Beat Depression	0.367	0.015	0.15	0.03	0.28
groupAI-assisted Personalized Narrative	0.363	0.016	0.15	0.03	0.28
groupDialectical Behavioral Therapy Skills	0.001	0.993	0.00	-0.12	0.12
groupInner Child Healing Walk	-0.010	0.949	0.00	-0.13	0.12
groupInteractive Cognitive Reappraisal	-0.088	0.561	-0.04	-0.16	0.09
groupMindful Acceptance	0.073	0.630	0.03	-0.09	0.15
groupMindful Attention Skills	0.145	0.336	0.06	-0.06	0.18
groupMoral Elevation	-0.018	0.904	-0.01	-0.13	0.12
groupPersonalized Intervention Recommender	0.088	0.559	0.04	-0.09	0.16
groupReframing Negative Thoughts	0.248	0.100	0.10	-0.02	0.23
groupSavoring Strategies	0.267	0.077	0.11	-0.01	0.24
timePost-test:groupPassive Control	-0.682	1.33e-10	-0.29	-0.37	-0.20
timeWeek 4:groupPassive Control	-0.210	0.066	-0.09	-0.18	0.01
timePost-test:group5 Habits to Beat Depression	-0.402	0.002	-0.17	-0.28	-0.06
timeWeek 4:group5 Habits to Beat Depression	-0.260	0.065	-0.11	-0.23	0.01
timePost-test:groupAI-assisted Personalized Narrative	-0.296	0.023	-0.12	-0.23	-0.02
timeWeek 4:groupAI-assisted Personalized Narrative	-0.221	0.115	-0.09	-0.21	0.02
timePost-test:groupDialectical Behavioral Therapy Skills	-0.236	0.070	-0.10	-0.21	0.01
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.007	0.959	0.00	-0.12	0.11
timePost-test:groupInner Child Healing Walk	-0.343	0.008	-0.14	-0.25	-0.04
timeWeek 4:groupInner Child Healing Walk	-0.141	0.313	-0.06	-0.17	0.06
timePost-test:groupInteractive Cognitive Reappraisal	0.145	0.266	0.06	-0.05	0.17
timeWeek 4:groupInteractive Cognitive Reappraisal	-0.052	0.716	-0.02	-0.14	0.10
timePost-test:groupMindful Acceptance	-0.067	0.609	-0.03	-0.14	0.08
timeWeek 4:groupMindful Acceptance	-0.160	0.255	-0.07	-0.18	0.05
timePost-test:groupMindful Attention Skills	0.069	0.597	0.03	-0.08	0.14
timeWeek 4:groupMindful Attention Skills	-0.103	0.463	-0.04	-0.16	0.07
timePost-test:groupMoral Elevation	-0.181	0.165	-0.08	-0.18	0.03
timeWeek 4:groupMoral Elevation	0.009	0.949	0.00	-0.11	0.12
timePost-test:groupPersonalized Intervention Recommender	-0.497	1.24e-04	-0.21	-0.31	-0.10
timeWeek 4:groupPersonalized Intervention Recommender	-0.147	0.299	-0.06	-0.18	0.05
timePost-test:groupReframing Negative Thoughts	-0.096	0.461	-0.04	-0.15	0.07
timeWeek 4:groupReframing Negative Thoughts	-0.248	0.077	-0.10	-0.22	0.01
timePost-test:groupSavoring Strategies	-0.179	0.169	-0.07	-0.18	0.03

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
timeWeek 4:groupSavoring Strategies	-0.071	0.608	-0.03	-0.14	0.08
sd__(Intercept)	1.895	NA	NA	NA	NA
sd__Observation	1.447	NA	NA	NA	NA

```
m1_dep_expect_activefirst %>% tidy %>% select(term,statistic,df) %>% kable(digits=3,caption='Model T score and df')
```

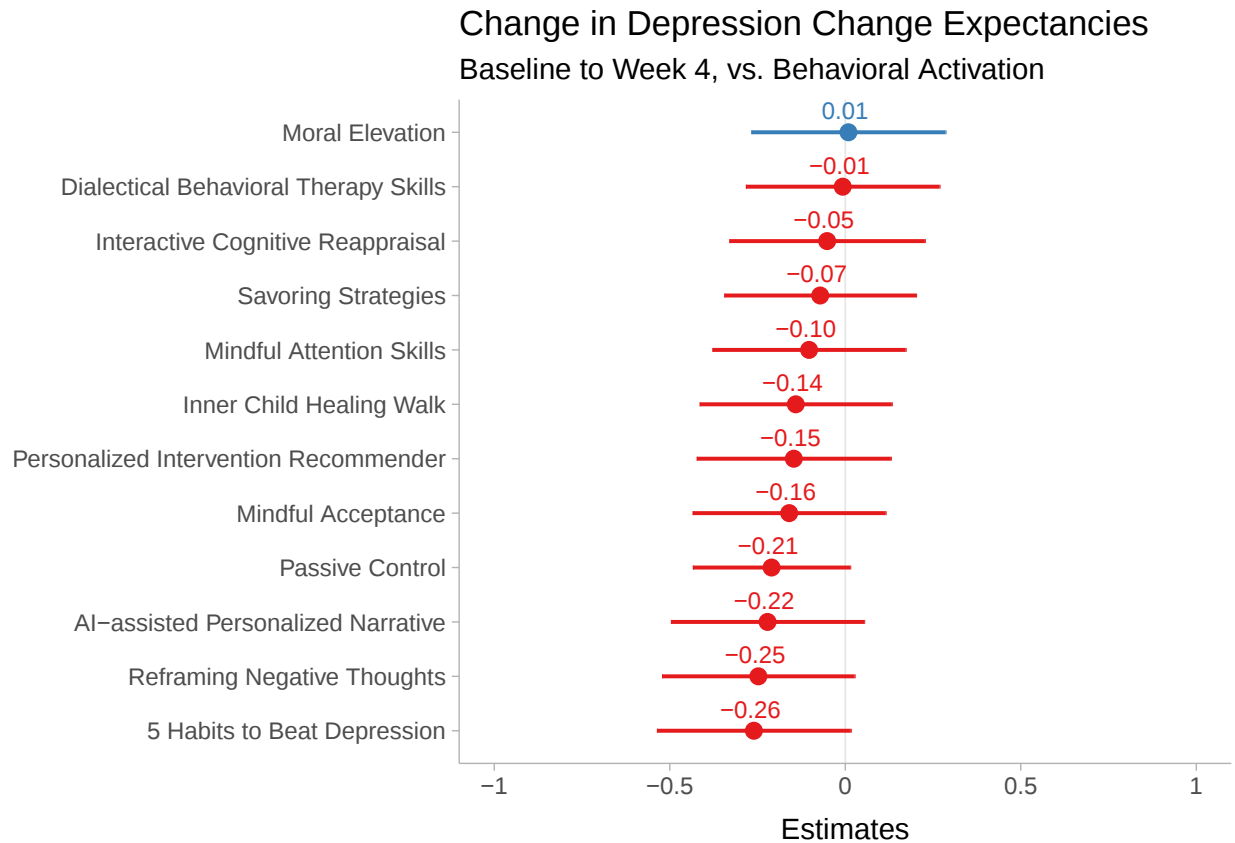
Table 23: Model T score and df

term	statistic	df
(Intercept)	81.043	12107.93
timePost-test	10.199	13308.78
timeWeek 4	10.781	13601.46
groupPassive Control	-0.008	12107.93
group5 Habits to Beat Depression	2.421	12107.93
groupAI-assisted Personalized Narrative	2.401	12107.93
groupDialectical Behavioral Therapy Skills	0.009	12107.93
groupInner Child Healing Walk	-0.065	12107.93
groupInteractive Cognitive Reappraisal	-0.581	12107.93
groupMindful Acceptance	0.482	12107.93
groupMindful Attention Skills	0.962	12107.93
groupMoral Elevation	-0.121	12107.93
groupPersonalized Intervention Recommender	0.584	12107.93
groupReframing Negative Thoughts	1.644	12107.93
groupSavoring Strategies	1.771	12107.93
timePost-test:groupPassive Control	-6.429	13319.71
timeWeek 4:groupPassive Control	-1.836	13604.32
timePost-test:group5 Habits to Beat Depression	-3.075	13330.19
timeWeek 4:group5 Habits to Beat Depression	-1.848	13614.40
timePost-test:groupAI-assisted Personalized Narrative	-2.271	13324.13
timeWeek 4:groupAI-assisted Personalized Narrative	-1.576	13608.13
timePost-test:groupDialectical Behavioral Therapy Skills	-1.815	13320.28
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.051	13615.77
timePost-test:groupInner Child Healing Walk	-2.656	13307.82
timeWeek 4:groupInner Child Healing Walk	-1.010	13597.77
timePost-test:groupInteractive Cognitive Reappraisal	1.113	13339.58
timeWeek 4:groupInteractive Cognitive Reappraisal	-0.364	13662.17
timePost-test:groupMindful Acceptance	-0.511	13378.78
timeWeek 4:groupMindful Acceptance	-1.139	13628.30
timePost-test:groupMindful Attention Skills	0.529	13320.16
timeWeek 4:groupMindful Attention Skills	-0.734	13612.99
timePost-test:groupMoral Elevation	-1.389	13328.91
timeWeek 4:groupMoral Elevation	0.064	13625.73
timePost-test:groupPersonalized Intervention Recommender	-3.839	13310.61
timeWeek 4:groupPersonalized Intervention Recommender	-1.039	13635.48
timePost-test:groupReframing Negative Thoughts	-0.738	13320.03
timeWeek 4:groupReframing Negative Thoughts	-1.769	13607.01
timePost-test:groupSavoring Strategies	-1.375	13328.50
timeWeek 4:groupSavoring Strategies	-0.513	13592.78
sd__(Intercept)	NA	NA
sd__Observation	NA	NA

```
(dep_exp_wk4_activefirst_plot <- plot_model(
  m1_dep_expect_activefirst, sort.est = T, terms=wk4_int_terms_activefirst, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Change in Depression Change Expectancies', 'Baseline to Week 4, vs. Behavioral Activation'))
```

Scale for x is already present.

Adding another scale for x, which will replace the existing scale.

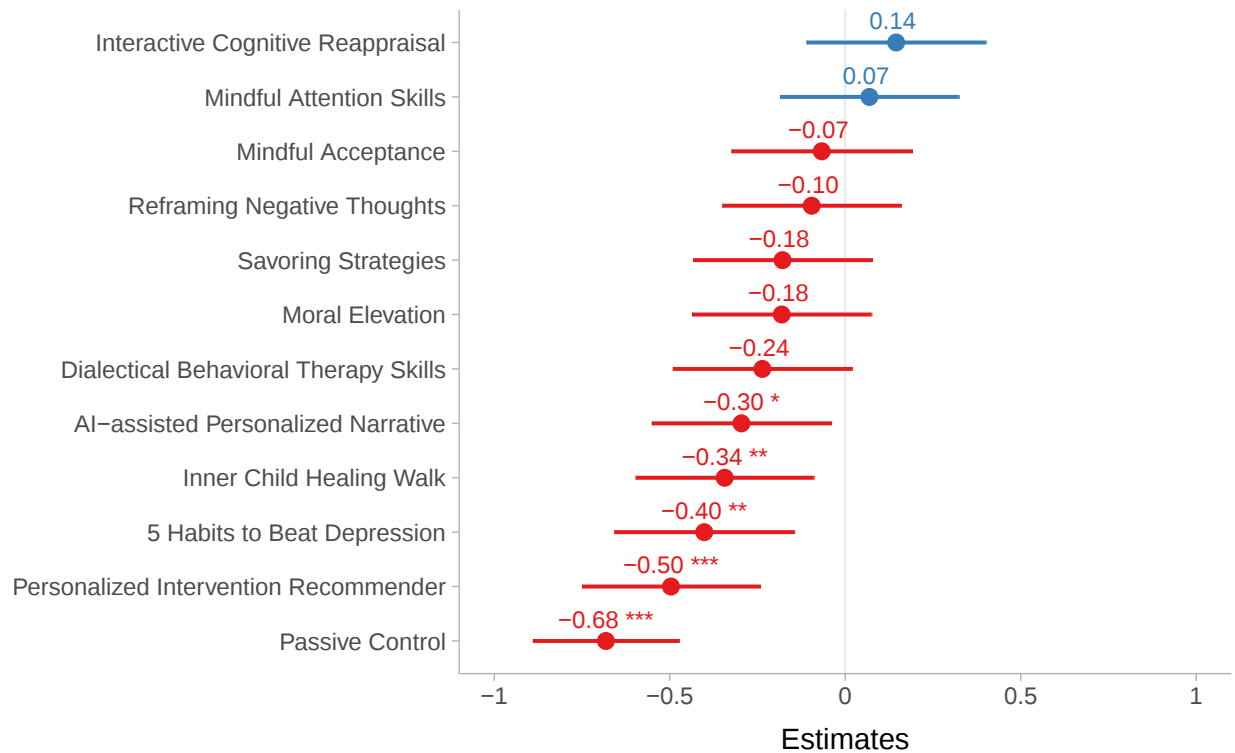


```
(dep_exp_posttest_activefirst_plot <- plot_model(
  m1_dep_expect_activefirst, sort.est = T,
  terms=posttest_int_terms_activefirst, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Change in Depression Change Expectancies', 'Baseline to Post-test, vs. Behavioral Activation'))
```

Scale for x is already present.

Adding another scale for x, which will replace the existing scale.

Change in Depression Change Expectancies Baseline to Post-test, vs. Behavioral Activation



```
m1_readiness_activefirst <- lmer(readiness_score ~ time * group + (1|group/pid), data=mega_alltimes_activefirst)
```

Depression Readiness for change

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv, :  
## unable to evaluate scaled gradient
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv, :  
## Model failed to converge: degenerate Hessian with 1 negative eigenvalues
```

```
## Warning: Model failed to converge with 1 negative eigenvalue: -3.2e-05
```

```
(readiness_cohens_d_activefirst <- add_cohens_d(m1_readiness_activefirst, 'Predicting: change in readiness for change'))
```

Table 24: Predicting: change in readiness for change

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	5.291	3.34e-290	NA	NA	NA
timePost-test	0.301	6.89e-10	0.23	0.16	0.31

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
timeWeek 4	0.125	0.017	0.10	0.02	0.18
groupPassive Control	-0.124	0.525	-0.10	-0.39	0.20
group5 Habits to Beat Depression	-0.067	0.741	-0.05	-0.36	0.25
groupAI-assisted Personalized Narrative	-0.095	0.636	-0.07	-0.38	0.23
groupDialectical Behavioral Therapy Skills	-0.048	0.813	-0.04	-0.34	0.27
groupInner Child Healing Walk	-0.077	0.703	-0.06	-0.36	0.24
groupInteractive Cognitive Reappraisal	-0.095	0.636	-0.07	-0.38	0.23
groupMindful Acceptance	-0.087	0.667	-0.07	-0.37	0.24
groupMindful Attention Skills	-0.111	0.582	-0.09	-0.39	0.22
groupMoral Elevation	-0.065	0.748	-0.05	-0.35	0.25
groupPersonalized Intervention Recommender	0.010	0.961	0.01	-0.30	0.31
groupReframing Negative Thoughts	-0.088	0.661	-0.07	-0.37	0.24
groupSavoring Strategies	-0.085	0.672	-0.07	-0.37	0.24
timePost-test:groupPassive Control	-0.246	1.37e-05	-0.19	-0.27	-0.10
timeWeek 4:groupPassive Control	0.095	0.116	0.07	-0.02	0.16
timePost-test:group5 Habits to Beat Depression	-0.018	0.794	-0.01	-0.12	0.09
timeWeek 4:group5 Habits to Beat Depression	0.004	0.958	0.00	-0.11	0.12
timePost-test:groupAI-assisted Personalized Narrative	0.009	0.898	0.01	-0.10	0.11
timeWeek 4:groupAI-assisted Personalized Narrative	0.022	0.766	0.02	-0.10	0.13
timePost-test:groupDialectical Behavioral Therapy Skills	-0.106	0.125	-0.08	-0.19	0.02
timeWeek 4:groupDialectical Behavioral Therapy Skills	0.025	0.743	0.02	-0.09	0.13
timePost-test:groupInner Child Healing Walk	-0.137	0.047	-0.11	-0.21	0.00
timeWeek 4:groupInner Child Healing Walk	0.035	0.641	0.03	-0.09	0.14
timePost-test:groupInteractive Cognitive Reappraisal	0.121	0.081	0.09	-0.01	0.20
timeWeek 4:groupInteractive Cognitive Reappraisal	0.126	0.096	0.10	-0.02	0.21
timePost-test:groupMindful Acceptance	-0.046	0.506	-0.04	-0.14	0.07
timeWeek 4:groupMindful Acceptance	-0.019	0.798	-0.01	-0.13	0.10
timePost-test:groupMindful Attention Skills	0.117	0.090	0.09	-0.01	0.19
timeWeek 4:groupMindful Attention Skills	0.040	0.591	0.03	-0.08	0.14
timePost-test:groupMoral Elevation	0.003	0.963	0.00	-0.10	0.11
timeWeek 4:groupMoral Elevation	0.027	0.724	0.02	-0.09	0.13
timePost-test:groupPersonalized Intervention Recommender	-0.157	0.023	-0.12	-0.22	-0.02
timeWeek 4:groupPersonalized Intervention Recommender	-0.083	0.269	-0.06	-0.18	0.05
timePost-test:groupReframing Negative Thoughts	0.017	0.802	0.01	-0.09	0.12
timeWeek 4:groupReframing Negative Thoughts	0.067	0.371	0.05	-0.06	0.16
timePost-test:groupSavoring Strategies	-0.085	0.221	-0.07	-0.17	0.04
timeWeek 4:groupSavoring Strategies	0.079	0.286	0.06	-0.05	0.17
sd__(Intercept)	1.048	NA	NA	NA	NA
sd__(Intercept)	0.130	NA	NA	NA	NA
sd__Observation	0.770	NA	NA	NA	NA

```
m1_readiness_activefirst %>% tidy %>% select(term, statistic, df) %>% kable(digits=3, caption='Model T score and df')
```

Table 25: Model T score and df

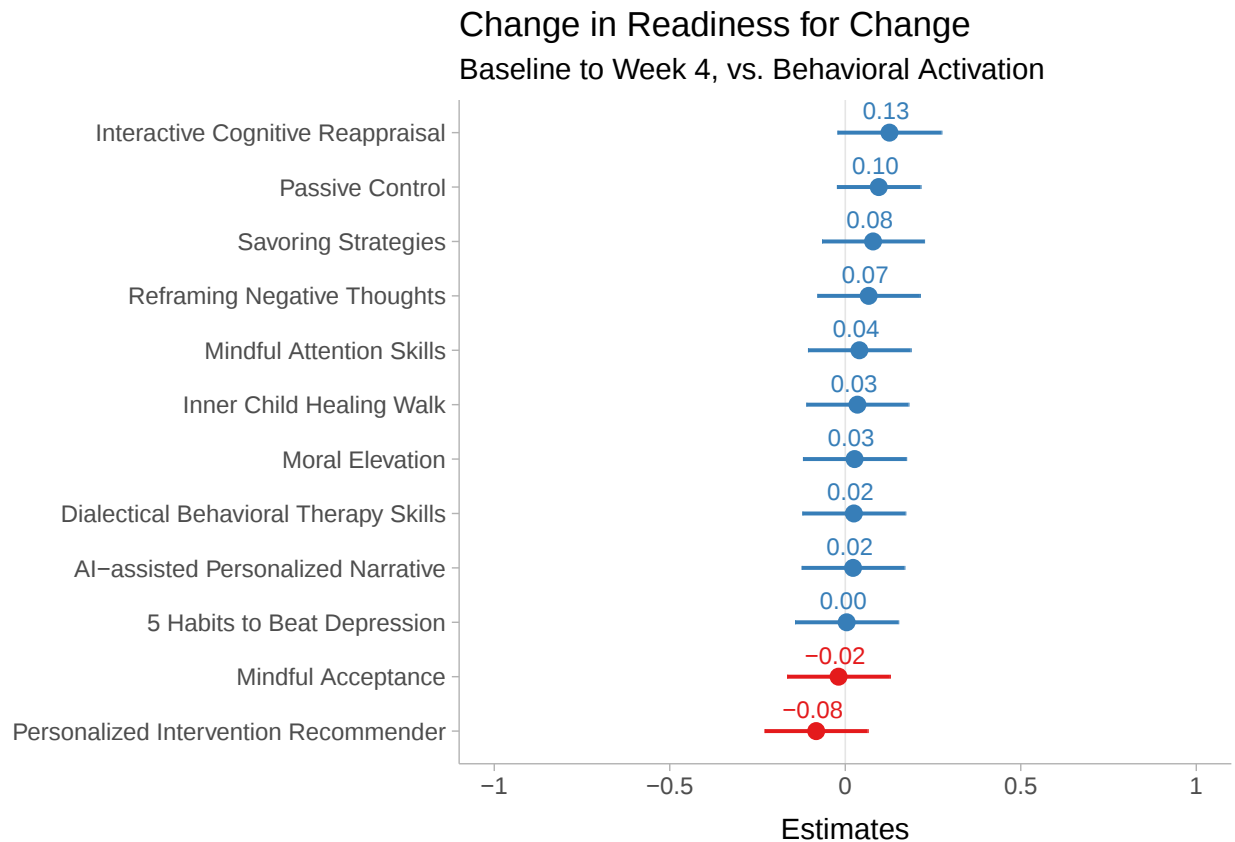
term	statistic	df
(Intercept)	37.134	16864.93
timePost-test	6.173	13271.41
timeWeek 4	2.384	13539.21
groupPassive Control	-0.635	15797.05
group5 Habits to Beat Depression	-0.330	16889.11
groupAI-assisted Personalized Narrative	-0.473	16870.91
groupDialectical Behavioral Therapy Skills	-0.236	16867.91
groupInner Child Healing Walk	-0.381	16847.23
groupInteractive Cognitive Reappraisal	-0.473	16856.03
groupMindful Acceptance	-0.430	16861.95
groupMindful Attention Skills	-0.551	16858.99
groupMoral Elevation	-0.321	16873.92
groupPersonalized Intervention Recommender	0.049	16844.32
groupReframing Negative Thoughts	-0.438	16850.15
groupSavoring Strategies	-0.424	16856.03
timePost-test:groupPassive Control	-4.351	13283.53
timeWeek 4:groupPassive Control	1.570	13544.71
timePost-test:group5 Habits to Beat Depression	-0.262	13292.01
timeWeek 4:group5 Habits to Beat Depression	0.053	13559.57
timePost-test:groupAI-assisted Personalized Narrative	0.128	13283.73
timeWeek 4:groupAI-assisted Personalized Narrative	0.298	13546.76
timePost-test:groupDialectical Behavioral Therapy Skills	-1.534	13282.31
timeWeek 4:groupDialectical Behavioral Therapy Skills	0.327	13557.41
timePost-test:groupInner Child Healing Walk	-1.987	13270.43
timeWeek 4:groupInner Child Healing Walk	0.466	13540.20
timePost-test:groupInteractive Cognitive Reappraisal	1.746	13299.49
timeWeek 4:groupInteractive Cognitive Reappraisal	1.666	13601.57
timePost-test:groupMindful Acceptance	-0.666	13338.56
timeWeek 4:groupMindful Acceptance	-0.256	13573.14
timePost-test:groupMindful Attention Skills	1.695	13282.19
timeWeek 4:groupMindful Attention Skills	0.538	13556.33
timePost-test:groupMoral Elevation	0.046	13290.71
timeWeek 4:groupMoral Elevation	0.353	13567.07
timePost-test:groupPersonalized Intervention Recommender	-2.275	13273.07
timeWeek 4:groupPersonalized Intervention Recommender	-1.105	13572.80
timePost-test:groupReframing Negative Thoughts	0.250	13284.31
timeWeek 4:groupReframing Negative Thoughts	0.894	13553.98
timePost-test:groupSavoring Strategies	-1.224	13290.31
timeWeek 4:groupSavoring Strategies	1.068	13537.21
sd__(Intercept)	NA	NA
sd__(Intercept)	NA	NA
sd__Observation	NA	NA

```
(readiness_wk4_activefirst_plot <- plot_model(
  m1_readiness_activefirst, sort.est = T, terms=wk4_int_terms_activefirst, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2)+
```

```
scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
ggtitle('Change in Readiness for Change','Baseline to Week 4, vs. Behavioral Activation'))
```

Scale for x is already present.

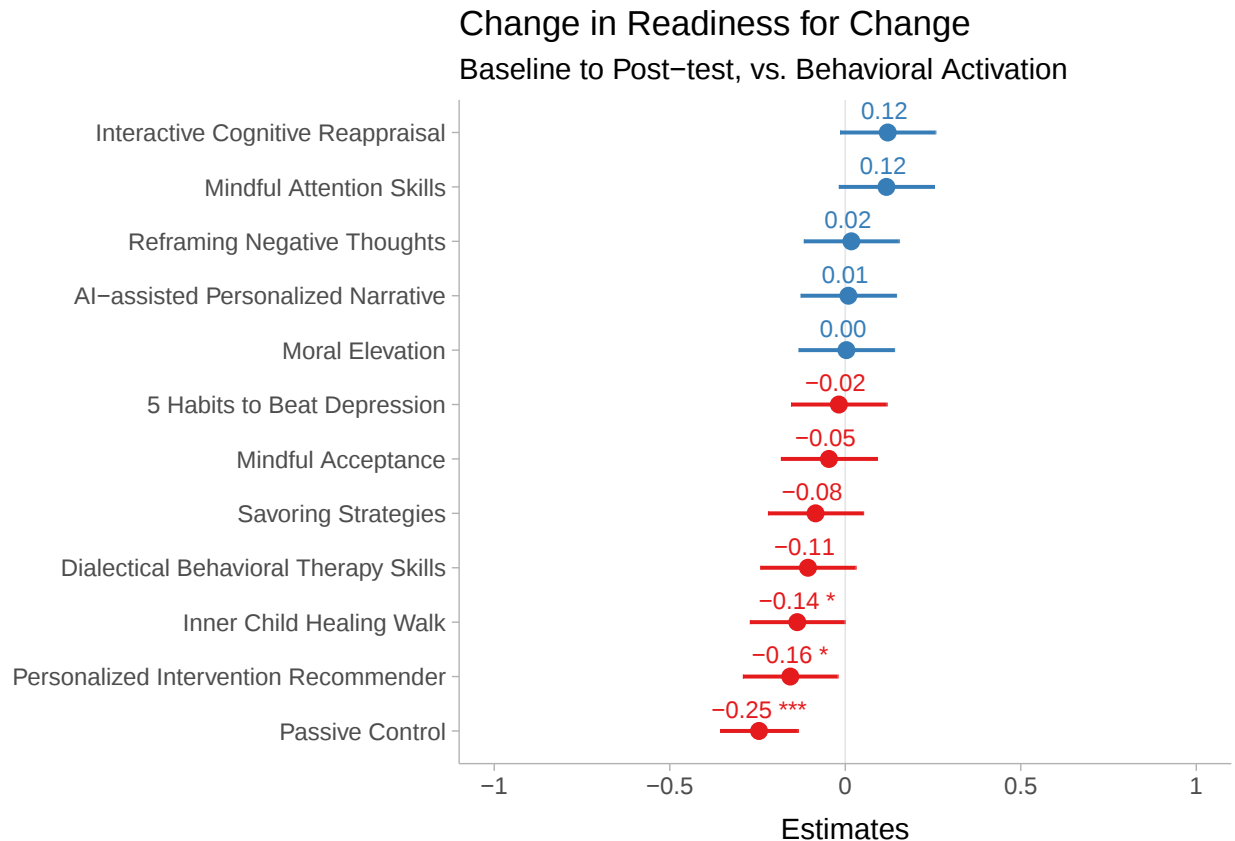
Adding another scale for x, which will replace the existing scale.



```
(readiness_posttest_activefirst_plot <- plot_model(
  m1_readiness_activefirst, sort.est = T,
  terms=posttest_int_terms_activefirst, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Change in Readiness for Change','Baseline to Post-test, vs. Behavioral Activation'))
```

Scale for x is already present.

Adding another scale for x, which will replace the existing scale.



H4: The experimental SSIs will differ from the active comparison SSI in acceptability

- A linear regression model testing between-group differences in intervention acceptability for each acceptability outcome at each timepoint the outcome was collected.
 - For these analyses, drop data from the passive control because it does not make sense to compare satisfaction between a mental health intervention and an educational program about trout.

```
#Credibility / Expectancy Questionnaire scores
df_for_acceptability <- mega_alltimes_active_first %>%
  filter(group!='Passive Control') %>%
  mutate(group=droplevels(group))

m1_ceq <- lm(CEQ_score~group,data=df_for_acceptability)
(ceq_cohens_d <- rstatix::cozens_d(CEQ_score~group,data=df_for_acceptability) %>% select(-magnitude,-.y
```

Credibility / Expectancy Questionnaire

group1	group2	effsize	n1	n2
Behavioral Activation	5 Habits to Beat Depression	-0.0568245	498	482
Behavioral Activation	AI-assisted Personalized Narrative	0.1842844	498	487
Behavioral Activation	Dialectical Behavioral Therapy Skills	0.0863498	498	489
Behavioral Activation	Inner Child Healing Walk	0.4273927	498	503
Behavioral Activation	Interactive Cognitive Reappraisal	-0.0486966	498	486
Behavioral Activation	Mindful Acceptance	0.1419434	498	469
Behavioral Activation	Mindful Attention Skills	-0.1135766	498	492
Behavioral Activation	Moral Elevation	0.1070076	498	486
Behavioral Activation	Personalized Intervention	0.1497208	498	501
	Recommender			
Behavioral Activation	Reframing Negative Thoughts	-0.0046622	498	495
Behavioral Activation	Savoring Strategies	0.0364593	498	492
5 Habits to Beat Depression	AI-assisted Personalized Narrative	0.2417962	482	487
5 Habits to Beat Depression	Dialectical Behavioral Therapy Skills	0.1457802	482	489
5 Habits to Beat Depression	Inner Child Healing Walk	0.4899570	482	503
5 Habits to Beat Depression	Interactive Cognitive Reappraisal	0.0041154	482	486
5 Habits to Beat Depression	Mindful Acceptance	0.1997998	482	469
5 Habits to Beat Depression	Mindful Attention Skills	-0.0592853	482	492
5 Habits to Beat Depression	Moral Elevation	0.1634979	482	486
5 Habits to Beat Depression	Personalized Intervention	0.2098410	482	501
	Recommender			
5 Habits to Beat Depression	Reframing Negative Thoughts	0.0507113	482	495
5 Habits to Beat Depression	Savoring Strategies	0.0907882	482	492
AI-assisted Personalized Narrative	Dialectical Behavioral Therapy Skills	-0.1040746	487	489
AI-assisted Personalized Narrative	Inner Child Healing Walk	0.2315140	487	503
AI-assisted Personalized Narrative	Interactive Cognitive Reappraisal	-0.2223333	487	486
AI-assisted Personalized Narrative	Mindful Acceptance	-0.0436727	487	469
AI-assisted Personalized Narrative	Mindful Attention Skills	-0.2922309	487	492
AI-assisted Personalized Narrative	Moral Elevation	-0.0752132	487	486
AI-assisted Personalized Narrative	Personalized Intervention	-0.0419259	487	501
	Recommender			
AI-assisted Personalized Narrative	Reframing Negative Thoughts	-0.1849874	487	495
AI-assisted Personalized Narrative	Savoring Strategies	-0.1404939	487	492
Dialectical Behavioral Therapy Skills	Inner Child Healing Walk	0.3490508	489	503
Dialectical Behavioral Therapy Skills	Interactive Cognitive Reappraisal	-0.1310589	489	486
Dialectical Behavioral Therapy Skills	Mindful Acceptance	0.0598136	489	469
Dialectical Behavioral Therapy Skills	Mindful Attention Skills	-0.2012170	489	492
Dialectical Behavioral Therapy Skills	Moral Elevation	0.0253963	489	486
Dialectical Behavioral Therapy Skills	Personalized Intervention	0.0649850	489	501
	Recommender			
Dialectical Behavioral Therapy Skills	Reframing Negative Thoughts	-0.0890732	489	495
Dialectical Behavioral Therapy Skills	Savoring Strategies	-0.0447976	489	492
Inner Child Healing Walk	Interactive Cognitive Reappraisal	-0.4546753	503	486
Inner Child Healing Walk	Mindful Acceptance	-0.2792476	503	469
Inner Child Healing Walk	Mindful Attention Skills	-0.5360346	503	492
Inner Child Healing Walk	Moral Elevation	-0.3087624	503	486
Inner Child Healing Walk	Personalized Intervention	-0.2842571	503	501
	Recommender			
Inner Child Healing Walk	Reframing Negative Thoughts	-0.4232526	503	495
Inner Child Healing Walk	Savoring Strategies	-0.3717507	503	492
Interactive Cognitive Reappraisal	Mindful Acceptance	0.1824805	486	469
Interactive Cognitive Reappraisal	Mindful Attention Skills	-0.0590081	486	492

group1	group2	effsize	n1	n2
Interactive Cognitive Reappraisal	Moral Elevation	0.1488395	486	486
Interactive Cognitive Reappraisal	Personalized Intervention	0.1908614	486	501
	Recommender			
Interactive Cognitive Reappraisal	Reframing Negative Thoughts	0.0432603	486	495
Interactive Cognitive Reappraisal	Savoring Strategies	0.0810803	486	492
Mindful Acceptance	Mindful Attention Skills	-0.2519286	469	492
Mindful Acceptance	Moral Elevation	-0.0324953	469	486
Mindful Acceptance	Personalized Intervention	0.0030689	469	501
	Recommender			
Mindful Acceptance	Reframing Negative Thoughts	-0.1434703	469	495
Mindful Acceptance	Savoring Strategies	-0.0993583	469	492
Mindful Attention Skills	Moral Elevation	0.2158099	492	486
Mindful Attention Skills	Personalized Intervention	0.2633618	492	501
	Recommender			
Mindful Attention Skills	Reframing Negative Thoughts	0.1063092	492	495
Mindful Attention Skills	Savoring Strategies	0.1438421	492	492
Moral Elevation	Personalized Intervention	0.0364954	486	501
	Recommender			
Moral Elevation	Reframing Negative Thoughts	-0.1092653	486	495
Moral Elevation	Savoring Strategies	-0.0666126	486	492
Personalized Intervention	Reframing Negative Thoughts	-0.1510251	501	495
Recommender				
Personalized Intervention	Savoring Strategies	-0.1052453	501	492
Recommender				
Reframing Negative Thoughts	Savoring Strategies	0.0401386	495	492

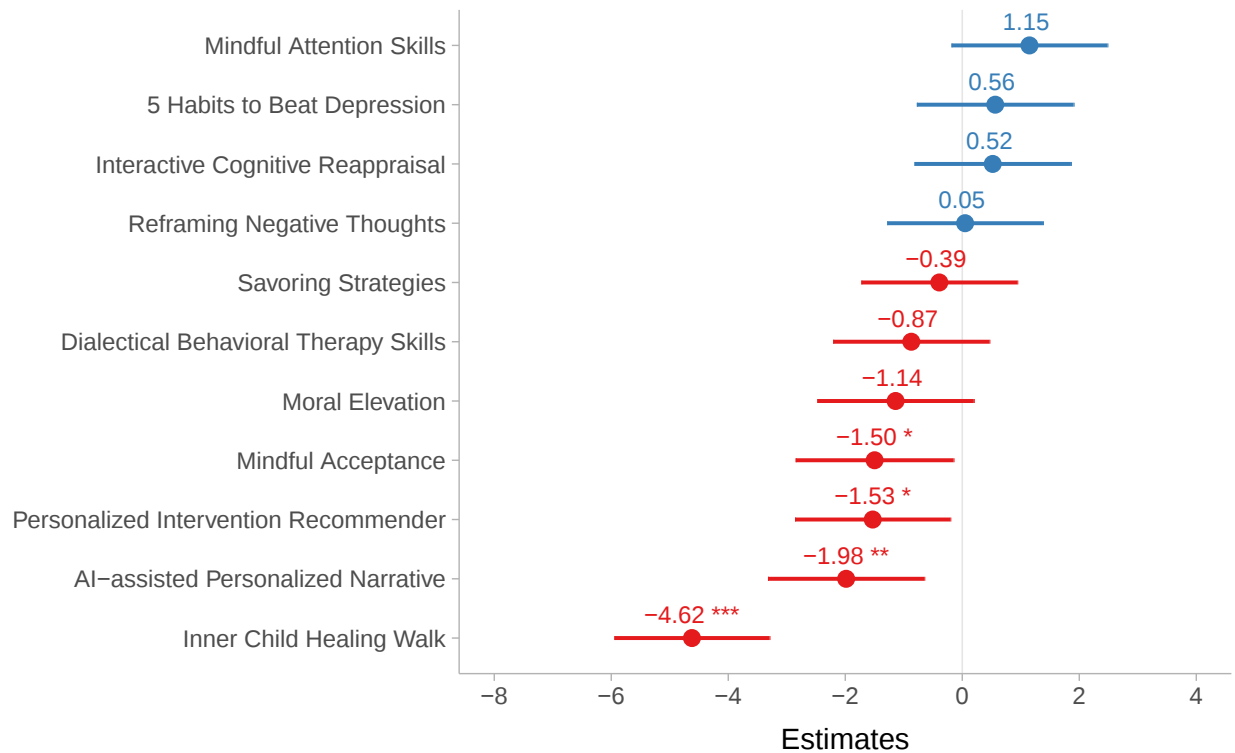
```

acceptability_terms <- m1_ceq %>% tidy() %>%
  filter(term!='(Intercept)') %>% pull(term)
(ceq_plot <- plot_model(
  m1_ceq, sort.est = T, terms=acceptability_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Credibility and Expected Benefit', 'At Post-test, range 4-56'))

```

Credibility and Expected Benefit

At Post-test, range 4–56

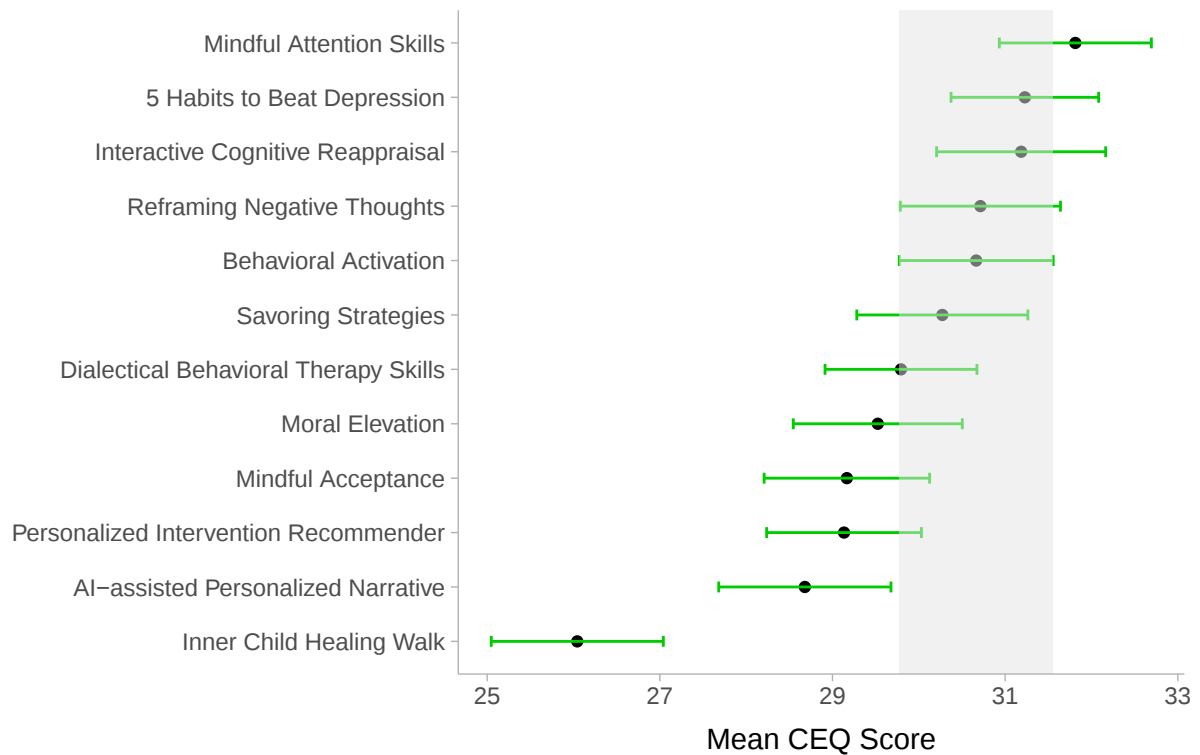


```
ba_stats <- mega_alltimes %>%
  filter(time=='Post-test'&group == "Behavioral Activation") %>%
  summarize(
    mean_CEQ_score = mean(CEQ_score, na.rm = TRUE),
    se = sd(CEQ_score, na.rm = TRUE) / sqrt(n()),
    ci_lower = mean_CEQ_score - 1.96 * se,
    ci_upper = mean_CEQ_score + 1.96 * se)

(ceq_pointplot <- mega_alltimes %>% filter(time=='Post-test'&group!='Passive Control') %>%
  group_by(group) %>%
  summarize(
    mean_CEQ_score = mean(CEQ_score, na.rm = TRUE),
    se = sd(CEQ_score, na.rm = TRUE) / sqrt(n()),
    ci_lower = mean_CEQ_score - 1.96 * se,
    ci_upper = mean_CEQ_score + 1.96 * se) %>%
  ggplot(aes(x = reorder(group, mean_CEQ_score), y = mean_CEQ_score)) +
  geom_point(size=1.5) +
  geom_errorbar(aes(ymin = ci_lower, ymax = ci_upper),
    color='green3',width = 0.2,show.legend = F) +
  # Highlight the CI range of Behavioral Activation
  annotate("rect",
    xmin = -Inf, xmax = Inf,
    ymin = ba_stats$ci_lower, ymax = ba_stats$ci_upper,
    fill = "gray90", alpha = 0.5)+
  coord_flip() +labs(x = "", y = "Mean CEQ Score")+
  ggtitle("Credibility and Expected Benefit","At Post-test, range 4–56"))
```

Credibility and Expected Benefit

At Post-test, range 4–56



```
m1_star <- lm(star_rating_1~group,data=df_for_acceptability %>%
  filter(time=='Post-test'))
(star_cohens_d <- rstatix::cohen's_d(star_rating_1~group,data=df_for_acceptability %>% filter(time=='Post-test')))
```

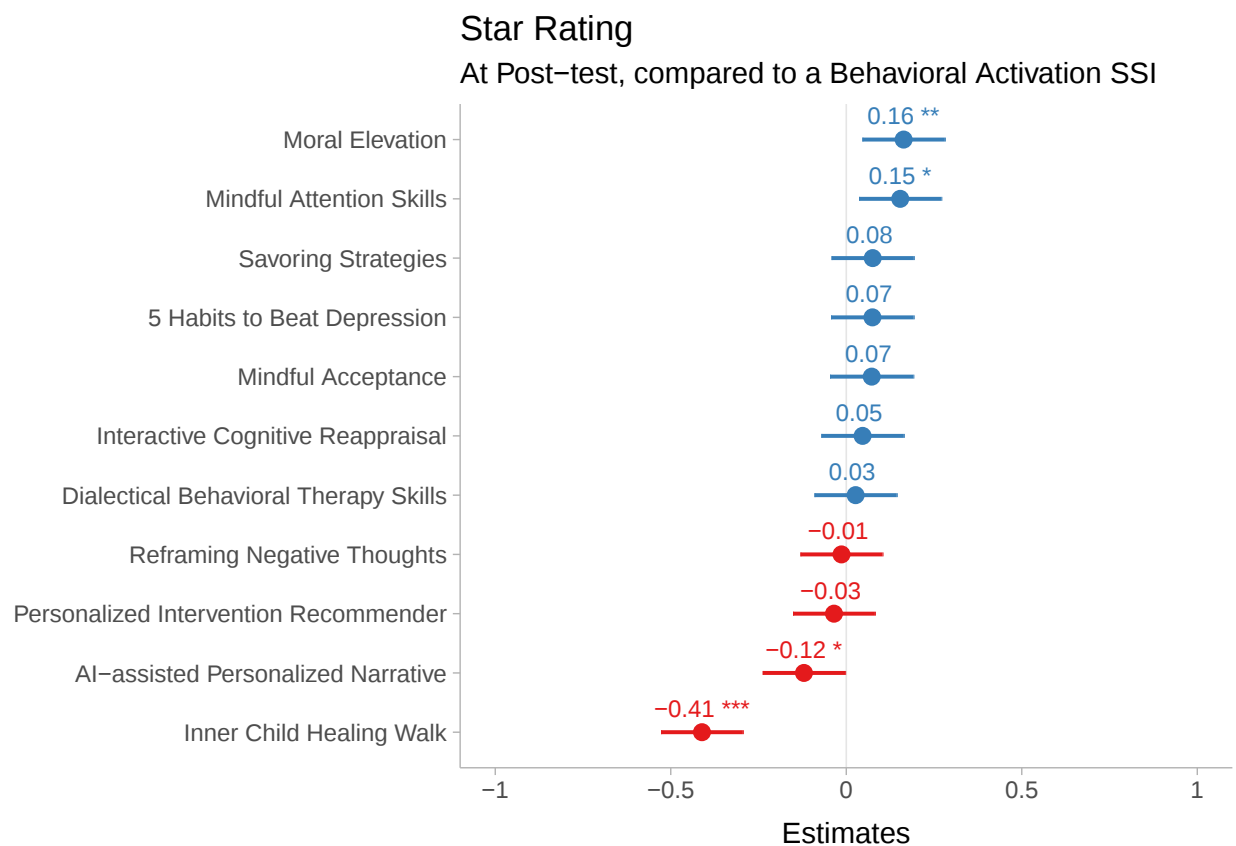
Star rating at post-test

group1	group2	effsize	n1	n2
Behavioral Activation	5 Habits to Beat Depression	-0.0837080	497	482
Behavioral Activation	AI-assisted Personalized Narrative	0.1220022	497	487
Behavioral Activation	Dialectical Behavioral Therapy Skills	-0.0289463	497	489
Behavioral Activation	Inner Child Healing Walk	0.4072790	497	503
Behavioral Activation	Interactive Cognitive Reappraisal	-0.0510202	497	485
Behavioral Activation	Mindful Acceptance	-0.0789056	497	467
Behavioral Activation	Mindful Attention Skills	-0.1728220	497	492
Behavioral Activation	Moral Elevation	-0.1763531	497	486
Behavioral Activation	Personalized Intervention Recommender	0.0375292	497	501
Behavioral Activation	Reframing Negative Thoughts	0.0145115	497	495
Behavioral Activation	Savoring Strategies	-0.0807169	497	490
5 Habits to Beat Depression	AI-assisted Personalized Narrative	0.2043925	482	487

group1	group2	effsize	n1	n2
5 Habits to Beat Depression	Dialectical Behavioral Therapy Skills	0.0541625	482	489
5 Habits to Beat Depression	Inner Child Healing Walk	0.4973373	482	503
5 Habits to Beat Depression	Interactive Cognitive Reappraisal	0.0320871	482	485
5 Habits to Beat Depression	Mindful Acceptance	0.0023050	482	467
5 Habits to Beat Depression	Mindful Attention Skills	-0.0929428	482	492
5 Habits to Beat Depression	Moral Elevation	-0.0997692	482	486
5 Habits to Beat Depression	Personalized Intervention	0.1222423	482	501
	Recommender			
5 Habits to Beat Depression	Reframing Negative Thoughts	0.0976179	482	495
5 Habits to Beat Depression	Savoring Strategies	-0.0008493	482	490
AI-assisted Personalized Narrative	Dialectical Behavioral Therapy Skills	-0.1498113	487	489
AI-assisted Personalized Narrative	Inner Child Healing Walk	0.2724739	487	503
AI-assisted Personalized Narrative	Interactive Cognitive Reappraisal	-0.1715441	487	485
AI-assisted Personalized Narrative	Mindful Acceptance	-0.1967849	487	467
AI-assisted Personalized Narrative	Mindful Attention Skills	-0.2876241	487	492
AI-assisted Personalized Narrative	Moral Elevation	-0.2873371	487	486
AI-assisted Personalized Narrative	Personalized Intervention	-0.0862095	487	501
	Recommender			
AI-assisted Personalized Narrative	Reframing Negative Thoughts	-0.1069834	487	495
AI-assisted Personalized Narrative	Savoring Strategies	-0.1969950	487	490
Dialectical Behavioral Therapy Skills	Inner Child Healing Walk	0.4360325	489	503
Dialectical Behavioral Therapy Skills	Interactive Cognitive Reappraisal	-0.0219192	489	485
Dialectical Behavioral Therapy Skills	Mindful Acceptance	-0.0502368	489	467
Dialectical Behavioral Therapy Skills	Mindful Attention Skills	-0.1438698	489	492
Dialectical Behavioral Therapy Skills	Moral Elevation	-0.1485474	489	486
Dialectical Behavioral Therapy Skills	Personalized Intervention	0.0665557	489	501
	Recommender			
Dialectical Behavioral Therapy Skills	Reframing Negative Thoughts	0.0431694	489	495
Dialectical Behavioral Therapy Skills	Savoring Strategies	-0.0524885	489	490
Inner Child Healing Walk	Interactive Cognitive Reappraisal	-0.4597559	503	485
Inner Child Healing Walk	Mindful Acceptance	-0.4824164	503	467
Inner Child Healing Walk	Mindful Attention Skills	-0.5789502	503	492
Inner Child Healing Walk	Moral Elevation	-0.5691211	503	486
Inner Child Healing Walk	Personalized Intervention	-0.3709348	503	501
	Recommender			
Inner Child Healing Walk	Reframing Negative Thoughts	-0.3894748	503	495
Inner Child Healing Walk	Savoring Strategies	-0.4790534	503	490
Interactive Cognitive Reappraisal	Mindful Acceptance	-0.0288080	485	467
Interactive Cognitive Reappraisal	Mindful Attention Skills	-0.1227818	485	492
Interactive Cognitive Reappraisal	Moral Elevation	-0.1283149	485	486
Interactive Cognitive Reappraisal	Personalized Intervention	0.0888894	485	501
	Recommender			
Interactive Cognitive Reappraisal	Reframing Negative Thoughts	0.0650876	485	495
Interactive Cognitive Reappraisal	Savoring Strategies	-0.0314077	485	490
Mindful Acceptance	Mindful Attention Skills	-0.0921247	467	492
Mindful Acceptance	Moral Elevation	-0.0988989	467	486
Mindful Acceptance	Personalized Intervention	0.1163029	467	501
	Recommender			
Mindful Acceptance	Reframing Negative Thoughts	0.0924946	467	495
Mindful Acceptance	Savoring Strategies	-0.0030218	467	490
Mindful Attention Skills	Moral Elevation	-0.0108579	492	486

group1	group2	effsize	n1	n2
Mindful Attention Skills	Personalized Intervention Recommender	0.2108711	492	501
Mindful Attention Skills	Reframing Negative Thoughts	0.1854955	492	495
Mindful Attention Skills	Savoring Strategies	0.0875032	492	490
Moral Elevation	Personalized Intervention Recommender	0.2129205	486	501
Moral Elevation	Reframing Negative Thoughts	0.1885802	486	495
Moral Elevation	Savoring Strategies	0.0944149	486	490
Personalized Intervention Recommender	Reframing Negative Thoughts	-0.0226137	501	495
Personalized Intervention Recommender	Savoring Strategies	-0.1175547	501	490
Reframing Negative Thoughts	Savoring Strategies	-0.0940989	495	490

```
(star_plot <- plot_model(
  m1_star, sort.est = T, terms=acceptability_terms,
  auto_label=F, show.values = T, value.offset = .4, value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Star Rating', 'At Post-test, compared to a Behavioral Activation SSI'))
```



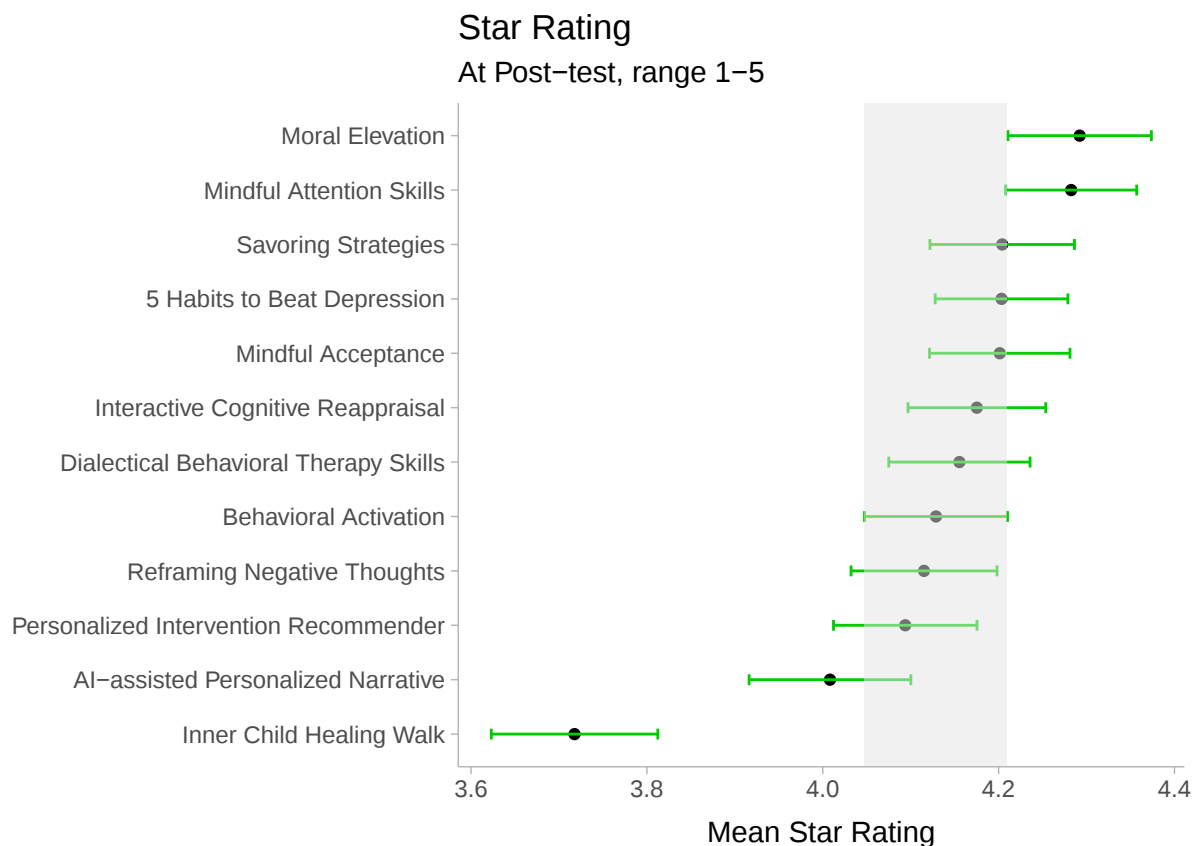
```
ba_stats <- mega_alltimes %>%
  filter(time=='Post-test'&group == "Behavioral Activation") %>%
  summarize(
```

```

mean_star_rating = mean(star_rating_1, na.rm = TRUE),
se = sd(star_rating_1, na.rm = TRUE) / sqrt(n()),
ci_lower = mean_star_rating - 1.96 * se,
ci_upper = mean_star_rating + 1.96 * se)

(star_pointplot <- mega_alltimes %>% filter(time=='Post-test'&group!='Passive Control') %>%
  group_by(group) %>%
  summarize(
    mean_star_score = mean(star_rating_1, na.rm = TRUE),
    se = sd(star_rating_1, na.rm = TRUE) / sqrt(n()),
    ci_lower = mean_star_score - 1.96 * se,
    ci_upper = mean_star_score + 1.96 * se) %>%
  ggplot(aes(x = reorder(group, mean_star_score), y = mean_star_score)) +
  geom_point(size=1.5) +
  geom_errorbar(aes(ymin = ci_lower, ymax = ci_upper),
    color='green3',width = 0.2,show.legend = F) +
  # Highlight the CI range of Behavioral Activation
  annotate("rect",
    xmin = -Inf, xmax = Inf,
    ymin = ba_stats$ci_lower, ymax = ba_stats$ci_upper,
    fill = "gray90", alpha = 0.5)+
  coord_flip() +labs(x = "", y = "Mean Star Rating")+
  ggtitle("Star Rating", "At Post-test, range 1-5"))

```



```

m1_star_wk4 <- lm(star_rating_1~group,data=df_for_acceptability %>%
  filter(time=='Week 4'))
rstatix::cohens_d(star_rating_1~group,data=df_for_acceptability %>%
  filter(time=='Week 4')) %>% select(-magnitude,-.y.) %>%kable()

```

Star Rating at Week 4

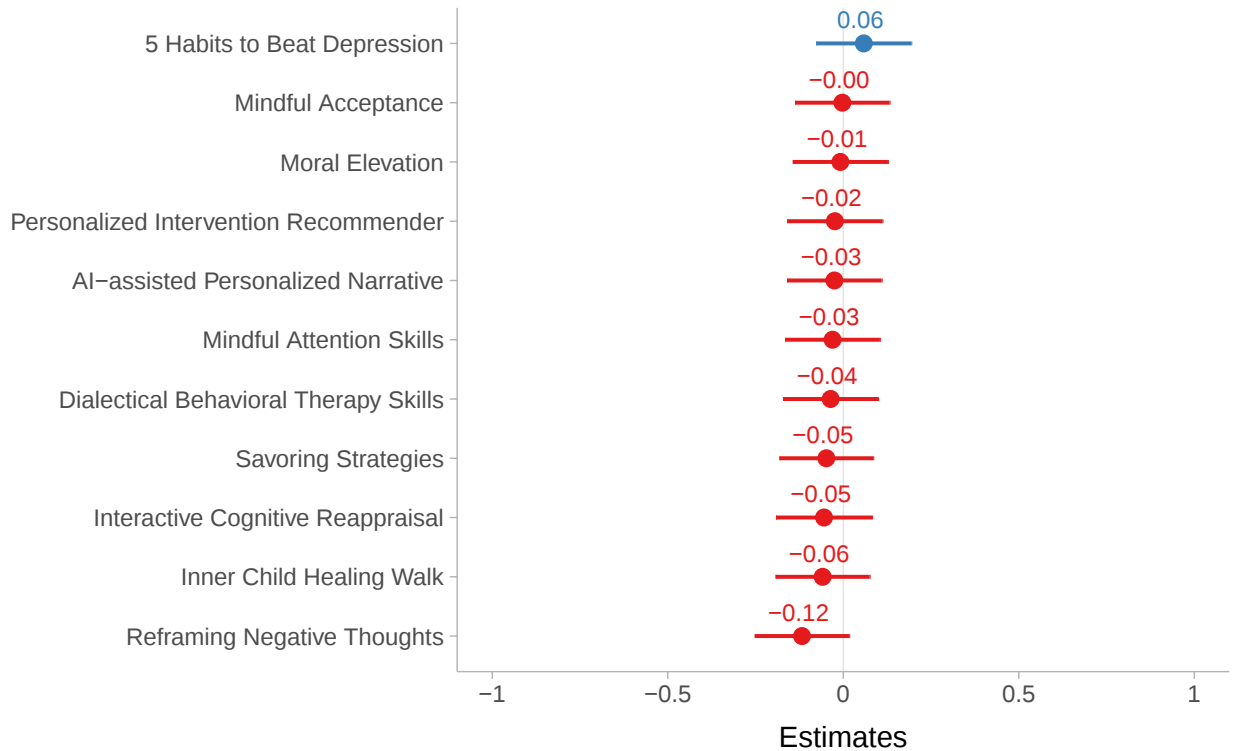
group1	group2	effsize	n1	n2
Behavioral Activation	5 Habits to Beat Depression	-0.0630600	403	390
Behavioral Activation	AI-assisted Personalized Narrative	0.0263811	403	398
Behavioral Activation	Dialectical Behavioral Therapy Skills	0.0377698	403	393
Behavioral Activation	Inner Child Healing Walk	0.0609969	403	407
Behavioral Activation	Interactive Cognitive Reappraisal	0.0573201	403	373
Behavioral Activation	Mindful Acceptance	0.0028329	403	400
Behavioral Activation	Mindful Attention Skills	0.0325392	403	396
Behavioral Activation	Moral Elevation	0.0088453	403	389
Behavioral Activation	Personalized Intervention	0.0247939	403	386
	Recommender			
Behavioral Activation	Reframing Negative Thoughts	0.1191657	403	400
Behavioral Activation	Savoring Strategies	0.0506161	403	412
5 Habits to Beat Depression	AI-assisted Personalized Narrative	0.0871167	390	398
5 Habits to Beat Depression	Dialectical Behavioral Therapy Skills	0.0988765	390	393
5 Habits to Beat Depression	Inner Child Healing Walk	0.1213467	390	407
5 Habits to Beat Depression	Interactive Cognitive Reappraisal	0.1181809	390	373
5 Habits to Beat Depression	Mindful Acceptance	0.0660918	390	400
5 Habits to Beat Depression	Mindful Attention Skills	0.0945532	390	396
5 Habits to Beat Depression	Moral Elevation	0.0713759	390	389
5 Habits to Beat Depression	Personalized Intervention	0.0850747	390	386
	Recommender			
5 Habits to Beat Depression	Reframing Negative Thoughts	0.1780095	390	400
5 Habits to Beat Depression	Savoring Strategies	0.1117278	390	412
AI-assisted Personalized Narrative	Dialectical Behavioral Therapy Skills	0.0108328	398	393
AI-assisted Personalized Narrative	Inner Child Healing Walk	0.0335915	398	407
AI-assisted Personalized Narrative	Interactive Cognitive Reappraisal	0.0298081	398	373
AI-assisted Personalized Narrative	Mindful Acceptance	-0.0237314	398	400
AI-assisted Personalized Narrative	Mindful Attention Skills	0.0053970	398	396
AI-assisted Personalized Narrative	Moral Elevation	-0.0176514	398	389
AI-assisted Personalized Narrative	Personalized Intervention	-0.0013409	398	386
	Recommender			
AI-assisted Personalized Narrative	Reframing Negative Thoughts	0.0905401	398	400
AI-assisted Personalized Narrative	Savoring Strategies	0.0232256	398	412
Dialectical Behavioral Therapy Skills	Inner Child Healing Walk	0.0230154	393	407
Dialectical Behavioral Therapy Skills	Interactive Cognitive Reappraisal	0.0191264	393	373
Dialectical Behavioral Therapy Skills	Mindful Acceptance	-0.0351383	393	400
Dialectical Behavioral Therapy Skills	Mindful Attention Skills	-0.0056203	393	396
Dialectical Behavioral Therapy Skills	Moral Elevation	-0.0288953	393	389
Dialectical Behavioral Therapy Skills	Personalized Intervention	-0.0121041	393	386
	Recommender			
Dialectical Behavioral Therapy Skills	Reframing Negative Thoughts	0.0805224	393	400
Dialectical Behavioral Therapy Skills	Savoring Strategies	0.0124642	393	412
Inner Child Healing Walk	Interactive Cognitive Reappraisal	-0.0040272	407	373

group1	group2	effsize	n1	n2
Inner Child Healing Walk	Mindful Acceptance	-0.0584648	407	400
Inner Child Healing Walk	Mindful Attention Skills	-0.0288854	407	396
Inner Child Healing Walk	Moral Elevation	-0.0520538	407	389
Inner Child Healing Walk	Personalized Intervention	-0.0346901	407	386
	Recommender			
Inner Child Healing Walk	Reframing Negative Thoughts	0.0574130	407	400
Inner Child Healing Walk	Savoring Strategies	-0.0107002	407	412
Interactive Cognitive Reappraisal	Mindful Acceptance	-0.0547570	373	400
Interactive Cognitive Reappraisal	Mindful Attention Skills	-0.0249930	373	396
Interactive Cognitive Reappraisal	Moral Elevation	-0.0483272	373	389
Interactive Cognitive Reappraisal	Personalized Intervention	-0.0309403	373	386
	Recommender			
Interactive Cognitive Reappraisal	Reframing Negative Thoughts	0.0617793	373	400
Interactive Cognitive Reappraisal	Savoring Strategies	-0.0067114	373	412
Mindful Acceptance	Mindful Attention Skills	0.0298538	400	396
Mindful Acceptance	Moral Elevation	0.0060640	400	389
Mindful Acceptance	Personalized Intervention	0.0221591	400	386
	Recommender			
Mindful Acceptance	Reframing Negative Thoughts	0.1168558	400	400
Mindful Acceptance	Savoring Strategies	0.0480229	400	412
Mindful Attention Skills	Moral Elevation	-0.0235727	396	389
Mindful Attention Skills	Personalized Intervention	-0.0067245	396	386
	Recommender			
Mindful Attention Skills	Reframing Negative Thoughts	0.0870020	396	400
Mindful Attention Skills	Savoring Strategies	0.0182612	396	412
Moral Elevation	Personalized Intervention	0.0161427	389	386
	Recommender			
Moral Elevation	Reframing Negative Thoughts	0.1100215	389	400
Moral Elevation	Savoring Strategies	0.0416383	389	412
Personalized Intervention	Reframing Negative Thoughts	0.0912368	386	400
Recommender				
Personalized Intervention	Savoring Strategies	0.0244084	386	412
Recommender				
Reframing Negative Thoughts	Savoring Strategies	-0.0685052	400	412

```
(star_plot_wk4 <- plot_model(m1_star_wk4, sort.est = T, terms=acceptability_terms, auto_label=F, show.values=
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Star Rating', 'At Week 4, compared to a Behavioral Activation SSI'))
```

Star Rating

At Week 4, compared to a Behavioral Activation SSI



```
m1_aha <- lm(aha~group,data=df_for_acceptability %>% filter(time=='Post-test'))
(aha_cohens_d <- rstatix::cohens_d(aha~group,data=df_for_acceptability%>% filter(time=='Post-test')) %>%
```

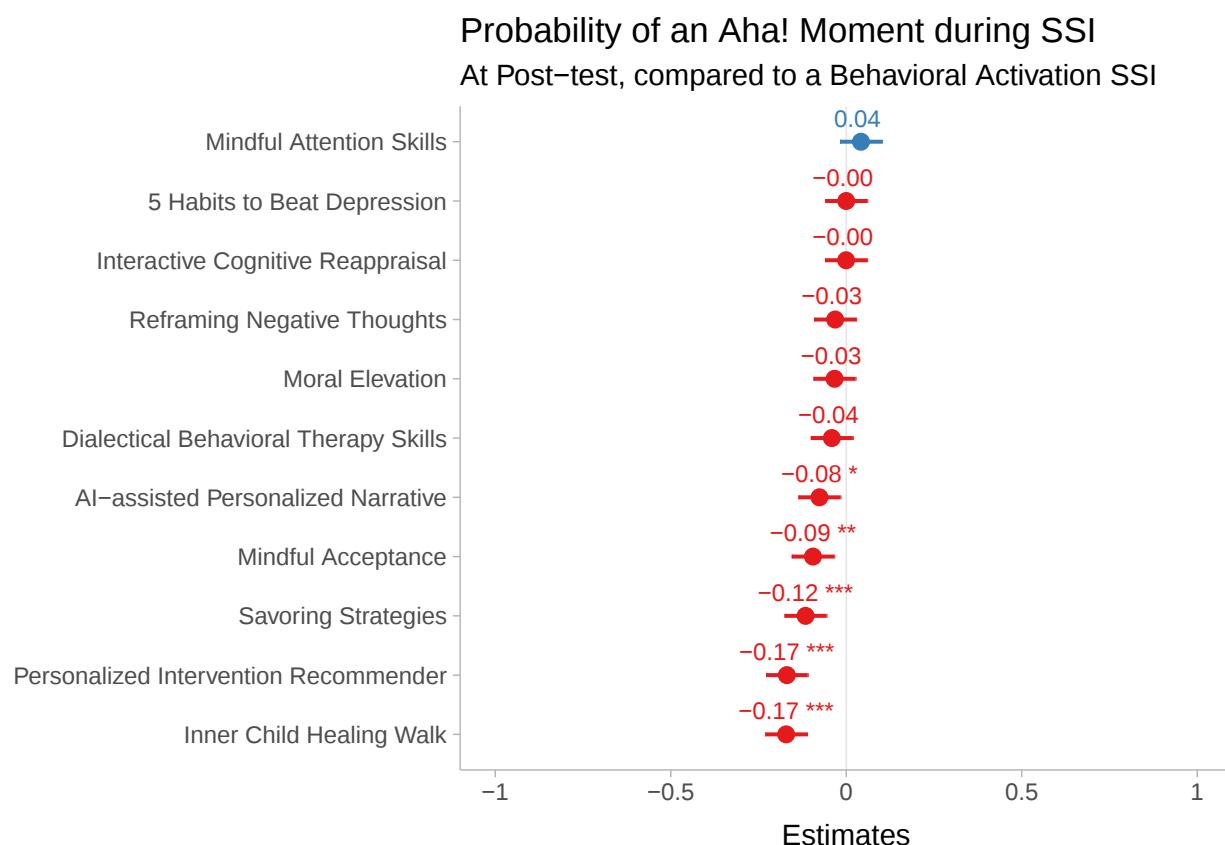
Frequency of Aha! moments at post-test

group1	group2	effsize	n1	n2
Behavioral Activation	5 Habits to Beat Depression	0.0003865	498	482
Behavioral Activation	AI-assisted Personalized Narrative	0.1568984	498	487
Behavioral Activation	Dialectical Behavioral Therapy Skills	0.0835862	498	489
Behavioral Activation	Inner Child Healing Walk	0.3656787	498	503
Behavioral Activation	Interactive Cognitive Reappraisal	0.0010396	498	487
Behavioral Activation	Mindful Acceptance	0.1957015	498	469
Behavioral Activation	Mindful Attention Skills	-0.0840678	498	492
Behavioral Activation	Moral Elevation	0.0676941	498	487
Behavioral Activation	Personalized Intervention Recommender	0.3610437	498	503
Behavioral Activation	Reframing Negative Thoughts	0.0643402	498	495
Behavioral Activation	Savoring Strategies	0.2413670	498	491
5 Habits to Beat Depression	AI-assisted Personalized Narrative	0.1565070	482	487
5 Habits to Beat Depression	Dialectical Behavioral Therapy Skills	0.0831976	482	489
5 Habits to Beat Depression	Inner Child Healing Walk	0.3652737	482	503
5 Habits to Beat Depression	Interactive Cognitive Reappraisal	0.0006531	482	487

group1	group2	effsize	n1	n2
5 Habits to Beat Depression	Mindful Acceptance	0.1953081	482	469
5 Habits to Beat Depression	Mindful Attention Skills	-0.0844536	482	492
5 Habits to Beat Depression	Moral Elevation	0.0673060	482	487
5 Habits to Beat Depression	Personalized Intervention	0.3606391	482	503
	Recommender			
5 Habits to Beat Depression	Reframing Negative Thoughts	0.0639522	482	495
5 Habits to Beat Depression	Savoring Strategies	0.2409710	482	491
AI-assisted Personalized Narrative	Dialectical Behavioral Therapy Skills	-0.0730889	487	489
AI-assisted Personalized Narrative	Inner Child Healing Walk	0.2062529	487	503
AI-assisted Personalized Narrative	Interactive Cognitive Reappraisal	-0.1558510	487	487
AI-assisted Personalized Narrative	Mindful Acceptance	0.0385387	487	469
AI-assisted Personalized Narrative	Mindful Attention Skills	-0.2417330	487	492
AI-assisted Personalized Narrative	Moral Elevation	-0.0889828	487	487
AI-assisted Personalized Narrative	Personalized Intervention	0.2017008	487	503
	Recommender			
AI-assisted Personalized Narrative	Reframing Negative Thoughts	-0.0923407	487	495
AI-assisted Personalized Narrative	Savoring Strategies	0.0837616	487	491
Dialectical Behavioral Therapy Skills	Inner Child Healing Walk	0.2802089	489	503
Dialectical Behavioral Therapy Skills	Interactive Cognitive Reappraisal	-0.0825440	489	487
Dialectical Behavioral Therapy Skills	Mindful Acceptance	0.1116952	489	469
Dialectical Behavioral Therapy Skills	Mindful Attention Skills	-0.1679402	489	492
Dialectical Behavioral Therapy Skills	Moral Elevation	-0.0158705	489	487
Dialectical Behavioral Therapy Skills	Personalized Intervention	0.2756255	489	503
	Recommender			
Dialectical Behavioral Therapy Skills	Reframing Negative Thoughts	-0.0192218	489	495
Dialectical Behavioral Therapy Skills	Savoring Strategies	0.1570581	489	491
Inner Child Healing Walk	Interactive Cognitive Reappraisal	-0.3646032	503	487
Inner Child Healing Walk	Mindful Acceptance	-0.1674529	503	469
Inner Child Healing Walk	Mindful Attention Skills	-0.4529752	503	492
Inner Child Healing Walk	Moral Elevation	-0.2963604	503	487
Inner Child Healing Walk	Personalized Intervention	-0.0045199	503	503
	Recommender			
Inner Child Healing Walk	Reframing Negative Thoughts	-0.2997781	503	495
Inner Child Healing Walk	Savoring Strategies	-0.1220958	503	491
Interactive Cognitive Reappraisal	Mindful Acceptance	0.1946503	487	469
Interactive Cognitive Reappraisal	Mindful Attention Skills	-0.0851083	487	492
Interactive Cognitive Reappraisal	Moral Elevation	0.0666526	487	487
Interactive Cognitive Reappraisal	Personalized Intervention	0.3599690	487	503
	Recommender			
Interactive Cognitive Reappraisal	Reframing Negative Thoughts	0.0632989	487	495
Interactive Cognitive Reappraisal	Savoring Strategies	0.2403105	487	491
Mindful Acceptance	Mindful Attention Skills	-0.2808727	469	492
Mindful Acceptance	Moral Elevation	-0.1276162	469	487
Mindful Acceptance	Personalized Intervention	0.1629127	469	503
	Recommender			
Mindful Acceptance	Reframing Negative Thoughts	-0.1309808	469	495
Mindful Acceptance	Savoring Strategies	0.0451912	469	491
Mindful Attention Skills	Moral Elevation	0.1519717	492	487
Mindful Attention Skills	Personalized Intervention	0.4482692	492	503
	Recommender			
Mindful Attention Skills	Reframing Negative Thoughts	0.1486037	492	495
Mindful Attention Skills	Savoring Strategies	0.3270100	492	491

group1	group2	effsize	n1	n2
Moral Elevation	Personalized Intervention Recommender	0.2917685	487	503
Moral Elevation	Reframing Negative Thoughts	-0.0033509	487	495
Moral Elevation	Savoring Strategies	0.1730243	487	491
Personalized Intervention Recommender	Reframing Negative Thoughts	-0.2951844	503	495
Personalized Intervention Recommender	Savoring Strategies	-0.1175656	503	491
Reframing Negative Thoughts	Savoring Strategies	0.1763997	495	491

```
(aha_plot <- plot_model(m1_aha, sort.est = T, terms=acceptability_terms, auto_label=F, show.values = T, val
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Probability of an Aha! Moment during SSI', 'At Post-test, compared to a Behavioral Activation
```



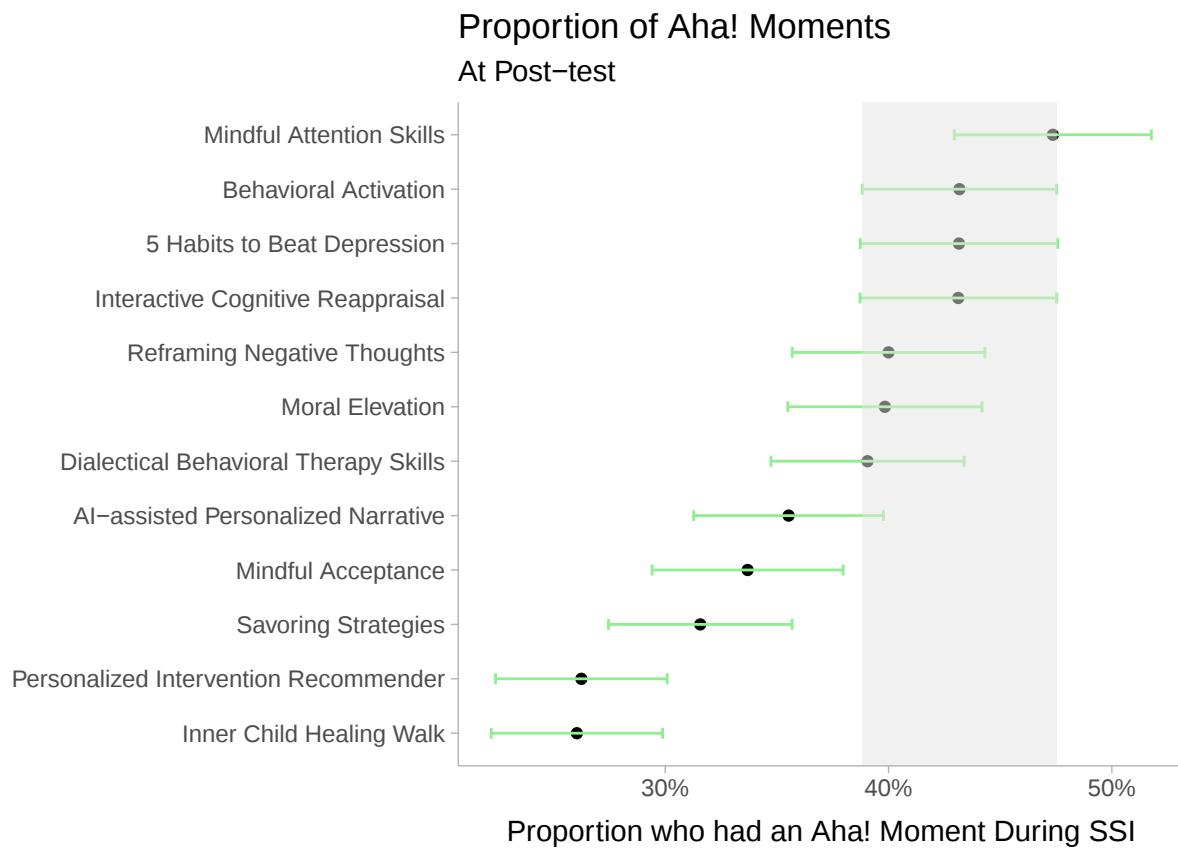
```
ba_stats <- mega_alltimes %>%
  filter(time=='Post-test' & group == "Behavioral Activation") %>%
  summarize(
    mean_aha_score = mean(aha, na.rm = TRUE),
    se = sd(aha, na.rm = TRUE) / sqrt(n()),
    ci_lower = mean_aha_score - 1.96 * se,
    ci_upper = mean_aha_score + 1.96 * se)

(aha_pointplot <- mega_alltimes %>%
```

```

filter(time=='Post-test'&group!='Passive Control') %>%
group_by(group) %>%
summarize(
  aha_prop = mean(aha, na.rm = TRUE),
  n = sum(!is.na(aha)),
  se = sqrt(aha_prop * (1 - aha_prop) / n),
  ci_lower = aha_prop - 1.96 * se,
  ci_upper = aha_prop + 1.96 * se
) %>%
ggplot(aes(x = reorder(group, aha_prop), y = aha_prop)) +
geom_point(size=1.5) +
geom_errorbar(aes(ymin = ci_lower, ymax = ci_upper),
              color='palegreen2',width = 0.2,show.legend = F) +
labs(x = "", y = "Proportion who had an Aha! Moment During SSI")+
  # Highlight the CI range of Behavioral Activation
annotate("rect",
  xmin = -Inf, xmax = Inf,
  ymin = ba_stats$ci_lower, ymax = ba_stats$ci_upper,
  fill = "gray90", alpha = 0.5)+
scale_y_continuous(labels = scales::percent)+
coord_flip() +
ggtitle("Proportion of Aha! Moments", "At Post-test")

```



```
m1_aha_wk4 <- lm(aha_wk4~group,data=df_for_acceptability %>% filter(time=='Week 4'))
rstatix::cohens_d(aha_wk4~group,data=df_for_acceptability%>% filter(time=='Week 4')) %>% select(-magnitu
```

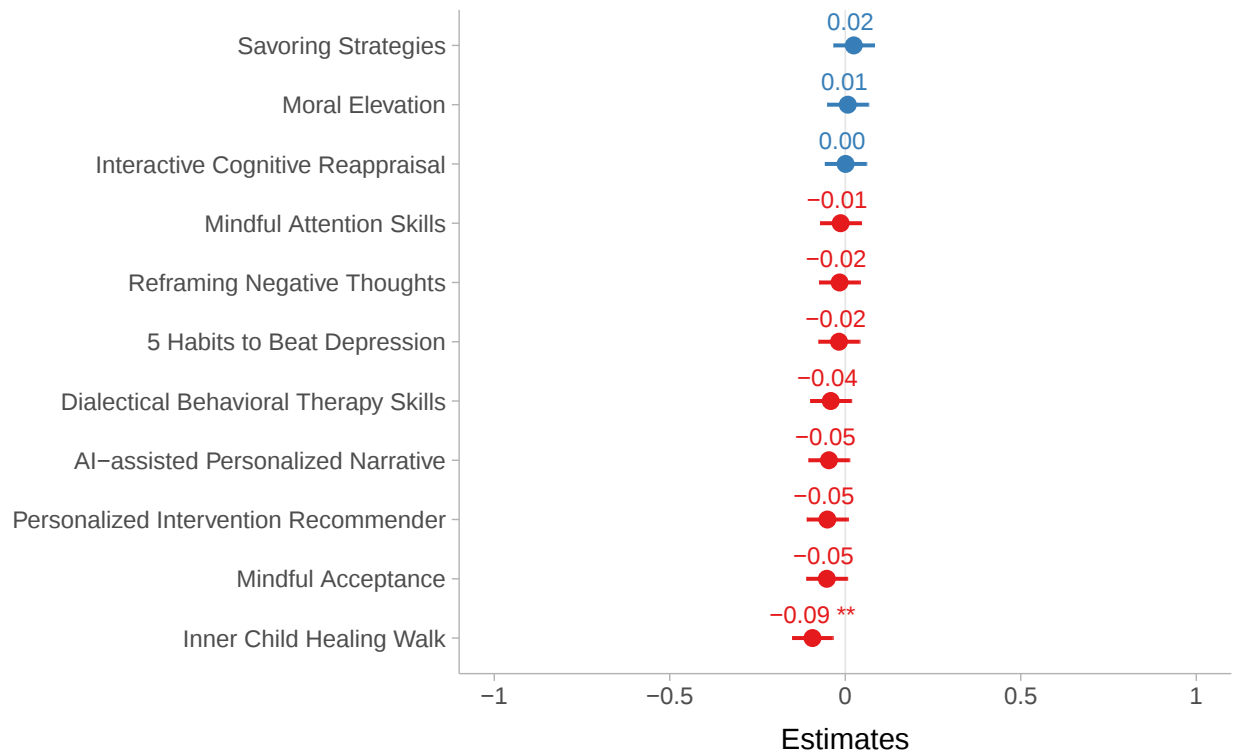
Frequency of Aha! moments at week 4

group1	group2	effsize	n1	n2
Behavioral Activation	5 Habits to Beat Depression	0.0414073	403	391
Behavioral Activation	AI-assisted Personalized Narrative	0.1106809	403	397
Behavioral Activation	Dialectical Behavioral Therapy Skills	0.0979336	403	392
Behavioral Activation	Inner Child Healing Walk	0.2320308	403	407
Behavioral Activation	Interactive Cognitive Reappraisal	-0.0020866	403	374
Behavioral Activation	Mindful Acceptance	0.1257006	403	399
Behavioral Activation	Mindful Attention Skills	0.0306000	403	396
Behavioral Activation	Moral Elevation	-0.0164799	403	388
Behavioral Activation	Personalized Intervention	0.1217798	403	386
	Recommender			
Behavioral Activation	Reframing Negative Thoughts	0.0376124	403	401
Behavioral Activation	Savoring Strategies	-0.0549311	403	411
5 Habits to Beat Depression	AI-assisted Personalized Narrative	0.0692407	391	397
5 Habits to Beat Depression	Dialectical Behavioral Therapy Skills	0.0565020	391	392
5 Habits to Beat Depression	Inner Child Healing Walk	0.1904898	391	407
5 Habits to Beat Depression	Interactive Cognitive Reappraisal	-0.0434923	391	374
5 Habits to Beat Depression	Mindful Acceptance	0.0842495	391	399
5 Habits to Beat Depression	Mindful Attention Skills	-0.0108058	391	396
5 Habits to Beat Depression	Moral Elevation	-0.0578907	391	388
5 Habits to Beat Depression	Personalized Intervention	0.0803323	391	386
	Recommender			
5 Habits to Beat Depression	Reframing Negative Thoughts	-0.0037948	391	401
5 Habits to Beat Depression	Savoring Strategies	-0.0963669	391	411
AI-assisted Personalized Narrative	Dialectical Behavioral Therapy Skills	-0.0127346	397	392
AI-assisted Personalized Narrative	Inner Child Healing Walk	0.1211870	397	407
AI-assisted Personalized Narrative	Interactive Cognitive Reappraisal	-0.1127647	397	374
AI-assisted Personalized Narrative	Mindful Acceptance	0.0150028	397	399
AI-assisted Personalized Narrative	Mindful Attention Skills	-0.0800527	397	396
AI-assisted Personalized Narrative	Moral Elevation	-0.1271835	397	388
AI-assisted Personalized Narrative	Personalized Intervention	0.0110887	397	386
	Recommender			
AI-assisted Personalized Narrative	Reframing Negative Thoughts	-0.0730384	397	401
AI-assisted Personalized Narrative	Savoring Strategies	-0.1657331	397	411
Dialectical Behavioral Therapy Skills	Inner Child Healing Walk	0.1339252	392	407
Dialectical Behavioral Therapy Skills	Interactive Cognitive Reappraisal	-0.1000175	392	374
Dialectical Behavioral Therapy Skills	Mindful Acceptance	0.0277376	392	399
Dialectical Behavioral Therapy Skills	Mindful Attention Skills	-0.0673122	392	396
Dialectical Behavioral Therapy Skills	Moral Elevation	-0.1144317	392	388
Dialectical Behavioral Therapy Skills	Personalized Intervention	0.0238231	392	386
	Recommender			
Dialectical Behavioral Therapy Skills	Reframing Negative Thoughts	-0.0602989	392	401
Dialectical Behavioral Therapy Skills	Savoring Strategies	-0.1529652	392	411
Inner Child Healing Walk	Interactive Cognitive Reappraisal	-0.2341136	407	374
Inner Child Healing Walk	Mindful Acceptance	-0.1061820	407	399
Inner Child Healing Walk	Mindful Attention Skills	-0.2013234	407	396

group1	group2	effsize	n1	n2
Inner Child Healing Walk	Moral Elevation	-0.2485849	407	388
Inner Child Healing Walk	Personalized Intervention	-0.1100938	407	386
	Recommender			
Inner Child Healing Walk	Reframing Negative Thoughts	-0.1942966	407	401
Inner Child Healing Walk	Savoring Strategies	-0.2873111	407	411
Interactive Cognitive Reappraisal	Mindful Acceptance	0.1277842	374	399
Interactive Cognitive Reappraisal	Mindful Attention Skills	0.0326853	374	396
Interactive Cognitive Reappraisal	Moral Elevation	-0.0143924	374	388
Interactive Cognitive Reappraisal	Personalized Intervention	0.1238634	374	386
	Recommender			
Interactive Cognitive Reappraisal	Reframing Negative Thoughts	0.0396976	374	401
Interactive Cognitive Reappraisal	Savoring Strategies	-0.0528410	374	411
Mindful Acceptance	Mindful Attention Skills	-0.0950638	399	396
Mindful Acceptance	Moral Elevation	-0.1422089	399	388
Mindful Acceptance	Personalized Intervention	-0.0039138	399	386
	Recommender			
Mindful Acceptance	Reframing Negative Thoughts	-0.0880481	399	401
Mindful Acceptance	Savoring Strategies	-0.1807782	399	411
Mindful Attention Skills	Moral Elevation	-0.0470819	396	388
Mindful Attention Skills	Personalized Intervention	0.0911458	396	386
	Recommender			
Mindful Attention Skills	Reframing Negative Thoughts	0.0070112	396	401
Mindful Attention Skills	Savoring Strategies	-0.0855502	396	411
Moral Elevation	Personalized Intervention	0.1382863	388	386
	Recommender			
Moral Elevation	Reframing Negative Thoughts	0.0540955	388	401
Moral Elevation	Savoring Strategies	-0.0384448	388	411
Personalized Intervention	Reframing Negative Thoughts	-0.0841307	386	401
Recommender				
Personalized Intervention	Savoring Strategies	-0.1768496	386	411
Recommender				
Reframing Negative Thoughts	Savoring Strategies	-0.0925693	401	411

```
(aha_plot_wk4 <- plot_model(
  m1_aha_wk4, sort.est = T, terms=acceptability_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2)+scale_x_discrete(
    labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Probability of an Aha! Moment during SSI', 'At Week 4'))
```

Probability of an Aha! Moment during SSI At Week 4



```
m1_aha_significance <- lm(aha_significant~group,data=df_for_acceptability %>%
  filter(time=='Post-test'))

(aha_significance_cohens_d <- rstatix::cohen's_d(
  aha_significant~group,data=df_for_acceptability) %>% select(-magnitude,-.y.)) %>%kable()
```

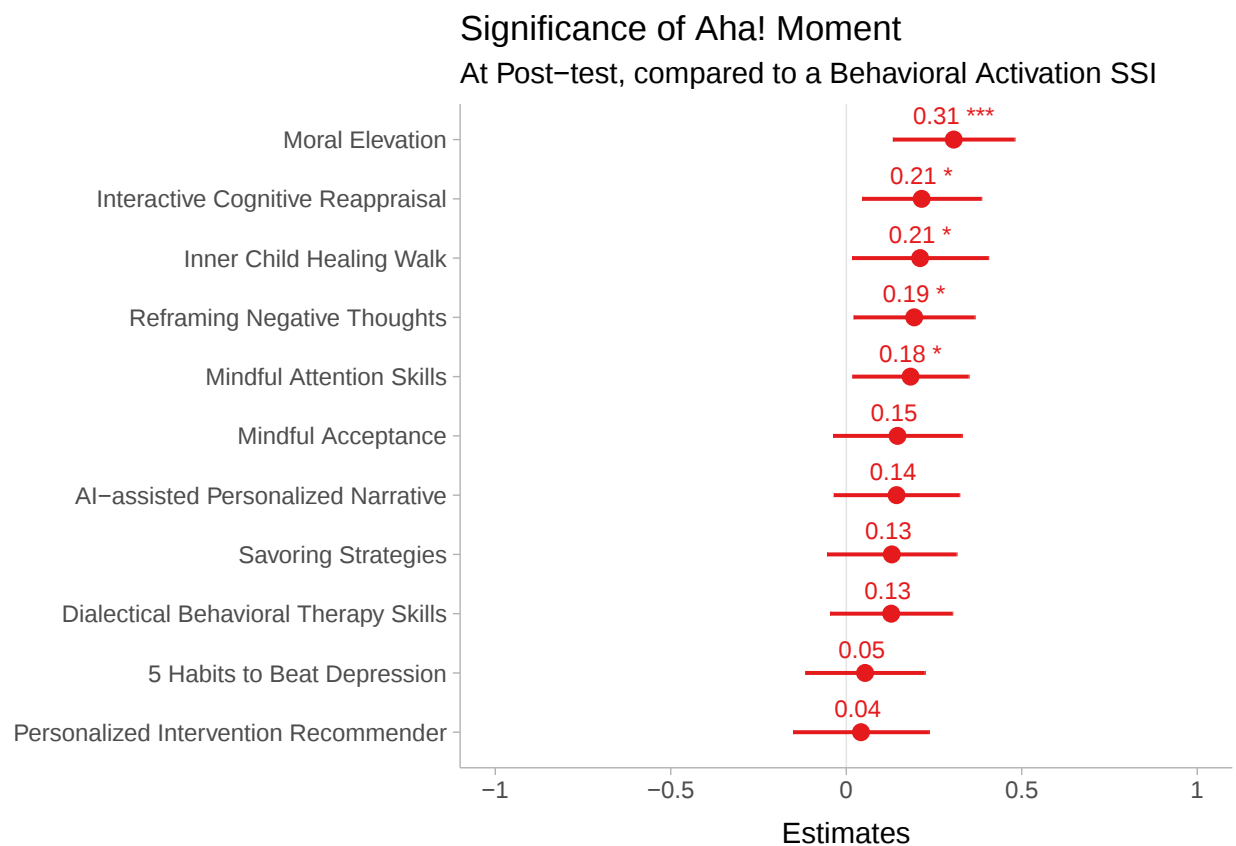
Significance of Aha! moments at post-test

group1	group2	effsize	n1	n2
Behavioral Activation	5 Habits to Beat Depression	-0.1037522	317	300
Behavioral Activation	AI-assisted Personalized Narrative	-0.1120357	317	255
Behavioral Activation	Dialectical Behavioral Therapy Skills	-0.1942869	317	274
Behavioral Activation	Inner Child Healing Walk	-0.2646972	317	196
Behavioral Activation	Interactive Cognitive Reappraisal	-0.2094864	317	305
Behavioral Activation	Mindful Acceptance	-0.0751834	317	238
Behavioral Activation	Mindful Attention Skills	-0.2327336	317	328
Behavioral Activation	Moral Elevation	-0.2463683	317	295
Behavioral Activation	Personalized Intervention Recommender	-0.0364156	317	210
Behavioral Activation	Reframing Negative Thoughts	-0.1395255	317	293
Behavioral Activation	Savoring Strategies	-0.0361031	317	269
5 Habits to Beat Depression	AI-assisted Personalized Narrative	-0.0092960	300	255

group1	group2	effsize	n1	n2
5 Habits to Beat Depression	Dialectical Behavioral Therapy Skills	-0.0828264	300	274
5 Habits to Beat Depression	Inner Child Healing Walk	-0.1578780	300	196
5 Habits to Beat Depression	Interactive Cognitive Reappraisal	-0.1057687	300	305
5 Habits to Beat Depression	Mindful Acceptance	0.0248929	300	238
5 Habits to Beat Depression	Mindful Attention Skills	-0.1273785	300	328
5 Habits to Beat Depression	Moral Elevation	-0.1423566	300	295
5 Habits to Beat Depression	Personalized Intervention	0.0677550	300	210
	Recommender			
5 Habits to Beat Depression	Reframing Negative Thoughts	-0.0383106	300	293
5 Habits to Beat Depression	Savoring Strategies	0.0646362	300	269
AI-assisted Personalized Narrative	Dialectical Behavioral Therapy Skills	-0.0720354	255	274
AI-assisted Personalized Narrative	Inner Child Healing Walk	-0.1468650	255	196
AI-assisted Personalized Narrative	Interactive Cognitive Reappraisal	-0.0955299	255	305
AI-assisted Personalized Narrative	Mindful Acceptance	0.0336610	255	238
AI-assisted Personalized Narrative	Mindful Attention Skills	-0.1167858	255	328
AI-assisted Personalized Narrative	Moral Elevation	-0.1317773	255	295
AI-assisted Personalized Narrative	Personalized Intervention	0.0764301	255	210
	Recommender			
AI-assisted Personalized Narrative	Reframing Negative Thoughts	-0.0288916	255	293
AI-assisted Personalized Narrative	Savoring Strategies	0.0730934	255	269
Dialectical Behavioral Therapy Skills	Inner Child Healing Walk	-0.0835224	274	196
Dialectical Behavioral Therapy Skills	Interactive Cognitive Reappraisal	-0.0301097	274	305
Dialectical Behavioral Therapy Skills	Mindful Acceptance	0.1062796	274	238
Dialectical Behavioral Therapy Skills	Mindful Attention Skills	-0.0519923	274	328
Dialectical Behavioral Therapy Skills	Moral Elevation	-0.0688267	274	295
Dialectical Behavioral Therapy Skills	Personalized Intervention	0.1559242	274	210
	Recommender			
Dialectical Behavioral Therapy Skills	Reframing Negative Thoughts	0.0398485	274	293
Dialectical Behavioral Therapy Skills	Savoring Strategies	0.1493552	274	269
Inner Child Healing Walk	Interactive Cognitive Reappraisal	0.0491975	196	305
Inner Child Healing Walk	Mindful Acceptance	0.1781259	196	238
Inner Child Healing Walk	Mindful Attention Skills	0.0292924	196	328
Inner Child Healing Walk	Moral Elevation	0.0120783	196	295
Inner Child Healing Walk	Personalized Intervention	0.2282215	196	210
	Recommender			
Inner Child Healing Walk	Reframing Negative Thoughts	0.1148853	196	293
Inner Child Healing Walk	Savoring Strategies	0.2199426	196	269
Interactive Cognitive Reappraisal	Mindful Acceptance	0.1272128	305	238
Interactive Cognitive Reappraisal	Mindful Attention Skills	-0.0200731	305	328
Interactive Cognitive Reappraisal	Moral Elevation	-0.0363021	305	295
Interactive Cognitive Reappraisal	Personalized Intervention	0.1738907	305	210
	Recommender			
Interactive Cognitive Reappraisal	Reframing Negative Thoughts	0.0650935	305	293
Interactive Cognitive Reappraisal	Savoring Strategies	0.1675697	305	269
Mindful Acceptance	Mindful Attention Skills	-0.1483910	238	328
Mindful Acceptance	Moral Elevation	-0.1627141	238	295
Mindful Acceptance	Personalized Intervention	0.0403902	238	210
	Recommender			
Mindful Acceptance	Reframing Negative Thoughts	-0.0614286	238	293
Mindful Acceptance	Savoring Strategies	0.0382638	238	269
Mindful Attention Skills	Moral Elevation	-0.0166770	328	295

group1	group2	effsize	n1	n2
Mindful Attention Skills	Personalized Intervention Recommender	0.1966508	328	210
Mindful Attention Skills	Reframing Negative Thoughts	0.0856170	328	293
Mindful Attention Skills	Savoring Strategies	0.1894827	328	269
Moral Elevation	Personalized Intervention Recommender	0.2107989	295	210
Moral Elevation	Reframing Negative Thoughts	0.1007892	295	293
Moral Elevation	Savoring Strategies	0.2033875	295	269
Personalized Intervention Recommender	Reframing Negative Thoughts	-0.1045599	210	293
Personalized Intervention Recommender	Savoring Strategies	-0.0009257	210	269
Reframing Negative Thoughts	Savoring Strategies	0.1004738	293	269

```
(aha_significance_plot <- plot_model(
  m1_aha_significance, sort.est = T, terms=acceptability_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Significance of Aha! Moment', 'At Post-test, compared to a Behavioral Activation SSI'))
```



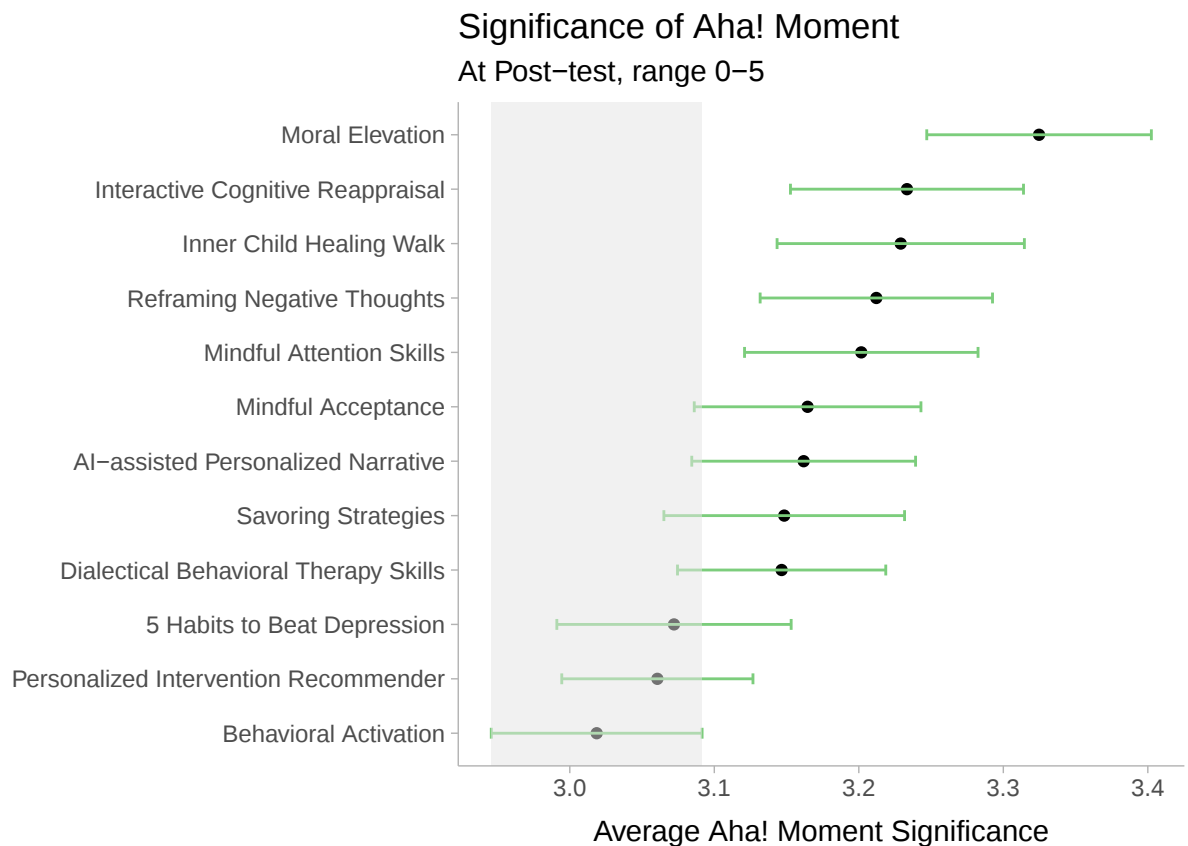
```
ba_stats <- mega_alltimes %>%
  filter(time=='Post-test' & group == "Behavioral Activation") %>%
  summarize(
```

```

mean_aha_score = mean(aha_significant, na.rm = TRUE),
se = sd(aha_significant, na.rm = TRUE) / sqrt(n()),
ci_lower = mean_aha_score - 1.96 * se,
ci_upper = mean_aha_score + 1.96 * se)

(aha_signif_pointplot <- mega_alltimes %>% filter(time=='Post-test'&group!='Passive Control') %>%
  group_by(group) %>%
  summarize(mean_aha_signif_score = mean(aha_significant, na.rm = TRUE),
    se = sd(aha_significant, na.rm = TRUE) / sqrt(n()),
    ci_lower = mean_aha_signif_score - 1.96 * se,
    ci_upper = mean_aha_signif_score + 1.96 * se) %>%
  ggplot(aes(x = reorder(group, mean_aha_signif_score), y = mean_aha_signif_score)) +
  geom_point(size=1.5) +
  geom_errorbar(aes(ymin = ci_lower, ymax = ci_upper),
    color='palegreen3',width = 0.2,show.legend = F) +
  # Highlight the CI range of Behavioral Activation
  annotate("rect",
    xmin = -Inf, xmax = Inf,
    ymin = ba_stats$ci_lower, ymax = ba_stats$ci_upper,
    fill = "gray90", alpha = 0.5)+
  coord_flip() +labs(x = "", y = "Average Aha! Moment Significance")+
  ggtitle("Significance of Aha! Moment", "At Post-test, range 0-5"))

```



```

m1_aha_significance_wk4 <- lm(
  aha_significant~group,data=df_for_acceptability %>%
    filter(time=='Week 4'))
rstatix::cohens_d(aha_significant~group,data=df_for_acceptability %>%
  filter(time=='Week 4')) %>%select(-magnitude,-.y.) %>% kable()

```

Significance of Aha! moments at week 4

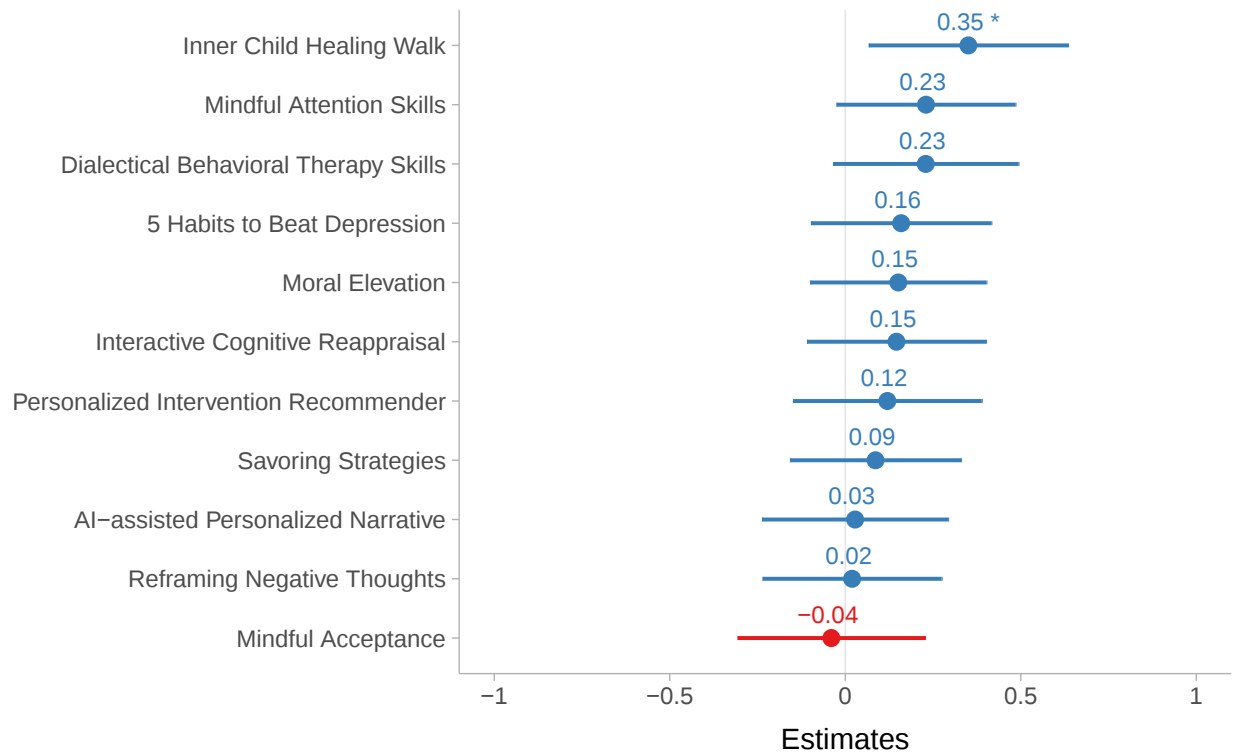
group1	group2	effsize	n1	n2
Behavioral Activation	5 Habits to Beat Depression	-0.1786060	102	92
Behavioral Activation	AI-assisted Personalized Narrative	-0.0310629	102	82
Behavioral Activation	Dialectical Behavioral Therapy Skills	-0.2750450	102	83
Behavioral Activation	Inner Child Healing Walk	-0.4165524	102	65
Behavioral Activation	Interactive Cognitive Reappraisal	-0.1603639	102	95
Behavioral Activation	Mindful Acceptance	0.0433023	102	80
Behavioral Activation	Mindful Attention Skills	-0.2523587	102	95
Behavioral Activation	Moral Elevation	-0.1631557	102	101
Behavioral Activation	Personalized Intervention	-0.1258454	102	78
	Recommender			
Behavioral Activation	Reframing Negative Thoughts	-0.0215656	102	95
Behavioral Activation	Savoring Strategies	-0.1002238	102	114
5 Habits to Beat Depression	AI-assisted Personalized Narrative	0.1436173	92	82
5 Habits to Beat Depression	Dialectical Behavioral Therapy Skills	-0.0826506	92	83
5 Habits to Beat Depression	Inner Child Healing Walk	-0.2237210	92	65
5 Habits to Beat Depression	Interactive Cognitive Reappraisal	0.0145149	92	95
5 Habits to Beat Depression	Mindful Acceptance	0.2139294	92	80
5 Habits to Beat Depression	Mindful Attention Skills	-0.0766110	92	95
5 Habits to Beat Depression	Moral Elevation	0.0085952	92	101
5 Habits to Beat Depression	Personalized Intervention	0.0407139	92	78
	Recommender			
5 Habits to Beat Depression	Reframing Negative Thoughts	0.1522696	92	95
5 Habits to Beat Depression	Savoring Strategies	0.0836136	92	114
AI-assisted Personalized Narrative	Dialectical Behavioral Therapy Skills	-0.2347596	82	83
AI-assisted Personalized Narrative	Inner Child Healing Walk	-0.3728494	82	65
AI-assisted Personalized Narrative	Interactive Cognitive Reappraisal	-0.1265445	82	95
AI-assisted Personalized Narrative	Mindful Acceptance	0.0721029	82	80
AI-assisted Personalized Narrative	Mindful Attention Skills	-0.2164703	82	95
AI-assisted Personalized Narrative	Moral Elevation	-0.1299327	82	101
AI-assisted Personalized Narrative	Personalized Intervention	-0.0944076	82	78
	Recommender			
AI-assisted Personalized Narrative	Reframing Negative Thoughts	0.0091447	82	95
AI-assisted Personalized Narrative	Savoring Strategies	-0.0659088	82	114
Dialectical Behavioral Therapy Skills	Inner Child Healing Walk	-0.1526278	83	65
Dialectical Behavioral Therapy Skills	Interactive Cognitive Reappraisal	0.0963037	83	95
Dialectical Behavioral Therapy Skills	Mindful Acceptance	0.3075643	83	80
Dialectical Behavioral Therapy Skills	Mindful Attention Skills	-0.0008758	83	95
Dialectical Behavioral Therapy Skills	Moral Elevation	0.0883505	83	101
Dialectical Behavioral Therapy Skills	Personalized Intervention	0.1199009	83	78
	Recommender			
Dialectical Behavioral Therapy Skills	Reframing Negative Thoughts	0.2435152	83	95
Dialectical Behavioral Therapy Skills	Savoring Strategies	0.1757089	83	114

group1	group2	effsize	n1	n2
Inner Child Healing Walk	Interactive Cognitive Reappraisal	0.2342576	65	95
Inner Child Healing Walk	Mindful Acceptance	0.4423932	65	80
Inner Child Healing Walk	Mindful Attention Skills	0.1375998	65	95
Inner Child Healing Walk	Moral Elevation	0.2236571	65	101
Inner Child Healing Walk	Personalized Intervention	0.2509258	65	78
	Recommender			
Inner Child Healing Walk	Reframing Negative Thoughts	0.3809106	65	95
Inner Child Healing Walk	Savoring Strategies	0.3214380	65	114
Interactive Cognitive Reappraisal	Mindful Acceptance	0.1959091	95	80
Interactive Cognitive Reappraisal	Mindful Attention Skills	-0.0894189	95	95
Interactive Cognitive Reappraisal	Moral Elevation	-0.0055594	95	101
Interactive Cognitive Reappraisal	Personalized Intervention	0.0263915	95	78
	Recommender			
Interactive Cognitive Reappraisal	Reframing Negative Thoughts	0.1351129	95	95
Interactive Cognitive Reappraisal	Savoring Strategies	0.0668882	95	114
Mindful Acceptance	Mindful Attention Skills	-0.2841943	80	95
Mindful Acceptance	Moral Elevation	-0.1981010	80	101
Mindful Acceptance	Personalized Intervention	-0.1614124	80	78
	Recommender			
Mindful Acceptance	Reframing Negative Thoughts	-0.0628349	80	95
Mindful Acceptance	Savoring Strategies	-0.1399321	80	114
Mindful Attention Skills	Moral Elevation	0.0823374	95	101
Mindful Attention Skills	Personalized Intervention	0.1119302	95	78
	Recommender			
Mindful Attention Skills	Reframing Negative Thoughts	0.2246707	95	95
Mindful Attention Skills	Savoring Strategies	0.1609112	95	114
Moral Elevation	Personalized Intervention	0.0313022	101	78
	Recommender			
Moral Elevation	Reframing Negative Thoughts	0.1383476	101	95
Moral Elevation	Savoring Strategies	0.0714585	101	114
Personalized Intervention	Reframing Negative Thoughts	0.1027397	78	95
Recommender				
Personalized Intervention	Savoring Strategies	0.0360408	78	114
Recommender				
Reframing Negative Thoughts	Savoring Strategies	-0.0751767	95	114

```
(aha_significance_plot_wk4 <- plot_model(
  m1_aha_significance_wk4, sort.est = T, terms=acceptability_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Significance of Aha! Moment', 'At Week 4, compared to a Behavioral Activation SSI'))
```

Significance of Aha! Moment

At Week 4, compared to a Behavioral Activation SSI



```
m1_aha_howchanged <- lm(aha_howchanged~group,data=df_for_acceptability)
rstatix::cohens_d(aha_howchanged~group,data=df_for_acceptability) %>%select(-magnitude,-.y.) %>% kable()
```

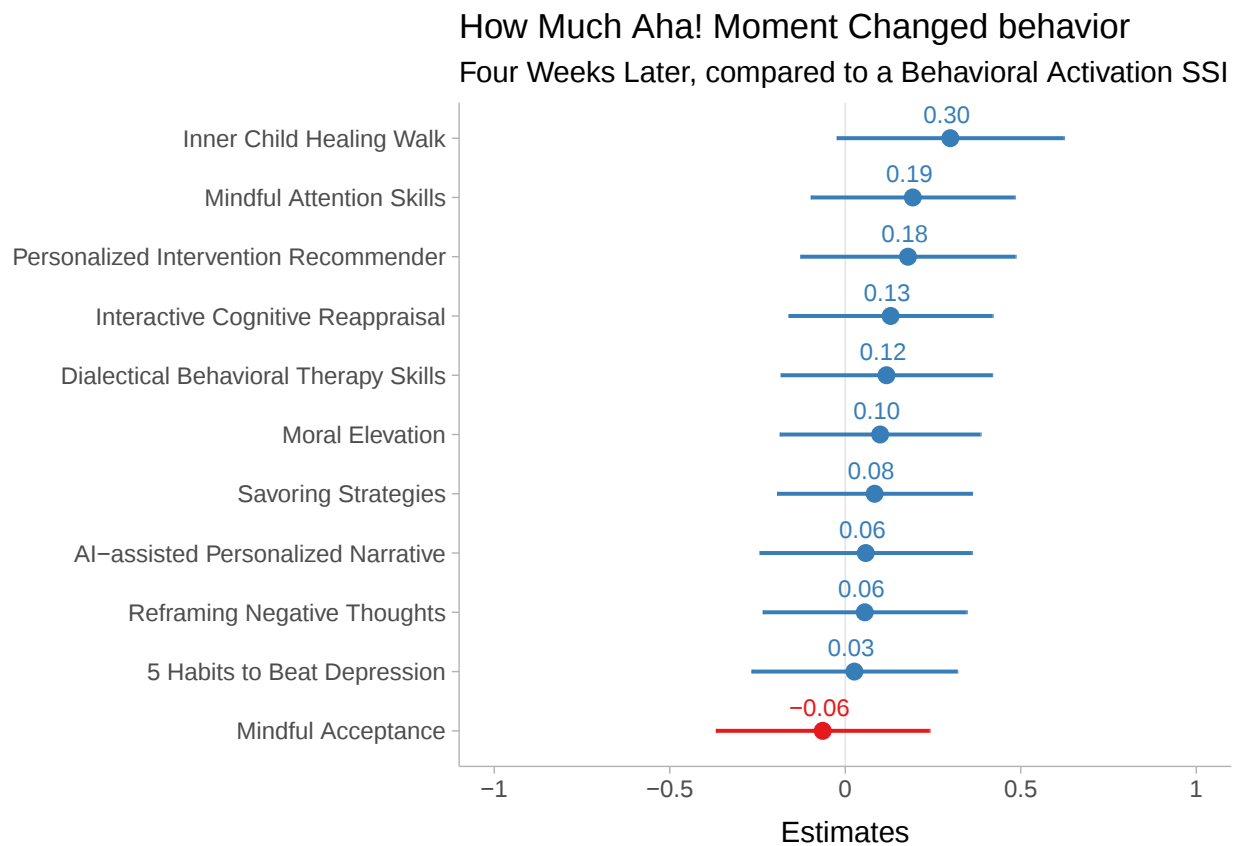
How much Aha! changed behavior at 4-week follow-up

group1	group2	effsize	n1	n2
Behavioral Activation	5 Habits to Beat Depression	-0.0261198	102	92
Behavioral Activation	AI-assisted Personalized Narrative	-0.0552170	102	82
Behavioral Activation	Dialectical Behavioral Therapy Skills	-0.1205656	102	83
Behavioral Activation	Inner Child Healing Walk	-0.3055764	102	65
Behavioral Activation	Interactive Cognitive Reappraisal	-0.1282595	102	95
Behavioral Activation	Mindful Acceptance	0.0650892	102	80
Behavioral Activation	Mindful Attention Skills	-0.1931959	102	95
Behavioral Activation	Moral Elevation	-0.0986626	102	101
Behavioral Activation	Personalized Intervention Recommender	-0.1714744	102	78
Behavioral Activation	Reframing Negative Thoughts	-0.0552827	102	95
Behavioral Activation	Savoring Strategies	-0.0860972	102	114
5 Habits to Beat Depression	AI-assisted Personalized Narrative	-0.0295482	92	82
5 Habits to Beat Depression	Dialectical Behavioral Therapy Skills	-0.0900684	92	83
5 Habits to Beat Depression	Inner Child Healing Walk	-0.2678557	92	65
5 Habits to Beat Depression	Interactive Cognitive Reappraisal	-0.0985602	92	95

group1	group2	effsize	n1	n2
5 Habits to Beat Depression	Mindful Acceptance	0.0878350	92	80
5 Habits to Beat Depression	Mindful Attention Skills	-0.1605997	92	95
5 Habits to Beat Depression	Moral Elevation	-0.0700889	92	101
5 Habits to Beat Depression	Personalized Intervention	-0.1413152	92	78
	Recommender			
5 Habits to Beat Depression	Reframing Negative Thoughts	-0.0282708	92	95
5 Habits to Beat Depression	Savoring Strategies	-0.0569030	92	114
AI-assisted Personalized Narrative	Dialectical Behavioral Therapy Skills	-0.0549469	82	83
AI-assisted Personalized Narrative	Inner Child Healing Walk	-0.2230775	82	65
AI-assisted Personalized Narrative	Interactive Cognitive Reappraisal	-0.0641016	82	95
AI-assisted Personalized Narrative	Mindful Acceptance	0.1128017	82	80
AI-assisted Personalized Narrative	Mindful Attention Skills	-0.1224136	82	95
AI-assisted Personalized Narrative	Moral Elevation	-0.0371349	82	101
AI-assisted Personalized Narrative	Personalized Intervention	-0.1058465	82	78
	Recommender			
AI-assisted Personalized Narrative	Reframing Negative Thoughts	0.0025612	82	95
AI-assisted Personalized Narrative	Savoring Strategies	-0.0235439	82	114
Dialectical Behavioral Therapy Skills	Inner Child Healing Walk	-0.1820163	83	65
Dialectical Behavioral Therapy Skills	Interactive Cognitive Reappraisal	-0.0114894	83	95
Dialectical Behavioral Therapy Skills	Mindful Acceptance	0.1805150	83	80
Dialectical Behavioral Therapy Skills	Mindful Attention Skills	-0.0738381	83	95
Dialectical Behavioral Therapy Skills	Moral Elevation	0.0175453	83	101
Dialectical Behavioral Therapy Skills	Personalized Intervention	-0.0578031	83	78
	Recommender			
Dialectical Behavioral Therapy Skills	Reframing Negative Thoughts	0.0604656	83	95
Dialectical Behavioral Therapy Skills	Savoring Strategies	0.0341341	83	114
Inner Child Healing Walk	Interactive Cognitive Reappraisal	0.1648115	65	95
Inner Child Healing Walk	Mindful Acceptance	0.3593529	65	80
Inner Child Healing Walk	Mindful Attention Skills	0.1047538	65	95
Inner Child Healing Walk	Moral Elevation	0.1936872	65	101
Inner Child Healing Walk	Personalized Intervention	0.1130636	65	78
	Recommender			
Inner Child Healing Walk	Reframing Negative Thoughts	0.2369162	65	95
Inner Child Healing Walk	Savoring Strategies	0.2164902	65	114
Interactive Cognitive Reappraisal	Mindful Acceptance	0.1862225	95	80
Interactive Cognitive Reappraisal	Mindful Attention Skills	-0.0603047	95	95
Interactive Cognitive Reappraisal	Moral Elevation	0.0281597	95	101
Interactive Cognitive Reappraisal	Personalized Intervention	-0.0453654	95	78
	Recommender			
Interactive Cognitive Reappraisal	Reframing Negative Thoughts	0.0698088	95	95
Interactive Cognitive Reappraisal	Savoring Strategies	0.0445550	95	114
Mindful Acceptance	Mindful Attention Skills	-0.2497539	80	95
Mindful Acceptance	Moral Elevation	-0.1575128	80	101
Mindful Acceptance	Personalized Intervention	-0.2265060	80	78
	Recommender			
Mindful Acceptance	Reframing Negative Thoughts	-0.1156111	80	95
Mindful Acceptance	Savoring Strategies	-0.1473188	80	114
Mindful Attention Skills	Moral Elevation	0.0887588	95	101
Mindful Attention Skills	Personalized Intervention	0.0126092	95	78
	Recommender			
Mindful Attention Skills	Reframing Negative Thoughts	0.1310286	95	95
Mindful Attention Skills	Savoring Strategies	0.1074531	95	114

group1	group2	effsize	n1	n2
Moral Elevation	Personalized Intervention Recommender	-0.0726626	101	78
Moral Elevation	Reframing Negative Thoughts	0.0415663	101	95
Moral Elevation	Savoring Strategies	0.0154387	101	114
Personalized Intervention Recommender	Reframing Negative Thoughts	0.1131499	78	95
Personalized Intervention Recommender	Savoring Strategies	0.0899104	78	114
Reframing Negative Thoughts	Savoring Strategies	-0.0274994	95	114

```
(aha_howchanged_plot <- plot_model(
  m1_aha_howchanged, sort.est = T, terms=acceptability_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('How Much Aha! Moment Changed behavior', 'Four Weeks Later, compared to a Behavioral Activation SSI'))
```



H5: Expecting one can improve one's depression more at baseline will be associated with different change

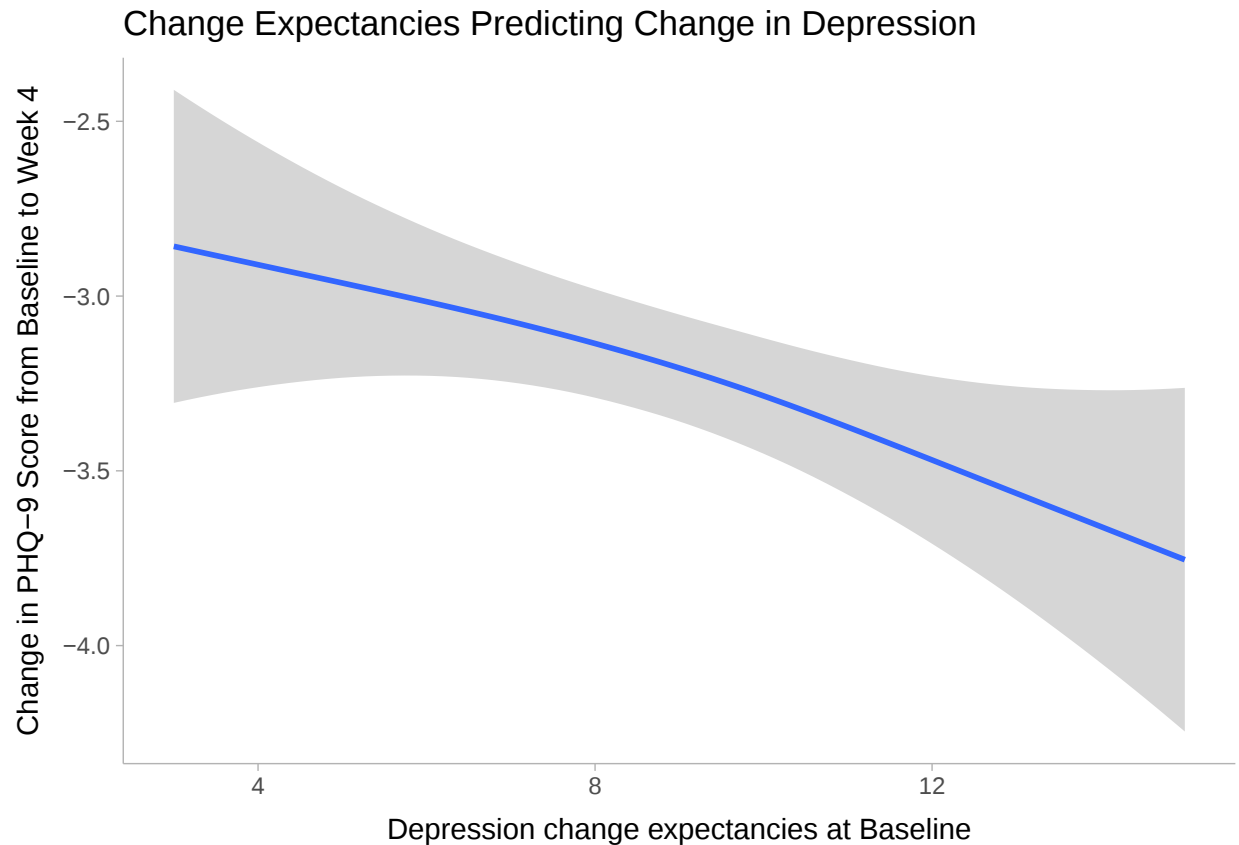
- A linear mixed-effects regression model with depressive symptoms as the DV, timepoint, baseline depression expectancies, and the interaction between the two as predictors, and a participant identifier

nested in experimental condition as a random intercept.

```
m1_expect_on_phq9 <- lmer(
  phq9_score ~ time * dep_expect_bl + (1|group/pid),
  data=mega_alltimes)
summary(m1_expect_on_phq9)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: phq9_score ~ time * dep_expect_bl + (1 | group/pid)
## Data: mega_alltimes
##
## REML criterion at convergence: 80492.5
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -3.5706 -0.5430 -0.0381  0.5324  3.2486
##
## Random effects:
## Groups      Name      Variance Std.Dev.
## pid:group (Intercept) 10.55     3.248
## group      (Intercept)  0.00     0.000
## Residual                    14.62     3.824
## Number of obs: 13462, groups: pid:group, 7505; group, 13
##
## Fixed effects:
##              Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)      2.040e+01  2.283e-01 1.172e+04  89.361 < 2e-16 ***
## timeWeek 4       -2.552e+00  2.651e-01  6.689e+03  -9.628 < 2e-16 ***
## dep_expect_bl     -5.670e-01  2.525e-02 1.172e+04 -22.457 < 2e-16 ***
## timeWeek 4:dep_expect_bl -8.376e-02  2.939e-02  6.707e+03  -2.850  0.00439 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) timWk4 dp_xp_
## timeWeek 4   -0.500
## dep_xpct_bl  -0.967  0.484
## tmW4:dp_xp_   0.483 -0.967 -0.499
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
mega_alltimes %>% select(pid,time,dep_expect_bl,phq9_score) %>%
  pivot_wider(names_from=time,values_from = phq9_score,names_prefix='phq9_score_') %>%
  mutate(phq9_change=`phq9_score_Week 4`-phq9_score_Baseline) %>%
  ggplot(aes(x=dep_expect_bl,y=phq9_change))+geom_smooth()+
  xlab('Depression change expectancies at Baseline')+
  ylab('Change in PHQ-9 Score from Baseline to Week 4')+
  ggtitle('Change Expectancies Predicting Change in Depression')
```



H6: The active SSIs will be better than the Passive SSI on average for all mental health outcomes

- Re-run the main analysis with experimental condition re-coded into a two-level factor in which any of the 12 active SSIs are coded as “active.” The random intercept, participant ID is nested within experimental condition.

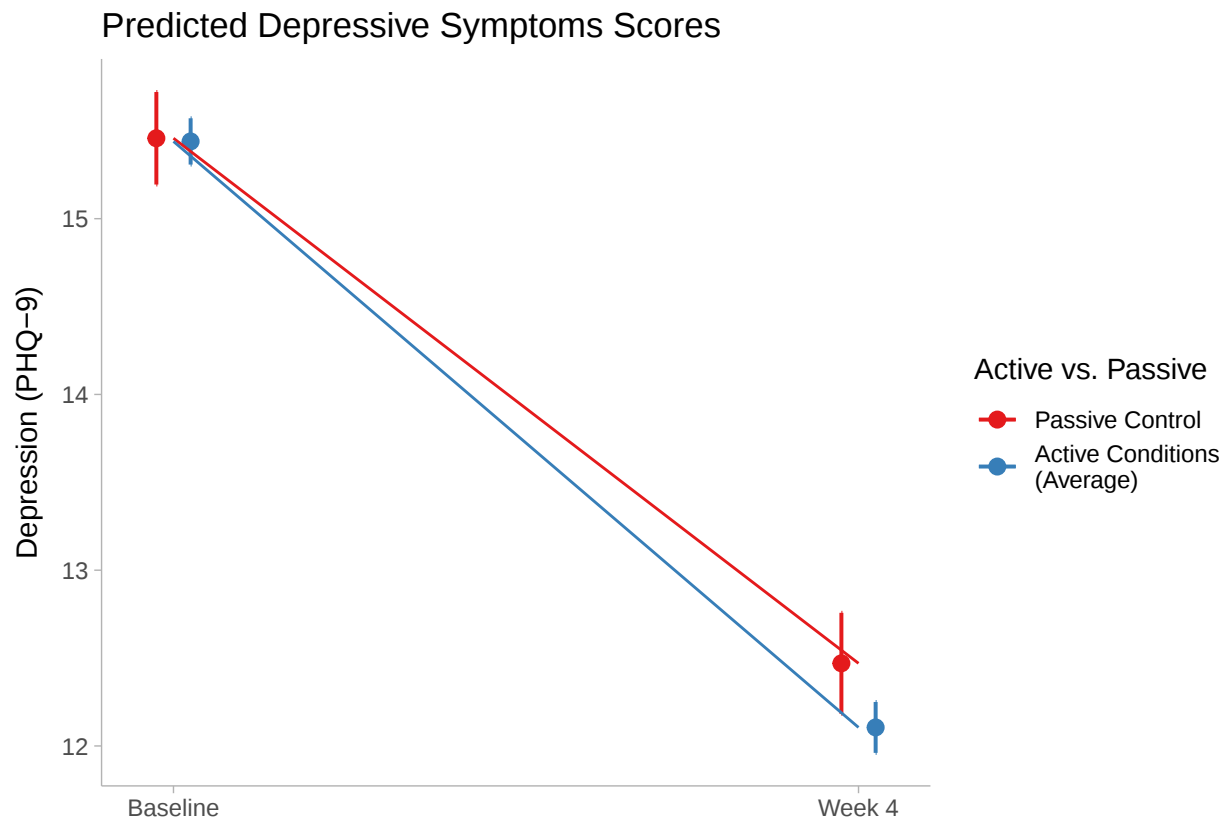
```
mega_alltimes <- mega_alltimes %>% mutate(passive_vs_all=ifelse(
  group=='Passive Control','Passive Control','Active Conditions\n(Average)')%>% factor %>% fct_rev())
m1_phq9_all_vs_passive <- lmer(phq9_score ~ time * passive_vs_all + (1|group/pid),data=mega_alltimes)
add_cohens_d(m1_phq9_all_vs_passive,'Predicting: change in depressive symptoms')
```

Depression

Table 34: Predicting: change in depressive symptoms

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	15.457	0.00e+00	NA	NA	NA
timeWeek 4	-2.987	3.28e-84	-0.57	-0.63	-0.52
passive_vs_allActive Conditions (Average)	-0.018	0.904	0.00	-0.06	0.05
timeWeek 4:passive_vs_allActive Conditions (Average)	-0.347	0.041	-0.07	-0.13	0.00
sd__(Intercept)	3.530	NA	NA	NA	NA
sd__(Intercept)	0.000	NA	NA	NA	NA
sd__Observation	3.825	NA	NA	NA	NA

```
(liness <- plot_model(m1_phq9_all_vs_passive,type='pred',terms=c('time','passive_vs_all'),ci.lvl = .95)+
  geom_line()+ggtitle('Predicted Depressive Symptoms Scores')+
  xlab(element_blank())+
  ylab('Depression (PHQ-9)')+
  guides(color=guide_legend(title="Active vs. Passive")))
```

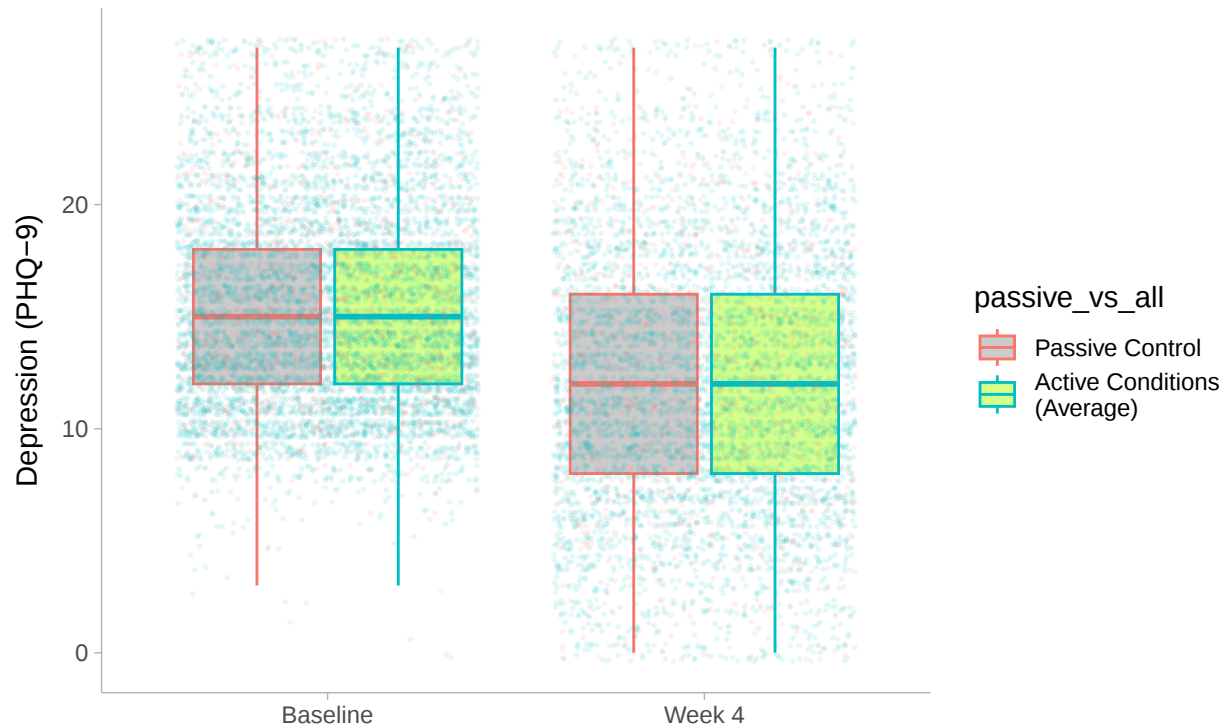


```
#ggsave("phq9_changeplot_lines.png",last_plot(),height=6,width=6)

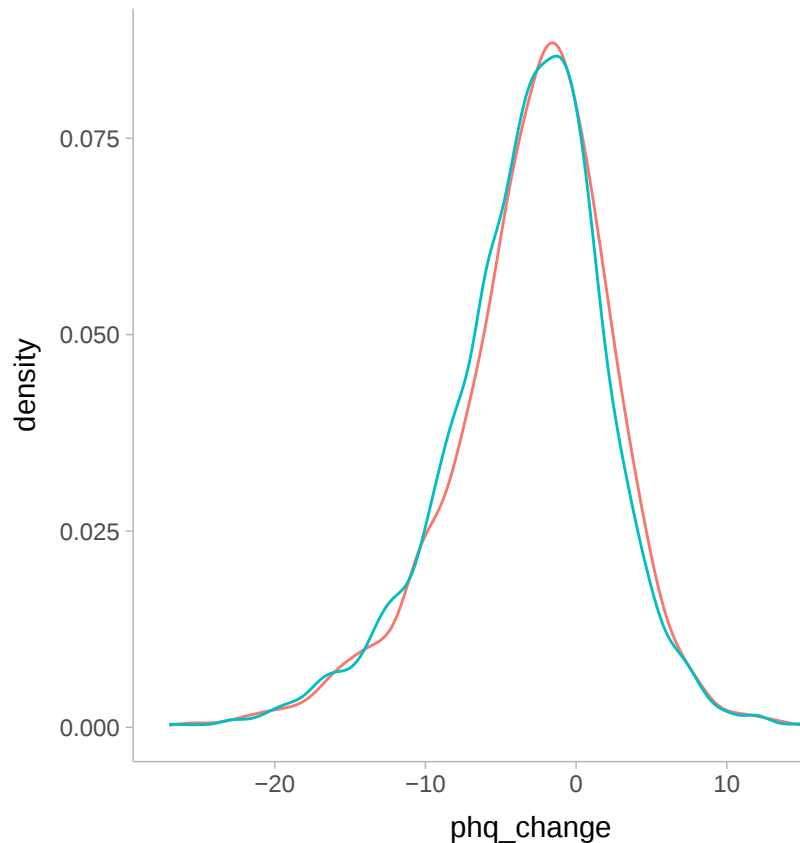
mega_alltimes %>% filter(time!='Post-test') %>%
  mutate(time=fct_drop(time)) %>%
```

```
ggplot(aes(x=time,y=phq9_score,fill=passive_vs_all, col=passive_vs_all))+
  geom_boxplot(alpha=0.8,outlier.shape = NA)+
  geom_jitter(alpha=0.1,size=.3)+
  ylab('Depression (PHQ-9)')+ xlab(element_blank())+
  ggtitle('Depression Score by Time and Condition',
          'Passive Control vs All Active Conditions Averaged')+
  scale_fill_manual(values = c("grey", 'darkolivegreen1'))
```

Depression Score by Time and Condition
Passive Control vs All Active Conditions Averaged



```
mega_alltimes %>% select(pid,phq9_score,time,passive_vs_all) %>%
  pivot_wider(names_from='time',values_from = 'phq9_score') %>%
  mutate(phq_change=`Week 4`-Baseline) %>% ggplot(aes(x=phq_change,color=passive_vs_all))+geom_densit
```



Distributions of change in depression over time

```
##### drop in phq over 5 points
mega_alltimes %>% select(pid,time,dep_expect_b1,phq9_score,group) %>%
  pivot_wider(names_from=time,values_from = phq9_score,names_prefix='phq9_score_') %>%
  mutate(phq_change=`phq9_score_Week 4`-phq9_score_Baseline) %>% group_by(group)%>%
  count(!is.na(phq_change)&phq_change<=-5,name='count_downby5') %>%
  mutate(pct_phq_went_down_5=count_downby5/sum(count_downby5)) %>%
  filter(`!is.na(phq_change) & phq_change <= -5`=='TRUE')
```

```
## # A tibble: 13 x 4
## # Groups:   group [13]
##   group                                !is.na(phq_change) &~1 count_downby5 pct_phq_went_down_5
##   <fct>                                <lgl>                                <int>          <dbl>
## 1 Passive Control                      TRUE                                391           0.260
## 2 5 Habits to Beat De~                 TRUE                                133           0.271
## 3 AI-assisted Persona~                 TRUE                                130           0.262
## 4 Behavioral Activati~                 TRUE                                158           0.317
## 5 Dialectical Behavio~                 TRUE                                152           0.305
## 6 Inner Child Healing~                 TRUE                                139           0.275
## 7 Interactive Cogniti~                 TRUE                                137           0.273
## 8 Mindful Acceptance                   TRUE                                150           0.3
## 9 Mindful Attention S~                 TRUE                                151           0.301
## 10 Moral Elevation                     TRUE                                148           0.298
## 11 Personalized Interv~                 TRUE                                139           0.275
## 12 Reframing Negative ~                 TRUE                                130           0.258
## 13 Savoring Strategies                 TRUE                                153           0.305
## # i abbreviated name: 1: `!is.na(phq_change) & phq_change <= -5`
```

```
##### rise in phq over 5 points
mega_alltimes %>% select(pid,time,phq9_score,group) %>%
  pivot_wider(names_from=time,values_from = phq9_score,names_prefix='phq9_score_') %>%
  mutate(phq_change=`phq9_score_Week 4`-phq9_score_Baseline) %>% group_by(group)%>%
  count(!is.na(phq_change)&phq_change>=5,name='count_upby5') %>%
  mutate(pct_phq_went_up_5=count_upby5/sum(count_upby5)) %>%
  filter(`!is.na(phq_change) & phq_change >= 5`=='TRUE')
```

```
## # A tibble: 13 x 4
## # Groups:   group [13]
##   group                                !is.na(phq_change) &~1 count_upby5 pct_phq_went_up_5
##   <fct>                                <lgl>                                <int>          <dbl>
## 1 Passive Control                      TRUE                                67            0.0445
## 2 5 Habits to Beat Depres~ TRUE                                22            0.0448
## 3 AI-assisted Personalize~ TRUE                                14            0.0282
## 4 Behavioral Activation                 TRUE                                27            0.0541
## 5 Dialectical Behavioral ~ TRUE                                21            0.0422
## 6 Inner Child Healing Walk             TRUE                                25            0.0495
## 7 Interactive Cognitive R~ TRUE                                21            0.0418
## 8 Mindful Acceptance                   TRUE                                19            0.038
## 9 Mindful Attention Skills             TRUE                                16            0.0319
## 10 Moral Elevation                     TRUE                                19            0.0383
## 11 Personalized Interventi~ TRUE                                26            0.0514
## 12 Reframing Negative Thou~ TRUE                                23            0.0456
## 13 Savoring Strategies                 TRUE                                22            0.0438
## # i abbreviated name: 1: `!is.na(phq_change) & phq_change >= 5`
```

It kinda looks like most of the difference is around the mean. Fewer people got a little worse, and more people got a little better. But it's slight!

```
m1_agency_all_vs_passive <- lmer(agency_score ~ time * passive_vs_all + (1|group/pid),data=mega_alltimes)
add_cohens_d(m1_agency_all_vs_passive,'Predicting: change in agency')
```

Agency

Table 35: Predicting: change in agency

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	14.521	4.48e-09	NA	NA	NA
timePost-test	0.153	0.096	0.03	-0.01	0.07
timeWeek 4	1.243	2.48e-36	0.27	0.23	0.31
passive_vs_allActive Conditions (Average)	-0.111	0.649	-0.02	-0.15	0.10
timePost-test:passive_vs_allActive Conditions (Average)	0.951	2.08e-20	0.21	0.16	0.25
timeWeek 4:passive_vs_allActive Conditions					

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Average)	0.359	0.001	0.08	0.03	0.13
sd__(Intercept)	3.847	NA	NA	NA	NA
sd__(Intercept)	0.182	NA	NA	NA	NA
sd__Observation	2.490	NA	NA	NA	NA

```
#Change in average SS effect on Agency from post-test to week 4
mixed_cohens_d(m1_agency_all_vs_passive) %>%
  filter(str_detect(term, 'Week 4:')) %>% pull(cohens_d) /
mixed_cohens_d(m1_agency_all_vs_passive) %>%
  filter(str_detect(term, 'Post-test:')) %>% pull(cohens_d)
```

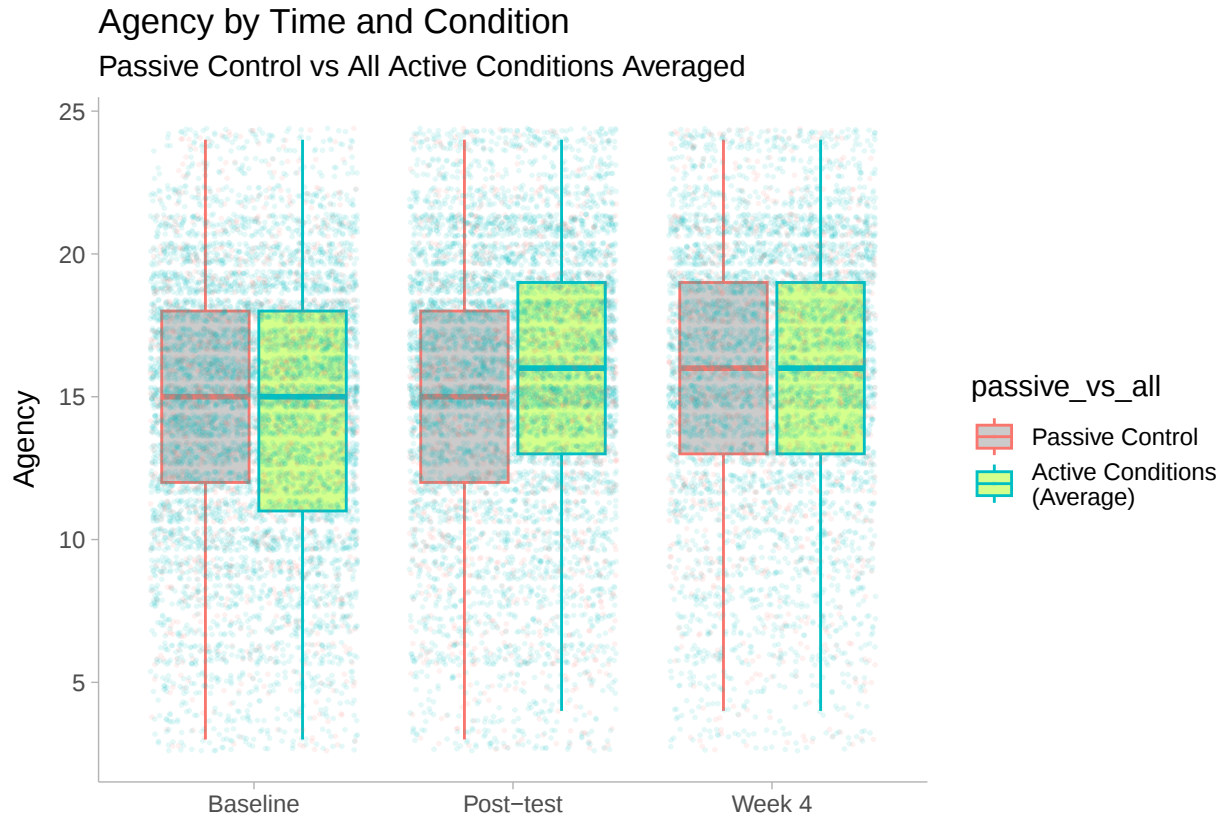
```
## [1] 0.3809524
```

```
(liness_agency <- plot_model(m1_agency_all_vs_passive, type='pred', terms=c('time', 'passive_vs_all'), ci.l=
  geom_line()+ggtitle('Predicted Agency Scores')+
  xlab(element_blank())+
  ylab('Agency')+
  guides(color=guide_legend(title="Active vs. Passive")))
```



```
mega_alltimes %>%
  ggplot(aes(x=time, y=agency_score, fill=passive_vs_all, col=passive_vs_all))+
  geom_boxplot(alpha=0.8, outlier.shape = NA)+
```

```
geom_jitter(alpha=0.1,size=.3)+
ylab('Agency')+ xlab(element_blank())+
ggtitle('Agency by Time and Condition',
        'Passive Control vs All Active Conditions Averaged')+
scale_fill_manual(values = c("grey","darkolivegreen1"))
```



```
m1_hopeless_all_vs_passive <- lmer(hopeless_score ~ time * passive_vs_all + (1|group/pid),data=mega_all)
add_cohens_d(m1_hopeless_all_vs_passive,'Predicting: change in hopelessness')
```

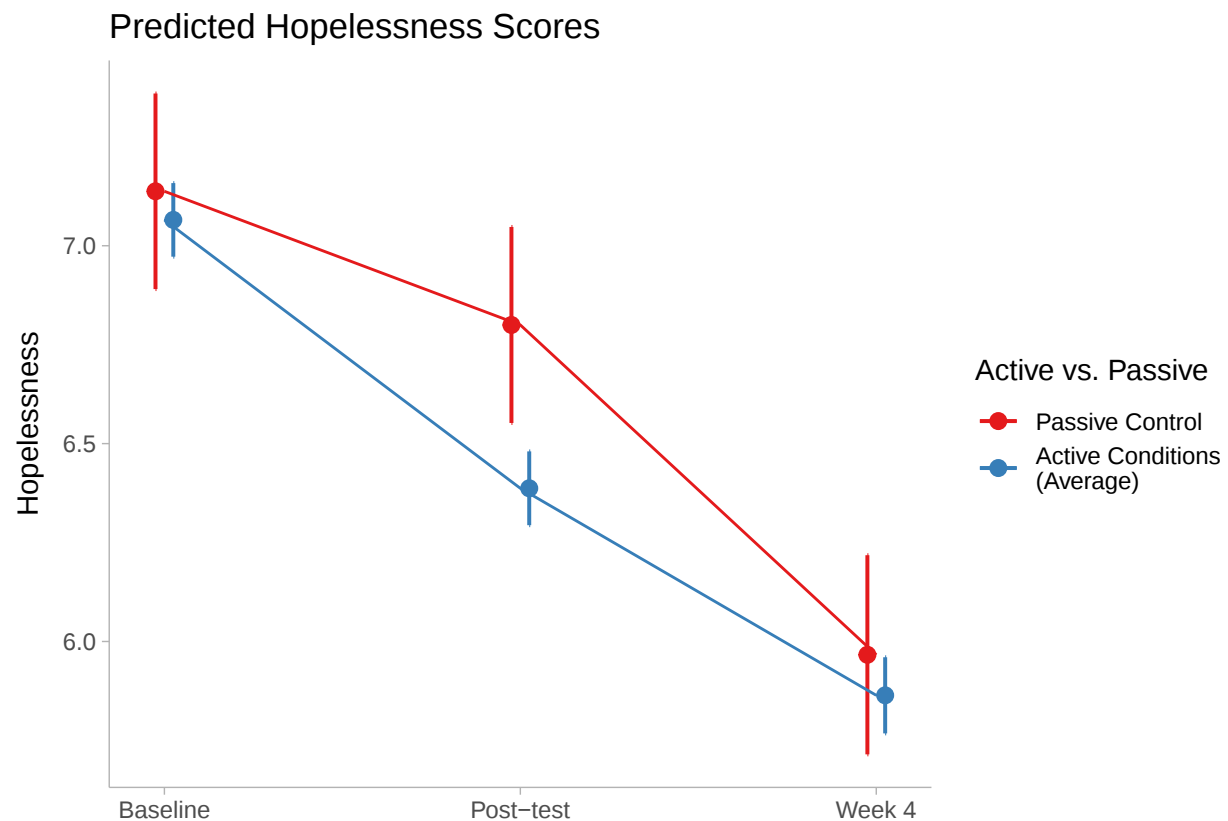
Hopelessness

Table 36: Predicting: change in hopelessness

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	7.138	4.22e-08	NA	NA	NA
timePost-test	-0.338	1.06e-08	-0.12	-0.16	-0.08
timeWeek 4	-1.171	1.11e-75	-0.41	-0.45	-0.36
passive_vs_allActive Conditions					

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Average)	-0.072	0.613	-0.03	-0.14	0.09
timePost-test:passive_vs_allActive Conditions (Average)	-0.340	2.47e-07	-0.12	-0.16	-0.07
timeWeek 4:passive_vs_allActive Conditions (Average)	-0.030	0.670	-0.01	-0.06	0.04
sd__(Intercept)	2.398	NA	NA	NA	NA
sd__(Intercept)	0.102	NA	NA	NA	NA
sd__Observation	1.601	NA	NA	NA	NA

```
(liness_hopelessness <- plot_model(m1_hopeless_all_vs_passive,type='pred',terms=c('time','passive_vs_all'),
  geom_line()+ggtitle('Predicted Hopelessness Scores')+
  xlab(element_blank())+
  ylab('Hopelessness')+
  guides(color=guide_legend(title="Active vs. Passive")))
```

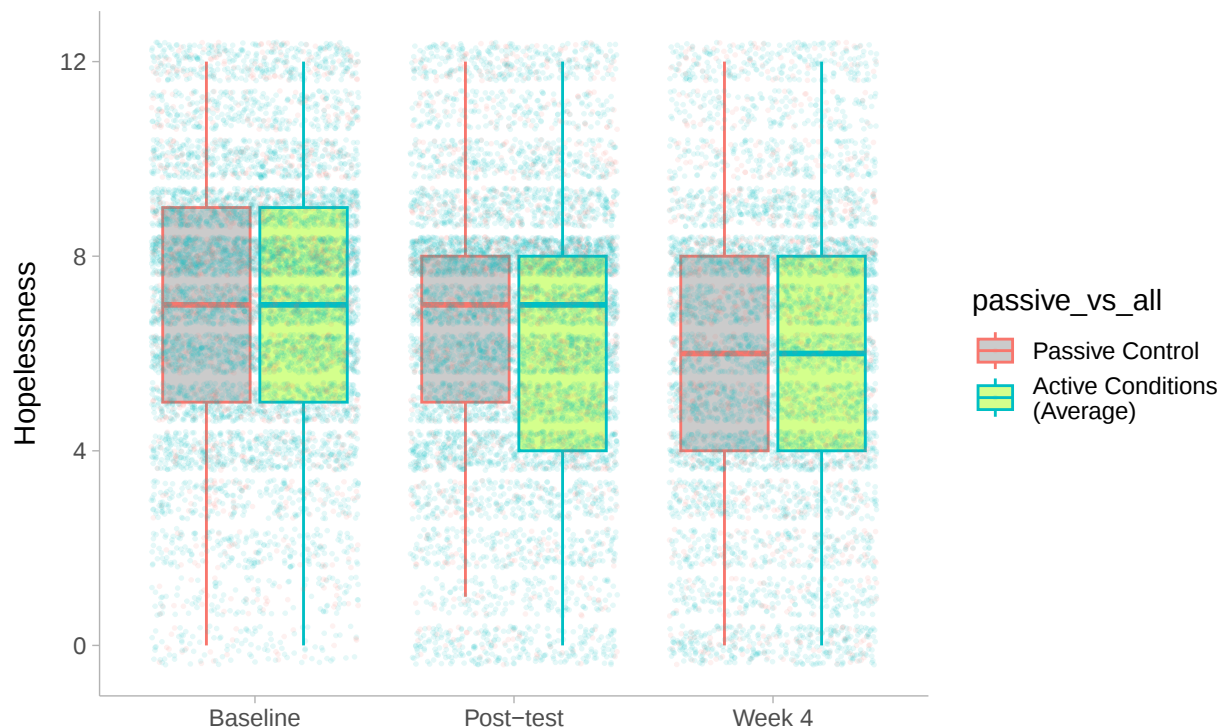


```
mega_alltimes %>%
  ggplot(aes(x=time,y=hopeless_score,fill=passive_vs_all, col=passive_vs_all))+
  geom_boxplot(alpha=0.8,outlier.shape = NA)+
  geom_jitter(alpha=0.1,size=.3)+
  ylab('Hopelessness')+ xlab(element_blank())+
  ggtitle('Hopelessness by Time and Condition',
```

```
'Passive Control vs All Active Conditions Averaged') +
scale_fill_manual(values = c("grey", 'darkolivegreen1'))
```

Hopelessness by Time and Condition

Passive Control vs All Active Conditions Averaged



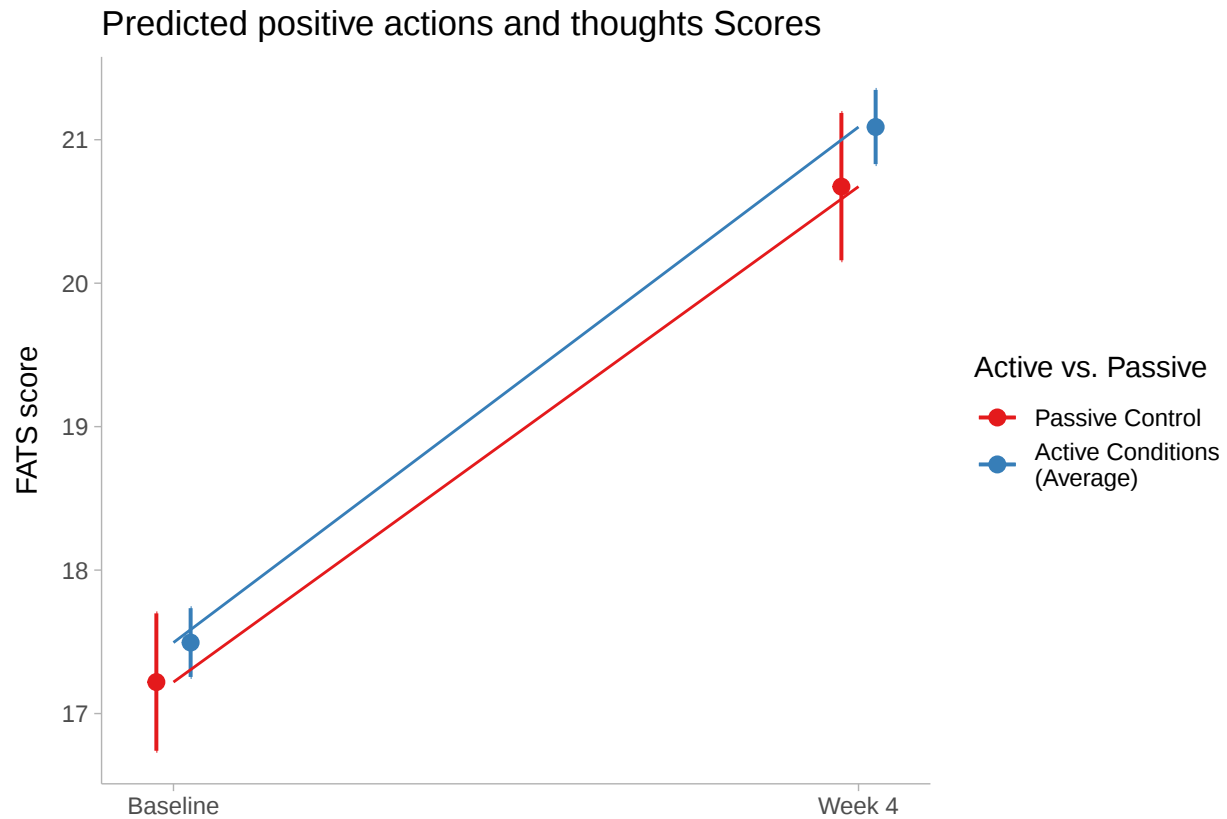
```
m1_fats_all_vs_passive <- lmer(fats_score ~ time * passive_vs_all + (1|group/pid), data=mega_alltimes)
add_cohens_d(m1_fats_all_vs_passive, 'Predicting: change in actions and thoughts')
```

Frequency of Actions and Thoughts Scale

Table 37: Predicting: change in actions and thoughts

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	17.219	0.00e+00	NA	NA	NA
timeWeek 4	3.454	4.85e-49	0.36	0.32	0.41
passive_vs_allActive Conditions (Average)	0.276	0.313	0.03	-0.03	0.09
timeWeek 4:passive_vs_allActive Conditions (Average)	0.140	0.591	0.01	-0.04	0.07
sd__(Intercept)	7.469	NA	NA	NA	NA
sd__(Intercept)	0.000	NA	NA	NA	NA
sd__Observation	5.829	NA	NA	NA	NA

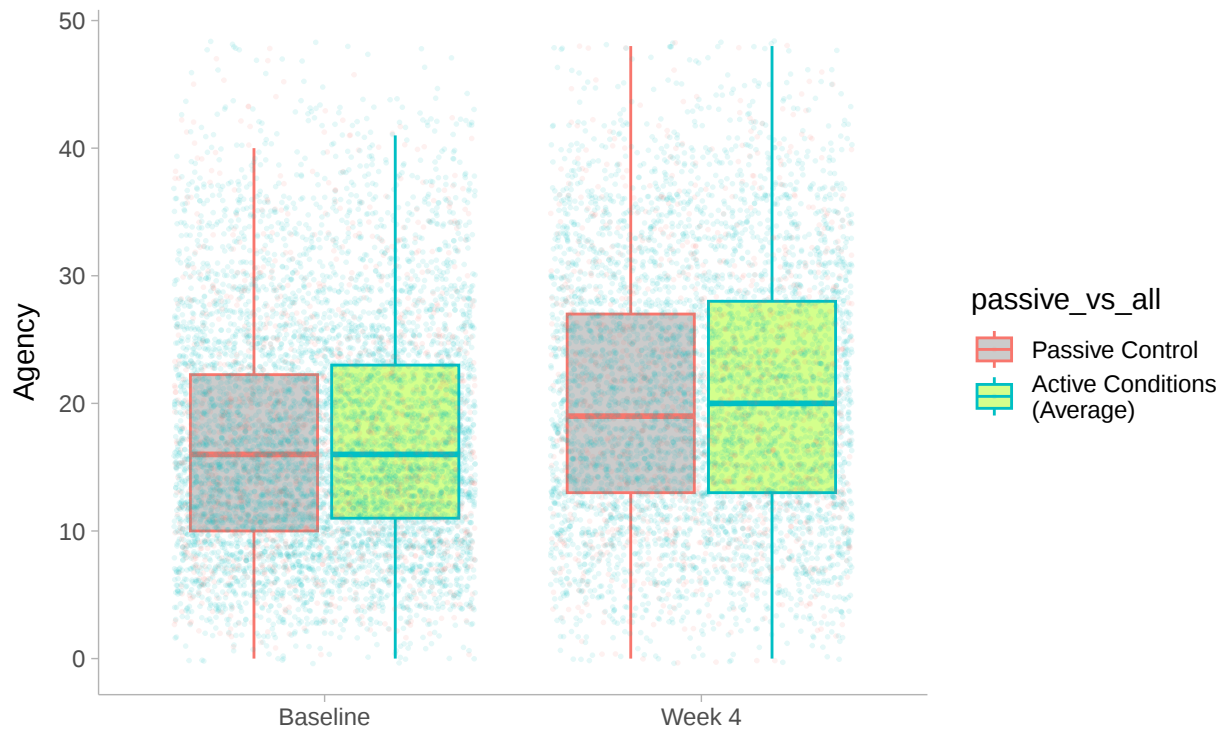
```
(liness_fats <- plot_model(m1_fats_all_vs_passive,type='pred',terms=c('time','passive_vs_all'),ci.lvl =
  geom_line()+ggtitle('Predicted positive actions and thoughts Scores')+
  xlab(element_blank())+
  ylab('FATS score')+
  guides(color=guide_legend(title="Active vs. Passive")))
```



```
mega_alltimes %>% filter(time!='Post-test') %>%
  mutate(time=fct_drop(time)) %>%
  ggplot(aes(x=time,y=fats_score,fill=passive_vs_all, col=passive_vs_all))+
  geom_boxplot(alpha=0.8,outlier.shape = NA)+
  geom_jitter(alpha=0.1,size=.3)+
  ylab('Agency')+ xlab(element_blank())+
  ggtitle('Positive Actions and Thinking by Time and Condition',
    'Passive Control vs All Active Conditions Averaged')+
  scale_fill_manual(values = c("grey",'darkolivegreen1'))
```

Positive Actions and Thinking by Time and Condition

Passive Control vs All Active Conditions Averaged



```
m1_dep_expect_all_vs_passive <- lmer(dep_expectancies_score ~ time * passive_vs_all + (1|group/pid), data = data,
add_cohens_d(m1_dep_expect_all_vs_passive, 'Predicting: change in depression change expectancies')
```

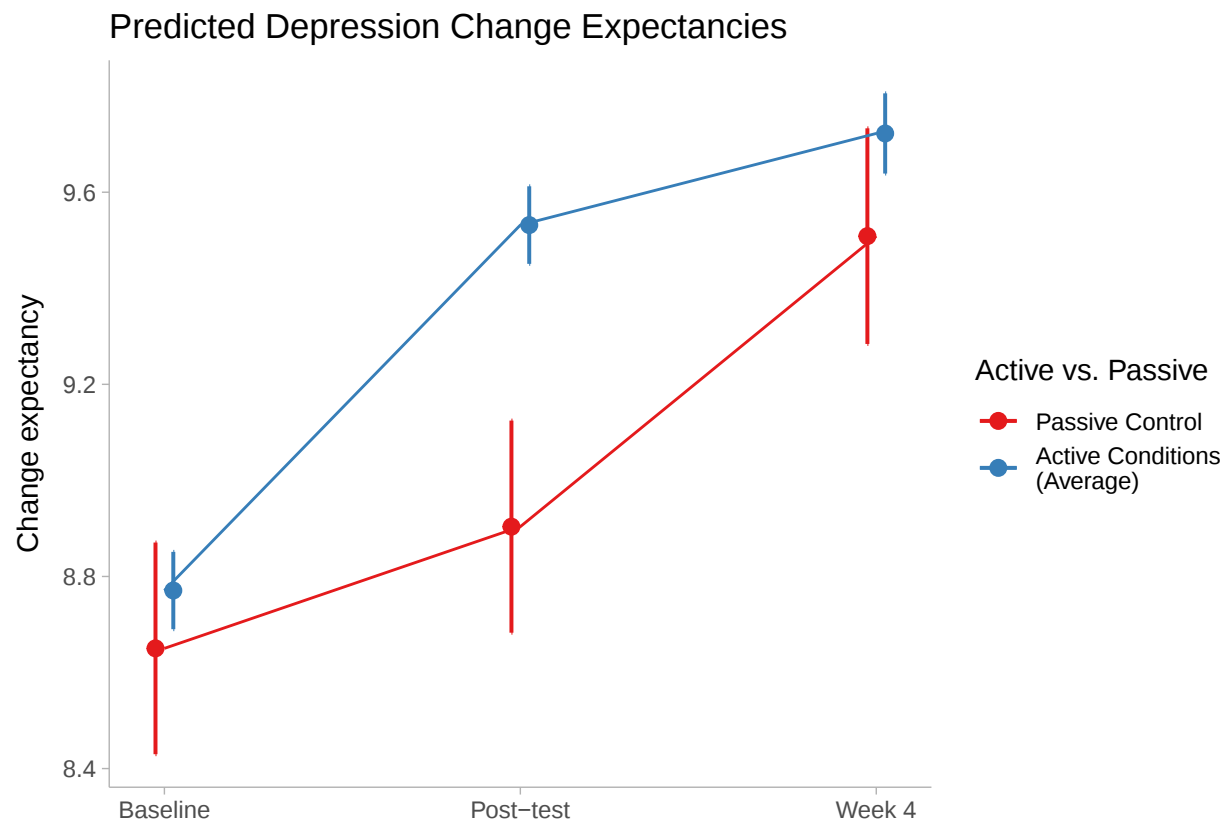
Depression Change Expectancies

Table 38: Predicting: change in depression change expectancies

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	8.650	8.23e-10	NA	NA	NA
timePost-test	0.253	2.07e-06	0.11	0.06	0.15
timeWeek 4	0.858	1.81e-50	0.36	0.31	0.41
passive_vs_allActive Conditions (Average)	0.120	0.352	0.05	-0.07	0.17
timePost-test:passive_vs_allActive Conditions (Average)	0.507	1.97e-17	0.21	0.16	0.26
timeWeek 4:passive_vs_allActive Conditions (Average)	0.093	0.145	0.04	-0.01	0.09
sd__(Intercept)	1.895	NA	NA	NA	NA

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
sd__(Intercept)	0.094	NA	NA	NA	NA
sd__Observation	1.450	NA	NA	NA	NA

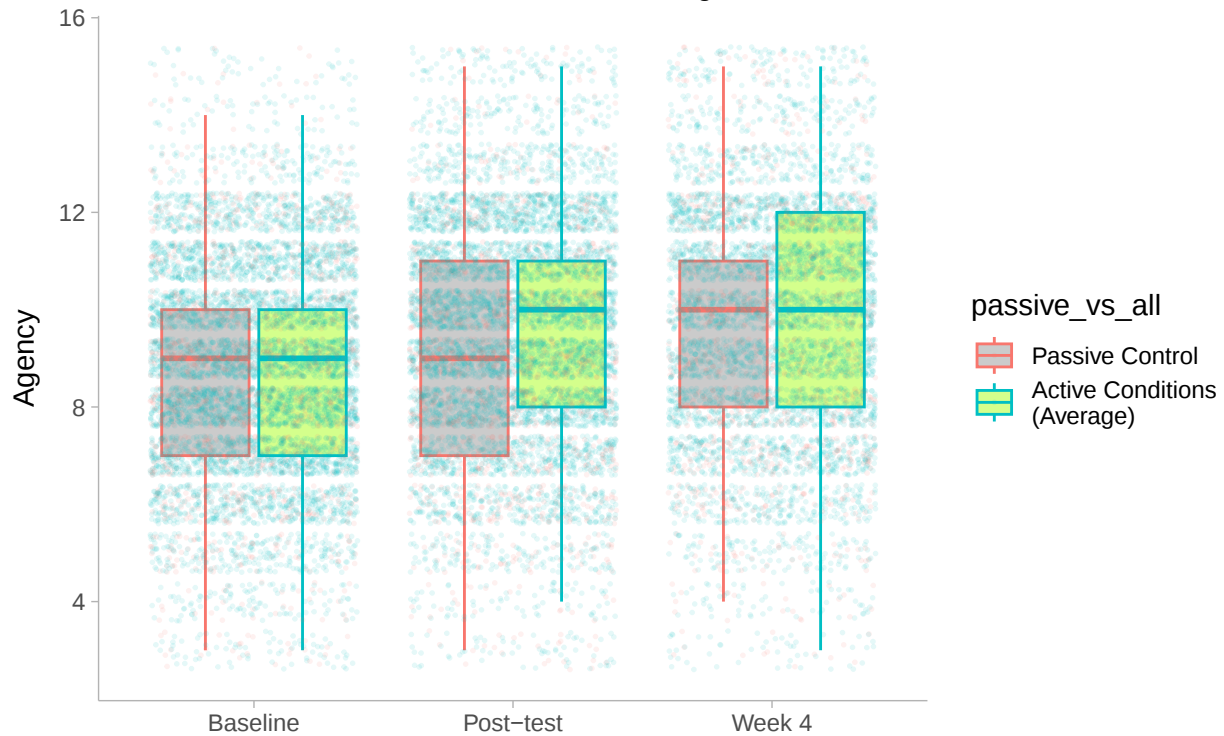
```
(liness_change_expectancies <- plot_model(m1_dep_expect_all_vs_passive,type='pred',terms=c('time','passive'),
  geom_line()+ggtitle('Predicted Depression Change Expectancies')+
  xlab(element_blank())+
  ylab('Change expectancy')+
  guides(color=guide_legend(title="Active vs. Passive")))
```



```
mega_alltimes %>%
  ggplot(aes(x=time,y=dep_expectancies_score,fill=passive_vs_all, col=passive_vs_all))+
  geom_boxplot(alpha=0.8,outlier.shape = NA)+
  geom_jitter(alpha=0.1,size=.3)+
  ylab('Agency')+ xlab(element_blank())+
  ggtitle('Depression Change Expectancies by Time and Condition',
    'Passive Control vs All Active Conditions Averaged')+
  scale_fill_manual(values = c("grey",'darkolivegreen1'))
```

Depression Change Expectancies by Time and Condition

Passive Control vs All Active Conditions Averaged



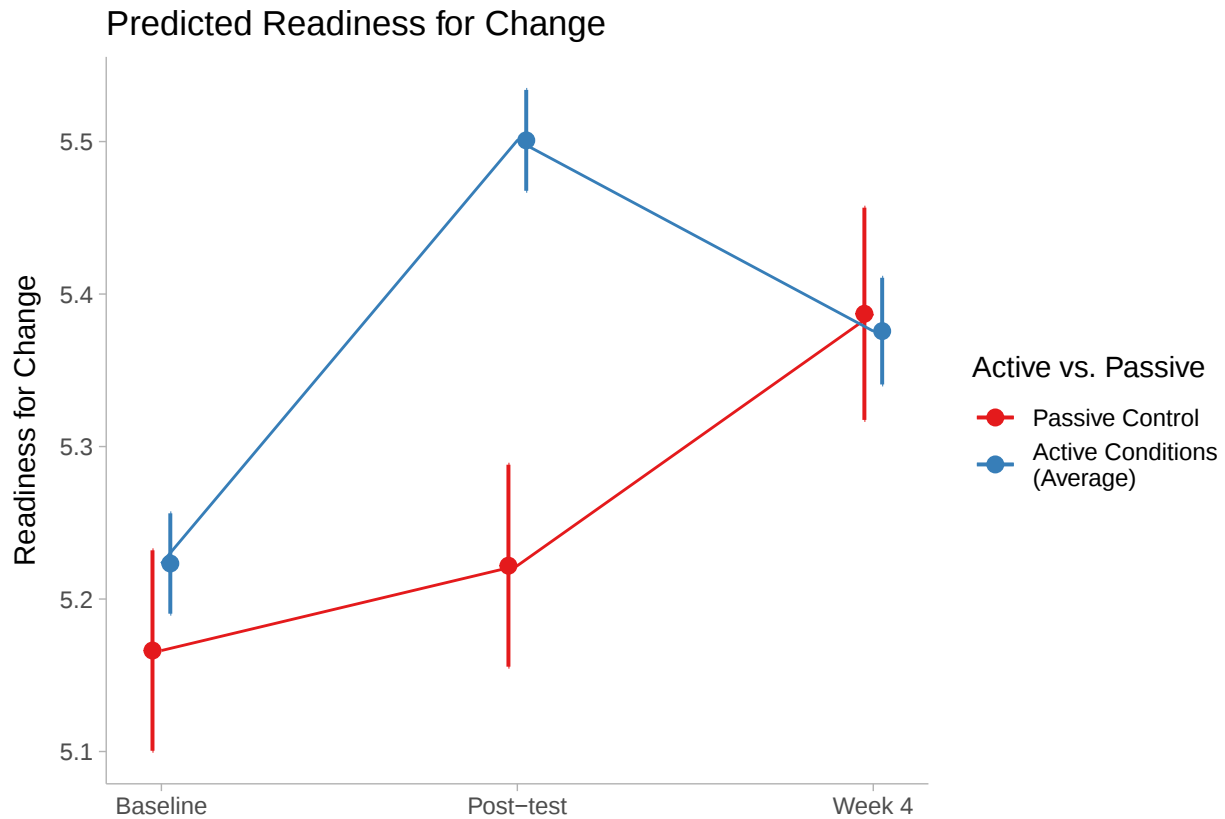
```
m1_readiness_all_vs_passive <- lmer(readiness_score ~ time * passive_vs_all + (1|group/pid), data=mega_a,
add_cohens_d(m1_readiness_all_vs_passive, 'Predicting: change in readiness for change')
```

Readiness for change

Table 39: Predicting: change in readiness for change

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	5.166	0.00e+00	NA	NA	NA
timePost-test	0.056	0.050	0.04	0.00	0.09
timeWeek 4	0.221	4.22e-13	0.17	0.12	0.22
passive_vs_allActive Conditions (Average)	0.057	0.128	0.04	-0.01	0.10
timePost-test:passive_vs_allActive Conditions (Average)	0.222	2.98e-12	0.17	0.12	0.22
timeWeek 4:passive_vs_allActive Conditions (Average)	-0.068	0.045	-0.05	-0.10	0.00
sd__(Intercept)	1.047	NA	NA	NA	NA
sd__(Intercept)	0.000	NA	NA	NA	NA
sd__Observation	0.771	NA	NA	NA	NA

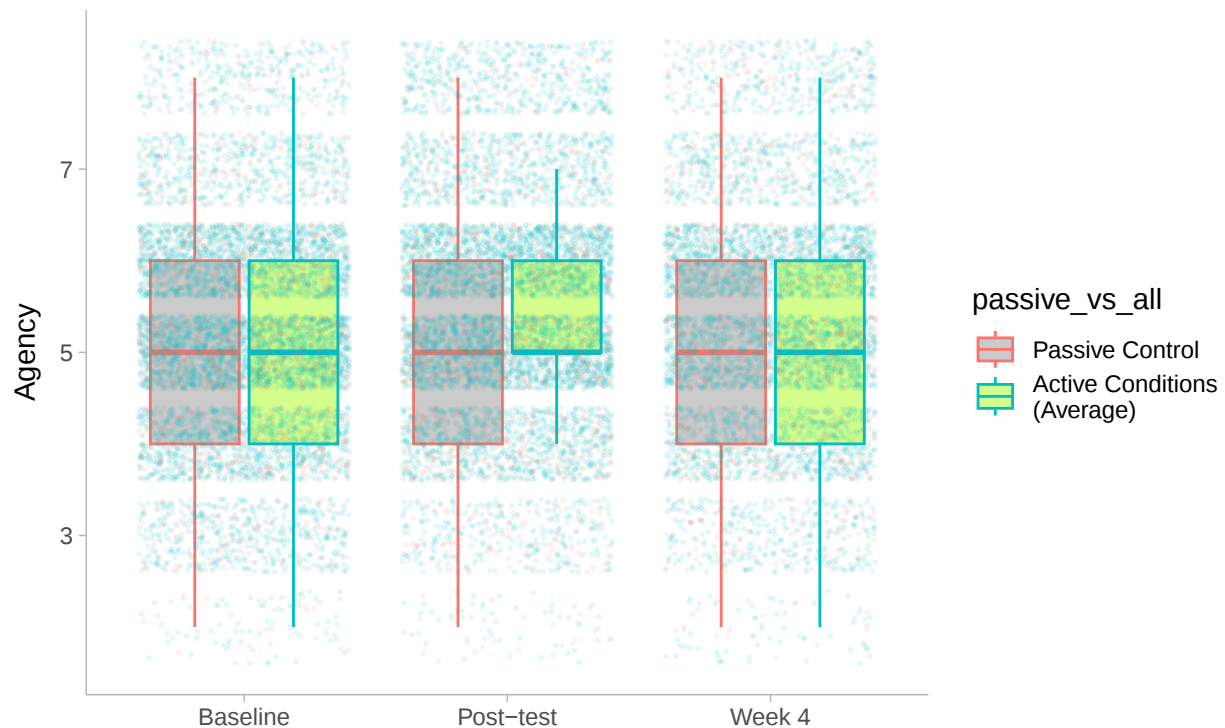
```
(liness_readiness <- plot_model(m1_readiness_all_vs_passive,type='pred',terms=c('time','passive_vs_all')+
  geom_line()+ggtitle('Predicted Readiness for Change')+
  xlab(element_blank())+
  ylab('Readiness for Change')+
  guides(color=guide_legend(title="Active vs. Passive")))
```



```
mega_alltimes %>%
  ggplot(aes(x=time,y=readiness_score,fill=passive_vs_all, col=passive_vs_all))+
  geom_boxplot(alpha=0.8,outlier.shape = NA)+
  geom_jitter(alpha=0.1,size=.3)+
  ylab('Agency')+ xlab(element_blank())+
  ggtitle('Readiness for Change by Time and Condition',
    'Passive Control vs All Active Conditions Averaged')+
  scale_fill_manual(values = c("grey",'darkolivegreen1'))
```

Readiness for Change by Time and Condition

Passive Control vs All Active Conditions Averaged



Sensitivity Analyses (Pre-registered)

Including demographic covariates

- Re-run the primary analysis with demographic covariates: age, gender, disability, race, education, relationship status, political party, employment status, household income, and perceived socioeconomic standing (Social Ladder).

```
m1_phq9_w_dem_covars <- lmer(phq9_score ~ time * group + Age + Gender + Race +  
  Education +  
  `Relationship/Marital Status` +  
  `Political Party` + `Employment Status` +  
  `Household Income` + `Social ladder` +  
  disability +(1|pid),data=mega_alltimes)  
  
add_cohens_d(m1_phq9_w_dem_covars,caption='Predicting: change in depressive symptoms')
```

Table 40: Predicting: change in depressive symptoms

term	estimate	p.value	cohens_d	cohens_d_97.5	cohens_d_2.5
(Intercept)	20.454	1.25e-21	NA	NA	NA
timeWeek 4	- 3.010	1.43e-85	-0.59	-0.65	-0.54
group5 Habits to Beat Depression	- 0.218	0.409	-0.04	-0.15	0.06
groupAI-assisted Personalized Narrative	- 0.174	0.510	-0.03	-0.14	0.07
groupBehavioral Activation	0.414	0.115	0.08	-0.02	0.18
groupDialectical Behavioral Therapy Skills	- 0.033	0.899	-0.01	-0.11	0.10
groupInner Child Healing Walk	- 0.035	0.895	-0.01	-0.11	0.09
groupInteractive Cognitive Reappraisal	0.153	0.559	0.03	-0.07	0.13
groupMindful Acceptance	- 0.448	0.088	-0.09	-0.19	0.01
groupMindful Attention Skills	0.096	0.715	0.02	-0.08	0.12
groupMoral Elevation	0.101	0.701	0.02	-0.08	0.12
groupPersonalized Intervention Recommender	0.083	0.751	0.02	-0.08	0.12
groupReframing Negative Thoughts	- 0.259	0.322	-0.05	-0.15	0.05
groupSavoring Strategies	0.093	0.724	0.02	-0.08	0.12
Age	- 0.030	4.02e-08	-0.01	-0.01	0.00
GenderAgender	- 0.813	0.389	-0.16	-0.53	0.20
GenderMan	0.057	0.930	0.01	-0.24	0.26
GenderNon-binary	- 0.070	0.921	-0.01	-0.29	0.26
GenderPrefer not to say	- 1.215	0.259	-0.24	-0.66	0.18
GenderTwo-spirit	- 1.402	0.360	-0.28	-0.87	0.32
GenderWoman	0.094	0.885	0.02	-0.23	0.27
RaceAsian Indian	0.260	0.719	0.05	-0.23	0.33
RaceAsian or Pacific Islander - Other	- 0.551	0.673	-0.11	-0.61	0.40
RaceBlack or African American	- 0.424	0.397	-0.08	-0.28	0.11
RaceChinese	- 0.203	0.759	-0.04	-0.30	0.22
RaceFilipino	0.128	0.849	0.03	-0.24	0.29
RaceGuamanian	- 0.483	0.863	-0.10	-1.18	0.99
RaceHawaiian	3.129	0.101	0.62	-0.12	1.36
RaceJapanese	- 0.404	0.652	-0.08	-0.43	0.27
RaceKorean	- 0.573	0.445	-0.11	-0.40	0.18
RaceOther	- 0.212	0.695	-0.04	-0.25	0.17

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
RacePrefer not to say	-0.265	0.713	-0.05	-0.33	0.23
RaceSamoan	4.219	0.203	0.83	-0.45	2.12
RaceVietnamese	-1.112	0.128	-0.22	-0.50	0.06
RaceWhite	-0.647	0.181	-0.13	-0.32	0.06
EducationLess than a high school diploma	-0.533	0.788	-0.11	-0.87	0.66
EducationHigh school graduate - high school diploma or the equivalent (for example: GED)	-1.125	0.559	-0.22	-0.97	0.52
EducationSome college, but no degree	-1.146	0.552	-0.23	-0.97	0.52
EducationAssociate degree (for example: AA, AS)	-1.199	0.534	-0.24	-0.98	0.51
EducationBachelor's degree (for example: BA, AB, BS)	-1.599	0.407	-0.32	-1.06	0.43
EducationMaster's degree (for example: MA, MS, MEng, MEd, MSW, MBA)	-1.366	0.480	-0.27	-1.02	0.48
EducationDoctorate degree (for example: PhD, EdD)	-1.196	0.542	-0.24	-1.00	0.52
EducationProfessional degree (for example: MD, DDS, DVM, LLB, JD)	-1.011	0.609	-0.20	-0.97	0.57
EducationPrefer not to say	0.338	0.881	0.07	-0.81	0.94
Relationship/Marital StatusI'd Rather Not Say	0.443	0.237	0.09	-0.06	0.23
Relationship/Marital StatusIn a civil union/partnership	0.843	0.060	0.17	-0.01	0.34
Relationship/Marital StatusIn a relationship	0.322	0.197	0.06	-0.03	0.16
Relationship/Marital StatusMarried	0.274	0.248	0.05	-0.04	0.15
Relationship/Marital StatusSeparated	1.084	0.018	0.21	0.04	0.39
Relationship/Marital StatusSingle	0.483	0.046	0.10	0.00	0.19
Relationship/Marital StatusWidowed	1.173	0.021	0.23	0.03	0.43
Political PartyIndependent	-0.235	0.063	-0.05	-0.10	0.00
Political PartyPrefer not to say	0.161	0.612	0.03	-0.09	0.15
Political PartyRepublican	0.404	0.005	0.08	0.02	0.14
Political PartySomething else	0.014	0.949	0.00	-0.08	0.09
Employment StatusFull-time	-0.091	0.717	-0.02	-0.11	0.08
Employment StatusNot in paid work (e.g., homemaker, disabled)	-0.258	0.380	-0.05	-0.16	0.06
Employment StatusPart-time	-0.201	0.454	-0.04	-0.14	0.06
Employment StatusPrefer not to say	0.096	0.861	0.02	-0.19	0.23
Employment StatusRetired	-0.860	0.049	-0.17	-0.34	0.00
Employment StatusStudent	-0.285	0.367	-0.06	-0.18	0.07
Employment StatusUnemployed	0.215	0.455	0.04	-0.07	0.15
Household Income\$10,000-\$19,999	-0.361	0.210	-0.07	-0.18	0.04

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
Household Income\$20,000-\$29,999	-0.785	0.004	-0.16	-0.26	-0.05
Household Income\$30,000-\$39,999	-0.962	3.46e-04	-0.19	-0.29	-0.09
Household Income\$40,000-\$49,999	-0.555	0.043	-0.11	-0.22	0.00
Household Income\$50,000-\$59,999	-0.952	6.02e-04	-0.19	-0.30	-0.08
Household Income\$60,000-\$69,999	-0.574	0.050	-0.11	-0.23	0.00
Household Income\$70,000-\$79,999	-0.626	0.034	-0.12	-0.24	-0.01
Household Income\$80,000-\$89,999	-0.684	0.038	-0.14	-0.26	-0.01
Household Income\$90,000-\$99,999	-0.805	0.010	-0.16	-0.28	-0.04
Household Income\$100,000-\$124,999	-0.572	0.047	-0.11	-0.22	0.00
Household Income\$125,000-\$149,999	-0.615	0.057	-0.12	-0.25	0.00
Household Income\$150,000-\$174,999	-1.005	0.006	-0.20	-0.34	-0.06
Household Income\$175,000-\$199,999	-0.340	0.468	-0.07	-0.25	0.11
Household Income\$200,000-\$224,999	-0.529	0.323	-0.10	-0.31	0.10
Household Income\$225,000-\$249,999	-0.061	0.933	-0.01	-0.29	0.27
Household Income\$250,000 or more	-0.401	0.429	-0.08	-0.28	0.12
Household IncomePrefer not to say	-1.052	0.003	-0.21	-0.34	-0.07
Social ladder	-0.500	1.19e-40	-0.10	-0.11	-0.08
disabilityPrefer not to Answer	-0.670	0.021	0.13	0.02	0.24
disabilityYes	-1.013	1.67e-20	0.20	0.16	0.24
timeWeek 4:group5 Habits to Beat Depression	-0.183	0.549	-0.04	-0.15	0.08
timeWeek 4:groupAI-assisted Personalized Narrative	-0.243	0.426	-0.05	-0.17	0.07
timeWeek 4:groupBehavioral Activation	-0.426	0.159	-0.08	-0.20	0.03
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.435	0.154	-0.09	-0.20	0.03
timeWeek 4:groupInner Child Healing Walk	-0.050	0.868	-0.01	-0.13	0.11
timeWeek 4:groupInteractive Cognitive Reappraisal	-0.763	0.014	-0.15	-0.27	-0.03
timeWeek 4:groupMindful Acceptance	-0.378	0.213	-0.07	-0.19	0.04

term	estimate	p.value	cohens_d	cohens_d_2015	cohens_d_97.5
timeWeek 4:groupMindful Attention Skills	-0.707	0.020	-0.14	-0.26	-0.02
timeWeek 4:groupMoral Elevation	0.366	0.232	-0.07	-0.19	0.05
timeWeek 4:groupPersonalized Intervention Recommender	0.518	0.090	-0.10	-0.22	0.02
timeWeek 4:groupReframing Negative Thoughts	0.059	0.845	0.01	-0.11	0.13
timeWeek 4:groupSavoring Strategies	0.115	0.701	-0.02	-0.14	0.09
sd__(Intercept)	3.314	NA	NA	NA	NA
sd__Observation	3.827	NA	NA	NA	NA

```
m1_phq9_w_dem_covars %>% tidy %>% select(term,statistic,df) %>% kable(digits=3,caption='Model T score and df')
```

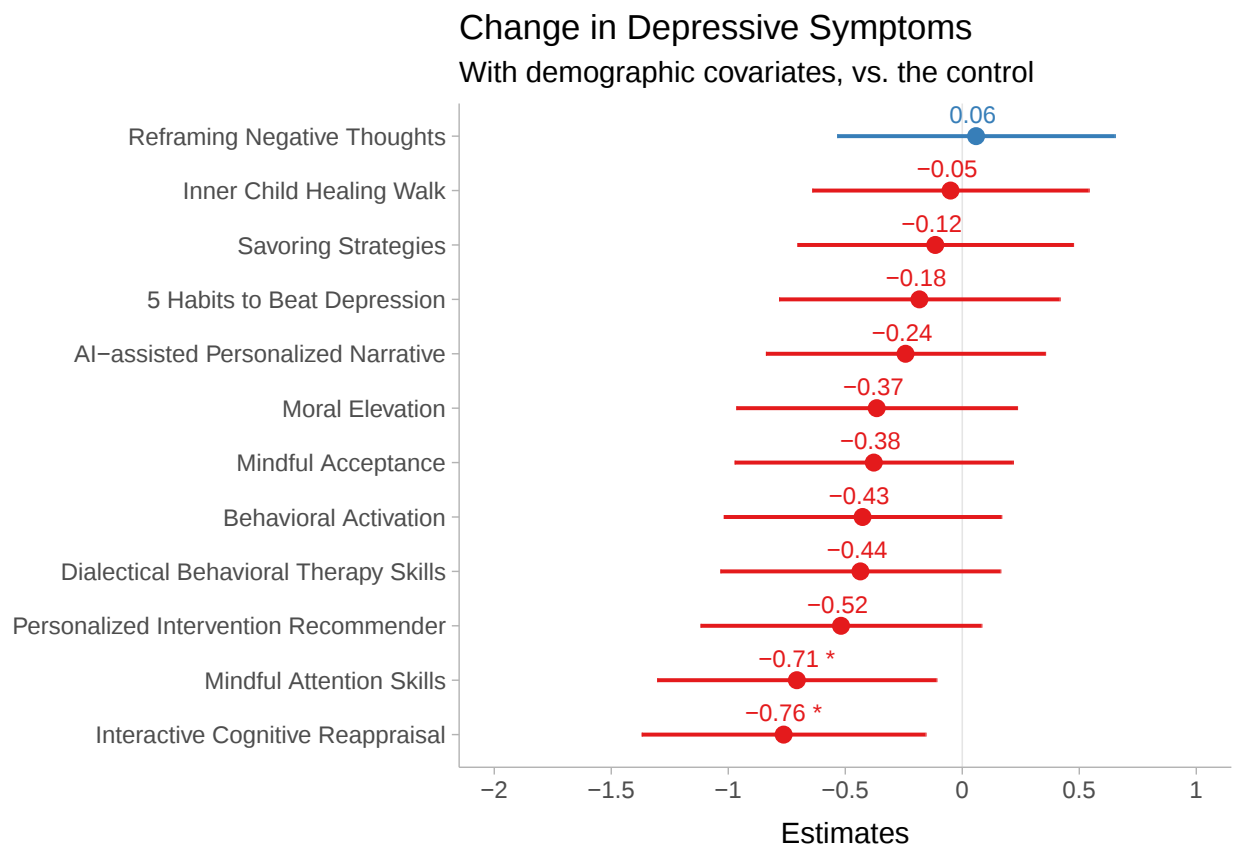
Table 41: Model T score and df

term	statistic	df
(Intercept)	9.586	6887.561
timeWeek 4	-19.890	6690.271
group5 Habits to Beat Depression	-0.826	11512.136
groupAI-assisted Personalized Narrative	-0.660	11500.420
groupBehavioral Activation	1.577	11508.184
groupDialectical Behavioral Therapy Skills	-0.127	11501.043
groupInner Child Healing Walk	-0.133	11505.091
groupInteractive Cognitive Reappraisal	0.584	11503.042
groupMindful Acceptance	-1.707	11498.847
groupMindful Attention Skills	0.365	11512.179
groupMoral Elevation	0.384	11500.043
groupPersonalized Intervention Recommender	0.317	11510.031
groupReframing Negative Thoughts	-0.991	11506.286
groupSavoring Strategies	0.353	11504.851
Age	-5.496	7417.586
GenderAgender	-0.862	7455.604
GenderMan	0.088	7655.413
GenderNon-binary	-0.099	7635.198
GenderPrefer not to say	-1.128	7504.592
GenderTwo-spirit	-0.915	7127.642
GenderWoman	0.144	7656.384
RaceAsian Indian	0.360	7373.732
RaceAsian or Pacific Islander - Other	-0.423	7876.626
RaceBlack or African American	-0.847	7391.602
RaceChinese	-0.306	7292.554
RaceFilipino	0.190	7374.265
RaceGuamanian	-0.173	9356.421
RaceHawaiian	1.640	7848.008
RaceJapanese	-0.452	7243.531
RaceKorean	-0.764	7305.698
RaceOther	-0.393	7365.254
RacePrefer not to say	-0.367	7279.941
RaceSamoan	1.273	8574.261

term	statistic	df
RaceVietnamese	-1.520	7371.160
RaceWhite	-1.337	7378.205
EducationLess than a high school diploma	-0.268	6770.087
EducationHigh school graduate - high school diploma or the equivalent (for example: GED)	-0.584	6739.230
EducationSome college, but no degree	-0.595	6739.177
EducationAssociate degree (for example: AA, AS)	-0.621	6740.792
EducationBachelor's degree (for example: BA, AB, BS)	-0.830	6739.233
EducationMaster's degree (for example: MA, MS, MEng, MEd, MSW, MBA)	-0.707	6743.154
EducationDoctorate degree (for example: PhD, EdD)	-0.610	6777.492
EducationProfessional degree (for example: MD, DDS, DVM, LLB, JD)	-0.512	6778.963
EducationPrefer not to say	0.149	7033.323
Relationship/Marital StatusI'd Rather Not Say	1.181	7492.718
Relationship/Marital StatusIn a civil union/partnership	1.882	7212.706
Relationship/Marital StatusIn a relationship	1.291	7287.112
Relationship/Marital StatusMarried	1.156	7267.043
Relationship/Marital StatusSeparated	2.371	7197.368
Relationship/Marital StatusSingle	1.992	7251.148
Relationship/Marital StatusWidowed	2.307	7096.806
Political PartyIndependent	-1.860	7287.649
Political PartyPrefer not to say	0.508	7736.650
Political PartyRepublican	2.832	7446.331
Political PartySomething else	0.064	7491.156
Employment StatusFull-time	-0.363	7345.911
Employment StatusNot in paid work (e.g., homemaker, disabled)	-0.878	7272.854
Employment StatusPart-time	-0.749	7356.473
Employment StatusPrefer not to say	0.175	7455.927
Employment StatusRetired	-1.973	7165.293
Employment StatusStudent	-0.903	7444.400
Employment StatusUnemployed	0.748	7342.074
Household Income\$10,000-\$19,999	-1.255	7249.231
Household Income\$20,000-\$29,999	-2.872	7238.363
Household Income\$30,000-\$39,999	-3.580	7226.600
Household Income\$40,000-\$49,999	-2.023	7272.090
Household Income\$50,000-\$59,999	-3.432	7257.421
Household Income\$60,000-\$69,999	-1.962	7300.615
Household Income\$70,000-\$79,999	-2.123	7310.901
Household Income\$80,000-\$89,999	-2.073	7377.765
Household Income\$90,000-\$99,999	-2.569	7399.392
Household Income\$100,000-\$124,999	-1.987	7302.702
Household Income\$125,000-\$149,999	-1.907	7390.704
Household Income\$150,000-\$174,999	-2.741	7493.701
Household Income\$175,000-\$199,999	-0.727	7474.450
Household Income\$200,000-\$224,999	-0.989	7312.625
Household Income\$225,000-\$249,999	-0.084	7693.481
Household Income\$250,000 or more	-0.790	7601.691
Household IncomePrefer not to say	-2.991	7378.052
Social ladder	-13.431	7450.516
disabilityPrefer not to Answer	2.316	7422.139
disabilityYes	9.309	7390.059
timeWeek 4:group5 Habits to Beat Depression	-0.599	6710.658
timeWeek 4:groupAI-assisted Personalized Narrative	-0.797	6707.796

term	statistic	df
timeWeek 4:groupBehavioral Activation	-1.409	6678.638
timeWeek 4:groupDialectical Behavioral Therapy Skills	-1.427	6732.925
timeWeek 4:groupInner Child Healing Walk	-0.167	6682.540
timeWeek 4:groupInteractive Cognitive Reappraisal	-2.467	6843.540
timeWeek 4:groupMindful Acceptance	-1.247	6700.826
timeWeek 4:groupMindful Attention Skills	-2.323	6728.986
timeWeek 4:groupMoral Elevation	-1.195	6738.246
timeWeek 4:groupPersonalized Intervention Recommender	-1.693	6792.299
timeWeek 4:groupReframing Negative Thoughts	0.195	6706.719
timeWeek 4:groupSavoring Strategies	-0.384	6648.230
sd__(Intercept)	NA	NA
sd__Observation	NA	NA

```
(phq9_with_demog_covars_plot <- plot_model(m1_phq9_w_dem_covars, sort.est = T, terms=wk4_int_terms, auto_1 = 1,
                                           show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Change in Depressive Symptoms', 'With demographic covariates, vs. the control'))
```



Including both demographic and baseline psychological covariates

- Re-run the primary analysis with the demographics above and baseline mental health covariates: depression change expectancies, positive actions and thoughts, readiness for change, agency, and hopelessness.

```
m1_phq9_w_all_covars <- lmer(phq9_score ~ `time` * `group` + Age + Gender + Race +
                             Education + `Relationship/Marital Status` +
                             `Political Party` + `Employment Status` +
                             `Household Income` + `Social ladder` +
                             disability + dep_expect_bl+ readiness_bl+
                             agency_bl + hopeless_bl+ fats_bl +
                             (1|pid),data=mega_alltimes)

add_cohens_d(m1_phq9_w_all_covars,caption='Predicting: change in depressive symptoms')
```

Table 42: Predicting: change in depressive symptoms

term	estimate	p.value	cohens_d	cohens_d_95%ci	cohens_d_97.5%ci
(Intercept)	15.123	4.53e-14	NA	NA	NA
timeWeek 4	- 3.036	7.25e-88	-0.64	-0.70	-0.58
group5 Habits to Beat Depression	- 0.015	0.953	0.00	-0.11	0.10
groupAI-assisted Personalized Narrative	0.062	0.802	0.01	-0.09	0.11
groupBehavioral Activation	0.337	0.173	0.07	-0.03	0.17
groupDialectical Behavioral Therapy Skills	- 0.052	0.833	-0.01	-0.11	0.09
groupInner Child Healing Walk	0.008	0.974	0.00	-0.10	0.10
groupInteractive Cognitive Reappraisal	0.036	0.883	0.01	-0.09	0.11
groupMindful Acceptance	- 0.387	0.117	-0.08	-0.18	0.02
groupMindful Attention Skills	0.220	0.372	0.05	-0.06	0.15
groupMoral Elevation	0.137	0.579	0.03	-0.07	0.13
groupPersonalized Intervention Recommender	0.122	0.618	0.03	-0.08	0.13
groupReframing Negative Thoughts	- 0.211	0.390	-0.04	-0.15	0.06
groupSavoring Strategies	0.215	0.382	0.05	-0.06	0.15
Age	- 0.029	1.62e-08	-0.01	-0.01	0.00
GenderAgender	- 0.580	0.504	-0.12	-0.48	0.24
GenderMan	0.236	0.696	0.05	-0.20	0.30
GenderNon-binary	0.199	0.759	0.04	-0.23	0.31
GenderPrefer not to say	- 1.092	0.271	-0.23	-0.64	0.18
GenderTwo-spirit	- 0.358	0.799	-0.08	-0.65	0.50
GenderWoman	0.383	0.522	0.08	-0.17	0.33
RaceAsian Indian	0.286	0.667	0.06	-0.21	0.33

term	estimate	p.value	cohens_d	cohens_d_97.5	cohens_d_2.5
RaceAsian or Pacific Islander - Other	-0.098	0.935	-0.02	-0.52	0.47
RaceBlack or African American	-0.040	0.930	-0.01	-0.20	0.18
RaceChinese	-0.149	0.807	-0.03	-0.28	0.22
RaceFilipino	0.417	0.500	0.09	-0.17	0.34
RaceGuamanian	2.145	0.410	0.45	-0.62	1.52
RaceHawaiian	2.529	0.151	0.53	-0.19	1.26
RaceJapanese	-0.343	0.677	-0.07	-0.41	0.27
RaceKorean	-0.636	0.357	-0.13	-0.42	0.15
RaceOther	0.085	0.865	0.02	-0.19	0.22
RacePrefer not to say	-0.155	0.815	-0.03	-0.31	0.24
RaceSamoan	4.097	0.182	0.86	-0.40	2.12
RaceVietnamese	-0.778	0.247	-0.16	-0.44	0.11
RaceWhite	-0.383	0.389	-0.08	-0.26	0.10
EducationLess than a high school diploma	0.583	0.749	0.12	-0.63	0.87
EducationHigh school graduate - high school diploma or the equivalent (for example: GED)	0.390	0.825	0.08	-0.65	0.81
EducationSome college, but no degree	0.373	0.833	0.08	-0.65	0.81
EducationAssociate degree (for example: AA, AS)	0.337	0.849	0.07	-0.66	0.80
EducationBachelor's degree (for example: BA, AB, BS)	-0.130	0.941	-0.03	-0.75	0.70
EducationMaster's degree (for example: MA, MS, MEng, MEd, MSW, MBA)	0.257	0.885	0.05	-0.68	0.78
EducationDoctorate degree (for example: PhD, EdD)	0.288	0.873	0.06	-0.68	0.80
EducationProfessional degree (for example: MD, DDS, DVM, LLB, JD)	0.428	0.813	0.09	-0.66	0.84
EducationPrefer not to say	1.567	0.451	0.33	-0.53	1.19
Relationship/Marital StatusI'd Rather Not Say	0.446	0.196	0.09	-0.05	0.24
Relationship/Marital StatusIn a civil union/partnership	0.432	0.294	0.09	-0.08	0.26
Relationship/Marital StatusIn a relationship	0.343	0.136	0.07	-0.02	0.17
Relationship/Marital StatusMarried	0.169	0.438	0.04	-0.05	0.13
Relationship/Marital StatusSeparated	0.984	0.019	0.21	0.03	0.38
Relationship/Marital StatusSingle	0.290	0.194	0.06	-0.03	0.15
Relationship/Marital StatusWidowed	0.993	0.034	0.21	0.02	0.40
Political PartyIndependent	-0.118	0.310	-0.02	-0.07	0.02
Political PartyPrefer not to say	0.476	0.105	0.10	-0.02	0.22
Political PartyRepublican	0.485	2.44e-04	0.10	0.05	0.16
Political PartySomething else	0.299	0.144	0.06	-0.02	0.15
Employment StatusFull-time	-0.342	0.137	-0.07	-0.17	0.02
Employment StatusNot in paid work (e.g., homemaker, disabled)	-0.340	0.209	-0.07	-0.18	0.04

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
Employment StatusPart-time	- 0.341	0.167	-0.07	-0.17	0.03
Employment StatusPrefer not to say	- 0.170	0.736	-0.04	-0.24	0.17
Employment StatusRetired	- 0.671	0.094	-0.14	-0.31	0.02
Employment StatusStudent	- 0.429	0.141	-0.09	-0.21	0.03
Employment StatusUnemployed	- 0.073	0.782	-0.02	-0.12	0.09
Household Income\$10,000-\$19,999	- 0.202	0.447	-0.04	-0.15	0.07
Household Income\$20,000-\$29,999	- 0.656	0.009	-0.14	-0.24	-0.03
Household Income\$30,000-\$39,999	- 0.649	0.009	-0.14	-0.24	-0.03
Household Income\$40,000-\$49,999	- 0.400	0.114	-0.08	-0.19	0.02
Household Income\$50,000-\$59,999	- 0.660	0.010	-0.14	-0.24	-0.03
Household Income\$60,000-\$69,999	- 0.570	0.034	-0.12	-0.23	-0.01
Household Income\$70,000-\$79,999	- 0.467	0.085	-0.10	-0.21	0.01
Household Income\$80,000-\$89,999	- 0.627	0.039	-0.13	-0.26	-0.01
Household Income\$90,000-\$99,999	- 0.657	0.023	-0.14	-0.26	-0.02
Household Income\$100,000-\$124,999	- 0.477	0.072	-0.10	-0.21	0.01
Household Income\$125,000-\$149,999	- 0.603	0.042	-0.13	-0.25	0.00
Household Income\$150,000-\$174,999	- 0.814	0.016	-0.17	-0.31	-0.03
Household Income\$175,000-\$199,999	- 0.333	0.440	-0.07	-0.25	0.11
Household Income\$200,000-\$224,999	- 0.472	0.337	-0.10	-0.30	0.10
Household Income\$225,000-\$249,999	- 0.391	0.559	-0.08	-0.36	0.19
Household Income\$250,000 or more	- 0.449	0.337	-0.09	-0.29	0.10
Household IncomePrefer not to say	- 0.940	0.004	-0.20	-0.33	-0.06
Social ladder	- 0.205	1.52e-08	-0.04	-0.06	-0.03
disabilityPrefer not to Answer	0.297	0.265	0.06	-0.05	0.17
disabilityYes	0.820	4.07e-16	0.17	0.13	0.21
dep__expect__bl	- 0.315	1.46e-35	-0.07	-0.08	-0.06
readiness__bl	0.125	0.004	0.03	0.01	0.04

term	estimate	p.value	cohens_d	cohens_d_95ci.lower	cohens_d_95ci.upper
agency_bl	-0.020	0.129	0.00	-0.01	0.00
hopeless_bl	0.544	9.12e-127	0.11	0.11	0.12
fats_bl	0.037	1.32e-08	0.01	0.01	0.01
timeWeek 4:group5 Habits to Beat Depression	-0.162	0.594	-0.03	-0.16	0.09
timeWeek 4:groupAI-assisted Personalized Narrative	-0.241	0.426	-0.05	-0.18	0.07
timeWeek 4:groupBehavioral Activation	-0.376	0.211	-0.08	-0.20	0.04
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.462	0.128	-0.10	-0.22	0.03
timeWeek 4:groupInner Child Healing Walk	-0.021	0.943	0.00	-0.13	0.12
timeWeek 4:groupInteractive Cognitive Reappraisal	-0.811	0.008	-0.17	-0.30	-0.04
timeWeek 4:groupMindful Acceptance	-0.371	0.219	-0.08	-0.20	0.05
timeWeek 4:groupMindful Attention Skills	-0.656	0.030	-0.14	-0.26	-0.01
timeWeek 4:groupMoral Elevation	-0.347	0.254	-0.07	-0.20	0.05
timeWeek 4:groupPersonalized Intervention Recommender	-0.512	0.092	-0.11	-0.23	0.02
timeWeek 4:groupReframing Negative Thoughts	0.059	0.845	0.01	-0.11	0.14
timeWeek 4:groupSavoring Strategies	-0.141	0.637	-0.03	-0.15	0.09
sd__(Intercept)	2.838	NA	NA	NA	NA
sd__Observation	3.821	NA	NA	NA	NA

```
m1_phq9_w_all_covars %>% tidy %>% select(term, statistic, df) %>% kable(digits=3, caption='Model T score and df')
```

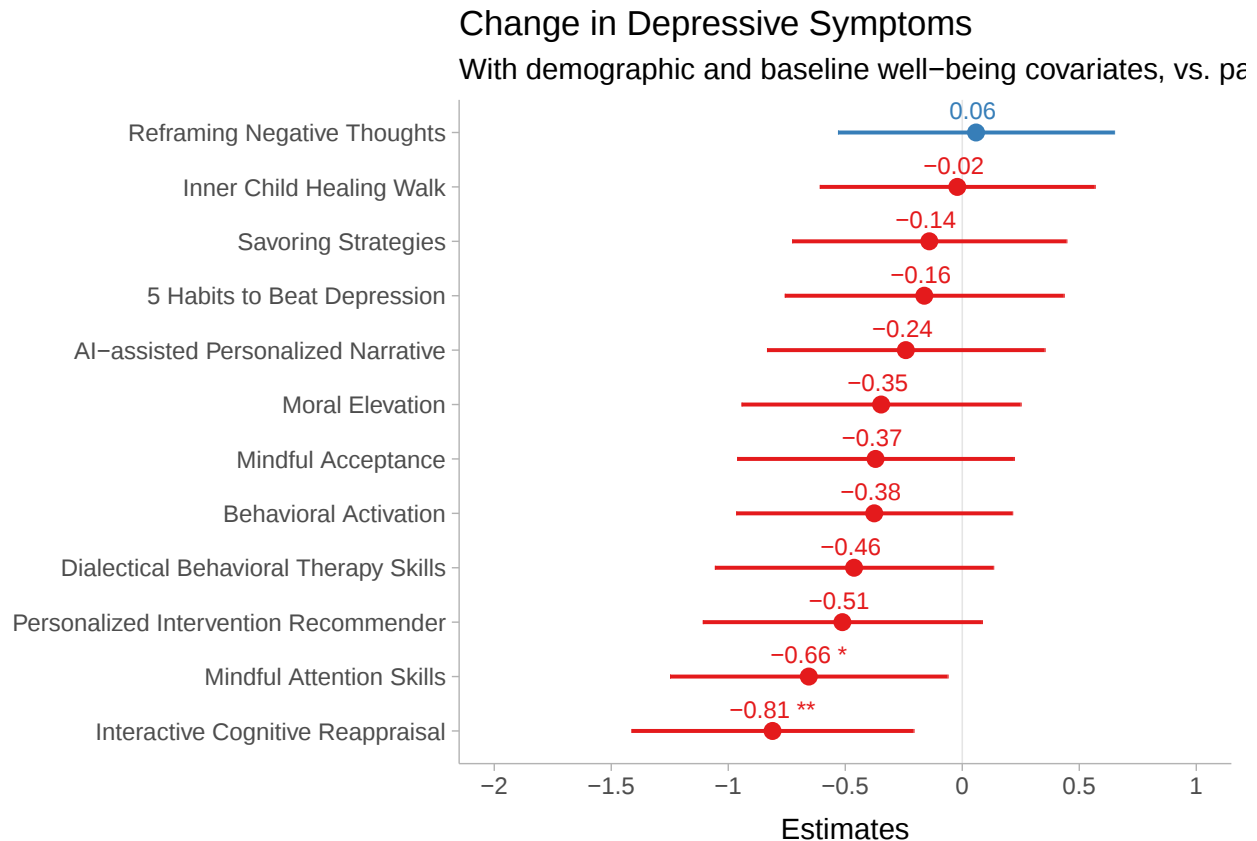
Table 43: Model T score and df

term	statistic	df
(Intercept)	7.561	6872.372
timeWeek 4	-20.164	6797.905
group5 Habits to Beat Depression	-0.060	12010.252
groupAI-assisted Personalized Narrative	0.251	11999.686
groupBehavioral Activation	1.364	12005.942
groupDialectical Behavioral Therapy Skills	-0.210	12002.139
groupInner Child Healing Walk	0.032	12005.944
groupInteractive Cognitive Reappraisal	0.147	12001.470
groupMindful Acceptance	-1.567	11999.415
groupMindful Attention Skills	0.892	12013.771
groupMoral Elevation	0.555	12002.151
groupPersonalized Intervention Recommender	0.498	12010.117
groupReframing Negative Thoughts	-0.859	12003.705

term	statistic	df
groupSavoring Strategies	0.874	12005.356
Age	-5.655	7411.581
GenderAgender	-0.669	7450.149
GenderMan	0.391	7668.796
GenderNon-binary	0.307	7645.737
GenderPrefer not to say	-1.101	7504.115
GenderTwo-spirit	-0.254	7096.794
GenderWoman	0.640	7669.557
RaceAsian Indian	0.430	7359.657
RaceAsian or Pacific Islander - Other	-0.082	7908.552
RaceBlack or African American	-0.088	7381.367
RaceChinese	-0.244	7274.239
RaceFilipino	0.674	7361.386
RaceGuamanian	0.824	9576.657
RaceHawaiian	1.437	7879.287
RaceJapanese	-0.417	7219.065
RaceKorean	-0.921	7285.812
RaceOther	0.170	7351.035
RacePrefer not to say	-0.234	7258.767
RaceSamoan	1.335	8687.996
RaceVietnamese	-1.157	7358.741
RaceWhite	-0.861	7365.608
EducationLess than a high school diploma	0.320	6712.652
EducationHigh school graduate - high school diploma or the equivalent (for example: GED)	0.221	6679.393
EducationSome college, but no degree	0.211	6679.308
EducationAssociate degree (for example: AA, AS)	0.190	6681.104
EducationBachelor's degree (for example: BA, AB, BS)	-0.074	6679.489
EducationMaster's degree (for example: MA, MS, MEng, MEd, MSW, MBA)	0.145	6683.875
EducationDoctorate degree (for example: PhD, EdD)	0.160	6720.890
EducationProfessional degree (for example: MD, DDS, DVM, LLB, JD)	0.236	6722.716
EducationPrefer not to say	0.754	6998.951
Relationship/Marital StatusI'd Rather Not Say	1.292	7492.382
Relationship/Marital StatusIn a civil union/partnership	1.049	7187.143
Relationship/Marital StatusIn a relationship	1.493	7268.035
Relationship/Marital StatusMarried	0.776	7246.187
Relationship/Marital StatusSeparated	2.341	7169.168
Relationship/Marital StatusSingle	1.300	7227.166
Relationship/Marital StatusWidowed	2.124	7060.895
Political PartyIndependent	-1.015	7271.142
Political PartyPrefer not to say	1.623	7757.280
Political PartyRepublican	3.670	7428.309
Political PartySomething else	1.462	7489.615
Employment StatusFull-time	-1.486	7330.181
Employment StatusNot in paid work (e.g., homemaker, disabled)	-1.258	7251.389
Employment StatusPart-time	-1.382	7341.844
Employment StatusPrefer not to say	-0.337	7449.675
Employment StatusRetired	-1.675	7134.924
Employment StatusStudent	-1.474	7436.294
Employment StatusUnemployed	-0.277	7327.943
Household Income\$10,000-\$19,999	-0.761	7226.714
Household Income\$20,000-\$29,999	-2.609	7213.838

term	statistic	df
Household Income\$30,000-\$39,999	-2.628	7201.650
Household Income\$40,000-\$49,999	-1.583	7250.565
Household Income\$50,000-\$59,999	-2.586	7235.627
Household Income\$60,000-\$69,999	-2.119	7281.734
Household Income\$70,000-\$79,999	-1.722	7292.080
Household Income\$80,000-\$89,999	-2.067	7365.162
Household Income\$90,000-\$99,999	-2.277	7388.272
Household Income\$100,000-\$124,999	-1.799	7284.911
Household Income\$125,000-\$149,999	-2.033	7379.725
Household Income\$150,000-\$174,999	-2.409	7491.621
Household Income\$175,000-\$199,999	-0.773	7470.445
Household Income\$200,000-\$224,999	-0.959	7293.228
Household Income\$225,000-\$249,999	-0.584	7707.954
Household Income\$250,000 or more	-0.960	7606.331
Household IncomePrefer not to say	-2.904	7364.464
Social ladder	-5.666	7428.969
disabilityPrefer not to Answer	1.114	7410.538
disabilityYes	8.155	7378.453
dep_expect_bl	-12.513	7338.441
readiness_bl	2.874	7378.965
agency_bl	-1.519	7368.330
hopeless_bl	24.422	7414.998
fats_bl	5.689	7530.057
timeWeek 4:group5 Habits to Beat Depression	-0.534	6820.095
timeWeek 4:groupAI-assisted Personalized Narrative	-0.797	6817.122
timeWeek 4:groupBehavioral Activation	-1.250	6784.579
timeWeek 4:groupDialectical Behavioral Therapy Skills	-1.524	6844.508
timeWeek 4:groupInner Child Healing Walk	-0.071	6789.139
timeWeek 4:groupInteractive Cognitive Reappraisal	-2.638	6967.227
timeWeek 4:groupMindful Acceptance	-1.229	6809.321
timeWeek 4:groupMindful Attention Skills	-2.167	6839.980
timeWeek 4:groupMoral Elevation	-1.140	6850.737
timeWeek 4:groupPersonalized Intervention Recommender	-1.684	6910.491
timeWeek 4:groupReframing Negative Thoughts	0.195	6815.881
timeWeek 4:groupSavoring Strategies	-0.471	6751.215
sd__(Intercept)	NA	NA
sd__Observation	NA	NA

```
(phq9_with_all_covars_plot <- plot_model(m1_phq9_w_all_covars, sort.est = T, terms=wk4_int_terms, auto_lab=
show.values = T, value.offset = .4, value.size = 3.2)+
scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
ggtitle('Change in Depressive Symptoms', 'With demographic and baseline well-being covariates, vs. p
```



Adding the demographic and baseline covariates really doesn't change the model much.

Robustness Check: Correcting for multiple comparisons (Pre-registered)

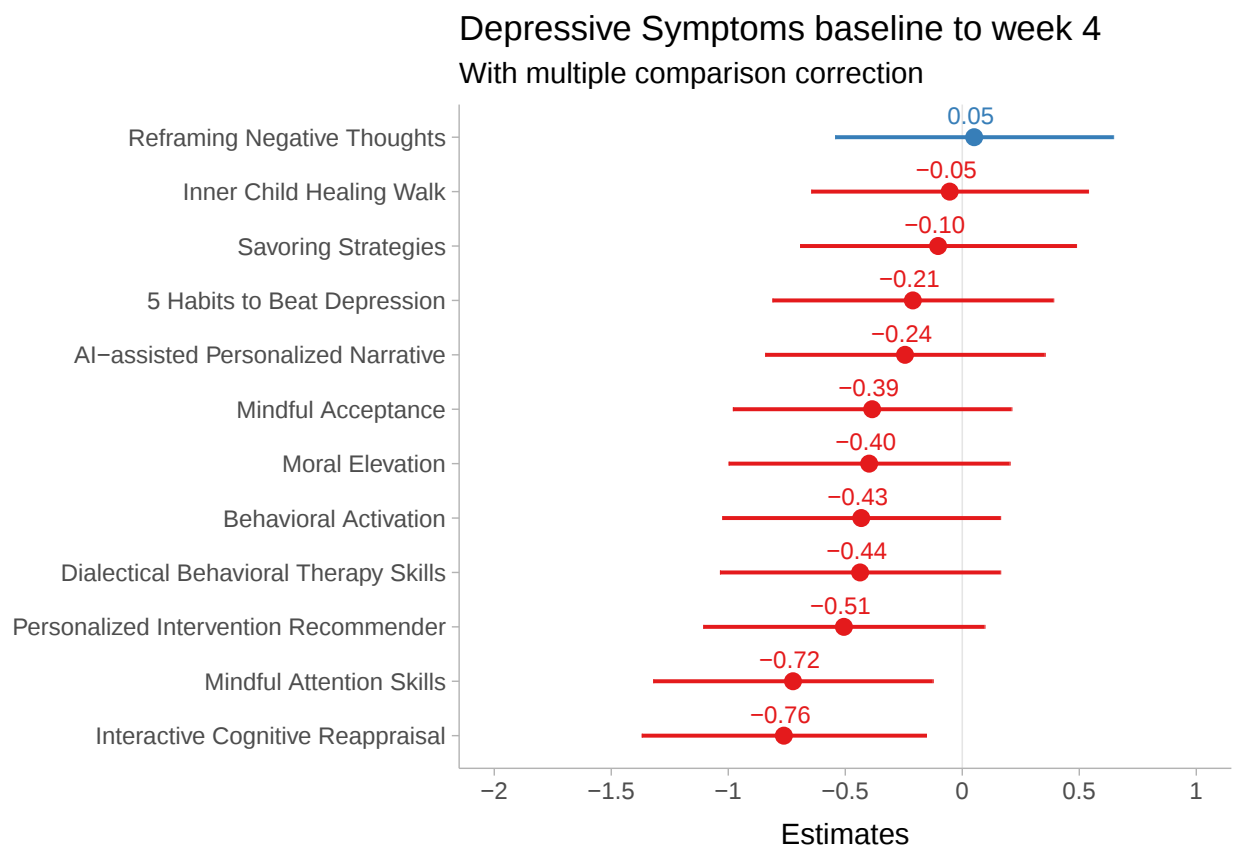
- Using the Benjamini-Hochberg procedure to re-rerun the models correcting for multiple comparisons to produce adjusted p-values.

```
#Depression
m1_phq9 %>% tidy() %>% filter(str_detect(term, ':')) %>%
  adjust_pvalue(method='BH') %>% select(term, p.value, p.value.adj) %>% print(n=100)
```

```
## # A tibble: 12 x 3
##   term                                p.value p.value.adj
##   <chr>                                <dbl>      <dbl>
## 1 timeWeek 4:group5 Habits to Beat Depression    0.490      0.654
## 2 timeWeek 4:groupAI-assisted Personalized Narrative 0.422      0.633
## 3 timeWeek 4:groupBehavioral Activation          0.154      0.351
## 4 timeWeek 4:groupDialectical Behavioral Therapy Skills 0.153      0.351
```

```
## 5 timeWeek 4:groupInner Child Healing Walk 0.858 0.867
## 6 timeWeek 4:groupInteractive Cognitive Reappraisal 0.0139 0.106
## 7 timeWeek 4:groupMindful Acceptance 0.205 0.351
## 8 timeWeek 4:groupMindful Attention Skills 0.0176 0.106
## 9 timeWeek 4:groupMoral Elevation 0.194 0.351
## 10 timeWeek 4:groupPersonalized Intervention Recommender 0.0989 0.351
## 11 timeWeek 4:groupReframing Negative Thoughts 0.867 0.867
## 12 timeWeek 4:groupSavoring Strategies 0.731 0.867
```

```
plot_model(m1_phq9, sort.est = T, terms=wk4_int_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2,
  p.adjust = 'hochberg')+
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Depressive Symptoms baseline to week 4', 'With multiple comparison correction')
```



```
#Agency
m1_agency %>% tidy() %>% filter(str_detect(term, ':group')) %>%
  adjust_pvalue(method='BH') %>% select(term, p.value, p.value.adj) %>% print(n=100)
```

```
## # A tibble: 24 x 3
##   term                                p.value p.value.adj
##   <chr>                                <dbl>      <dbl>
## 1 timePost-test:group5 Habits to Beat Depression 4.33e- 5    1.04e- 4
## 2 timeWeek 4:group5 Habits to Beat Depression 8.82e- 2    1.06e- 1
## 3 timePost-test:groupAI-assisted Personalized Narrative 7.85e- 7    2.69e- 6
```

## 4	timeWeek 4:groupAI-assisted Personalized Narrative	7.40e- 1	7.40e- 1
## 5	timePost-test:groupBehavioral Activation	2.08e- 9	1.25e- 8
## 6	timeWeek 4:groupBehavioral Activation	1.65e- 1	1.88e- 1
## 7	timePost-test:groupDialectical Behavioral Therapy Skills	9.15e- 7	2.75e- 6
## 8	timeWeek 4:groupDialectical Behavioral Therapy Skills	2.91e- 3	5.81e- 3
## 9	timePost-test:groupInner Child Healing Walk	3.42e- 3	6.31e- 3
## 10	timeWeek 4:groupInner Child Healing Walk	4.77e- 2	6.74e- 2
## 11	timePost-test:groupInteractive Cognitive Reappraisal	4.02e-20	9.64e-19
## 12	timeWeek 4:groupInteractive Cognitive Reappraisal	3.96e- 4	8.64e- 4
## 13	timePost-test:groupMindful Acceptance	1.05e- 7	4.18e- 7
## 14	timeWeek 4:groupMindful Acceptance	8.08e- 3	1.39e- 2
## 15	timePost-test:groupMindful Attention Skills	1.19e-12	1.43e-11
## 16	timeWeek 4:groupMindful Attention Skills	8.47e- 2	1.06e- 1
## 17	timePost-test:groupMoral Elevation	1.61e- 8	7.72e- 8
## 18	timeWeek 4:groupMoral Elevation	1.80e- 2	2.88e- 2
## 19	timePost-test:groupPersonalized Intervention Recommender	8.87e- 2	1.06e- 1
## 20	timeWeek 4:groupPersonalized Intervention Recommender	7.31e- 1	7.40e- 1
## 21	timePost-test:groupReframing Negative Thoughts	1.10e-10	8.78e-10
## 22	timeWeek 4:groupReframing Negative Thoughts	1.96e- 2	2.94e- 2
## 23	timePost-test:groupSavoring Strategies	4.06e- 5	1.04e- 4
## 24	timeWeek 4:groupSavoring Strategies	6.46e- 1	7.05e- 1

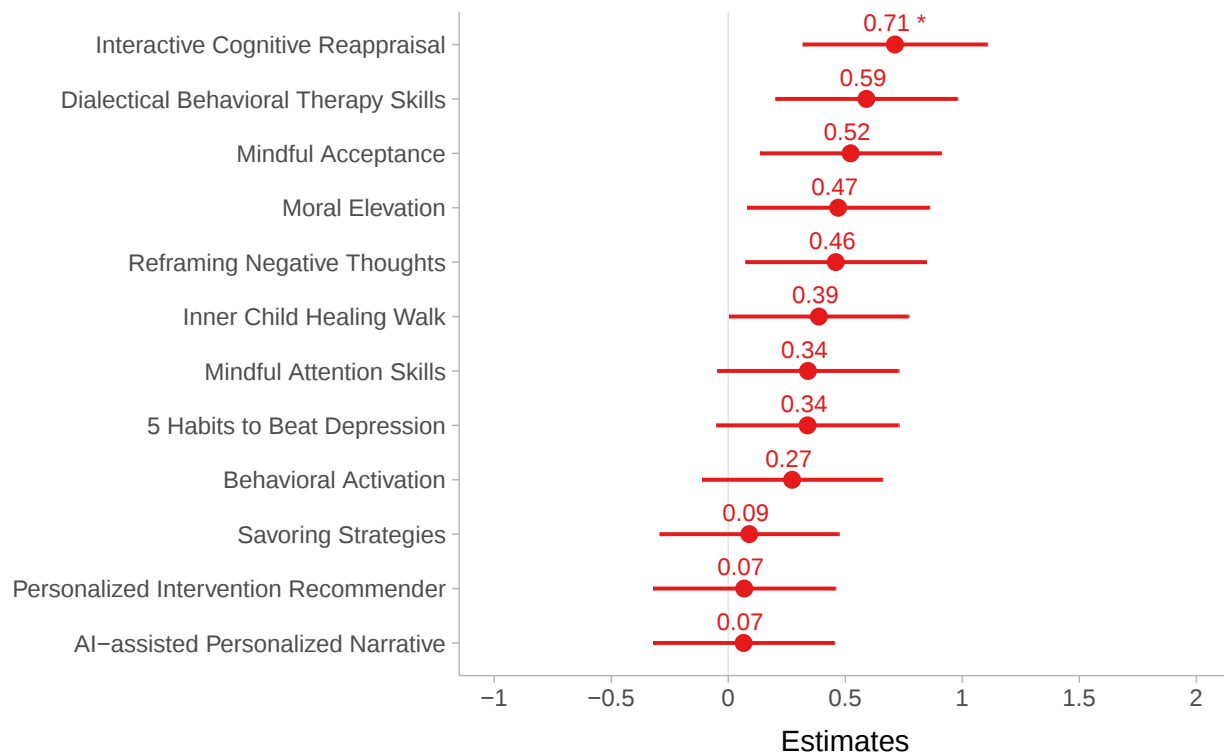
```

plot_model(m1_agency, sort.est = T, terms=wk4_int_terms, auto_label=F,
           show.values = T, value.offset = .4, value.size = 3.2,
           p.adjust = 'hochberg')+
scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
ggtitle('Agency baseline to week 4', 'With multiple comparison correction')

```

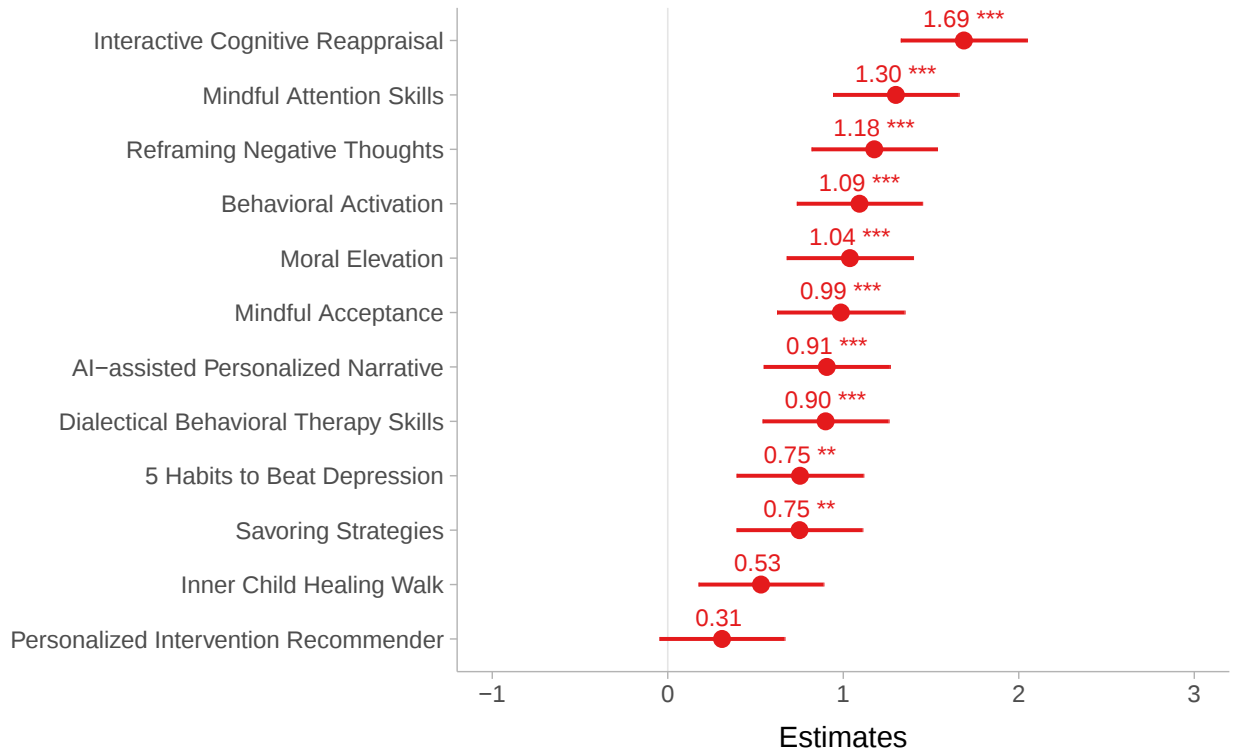
Agency baseline to week 4

With multiple comparison correction



```
plot_model(m1_agency, sort.est = T, terms=posttest_int_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2,
  p.adjust = 'hochberg')+
scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
ggtitle('Agency baseline to post-test', 'With multiple comparison correction')
```

Agency baseline to post-test With multiple comparison correction



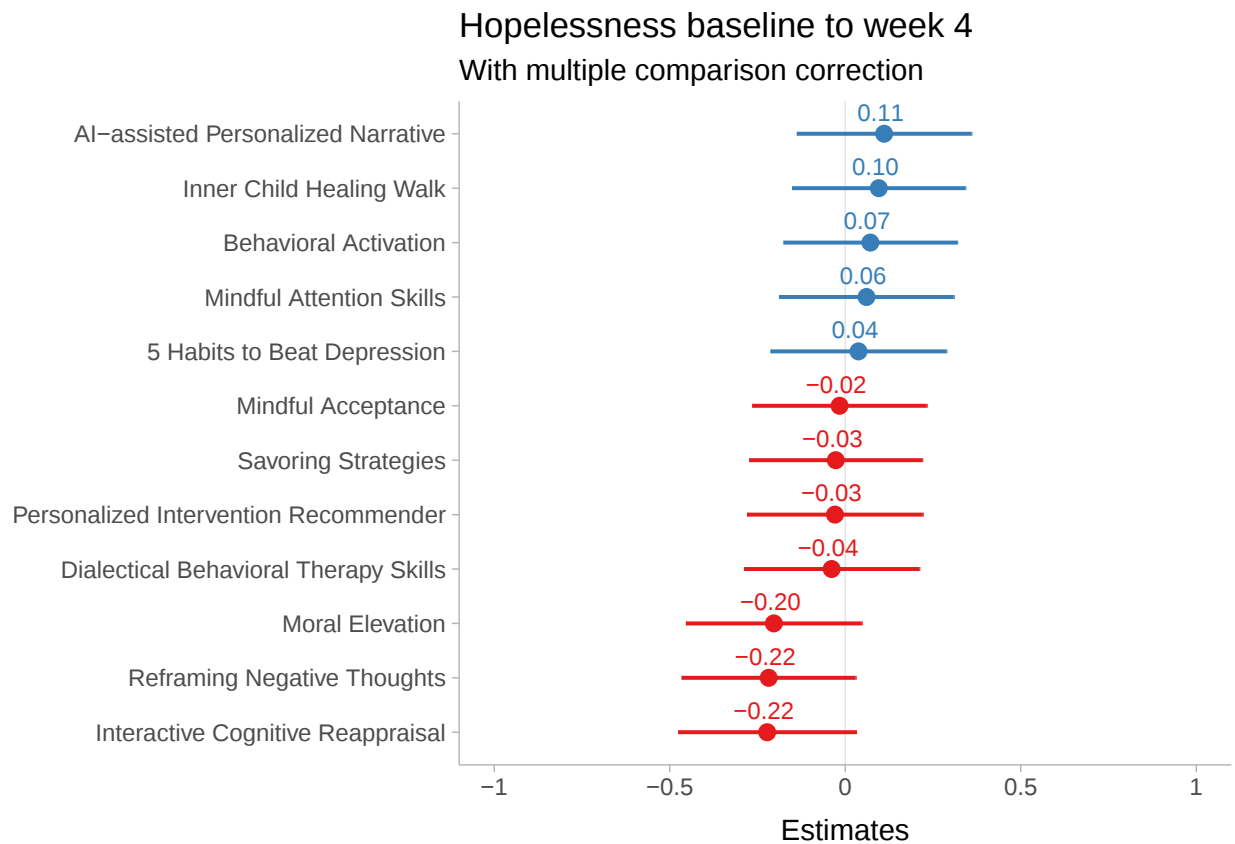
#Hopelessness

```
m1_hopeless %>% tidy() %>% filter(str_detect(term,':group')) %>%
  adjust_pvalue(method='BH') %>% select(term,p.value,p.value.adj)%>% print(n=100)
```

```
## # A tibble: 24 x 3
##   term                                p.value p.value.adj
##   <chr>                                <dbl>      <dbl>
## 1 timePost-test:group5 Habits to Beat Depression 1.12e-1 0.207
## 2 timeWeek 4:group5 Habits to Beat Depression 7.69e-1 0.898
## 3 timePost-test:groupAI-assisted Personalized Narrative 1.81e-3 0.00622
## 4 timeWeek 4:groupAI-assisted Personalized Narrative 3.83e-1 0.613
## 5 timePost-test:groupBehavioral Activation 6.12e-3 0.0163
## 6 timeWeek 4:groupBehavioral Activation 5.71e-1 0.806
## 7 timePost-test:groupDialectical Behavioral Therapy Skills 1.77e-1 0.303
## 8 timeWeek 4:groupDialectical Behavioral Therapy Skills 7.61e-1 0.898
## 9 timePost-test:groupInner Child Healing Walk 7.41e-4 0.00296
## 10 timeWeek 4:groupInner Child Healing Walk 4.48e-1 0.672
## 11 timePost-test:groupInteractive Cognitive Reappraisal 9.00e-5 0.000933
## 12 timeWeek 4:groupInteractive Cognitive Reappraisal 8.50e-2 0.185
## 13 timePost-test:groupMindful Acceptance 1.43e-4 0.000933
## 14 timeWeek 4:groupMindful Acceptance 8.98e-1 0.898
## 15 timePost-test:groupMindful Attention Skills 1.56e-4 0.000933
## 16 timeWeek 4:groupMindful Attention Skills 6.35e-1 0.846
## 17 timePost-test:groupMoral Elevation 1.98e-4 0.000949
## 18 timeWeek 4:groupMoral Elevation 1.11e-1 0.207
## 19 timePost-test:groupPersonalized Intervention Recommender 8.66e-1 0.898
```

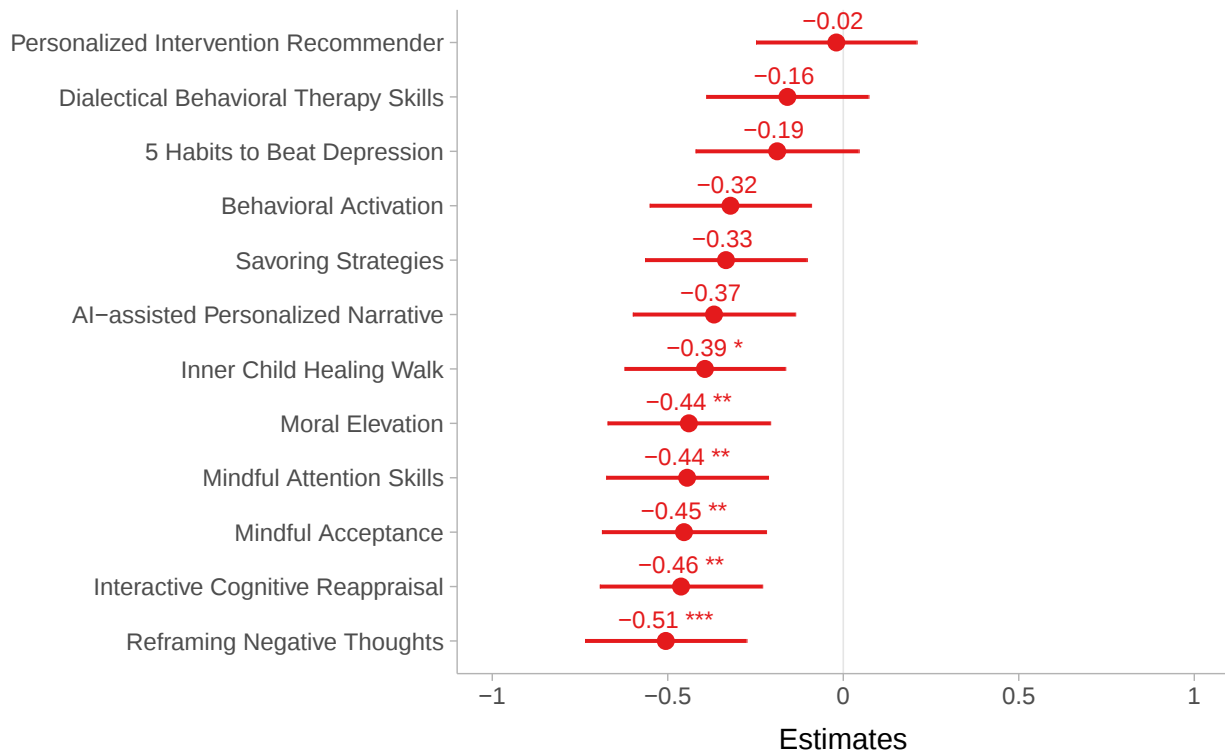
```
## 20 timeWeek 4:groupPersonalized Intervention Recommender      8.18e-1    0.898
## 21 timePost-test:groupReframing Negative Thoughts             1.65e-5    0.000395
## 22 timeWeek 4:groupReframing Negative Thoughts               8.45e-2    0.185
## 23 timePost-test:groupSavoring Strategies                    4.49e-3    0.0135
## 24 timeWeek 4:groupSavoring Strategies                       8.29e-1    0.898
```

```
plot_model(m1_hopeless,sort.est = T,terms=wk4_int_terms,auto_label=F,
           show.values = T, value.offset = .4,value.size = 3.2,
           p.adjust = 'hochberg')+
scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
ggtitle('Hopelessness baseline to week 4','With multiple comparison correction')
```



```
plot_model(m1_hopeless,sort.est = T,terms=posttest_int_terms,auto_label=F,
           show.values = T, value.offset = .4,value.size = 3.2,
           p.adjust = 'hochberg')+
scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
ggtitle('Hopelessness baseline to post-test','With multiple comparison correction')
```

Hopelessness baseline to post-test With multiple comparison correction



#Frequency of actions and Thoughts

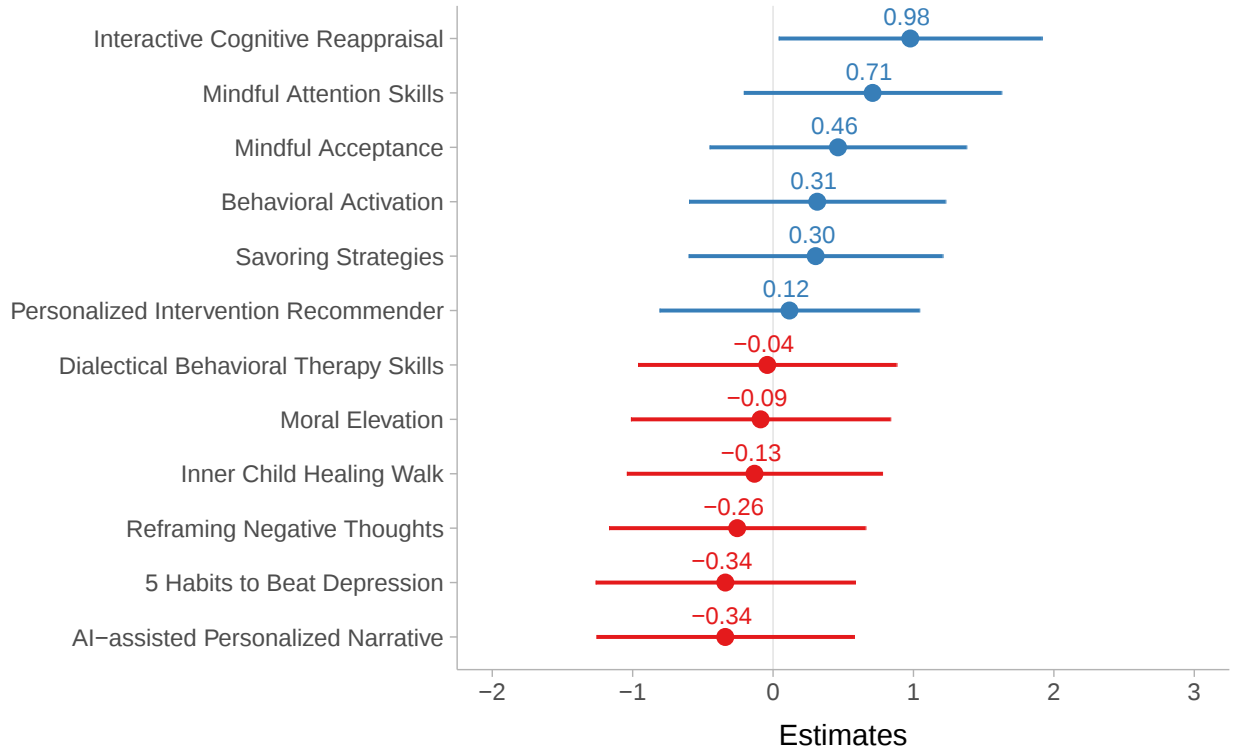
```
m1_fats %>% tidy() %>% filter(str_detect(term, ':group')) %>%
  adjust_pvalue(method='BH') %>% select(term, p.value, p.value.adj) %>% print(n=100)
```

```
## # A tibble: 12 x 3
##   term                                p.value p.value.adj
##   <chr>                                <dbl>     <dbl>
## 1 timeWeek 4:group5 Habits to Beat Depression    0.470     0.875
## 2 timeWeek 4:groupAI-assisted Personalized Narrative 0.467     0.875
## 3 timeWeek 4:groupBehavioral Activation          0.500     0.875
## 4 timeWeek 4:groupDialectical Behavioral Therapy Skills 0.930     0.930
## 5 timeWeek 4:groupInner Child Healing Walk        0.775     0.928
## 6 timeWeek 4:groupInteractive Cognitive Reappraisal 0.0410    0.491
## 7 timeWeek 4:groupMindful Acceptance              0.322     0.875
## 8 timeWeek 4:groupMindful Attention Skills        0.130     0.778
## 9 timeWeek 4:groupMoral Elevation                0.850     0.928
## 10 timeWeek 4:groupPersonalized Intervention Recommender 0.805     0.928
## 11 timeWeek 4:groupReframing Negative Thoughts    0.584     0.875
## 12 timeWeek 4:groupSavoring Strategies           0.511     0.875
```

```
plot_model(m1_fats, sort.est = T, terms=wk4_int_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2,
  p.adjust = 'hochberg')+
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('FATS baseline to week 4', 'With multiple comparison correction')
```

FATS baseline to week 4

With multiple comparison correction



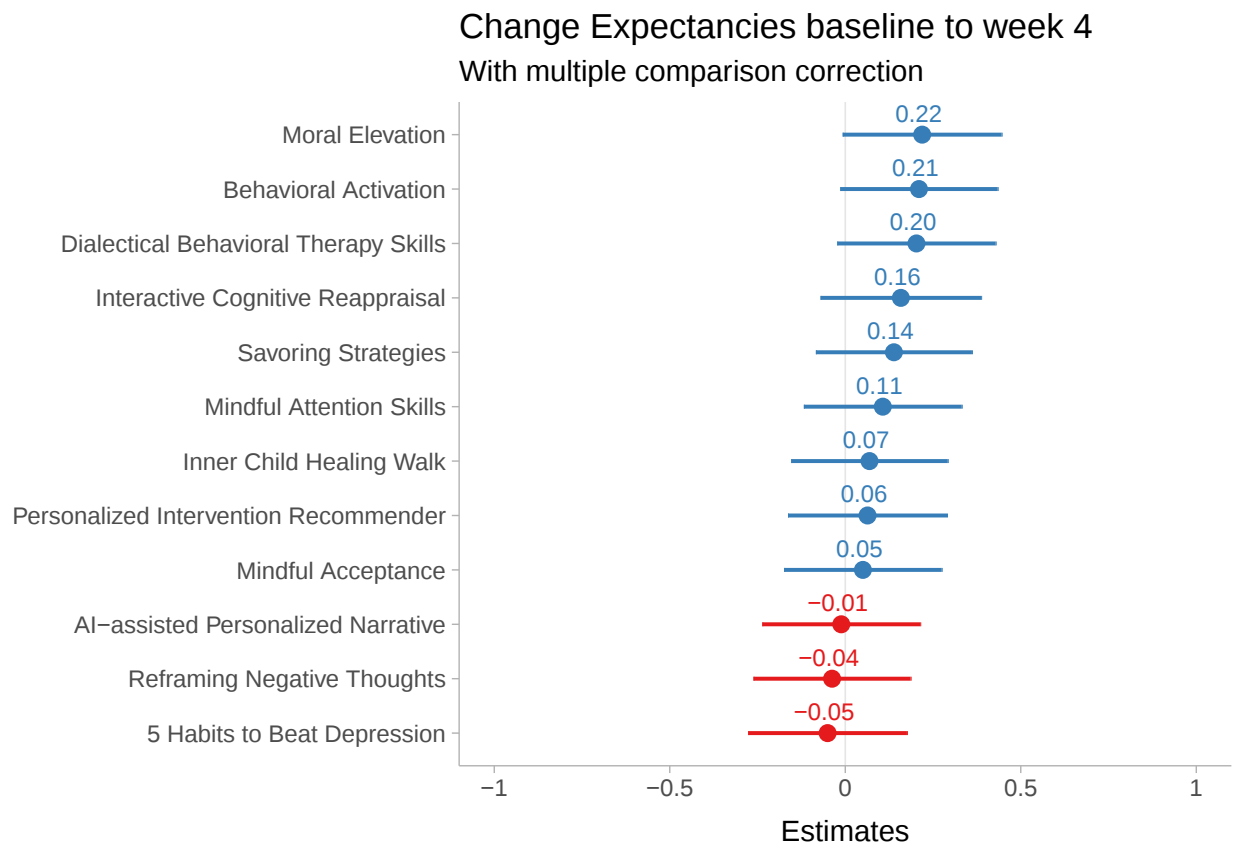
#Depression Change Expectancies

```
m1_dep_expect %>% tidy() %>% filter(str_detect(term,':group')) %>%
  adjust_pvalue(method='BH') %>% select(term,p.value,p.value.adj)%>% print(n=100)
```

```
## # A tibble: 24 x 3
##   term                                p.value p.value.adj
##   <chr>                                <dbl>      <dbl>
## 1 timePost-test:group5 Habits to Beat Depression 8.97e- 3  1.96e- 2
## 2 timeWeek 4:group5 Habits to Beat Depression 6.62e- 1  7.23e- 1
## 3 timePost-test:groupAI-assisted Personalized Narrative 2.99e- 4  7.96e- 4
## 4 timeWeek 4:groupAI-assisted Personalized Narrative 9.21e- 1  9.21e- 1
## 5 timePost-test:groupBehavioral Activation 1.33e-10  1.06e- 9
## 6 timeWeek 4:groupBehavioral Activation 6.64e- 2  1.23e- 1
## 7 timePost-test:groupDialectical Behavioral Therapy Skills 2.91e- 5  8.74e- 5
## 8 timeWeek 4:groupDialectical Behavioral Therapy Skills 7.82e- 2  1.27e- 1
## 9 timePost-test:groupInner Child Healing Walk 1.36e- 3  3.27e- 3
## 10 timeWeek 4:groupInner Child Healing Walk 5.44e- 1  6.87e- 1
## 11 timePost-test:groupInteractive Cognitive Reappraisal 9.93e-15  2.38e-13
## 12 timeWeek 4:groupInteractive Cognitive Reappraisal 1.75e- 1  2.62e- 1
## 13 timePost-test:groupMindful Acceptance 1.21e- 8  7.26e- 8
## 14 timeWeek 4:groupMindful Acceptance 6.61e- 1  7.23e- 1
## 15 timePost-test:groupMindful Attention Skills 1.76e-12  2.12e-11
## 16 timeWeek 4:groupMindful Attention Skills 3.51e- 1  4.68e- 1
## 17 timePost-test:groupMoral Elevation 2.78e- 6  9.53e- 6
## 18 timeWeek 4:groupMoral Elevation 5.80e- 2  1.16e- 1
## 19 timePost-test:groupPersonalized Intervention Recommender 7.95e- 2  1.27e- 1
```

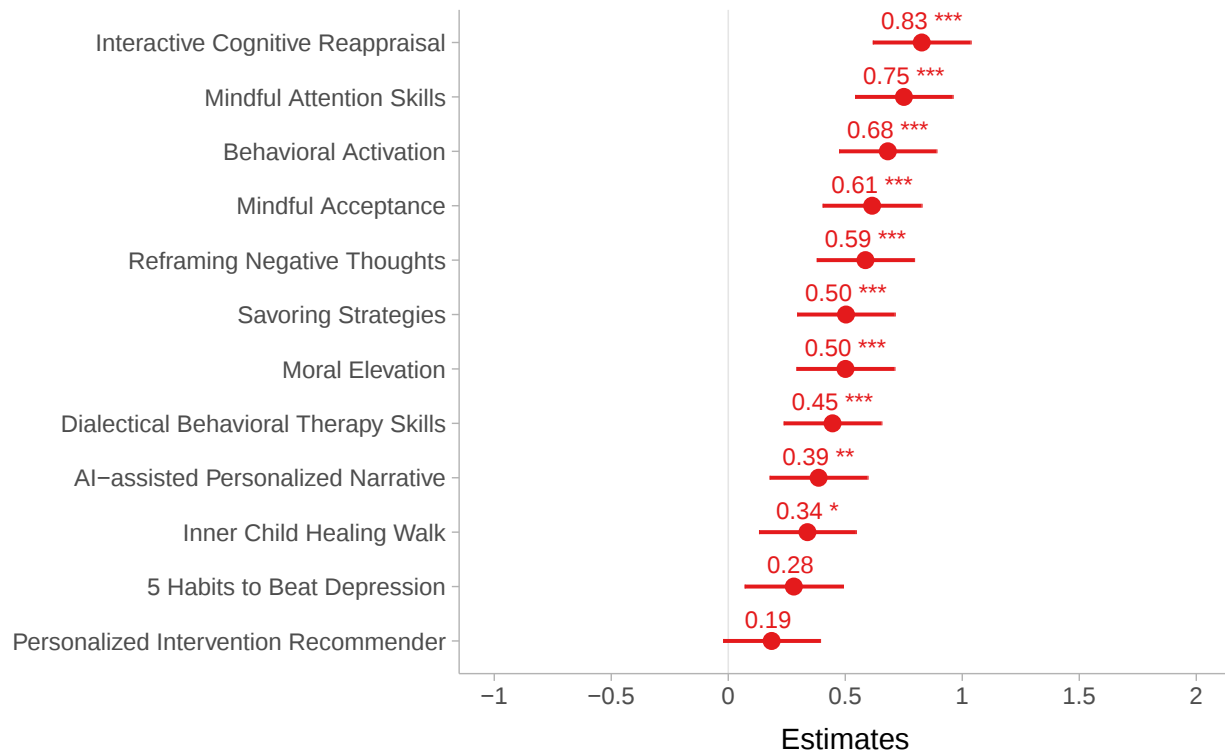
```
## 20 timeWeek 4:groupPersonalized Intervention Recommender    5.83e- 1    7.00e- 1
## 21 timePost-test:groupReframing Negative Thoughts          3.37e- 8    1.62e- 7
## 22 timeWeek 4:groupReframing Negative Thoughts            7.42e- 1    7.74e- 1
## 23 timePost-test:groupSavoring Strategies                 2.25e- 6    9.01e- 6
## 24 timeWeek 4:groupSavoring Strategies                    2.22e- 1    3.13e- 1
```

```
plot_model(m1_dep_expect, sort.est = T, terms=wk4_int_terms, auto_label=F,
           show.values = T, value.offset = .4, value.size = 3.2,
           p.adjust = 'hochberg')+
scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
ggtitle('Change Expectancies baseline to week 4',
        'With multiple comparison correction')
```



```
plot_model(m1_dep_expect, sort.est = T, terms=posttest_int_terms, auto_label=F,
           show.values = T, value.offset = .4, value.size = 3.2,
           p.adjust = 'hochberg')+
scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
ggtitle('Change Expectancies baseline to post-test',
        'With multiple comparison correction')
```

Change Expectancies baseline to post-test With multiple comparison correction

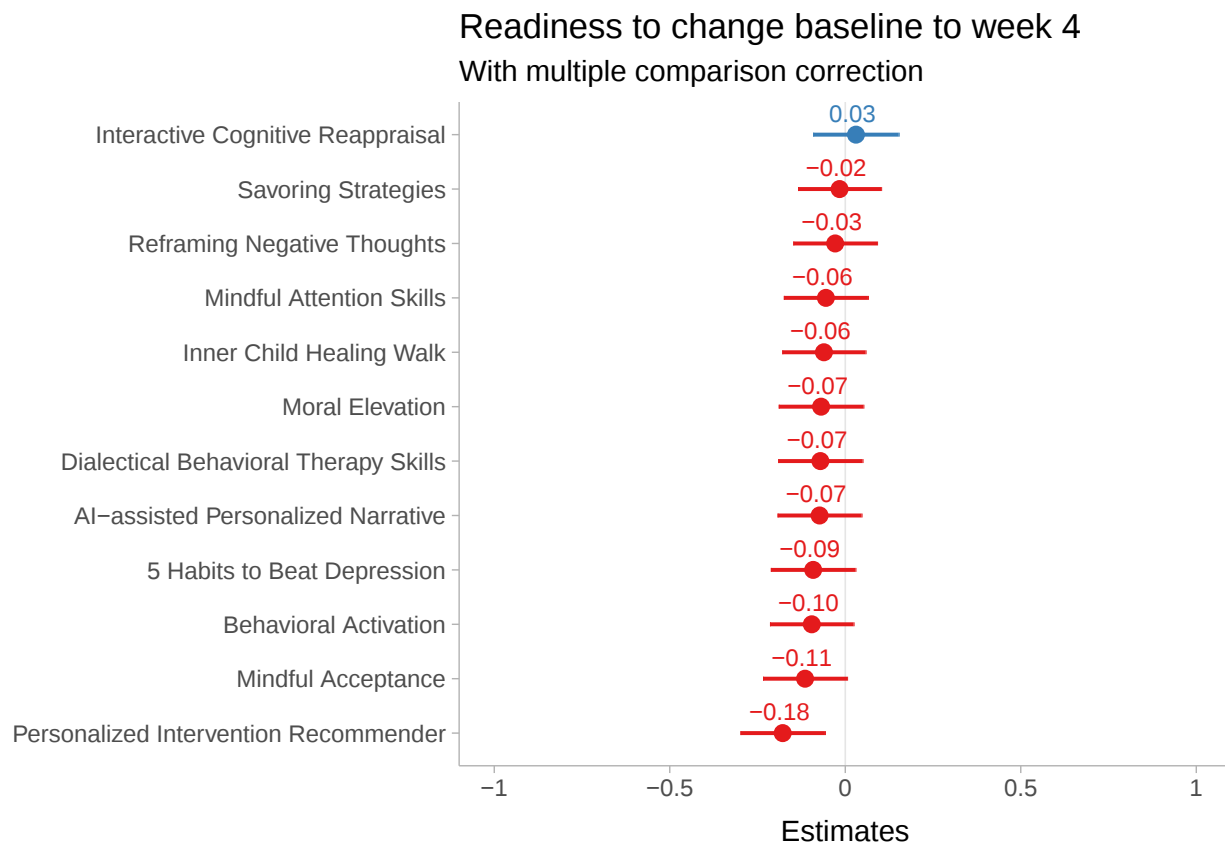


```
#Readiness to change
m1_readiness %>% tidy() %>% filter(str_detect(term,':group')) %>%
  adjust_pvalue(method='BH') %>% select(term,p.value,p.value.adj)%>% print(n=100)
```

```
## # A tibble: 24 x 3
##   term                                p.value p.value.adj
##   <chr>                                <dbl>     <dbl>
## 1 timePost-test:group5 Habits to Beat Depression 6.78e- 5 2.32e-4
## 2 timeWeek 4:group5 Habits to Beat Depression 1.37e- 1 2.05e-1
## 3 timePost-test:groupAI-assisted Personalized Narrative 7.53e- 6 4.52e-5
## 4 timeWeek 4:groupAI-assisted Personalized Narrative 2.31e- 1 3.26e-1
## 5 timePost-test:groupBehavioral Activation 1.37e- 5 5.47e-5
## 6 timeWeek 4:groupBehavioral Activation 1.16e- 1 1.86e-1
## 7 timePost-test:groupDialectical Behavioral Therapy Skills 1.40e- 2 3.06e-2
## 8 timeWeek 4:groupDialectical Behavioral Therapy Skills 2.47e- 1 3.30e-1
## 9 timePost-test:groupInner Child Healing Walk 5.29e- 2 1.06e-1
## 10 timeWeek 4:groupInner Child Healing Walk 3.16e- 1 3.79e-1
## 11 timePost-test:groupInteractive Cognitive Reappraisal 1.11e-10 1.81e-9
## 12 timeWeek 4:groupInteractive Cognitive Reappraisal 6.24e- 1 6.64e-1
## 13 timePost-test:groupMindful Acceptance 5.23e- 4 1.57e-3
## 14 timeWeek 4:groupMindful Acceptance 6.08e- 2 1.12e-1
## 15 timePost-test:groupMindful Attention Skills 1.51e-10 1.81e-9
## 16 timeWeek 4:groupMindful Attention Skills 3.66e- 1 4.19e-1
## 17 timePost-test:groupMoral Elevation 1.22e- 5 5.47e-5
## 18 timeWeek 4:groupMoral Elevation 2.63e- 1 3.32e-1
## 19 timePost-test:groupPersonalized Intervention Recommender 1.14e- 1 1.86e-1
```

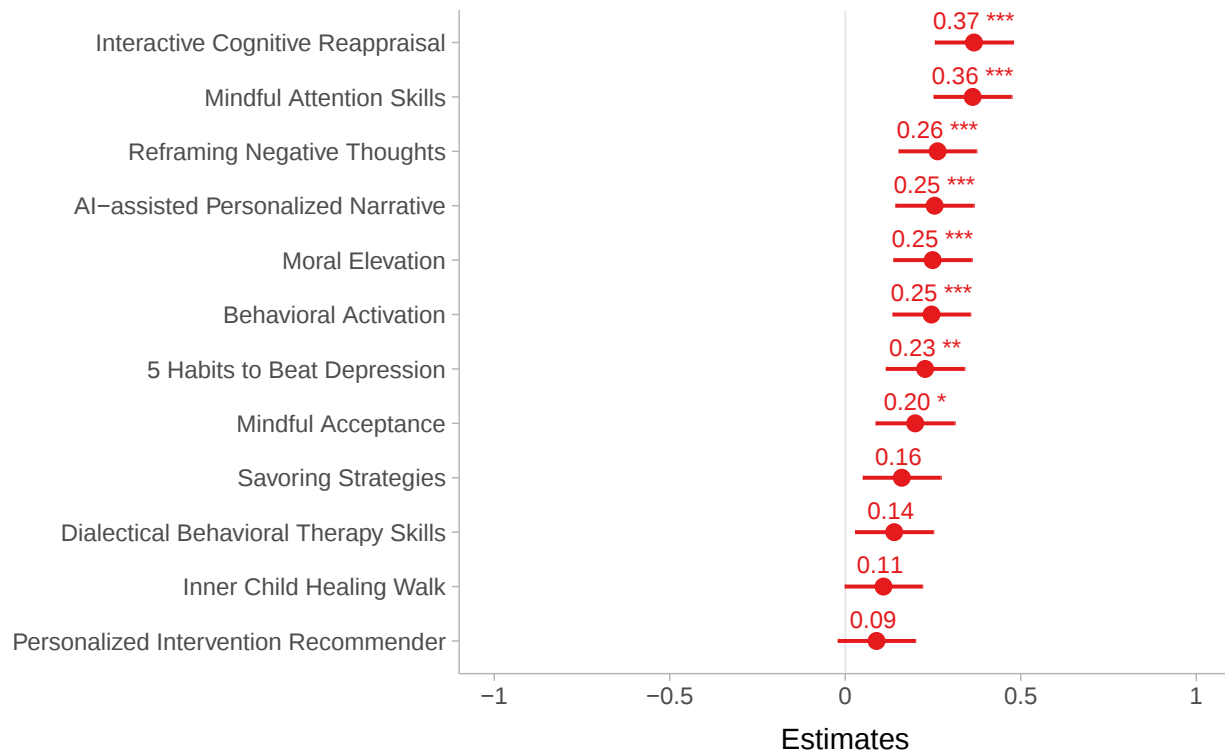
```
## 20 timeWeek 4:groupPersonalized Intervention Recommender 3.72e- 3 9.91e-3
## 21 timePost-test:groupReframing Negative Thoughts 3.28e- 6 2.63e-5
## 22 timeWeek 4:groupReframing Negative Thoughts 6.37e- 1 6.64e-1
## 23 timePost-test:groupSavoring Strategies 4.47e- 3 1.07e-2
## 24 timeWeek 4:groupSavoring Strategies 7.88e- 1 7.88e-1
```

```
plot_model(m1_readiness, sort.est = T, terms=wk4_int_terms, auto_label=F,
           show.values = T, value.offset = .4, value.size = 3.2,
           p.adjust = 'hochberg')+
scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
ggtitle('Readiness to change baseline to week 4',
        'With multiple comparison correction')
```



```
plot_model(m1_readiness, sort.est = T, terms=posttest_int_terms, auto_label=F,
           show.values = T, value.offset = .4, value.size = 3.2,
           p.adjust = 'hochberg')+
scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
ggtitle('Readiness to change baseline to post-test',
        'With multiple comparison correction')
```

Readiness to change baseline to post-test With multiple comparison correction

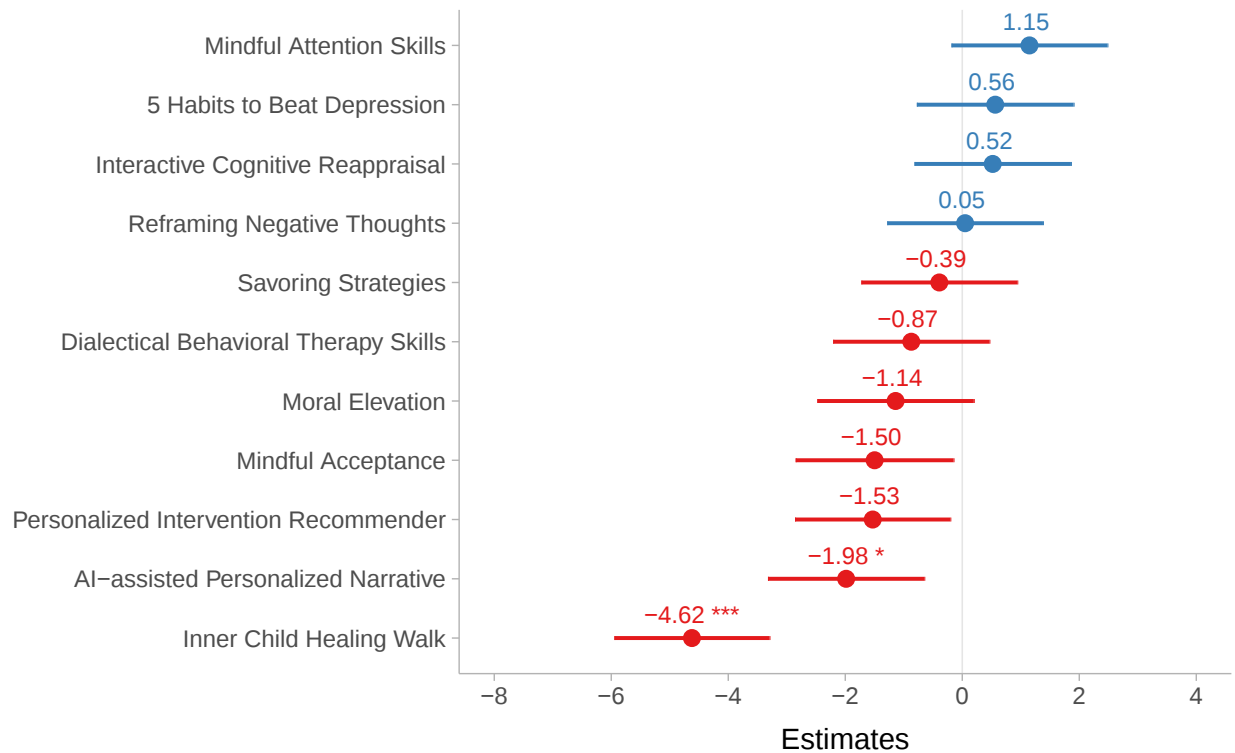


```
#Credibility / Expectancy Questionnaire
m1_ceq %>% tidy() %>% filter(str_detect(term,'group')) %>%
  adjust_pvalue(method='BH') %>% select(term,p.value,p.value.adj)%>% print(n=100)
```

```
## # A tibble: 11 x 3
##   term                                p.value p.value.adj
##   <chr>                                <dbl>     <dbl>
## 1 group5 Habits to Beat Depression    4.10e- 1    5.44e- 1
## 2 groupAI-assisted Personalized Narrative 3.60e- 3    1.98e- 2
## 3 groupDialectical Behavioral Therapy Skills 2.01e- 1    3.16e- 1
## 4 groupInner Child Healing Walk      9.08e-12    9.99e-11
## 5 groupInteractive Cognitive Reappraisal 4.45e- 1    5.44e- 1
## 6 groupMindful Acceptance            2.95e- 2    8.12e- 2
## 7 groupMindful Attention Skills       9.13e- 2    1.74e- 1
## 8 groupMoral Elevation                9.47e- 2    1.74e- 1
## 9 groupPersonalized Intervention Recommender 2.37e- 2    8.12e- 2
## 10 groupReframing Negative Thoughts    9.43e- 1    9.43e- 1
## 11 groupSavoring Strategies           5.64e- 1    6.20e- 1
```

```
(ceq_plot <- plot_model(m1_ceq,sort.est = T,terms=acceptability_terms,auto_label=F,
  show.values = T, value.offset = .4,value.size = 3.2,
  p.adjust = 'hochberg'))+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Credibility and Expected Benefit','With multiple comparison correction'))
```

Credibility and Expected Benefit With multiple comparison correction



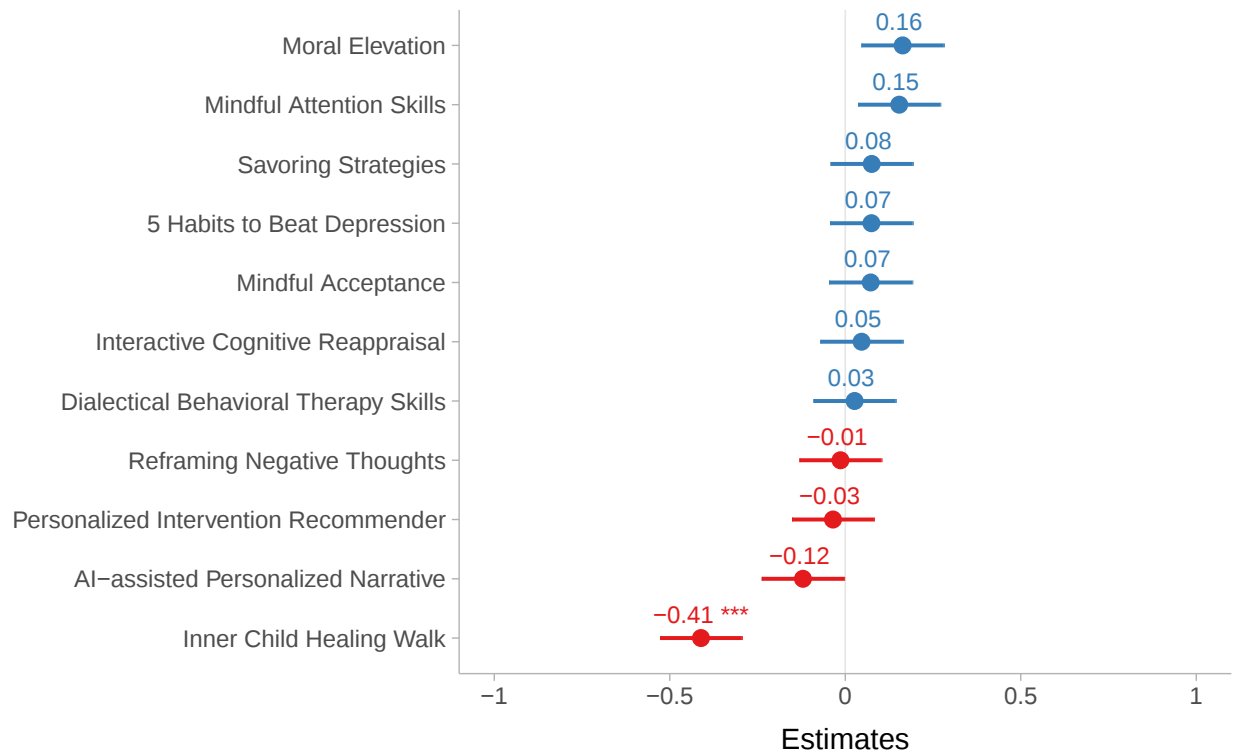
```
#Star ratings
m1_star %>% tidy() %>% filter(str_detect(term, 'group')) %>%
  adjust_pvalue(method='BH') %>% select(term, p.value, p.value.adj) %>% print(n=100)
```

```
## # A tibble: 11 x 3
##   term                                p.value p.value.adj
##   <chr>                                <dbl>     <dbl>
## 1 group5 Habits to Beat Depression    2.14e- 1  3.63e- 1
## 2 groupAI-assisted Personalized Narrative 4.42e- 2  1.21e- 1
## 3 groupDialectical Behavioral Therapy Skills 6.56e- 1  7.22e- 1
## 4 groupInner Child Healing Walk       5.01e-12  5.51e-11
## 5 groupInteractive Cognitive Reappraisal 4.38e- 1  6.02e- 1
## 6 groupMindful Acceptance             2.31e- 1  3.63e- 1
## 7 groupMindful Attention Skills        1.01e- 2  3.70e- 2
## 8 groupMoral Elevation                 6.41e- 3  3.53e- 2
## 9 groupPersonalized Intervention Recommender 5.57e- 1  6.80e- 1
## 10 groupReframing Negative Thoughts    8.19e- 1  8.19e- 1
## 11 groupSavoring Strategies            2.08e- 1  3.63e- 1
```

```
plot_model(m1_star, sort.est = T, terms=acceptability_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2,
  p.adjust = 'hochberg') +
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Star rating at post-test', 'With multiple comparison correction')
```

Star rating at post-test

With multiple comparison correction



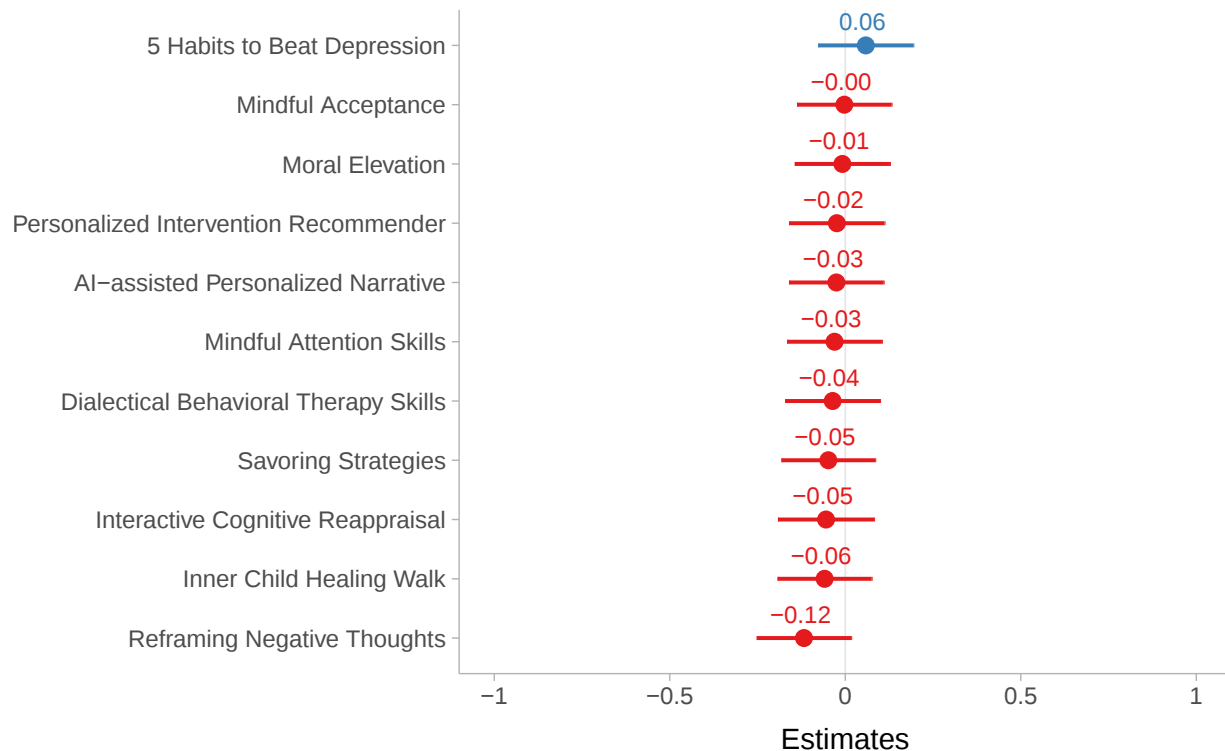
```
m1_star_wk4 %>% tidy() %>% filter(str_detect(term, 'group')) %>%
  adjust_pvalue(method='BH') %>% select(term, p.value, p.value.adj)
```

```
## # A tibble: 11 x 3
##   term                                p.value p.value.adj
##   <chr>                                <dbl>     <dbl>
## 1 group5 Habits to Beat Depression      0.397      0.891
## 2 groupAI-assisted Personalized Narrative 0.713      0.891
## 3 groupDialectical Behavioral Therapy Skills 0.602      0.891
## 4 groupInner Child Healing Walk          0.389      0.891
## 5 groupInteractive Cognitive Reappraisal    0.433      0.891
## 6 groupMindful Acceptance                0.970      0.970
## 7 groupMindful Attention Skills           0.657      0.891
## 8 groupMoral Elevation                   0.905      0.970
## 9 groupPersonalized Intervention Recommender 0.729      0.891
## 10 groupReframing Negative Thoughts        0.0867     0.891
## 11 groupSavoring Strategies               0.479      0.891
```

```
plot_model(m1_star_wk4, sort.est = T, terms=acceptability_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2,
  p.adjust = 'hochberg')+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Star rating at Week 4', 'With multiple comparison correction')
```

Star rating at Week 4

With multiple comparison correction



#Aha moments

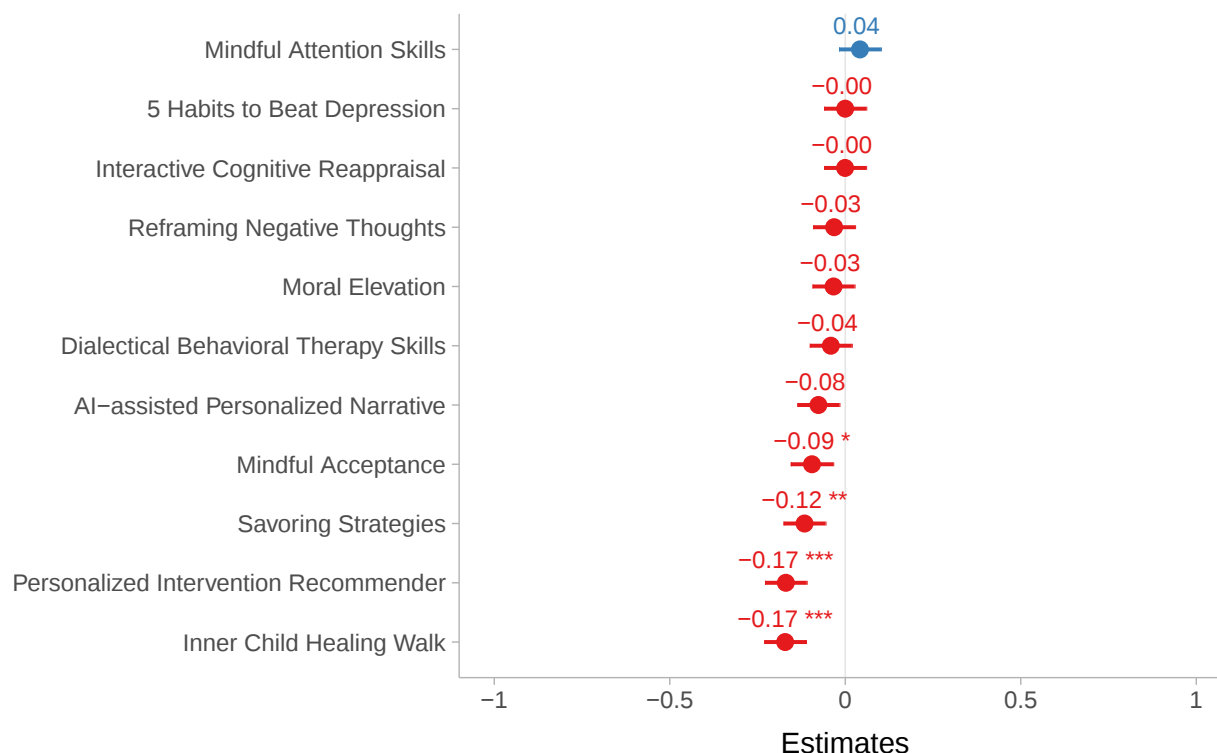
```
m1_aha %>% tidy() %>% filter(str_detect(term,'group')) %>%
  adjust_pvalue(method='BH') %>% select(term,p.value,p.value.adj)%>% print(n=100)
```

```
## # A tibble: 11 x 3
##   term                                p.value p.value.adj
##   <chr>                                <dbl>      <dbl>
## 1 group5 Habits to Beat Depression    0.995      0.995
## 2 groupAI-assisted Personalized Narrative 0.0124     0.0272
## 3 groupDialectical Behavioral Therapy Skills 0.178      0.280
## 4 groupInner Child Healing Walk        0.0000000169 0.000000136
## 5 groupInteractive Cognitive Reappraisal    0.987      0.995
## 6 groupMindful Acceptance              0.00213     0.00586
## 7 groupMindful Attention Skills          0.170      0.280
## 8 groupMoral Elevation                  0.275      0.364
## 9 groupPersonalized Intervention Recommender 0.0000000247 0.000000136
## 10 groupReframing Negative Thoughts        0.297      0.364
## 11 groupSavoring Strategies              0.000144    0.000528
```

```
plot_model(m1_aha,sort.est = T,terms=acceptability_terms,auto_label=F,
  show.values = T, value.offset = .4,value.size = 3.2,
  p.adjust = 'hochberg')+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Aha moment at post-test','With multiple comparison correction')
```

Aha moment at post-test

With multiple comparison correction



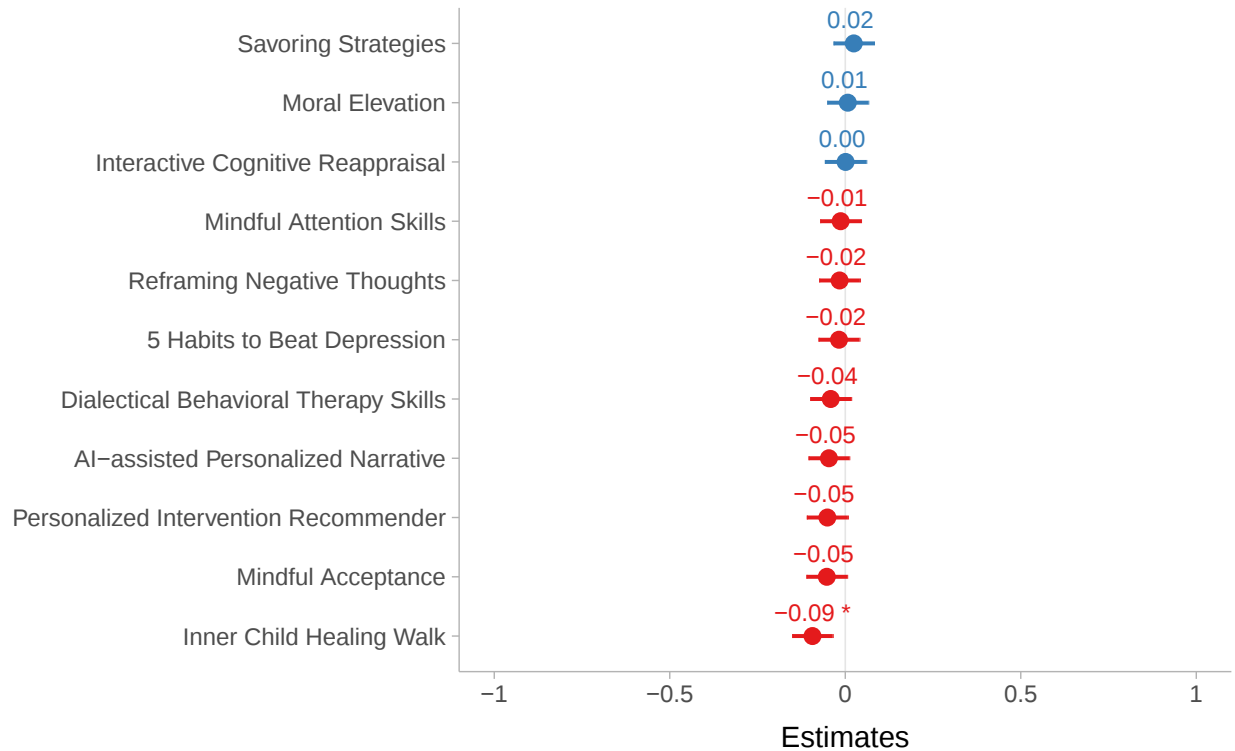
```
m1_aha_wk4 %>% tidy() %>% filter(str_detect(term,'group')) %>%
  adjust_pvalue(method='BH') %>% select(term,p.value,p.value.adj)
```

```
## # A tibble: 11 x 3
##   term                                p.value p.value.adj
##   <chr>                                <dbl>     <dbl>
## 1 group5 Habits to Beat Depression    0.549     0.802
## 2 groupAI-assisted Personalized Narrative 0.116     0.319
## 3 groupDialectical Behavioral Therapy Skills 0.164     0.361
## 4 groupInner Child Healing Walk      0.00152    0.0167
## 5 groupInteractive Cognitive Reappraisal 0.976     0.976
## 6 groupMindful Acceptance            0.0755    0.319
## 7 groupMindful Attention Skills       0.656     0.802
## 8 groupMoral Elevation               0.809     0.890
## 9 groupPersonalized Intervention Recommender 0.0872    0.319
## 10 groupReframing Negative Thoughts    0.584     0.802
## 11 groupSavoring Strategies           0.409     0.749
```

```
plot_model(m1_aha_wk4,sort.est = T,terms=acceptability_terms,auto_label=F,
  show.values = T, value.offset = .4,value.size = 3.2,
  p.adjust = 'hochberg')+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Aha moment at week 4','With multiple comparison correction')
```

Aha moment at week 4

With multiple comparison correction



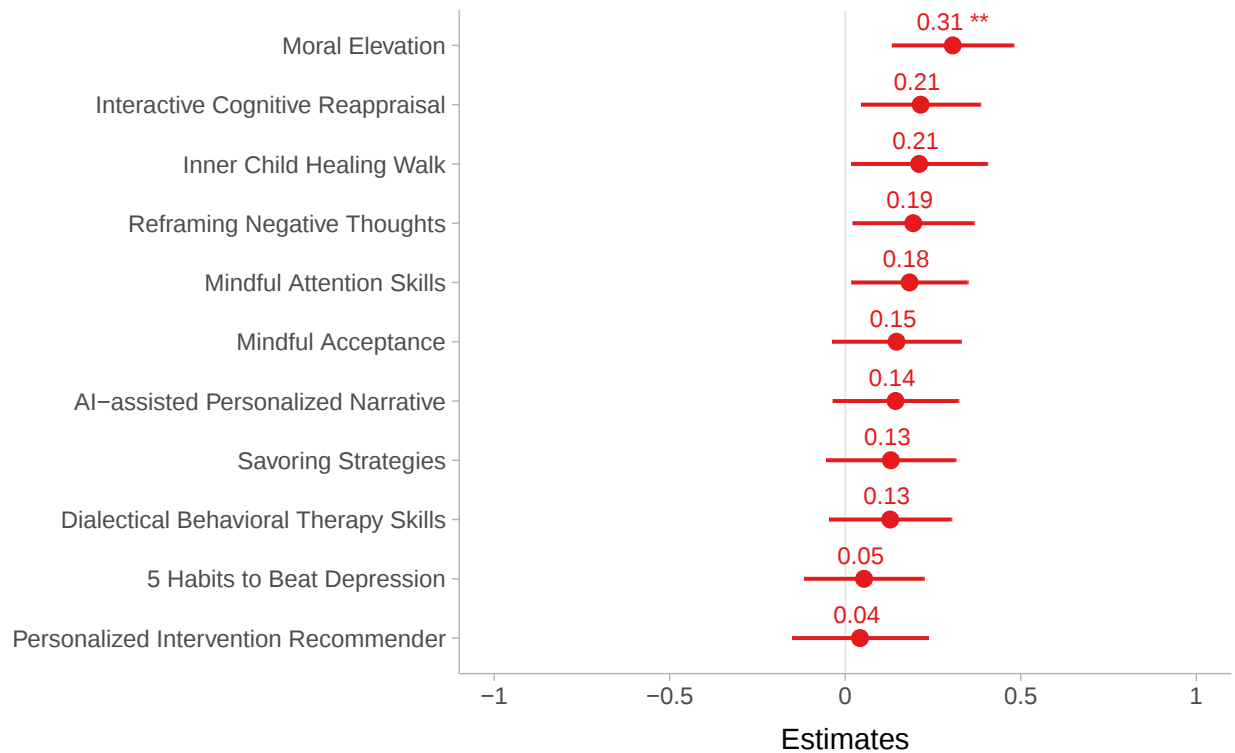
```
#Aha moment significance
m1_aha_significance %>% tidy() %>% filter(str_detect(term, 'group')) %>%
  adjust_pvalue(method='BH') %>% select(term, p.value, p.value.adj) %>% print(n=100)
```

```
## # A tibble: 11 x 3
##   term                                p.value p.value.adj
##   <chr>                                <dbl>     <dbl>
## 1 group5 Habits to Beat Depression    0.538     0.591
## 2 groupAI-assisted Personalized Narrative 0.116     0.187
## 3 groupDialectical Behavioral Therapy Skills 0.149     0.205
## 4 groupInner Child Healing Walk      0.0336    0.0738
## 5 groupInteractive Cognitive Reappraisal 0.0132    0.0728
## 6 groupMindful Acceptance            0.119     0.187
## 7 groupMindful Attention Skills       0.0302    0.0738
## 8 groupMoral Elevation               0.000544  0.00598
## 9 groupPersonalized Intervention Recommender 0.670     0.670
## 10 groupReframing Negative Thoughts    0.0278    0.0738
## 11 groupSavoring Strategies           0.168     0.205
```

```
plot_model(m1_aha_significance, sort.est = T, terms=acceptability_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2,
  p.adjust = 'hochberg')+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Aha moment significance at post-test', 'With multiple comparison correction')
```

Aha moment significance at post-test

With multiple comparison correction



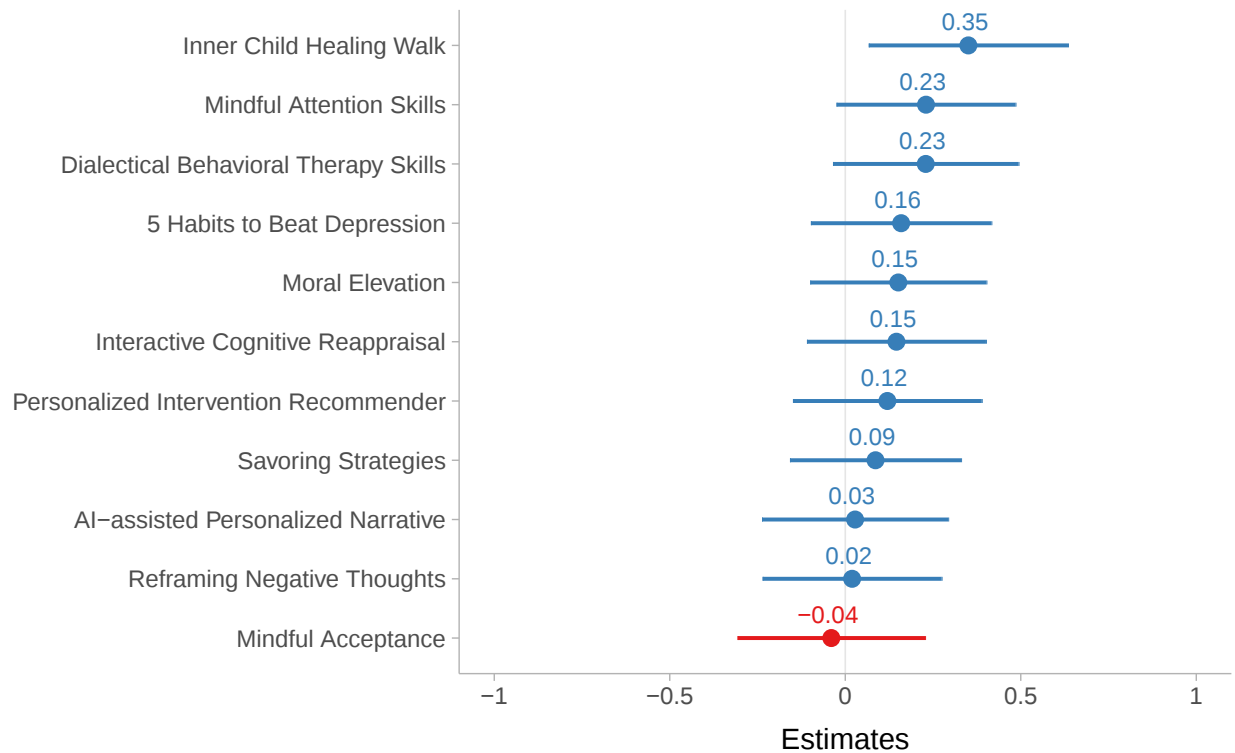
```
m1_aha_significance_wk4 %>% tidy() %>% filter(str_detect(term, 'group')) %>%
  adjust_pvalue(method='BH') %>% select(term, p.value, p.value.adj) %>% print(n=100)
```

```
## # A tibble: 11 x 3
##   term                                p.value p.value.adj
##   <chr>                                <dbl>     <dbl>
## 1 group5 Habits to Beat Depression      0.225     0.480
## 2 groupAI-assisted Personalized Narrative 0.836     0.881
## 3 groupDialectical Behavioral Therapy Skills 0.0890    0.326
## 4 groupInner Child Healing Walk         0.0155    0.170
## 5 groupInteractive Cognitive Reappraisal    0.262     0.480
## 6 groupMindful Acceptance                0.771     0.881
## 7 groupMindful Attention Skills          0.0769    0.326
## 8 groupMoral Elevation                  0.238     0.480
## 9 groupPersonalized Intervention Recommender 0.382     0.600
## 10 groupReframing Negative Thoughts        0.881     0.881
## 11 groupSavoring Strategies               0.488     0.671
```

```
plot_model(m1_aha_significance_wk4, sort.est = T, terms=acceptability_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2,
  p.adjust = 'hochberg')+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Aha moment significance at week 4', 'With multiple comparison correction')
```

Aha moment significance at week 4

With multiple comparison correction



#How much aha moment changed behavior four weeks later

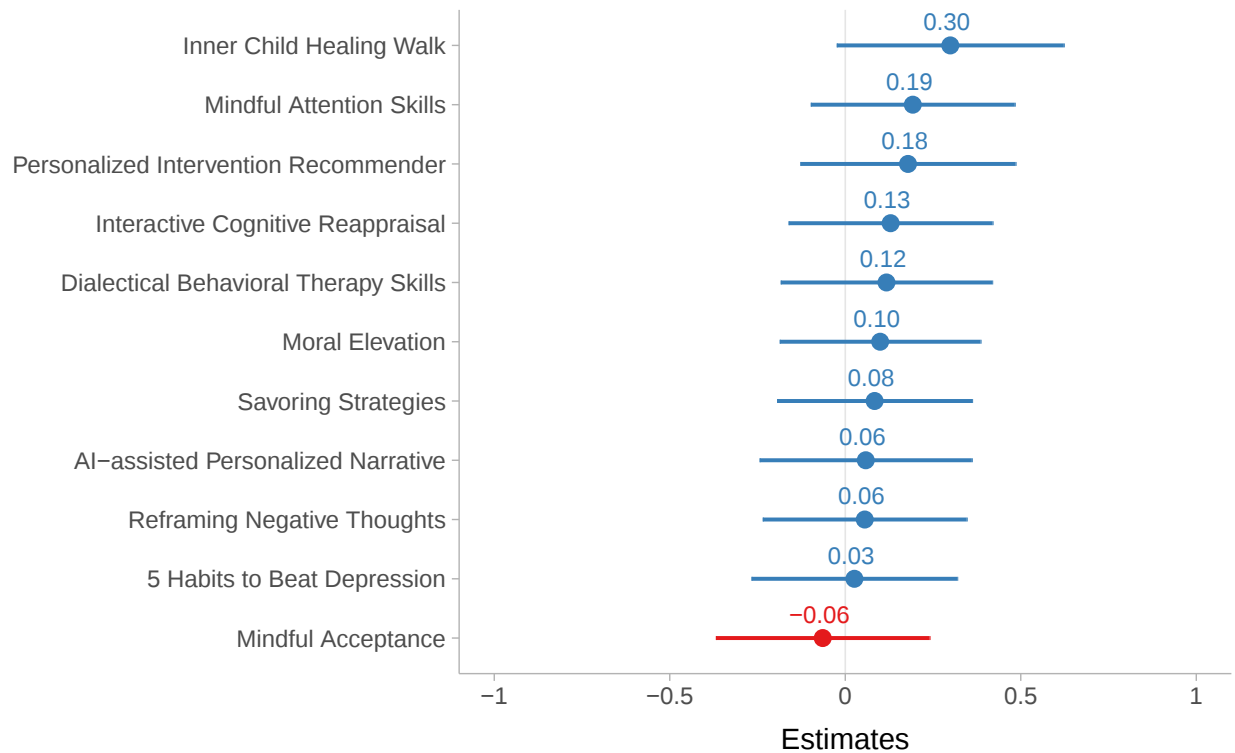
```
m1_aha_howchanged %>% tidy() %>% filter(str_detect(term, 'group')) %>%
  adjust_pvalue(method='BH') %>% select(term, p.value, p.value.adj)
```

```
## # A tibble: 11 x 3
```

term	p.value	p.value.adj
1 group5 Habits to Beat Depression	0.862	0.862
2 groupAI-assisted Personalized Narrative	0.705	0.779
3 groupDialectical Behavioral Therapy Skills	0.445	0.779
4 groupInner Child Healing Walk	0.0697	0.767
5 groupInteractive Cognitive Reappraisal	0.383	0.779
6 groupMindful Acceptance	0.679	0.779
7 groupMindful Attention Skills	0.194	0.779
8 groupMoral Elevation	0.496	0.779
9 groupPersonalized Intervention Recommender	0.253	0.779
10 groupReframing Negative Thoughts	0.708	0.779
11 groupSavoring Strategies	0.555	0.779

```
plot_model(m1_aha_howchanged, sort.est = T, terms=acceptability_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2,
  p.adjust = 'hochberg')+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle("How much Aha! moment changed one's behavior at week 4", 'With multiple comparison correction')
```

How much Aha! moment changed one's behavior at With multiple comparison correction



Additional Analyses (Not pre-registered)

1. Intervention features predicting outcomes

- Before collecting data, we coded the SSIs on several characteristics (<https://osf.io/5kxqz>)
- This analysis is massively underpowered (n=12), but may be worth a look anyways.

```
#each of these compares an outcome by the presence of a feature

#loading our ratings of each SSI's characteristics
ssi_characteristics <- read_excel('top10 ssi characteristics all three ratings.xlsx')

ceq_avgs <- mega_alltimes %>% filter(time=='Post-test') %>% group_by(group) %>%
  summarize(CEQ_mean=mean(CEQ_score,na.rm=T))

#joining study effect sizes and our team's ratings of SSI characteristics
chars_plus_studydata <- ceq_avgs %>% left_join(
  mixed_cohens_d(m1_phq9) %>%
    filter(str_detect(term,'timeWeek 4:')) %>%
    select(group=term,PHQ_ES='cohens_d') %>%
```

```

mutate(group=str_remove(group,'timeWeek 4:group')) %>%
left_join(ssi_characteristics,by=c('group'='SSI')) %>%
rename_with(~ str_replace(., " \\(.*", ""))

# Define predictors and outcomes
predictors <- c(
  "CEQ_mean","`Video or audio mostly`", "Engagingness",
  "`Interactive activities`", "`Personalization / choice`",
  "Effortful", "`Refer to other resources`", "`Meditation practice`",
  "`Cognitive reframing`", "`Behavioral activation`", "`Mindfulness`",
  "`Clinician-created mostly`", "`take-home reminder`")

# Create a dataframe to store results
run_models <- function(outcome) {
  do.call(rbind, lapply(predictors, function(predictor) {
    model <- lm(as.formula(paste(outcome, "~", predictor)), data = chars_plus_studydata)
    tidy(model) %>%
      filter(term != "(Intercept)") %>%
      adjust_pvalue(method='BH')# Remove intercept
  }))
}

# Run models for each outcome and store in separate dataframes
(results_PHQ <- run_models("PHQ_ES")) #predicting PHQ_ES

```

```
## # A tibble: 13 x 6
```

##	term	estimate	std.error	statistic	p.value	p.value.adj
##	<chr>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
## 1	CEQ_mean	-0.0133	0.00910	-1.46	0.174	0.174
## 2	'Video or audio mostly'	0.03	0.0506	0.593	0.575	0.575
## 3	Engagingness	-0.0106	0.0259	-0.410	0.696	0.696
## 4	'Interactive activities'	-0.00484	0.0184	-0.263	0.801	0.801
## 5	'Personalization / choice'	-0.0111	0.0148	-0.749	0.482	0.482
## 6	Effortful	-0.0262	0.0268	-0.976	0.367	0.367
## 7	'Refer to other resources'	0.0253	0.0454	0.559	0.597	0.597
## 8	'Meditation practice'	0.035	0.0427	0.819	0.444	0.444
## 9	'Cognitive reframing'	-0.0174	0.0128	-1.35	0.225	0.225
## 10	'Behavioral activation'	-0.00529	0.0192	-0.275	0.792	0.792
## 11	Mindfulness	-0.000286	0.0152	-0.0188	0.986	0.986
## 12	'Clinician-created mostly'	0.035	0.0427	0.819	0.444	0.444
## 13	'take-home reminder'	-0.0233	0.0511	-0.456	0.664	0.664

```
(results_CEQ <- run_models("CEQ_mean")) #predicting CEQ_mean
```

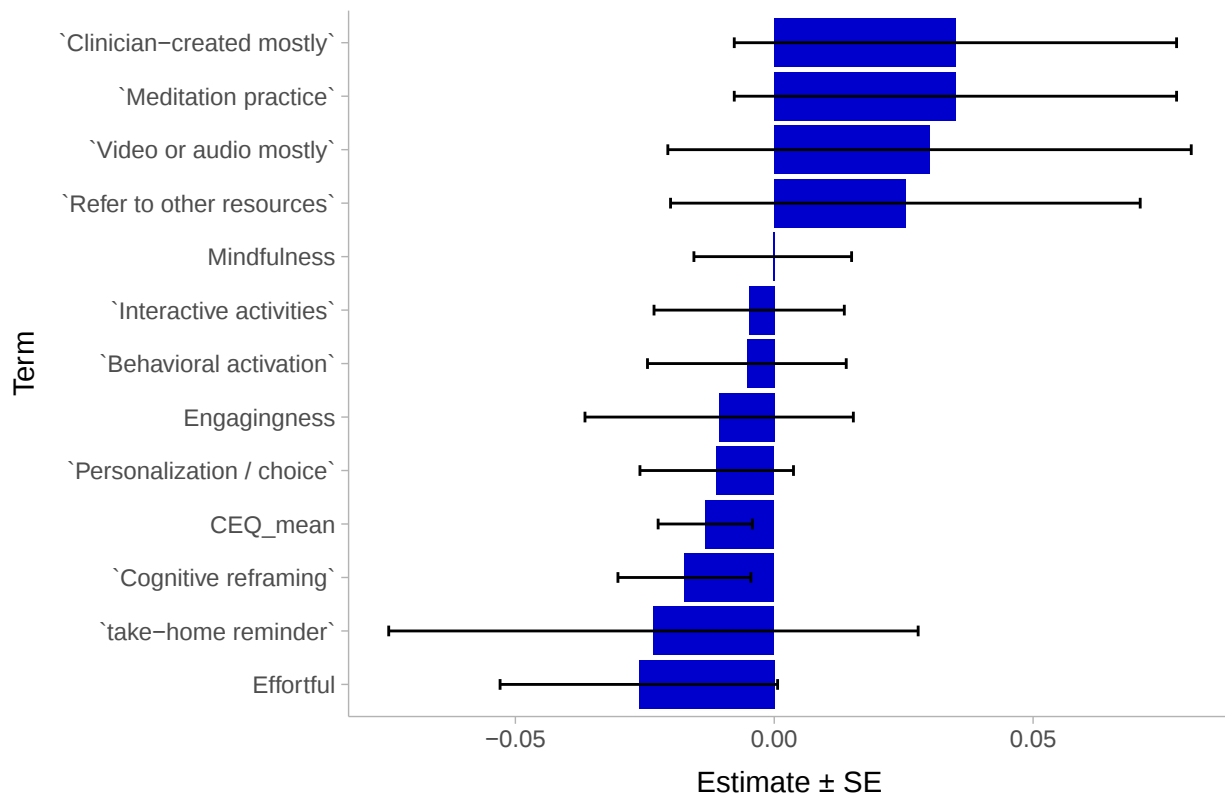
```
## # A tibble: 12 x 6
```

##	term	estimate	std.error	statistic	p.value	p.value.adj
##	<chr>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
## 1	'Video or audio mostly'	-0.936	1.56	-0.601	0.570	0.570
## 2	Engagingness	-0.189	0.807	-0.234	0.823	0.823
## 3	'Interactive activities'	-0.325	0.555	-0.587	0.579	0.579
## 4	'Personalization / choice'	0.208	0.471	0.442	0.674	0.674
## 5	Effortful	0.682	0.845	0.807	0.451	0.451

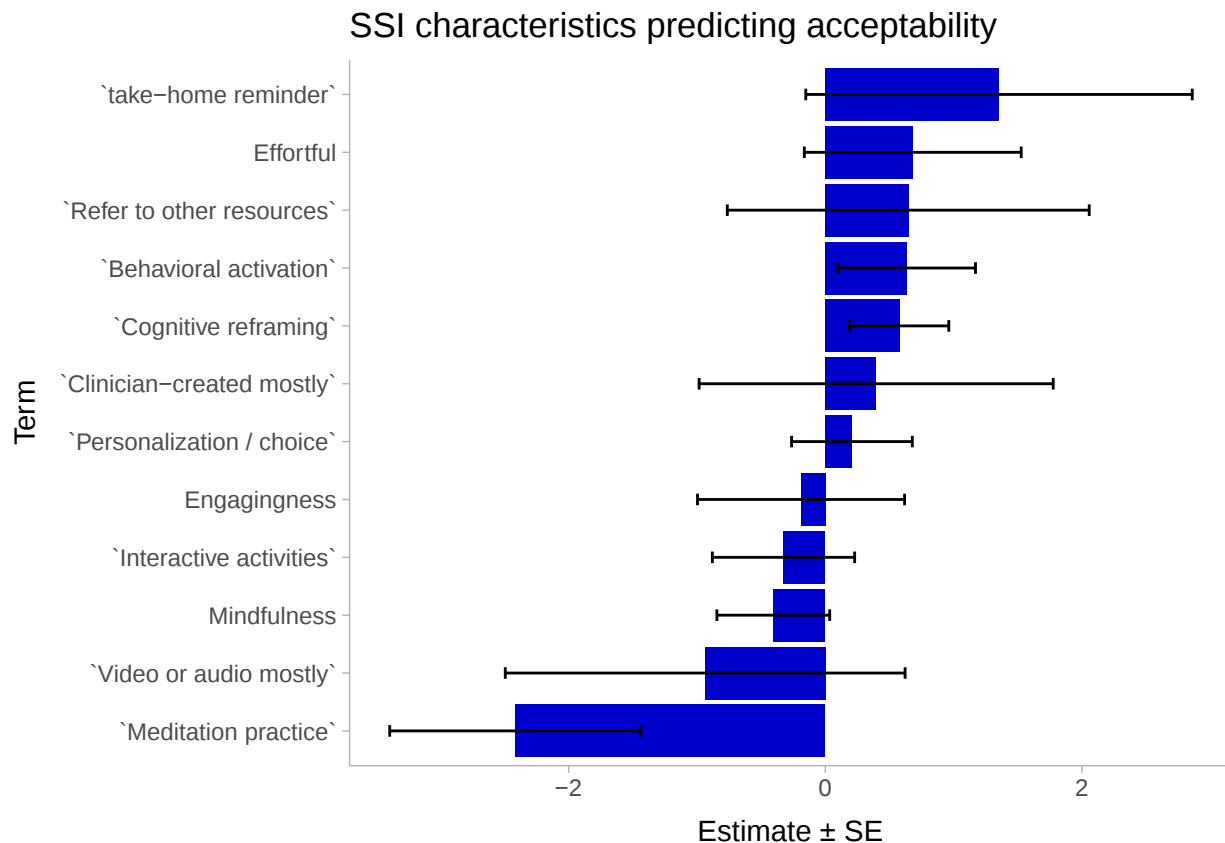
```
## 6 'Refer to other resources' 0.647 1.41 0.459 0.663 0.663
## 7 'Meditation practice' -2.42 0.979 -2.47 0.0486 0.0486
## 8 'Cognitive reframing' 0.577 0.386 1.49 0.186 0.186
## 9 'Behavioral activation' 0.635 0.537 1.18 0.282 0.282
## 10 Mindfulness -0.405 0.440 -0.921 0.393 0.393
## 11 'Clinician-created mostly' 0.397 1.38 0.287 0.783 0.783
## 12 'take-home reminder' 1.35 1.51 0.899 0.403 0.403
```

```
ggplot(results_PHQ, aes(x = reorder(term, estimate), y = estimate)) +
  geom_bar(stat = "identity", fill = "blue3") +
  geom_errorbar(aes(ymin = estimate - std.error, ymax = estimate + std.error),
    width = 0.2) + coord_flip() +
  labs(x = "Term", y = "Estimate \u00B1 SE",
    title = "Intervention characteristics predicting change in depression")
```

Intervention characteristics predicting change in depression



```
ggplot(results_CEQ, aes(x = reorder(term, estimate), y = estimate)) +
  geom_bar(stat = "identity", fill = "blue3") +
  geom_errorbar(aes(ymin = estimate - std.error, ymax = estimate + std.error),
    width = 0.2) + coord_flip() +
  labs(x = "Term", y = "Estimate \u00B1 SE",
    title = "SSI characteristics predicting acceptability", 'At Post-test')
```



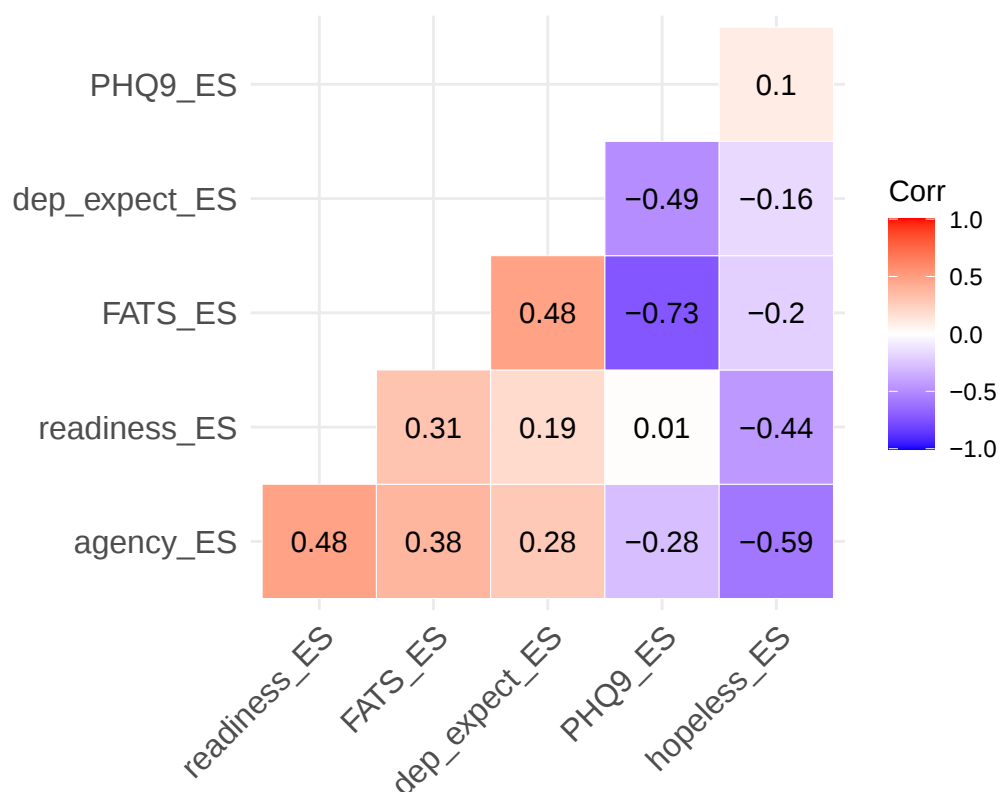
2. Correlation between intervention effects

This analysis is also super underpowered.

```
#Week 4 correlations
ESs_outcomes_wk4 <- phq9_cohens_d %>% filter(str_detect(term,'Week 4:group')) %>%
  rename(PHQ9_ES=cohens_d) %>%
  left_join(agency_cohens_d %>% filter(str_detect(term,'Week 4:group')) %>%
    rename(agency_ES=cohens_d),by='term') %>%
  left_join(hopeless_cohens_d %>% filter(str_detect(term,'Week 4:group')) %>%
    rename(hopeless_ES=cohens_d),by='term') %>%
  left_join(fats_cohens_d %>% filter(str_detect(term,'Week 4:group')) %>%
    rename(FATS_ES=cohens_d),by='term') %>%
  left_join(dep_expect_cohens_d %>% filter(str_detect(term,'Week 4:group')) %>%
    rename(dep_expect_ES=cohens_d),by='term') %>%
  left_join(readiness_cohens_d %>% filter(str_detect(term,'Week 4:group')) %>%
    rename(readiness_ES=cohens_d),by='term') %>%
  mutate(term=str_remove(term,'timeWeek 4:group')) %>%
  select(ends_with('_ES'))

corr_wk4 <- round(cor(ESs_outcomes_wk4), 2)
ggcorrplot(corr_wk4, hc.order = TRUE, type = "lower",
  outline.col = "white",lab=T,
  title = 'Correlation between intervention effect sizes over 4 weeks')
```

Correlation between intervention effect sizes over 4 weeks

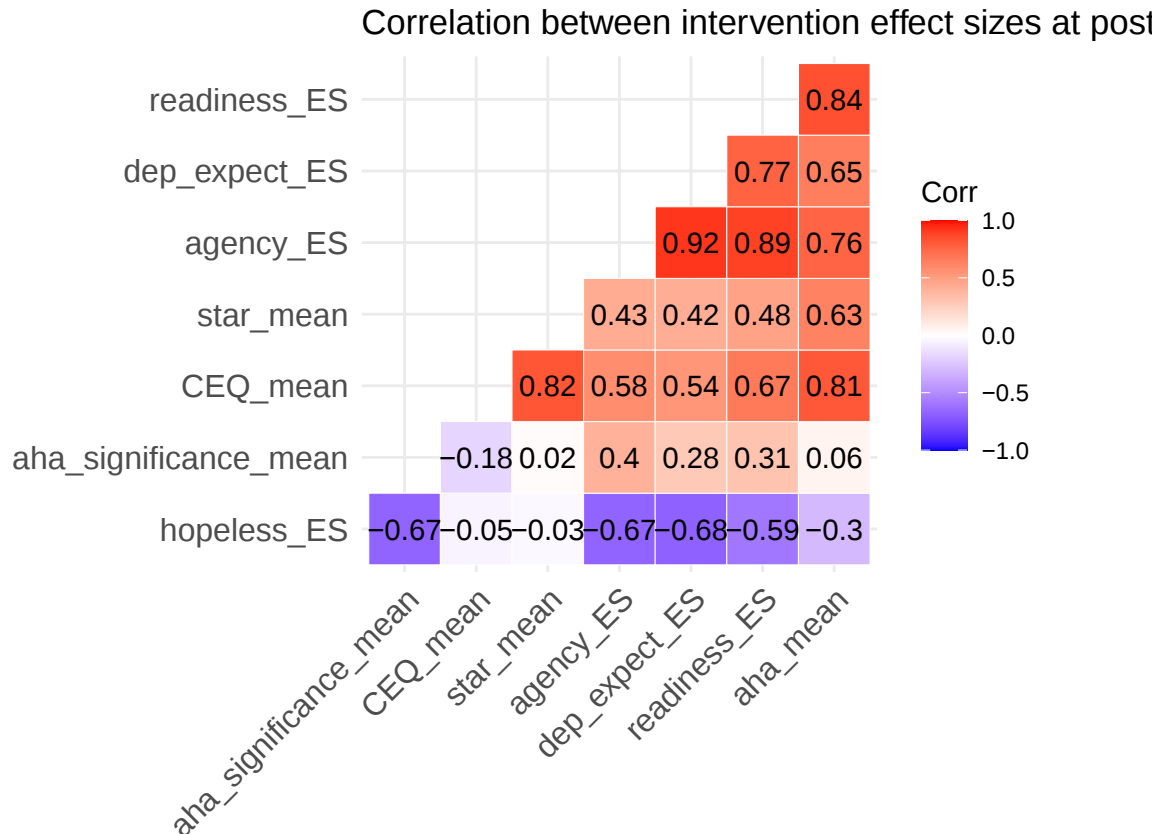


```
# Post-test correlations

star_avgs <- mega_alltimes %>% filter(time=='Post-test') %>% group_by(group) %>%
  summarize(star_mean=mean(star_rating_1,na.rm=T))
aha_avgs <- mega_alltimes %>% filter(time=='Post-test') %>% group_by(group) %>%
  summarize(aha_mean=mean(aha,na.rm=T))
aha_significance_avgs <- mega_alltimes %>% filter(time=='Post-test') %>% group_by(group) %>%
  summarize(aha_significance_mean=mean(aha_significant,na.rm=T))

ESs_outcomes_pt <- agency_cohens_d %>%
  filter(str_detect(term,'Post-test:group')) %>%
  rename(agency_ES=cohens_d) %>%
  left_join(hopeless_cohens_d %>% filter(str_detect(term,'Post-test:group')) %>%
    rename(hopeless_ES=cohens_d),by='term') %>%
  left_join(dep_expect_cohens_d %>% filter(str_detect(term,'Post-test:group')) %>%
    rename(dep_expect_ES=cohens_d),by='term') %>%
  left_join(readiness_cohens_d %>% filter(str_detect(term,'Post-test:group')) %>%
    rename(readiness_ES=cohens_d),by='term') %>%
  mutate(term=str_remove(term,'timePost-test:group')) %>%
  rename(group=term) %>%
  left_join(ceq_avgs) %>%
  left_join(star_avgs) %>%
  left_join(aha_avgs) %>%
  left_join(aha_significance_avgs) %>%
  select(ends_with('_ES')|ends_with('_mean'))
#correlating acceptability outcomes
```

```
corr_pt <- round(cor(ESs_outcomes_pt), 2)
ggcorrplot(corr_pt, hc.order = TRUE, type = "lower",
  outline.col = "white", lab=T,
  title = 'Correlation between intervention effect sizes at post-test')
```



```
#Make figures showing effect sizes per group across each outcome
ESs_outcomes_all_with_names <- phq9_cohens_d %>% filter(str_detect(term, 'Week 4:group')) %>%
  rename(PHQ9_Week4_ES=cohens_d) %>%
  mutate(term=str_remove(term, '.*:group')) %>%
  left_join(agency_cohens_d %>% filter(str_detect(term, 'Week 4:group')) %>%
    mutate(term=str_remove(term, '.*:group')) %>%
    rename(Agency_Week4_ES=cohens_d), by='term') %>%
  left_join(hopeless_cohens_d %>% filter(str_detect(term, 'Week 4:group')) %>%
    mutate(term=str_remove(term, '.*:group')) %>%
    rename(Hopelessness_Week4_ES=cohens_d), by='term') %>%
  left_join(fats_cohens_d %>% filter(str_detect(term, 'Week 4:group')) %>%
    mutate(term=str_remove(term, '.*:group')) %>%
    rename(FATS_Week4_ES=cohens_d), by='term') %>%
  left_join(dep_expect_cohens_d %>% filter(str_detect(term, 'Week 4:group')) %>%
    mutate(term=str_remove(term, '.*:group')) %>%
    rename(Change_Expectancy_Week4_ES=cohens_d), by='term') %>%
  left_join(readiness_cohens_d %>% filter(str_detect(term, 'Week 4:group')) %>%
    mutate(term=str_remove(term, '.*:group')) %>%
    rename(Readiness_Week4_ES=cohens_d), by='term') %>%
  left_join(agency_cohens_d %>% filter(str_detect(term, 'Post-test:group')) %>%
```

```

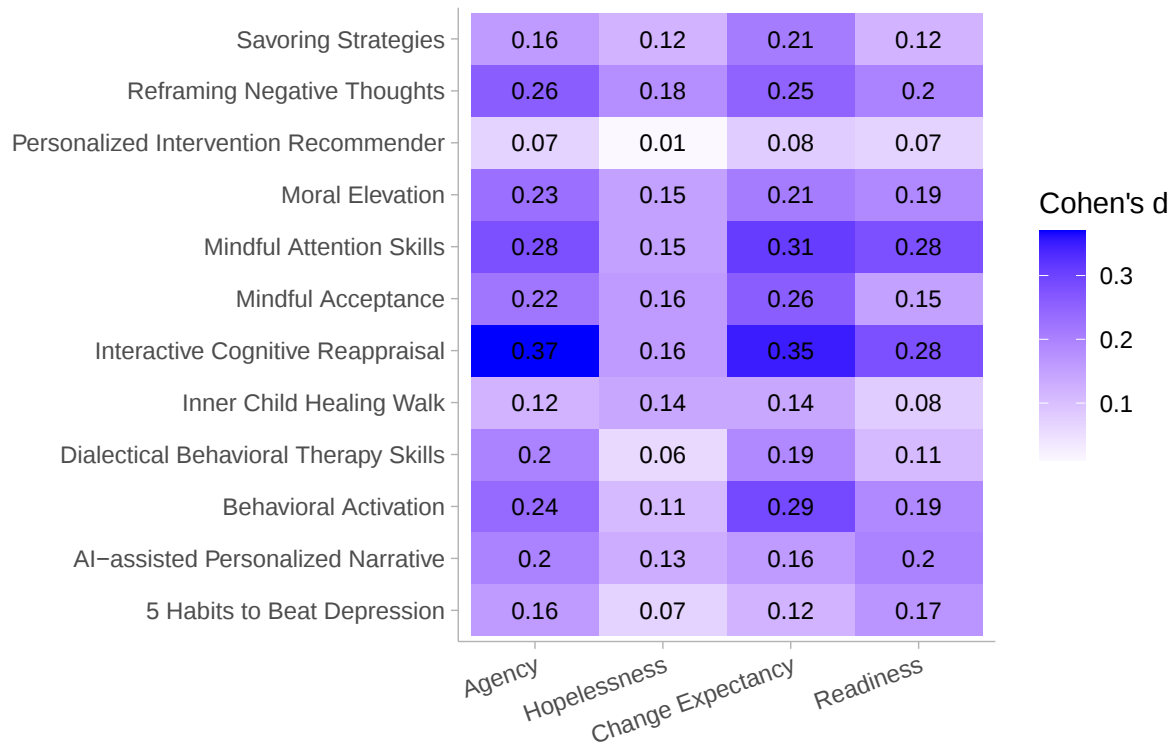
      mutate(term=str_remove(term, '.*:group')) %>%
      rename(Agency_Posttest_ES=cohens_d),by='term') %>%
left_join(hopeless_cohens_d %>% filter(str_detect(term, 'Post-test:group')) %>%
      mutate(term=str_remove(term, '.*:group')) %>%
      rename(Hopelessness_Posttest_ES=cohens_d),by='term') %>%
left_join(dep_expect_cohens_d %>% filter(str_detect(term, 'Post-test:group')) %>%
      mutate(term=str_remove(term, '.*:group')) %>%
      rename(Change_Expectancy_Posttest_ES=cohens_d),by='term') %>%
left_join(readiness_cohens_d %>% filter(str_detect(term, 'Post-test:group')) %>%
      mutate(term=str_remove(term, '.*:group')) %>%
      rename(Readiness_Posttest_ES=cohens_d),by='term') %>%
select(term,ends_with('_ES'))%>% rename_with(~str_remove(., '_ES'))

ESs_outcomes_all_with_names_long <- ESs_outcomes_all_with_names %>%
pivot_longer(
  cols = -term,
  names_to = "Outcome",
  values_to = 'Effect') %>% mutate(
  Effect =ifelse(str_detect(Outcome, 'PHQ|Hope'),
    -1*Effect,Effect)) %>%
mutate(Outcome=str_replace(
  Outcome, 'PHQ9_Week4', 'Depression_Week4')) %>%
mutate(Outcome=str_replace(
  Outcome, 'FATS_Week4', '+_Actions/Thinking_Week4')) %>%
mutate(Outcome=factor(Outcome,levels=c(
  'Depression_Week4', 'Agency_Week4', 'Agency_Posttest',
  'Hopelessness_Week4', 'Hopelessness_Posttest',
  '+_Actions/Thinking_Week4',
  'Change_Expectancy_Week4', 'Change_Expectancy_Posttest',
  'Readiness_Week4', 'Readiness_Posttest')
))

#at post-test
(ES_across_outcomes_posttest <- ESs_outcomes_all_with_names_long %>%
  filter(str_detect(Outcome, 'Posttest')) %>%
  mutate(Outcome=fct_relabel(
    Outcome,~str_remove(., '_Posttest')) %>%
  mutate(Outcome=fct_relabel(
    Outcome,~str_replace(., '_', ' ')) %>%
  ggplot(aes(Outcome,term,fill=Effect)) +
  geom_tile() +
  geom_text(aes(label = Effect), size = 3) +
  scale_fill_gradient2(
    low = "red",
    high = "blue"
  ) +
  ggtitle("Effect Sizes across Outcomes at Post-test") +
  labs(fill = "Cohen's d") +
  theme(axis.text.x = element_text(angle = 20, hjust = 1))+xlab('')+ylab('')
)

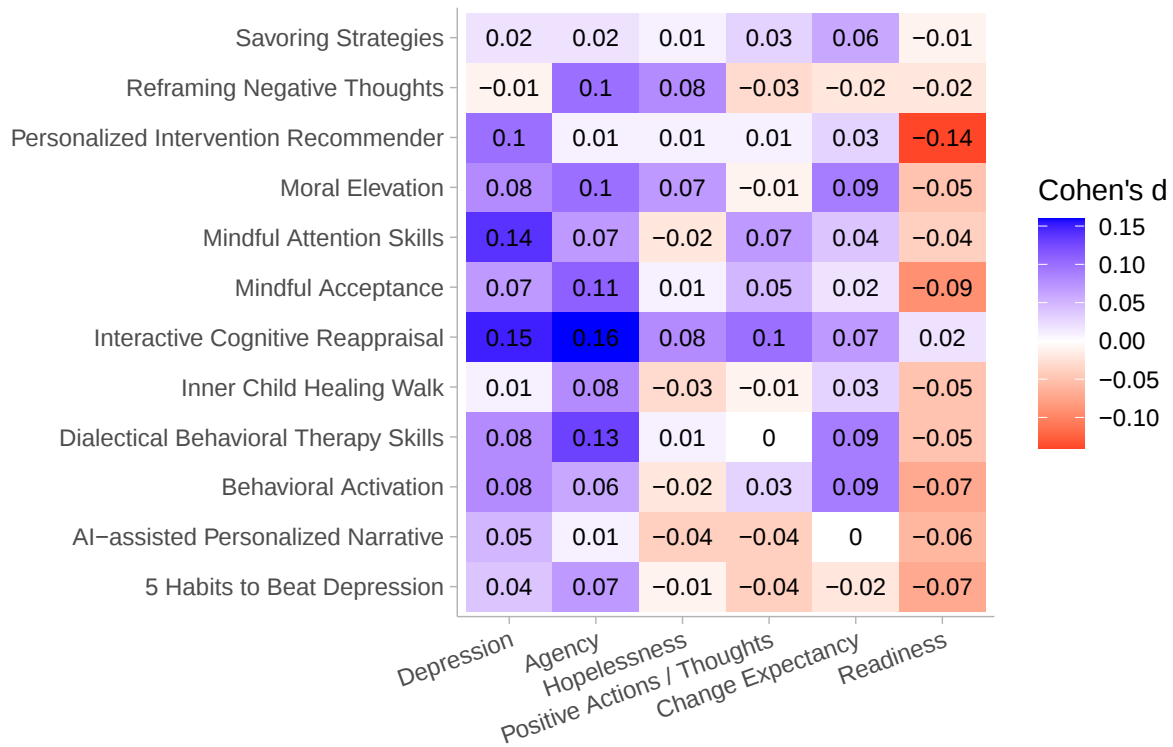
```

Effect Sizes across Outcomes at Post-test



```
#at Week 4
(ES_across_outcomes_wk4 <- ESs_outcomes_all_with_names_long %>%
  filter(str_detect(Outcome, 'Week4')) %>%
  mutate(Outcome = fct_relabel(
    Outcome, ~str_remove(.x, '_Week4')) %>%
  mutate(Outcome = fct_recode(
    Outcome, 'Positive Actions / Thoughts' = '+_Actions/Thinking'
  )) %>%
  mutate(Outcome = fct_relabel(
    Outcome, ~str_replace(.x, '_', ' ')) %>%
  ggplot(aes(Outcome, term, fill = Effect)) +
  geom_tile() +
  geom_text(aes(label = Effect), size = 3) +
  scale_fill_gradient2(
    low = "red",
    high = "blue"
  ) + ggtitle("Effect Sizes across Outcomes at Week 4") +
  labs(fill = "Cohen's d") +
  theme(axis.text.x = element_text(angle = 20, hjust = 1)) + xlab('') + ylab('')
)
```

Effect Sizes across Outcomes at Week 4



#put all wk4 plots together

```
combined_plot_wk4_effects <- wrap_plots(
  phq9_plot,
  agency_wk4_plot,
  hopelessness_wk4_plot,
  fats_wk4_plot,
  dep_expect_wk4_plot,
  readiness_wk4_plot,ncol=2)
```

#put all posttest plots together

```
combined_plot_posttest_effects <- wrap_plots(
  agency_posttest_plot,
  hopelessness_posttest_plot,
  dep_expect_posttest_plot,
  readiness_posttest_plot,ncol=2)
```

#put Effect size across outcomes plots together

```
combined_effects_x_outcomes <- wrap_plots(ES_across_outcomes_posttest, ES_across_outcomes_wk4)
```

#put all acceptability plots together

```
combined_acceptability_plots <- wrap_plots(
  ceq_pointplot,aha_pointplot,aha_signif_pointplot,star_pointplot,ncol=2)+
  plot_annotation(
    theme = theme(plot.title = element_text(hjust = 0.5)))
```

```
#ggsave("~/megastudy_stuff/mega_figures/combined_plot_posttest_effects.png",combined_plot_posttest_effe
```

```
#ggsave("~/megastudy_stuff/mega_figures/combined_plot_wk4_effects.png",combined_plot_wk4_effects,height=100)
#ggsave("~/megastudy_stuff/mega_figures/combined_effects_x_outcome.png",combined_effects_x_outcomes,height=100)
#ggsave("~/megastudy_stuff/mega_figures/combined_acceptability_plots.png",combined_acceptability_plots,height=100)
```

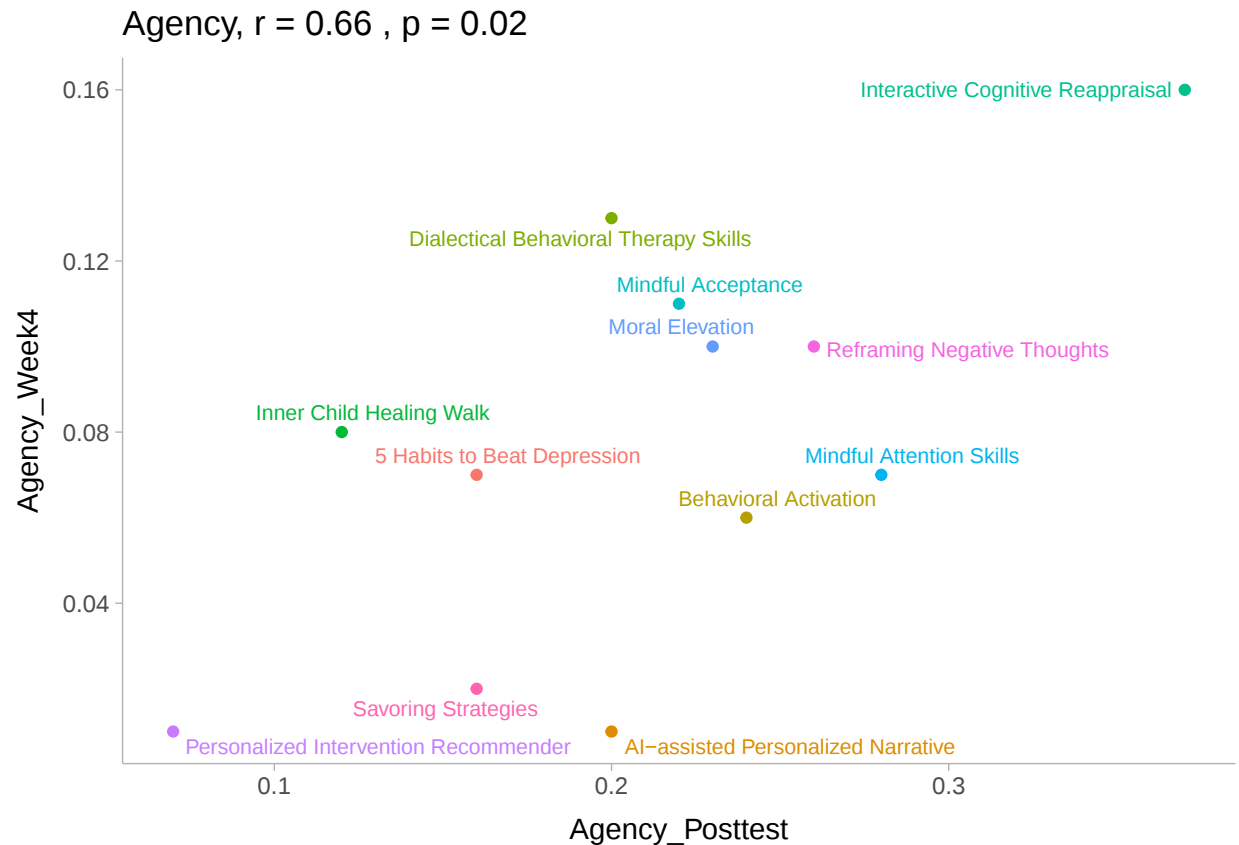
```
pt_and_wk4_ESs_for_corr <- ESs_outcomes_all_with_names %>% select(term,
  contains('Agency')|contains('Hope')|contains('Expect')|contains('Readiness'))

(agency_es_cor <- with(pt_and_wk4_ESs_for_corr,cor.test(Agency_Posttest,Agency_Week4)))
```

Correlation between Post-test and Week Four Effects

```
##
## Pearson's product-moment correlation
##
## data: Agency_Posttest and Agency_Week4
## t = 2.7574, df = 10, p-value = 0.02022
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## 0.1337496 0.8939387
## sample estimates:
## cor
## 0.6572047
```

```
(agency_es_cor_plot <- pt_and_wk4_ESs_for_corr %>% ggplot(aes(
  Agency_Posttest,Agency_Week4,color=term,label=term))+
  geom_point() + ggrepel::geom_text_repel(size=2.8)+
  ggtitle(paste('Agency, r =',agency_es_cor$estimate %>% round(2),', p =',agency_es_cor$p.value %>% round(2)))
theme(legend.position="none"))
```

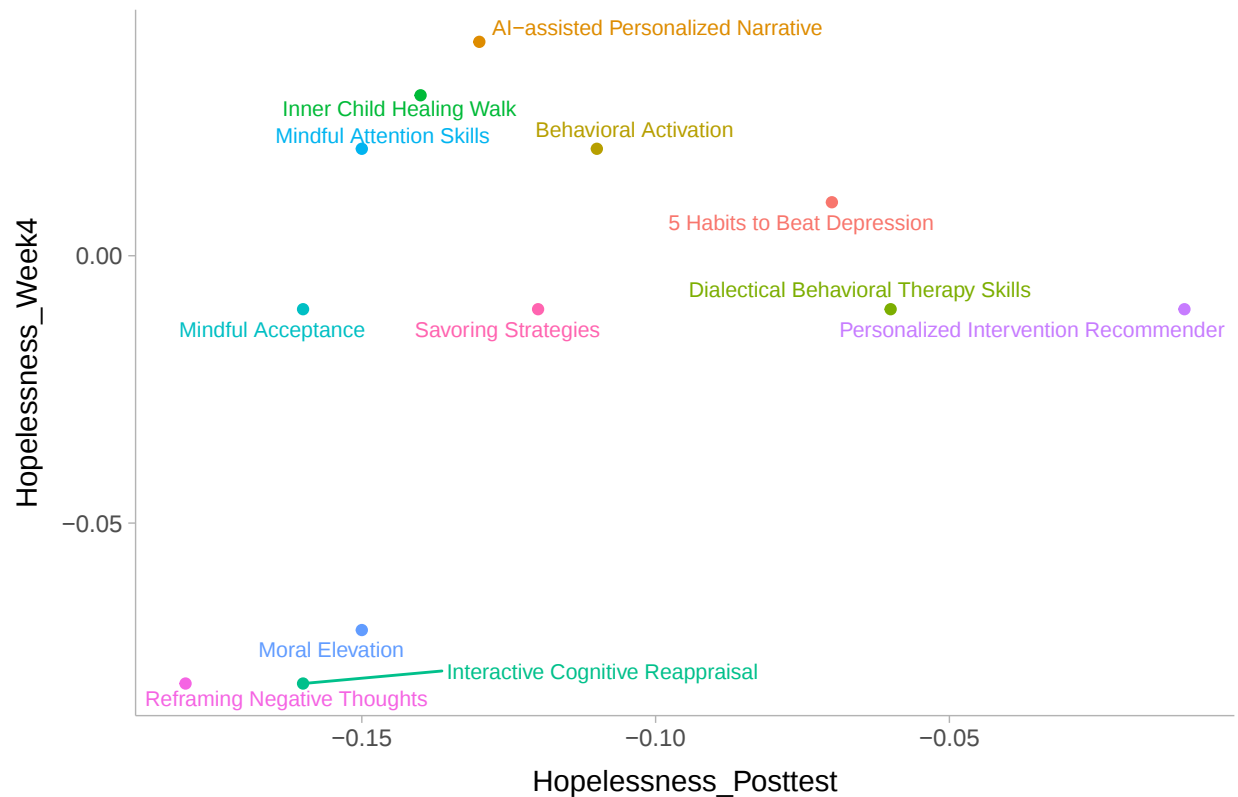


```
(hope_es_cor <- with(pt_and_wk4_ESs_for_corr, cor.test(Hopelessness_Posttest, Hopelessness_Week4)))
```

```
##
## Pearson's product-moment correlation
##
## data: Hopelessness_Posttest and Hopelessness_Week4
## t = 1.1459, df = 10, p-value = 0.2785
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.2899021 0.7650095
## sample estimates:
## cor
## 0.3406803
```

```
(hope_es_cor_plot <- pt_and_wk4_ESs_for_corr %>% ggplot(aes(
  Hopelessness_Posttest, Hopelessness_Week4, color=term, label=term)) +
  geom_point() + ggrepel::geom_text_repel(size=2.8) +
  ggtitle(paste('Hopelessness, r =', hope_es_cor$estimate %>% round(2), ', p =', hope_es_cor$p.value %>%
    round(2))) +
  theme(legend.position="none"))
```

Hopelessness, $r = 0.34$, $p = 0.28$

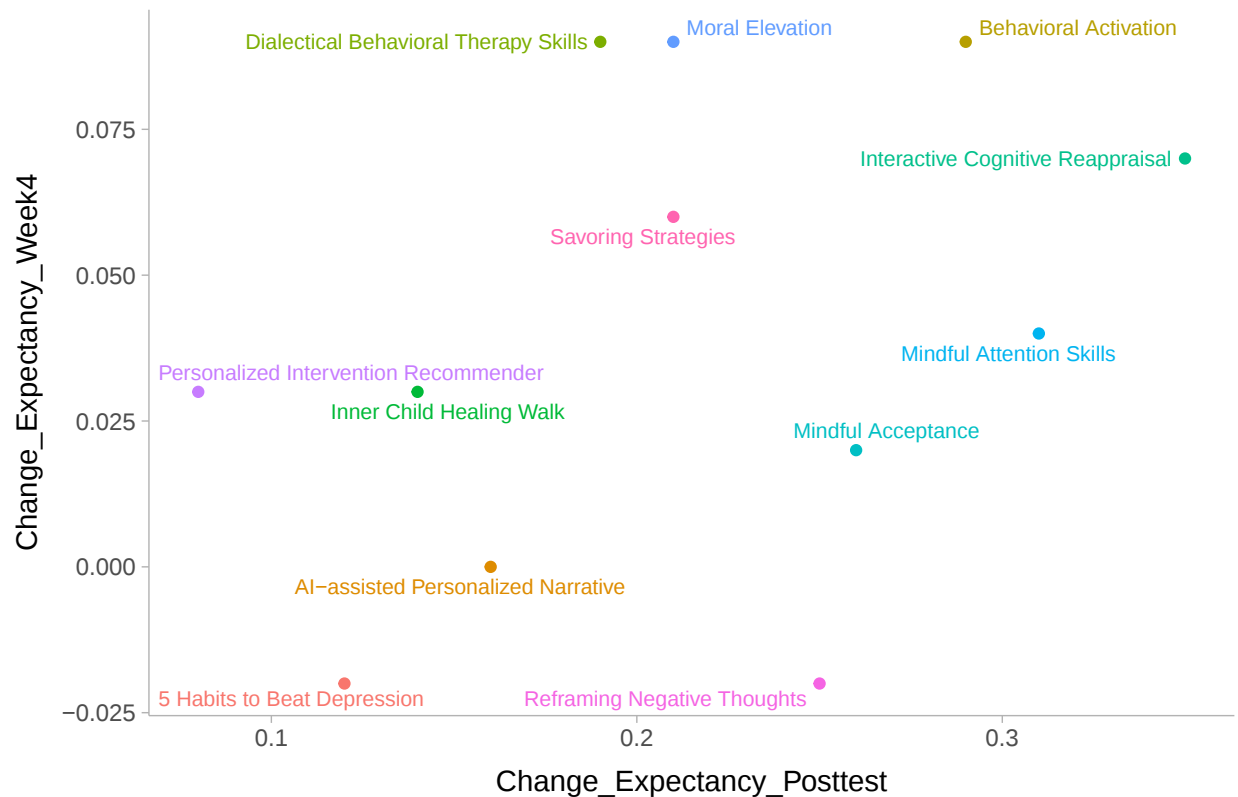


```
(DCES_es_cor <- with(pt_and_wk4_ESs_for_corr, cor.test(Change_Expectancy_Posttest, Change_Expectancy_Week4))
```

```
##
## Pearson's product-moment correlation
##
## data: Change_Expectancy_Posttest and Change_Expectancy_Week4
## t = 1.2316, df = 10, p-value = 0.2463
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.2664987 0.7753289
## sample estimates:
## cor
## 0.3629075
```

```
(DCES_es_cor_plot <- pt_and_wk4_ESs_for_corr %>% ggplot(aes(
  Change_Expectancy_Posttest, Change_Expectancy_Week4, color=term, label=term)) +
  geom_point() + ggrepel::geom_text_repel(size=2.8) +
  ggtitle(paste('Depression Change Expectancy, r =', DCES_es_cor$estimate %>% round(2), ', p =', DCES_es_cor$p.value %>% round(2)))
  theme(legend.position="none"))
```

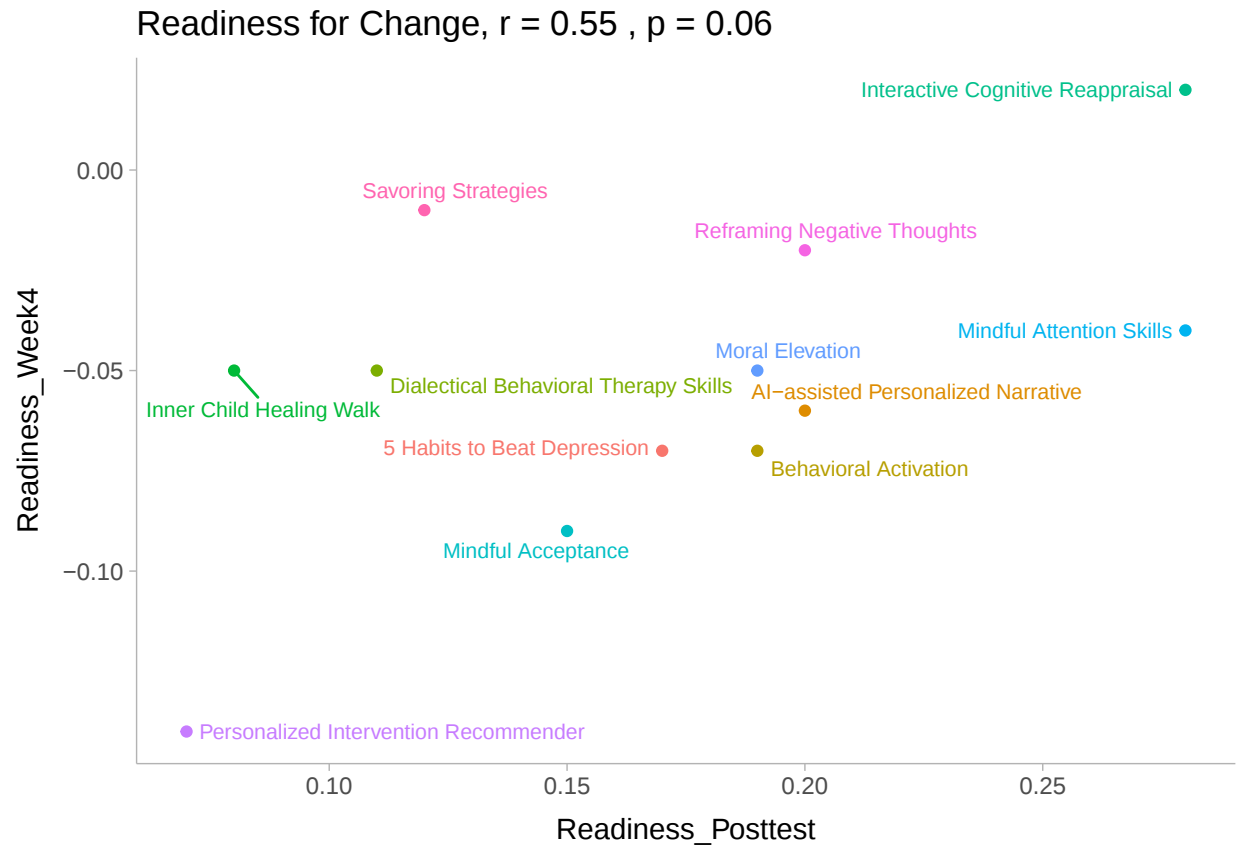
Depression Change Expectancy, $r = 0.36$, $p = 0.25$



```
(readiness_es_cor <- with(pt_and_wk4_ESs_for_corr, cor.test(Readiness_Posttest, Readiness_Week4)))
```

```
##
## Pearson's product-moment correlation
##
## data: Readiness_Posttest and Readiness_Week4
## t = 2.0931, df = 10, p-value = 0.0628
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.03214656 0.85500858
## sample estimates:
## cor
## 0.5519377
```

```
(readiness_es_cor_plot <- pt_and_wk4_ESs_for_corr %>% ggplot(aes(Readiness_Posttest, Readiness_Week4, color =
  geom_point() + ggrepel::geom_text_repel(size=2.8)+
  ggtitle(paste('Readiness for Change, r =', readiness_es_cor$estimate %>% round(2), ', p =', readiness_
  theme(legend.position="none"))
```



```
combined_es_cor <- wrap_plots(
  agency_es_cor_plot, hope_es_cor_plot, DCES_es_cor_plot, readiness_es_cor_plot, ncol=2) +
  plot_annotation(
    title="Correlations between Cohen's D at Post-test and Week 4",
    theme = theme(plot.title = element_text(hjust = 0.5)))

#ggsave("~/megastudy_stuff/mega_figures/combined_es_cor_plots.png", combined_es_cor, height=12, width=12)
```

3. Change in letting distressing thoughts go (single-item)

```
##A single item from the five-factor mindfulness questionnaire
m1_let_distressing_thoughts_go <- lmer(ffmq_distressing ~ time * group + (1|group/pid), data=mega_alltime)
add_cohens_d(m1_let_distressing_thoughts_go, 'Predicting: change in "I let distressing thoughts go"')
```

Table 44: Predicting: change in “I let distressing thoughts go”

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	2.616	0.00e+00	NA	NA	NA
timePost-test	0.000	1.000	0.00	-0.04	0.04
timeWeek 4	0.298	7.87e-45	0.33	0.29	0.38
group5 Habits to Beat Depression	0.054	0.249	0.06	-0.04	0.16

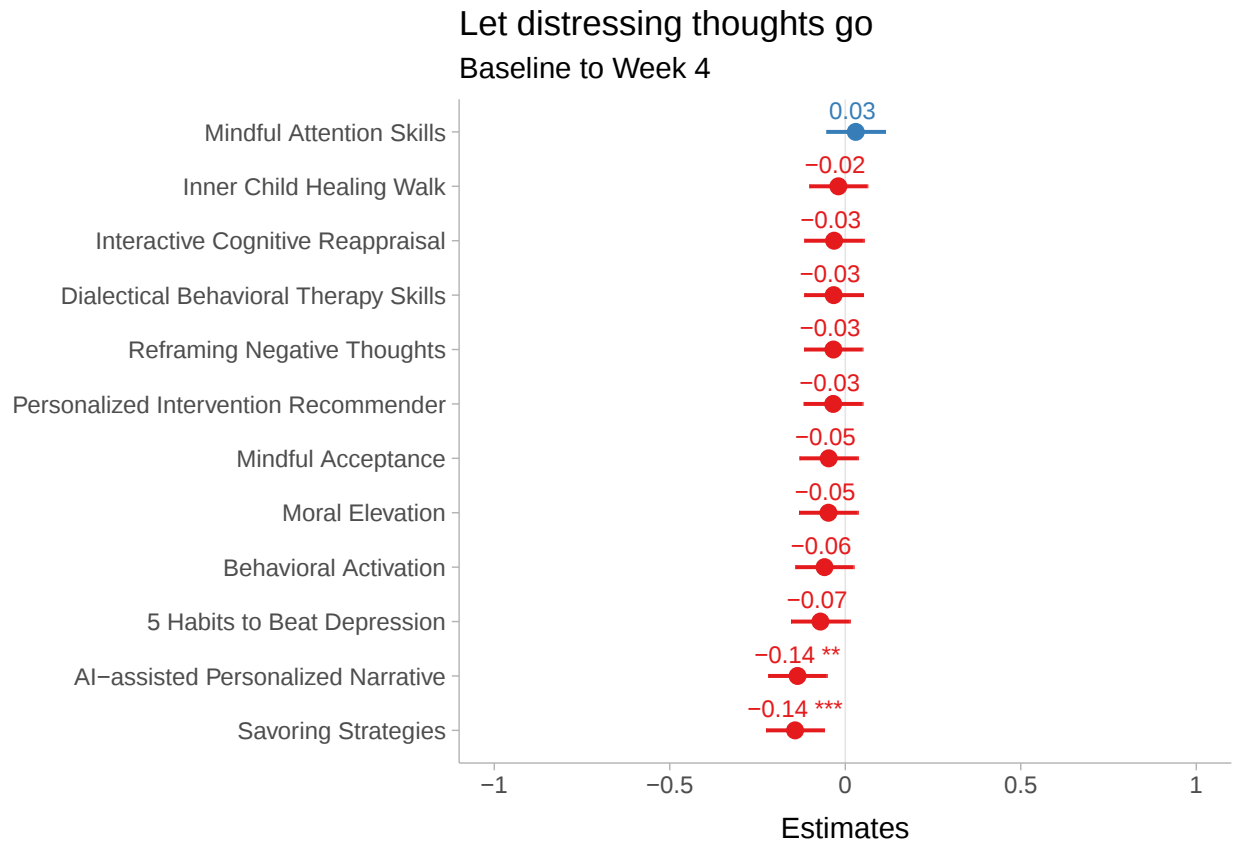
term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
groupAI-assisted Personalized Narrative	0.114	0.014	0.13	0.03	0.23
groupBehavioral Activation	0.025	0.591	0.03	-0.07	0.13
groupDialectical Behavioral Therapy Skills	0.006	0.895	0.01	-0.09	0.11
groupInner Child Healing Walk	0.001	0.975	0.00	-0.10	0.10
groupInteractive Cognitive Reappraisal	0.031	0.502	0.03	-0.07	0.14
groupMindful Acceptance	0.020	0.671	0.02	-0.08	0.12
groupMindful Attention Skills	0.008	0.856	0.01	-0.09	0.11
groupMoral Elevation	0.065	0.161	0.07	-0.03	0.17
groupPersonalized Intervention Recommender	0.024	0.603	0.03	-0.07	0.13
groupReframing Negative Thoughts	-0.001	0.978	0.00	-0.10	0.10
groupSavoring Strategies	0.091	0.050	0.10	0.00	0.20
timePost-test:group5 Habits to Beat Depression	0.000	1.000	0.00	-0.09	0.09
timeWeek 4:group5 Habits to Beat Depression	-0.071	0.098	-0.08	-0.17	0.01
timePost-test:groupAI-assisted Personalized Narrative	0.000	1.000	0.00	-0.09	0.09
timeWeek 4:groupAI-assisted Personalized Narrative	-0.136	0.001	-0.15	-0.24	-0.06
timePost-test:groupBehavioral Activation	0.000	1.000	0.00	-0.09	0.09
timeWeek 4:groupBehavioral Activation	-0.059	0.163	-0.07	-0.16	0.03
timePost-test:groupDialectical Behavioral Therapy Skills	0.000	1.000	0.00	-0.09	0.09
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.033	0.438	-0.04	-0.13	0.06
timePost-test:groupInner Child Healing Walk	0.000	1.000	0.00	-0.09	0.09
timeWeek 4:groupInner Child Healing Walk	-0.020	0.641	-0.02	-0.11	0.07
timePost-test:groupInteractive Cognitive Reappraisal	0.000	1.000	0.00	-0.09	0.09
timeWeek 4:groupInteractive Cognitive Reappraisal	-0.032	0.461	-0.04	-0.13	0.06
timePost-test:groupMindful Acceptance	0.000	1.000	0.00	-0.09	0.09
timeWeek 4:groupMindful Acceptance	-0.047	0.266	-0.05	-0.15	0.04
timePost-test:groupMindful Attention Skills	0.000	1.000	0.00	-0.09	0.09
timeWeek 4:groupMindful Attention Skills	0.030	0.483	0.03	-0.06	0.13
timePost-test:groupMoral Elevation	0.000	1.000	0.00	-0.09	0.09
timeWeek 4:groupMoral Elevation	-0.048	0.262	-0.05	-0.15	0.04
timePost-test:groupPersonalized Intervention Recommender	0.000	1.000	0.00	-0.09	0.09
timeWeek 4:groupPersonalized Intervention Recommender	-0.034	0.420	-0.04	-0.13	0.06
timePost-test:groupReframing Negative Thoughts	0.000	1.000	0.00	-0.09	0.09
timeWeek 4:groupReframing Negative Thoughts	-0.034	0.424	-0.04	-0.13	0.05
timePost-test:groupSavoring Strategies	0.000	1.000	0.00	-0.09	0.09
timeWeek 4:groupSavoring Strategies	-0.143	6.66e-04	-0.16	-0.25	-0.07
sd__(Intercept)	0.716	NA	NA	NA	NA
sd__(Intercept)	0.002	NA	NA	NA	NA
sd__Observation	0.538	NA	NA	NA	NA

```
(let_thoughts_go_cohens_d <- mixed_cohens_d(m1_let_distressing_thoughts_go))
```

```
## # A tibble: 38 x 8
```

```
##      term      cohens_d estimate statistic      df p.value cohens_d_2.5 cohens_d_97.5
##      <chr>      <dbl>      <dbl>      <dbl>      <dbl>      <dbl>      <dbl>
## 1 timePo~      0          0          0      13424.      1        -0.04       0.04
## 2 timeWe~      0.33      0.3        14.1    13711.      0         0.29       0.38
## 3 group5~      0.06      0.05        1.15   12024.     0.25      -0.04       0.16
## 4 groupA~      0.13      0.11        2.46   12024.     0.01       0.03       0.23
## 5 groupB~      0.03      0.02        0.54   12025.     0.59      -0.07       0.13
## 6 groupD~      0.01      0.01        0.13   12025.     0.89      -0.09       0.11
## 7 groupI~      0          0          0.03   12025.     0.97      -0.1        0.1
## 8 groupI~      0.03      0.03        0.67   12025.     0.5        -0.07       0.14
## 9 groupM~      0.02      0.02        0.42   12025.     0.67      -0.08       0.12
## 10 groupM~     0.01      0.01        0.18   12025.     0.86      -0.09       0.11
## # i 28 more rows
```

```
(let_thoughts_go_plot <- plot_model(m1_let_distressing_thoughts_go, sort.est = T, terms=wk4_int_terms, auto.layout = F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Let distressing thoughts go', 'Baseline to Week 4'))
```



4. How much do you feel the program you completed four weeks ago, in the first part of this study, has helped you?

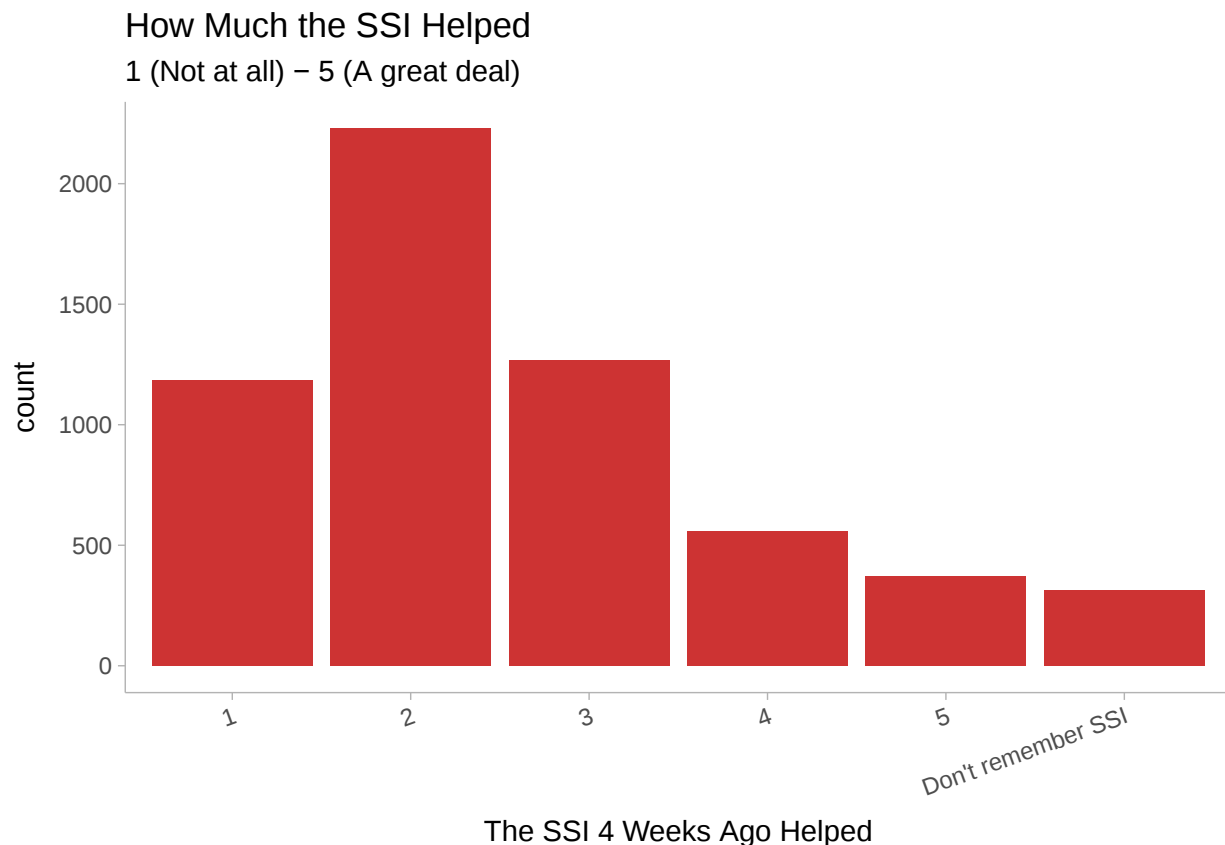
```
mega_alltimes %>% filter(!is.na(program_helped)) %>% count(program_helped) %>%
  mutate(n/sum(n))
```

```
## # A tibble: 6 x 3
##   program_helped      n 'n/sum(n)'
##   <dbl> <int>      <dbl>
## 1         1  1186      0.200
## 2         2  2228      0.376
## 3         3  1269      0.214
## 4         4   557      0.0940
## 5         5   373      0.0629
## 6        999   313      0.0528
```

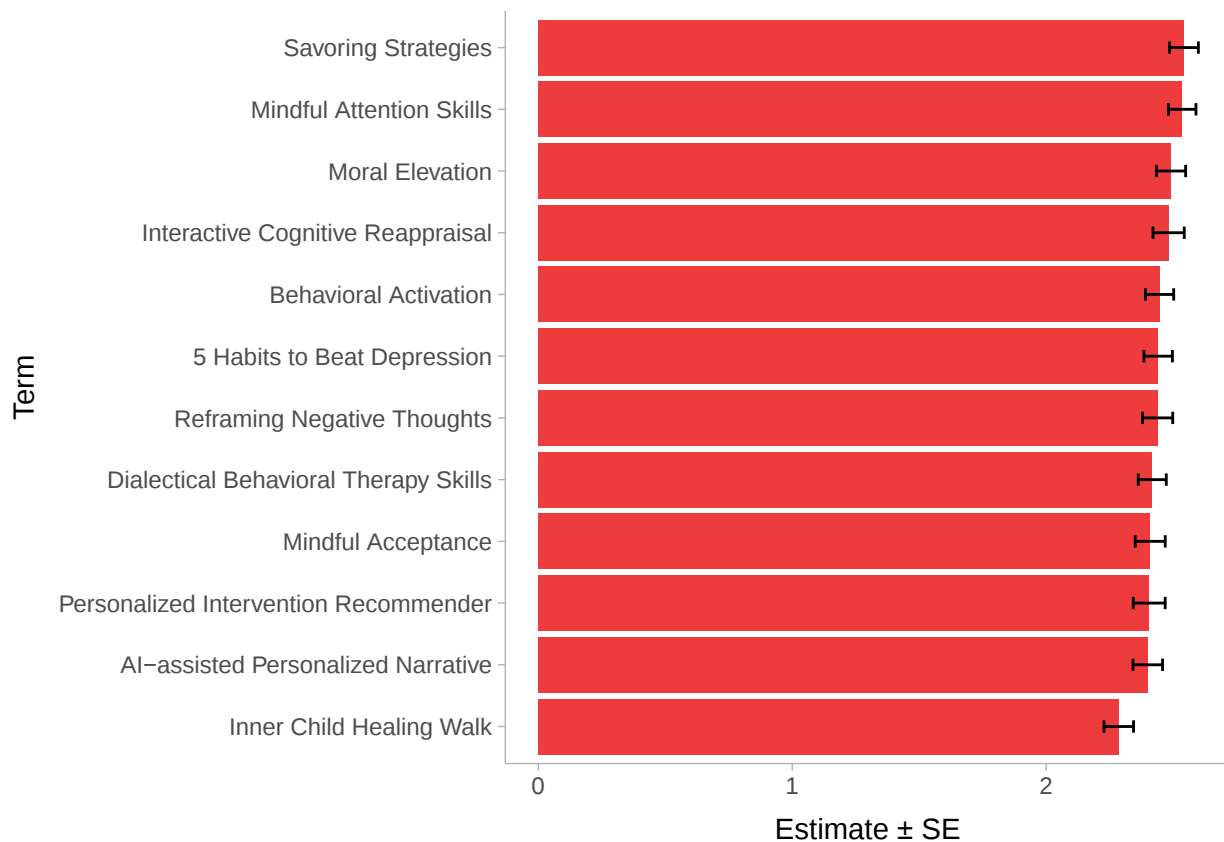
```
mega_alltimes %>% filter(!is.na(program_helped), program_helped != 999) %>%
  summarize(mean(program_helped), sd(program_helped))
```

```
## # A tibble: 1 x 2
##   'mean(program_helped)' 'sd(program_helped)'
##   <dbl>                <dbl>
## 1      2.41             1.12
```

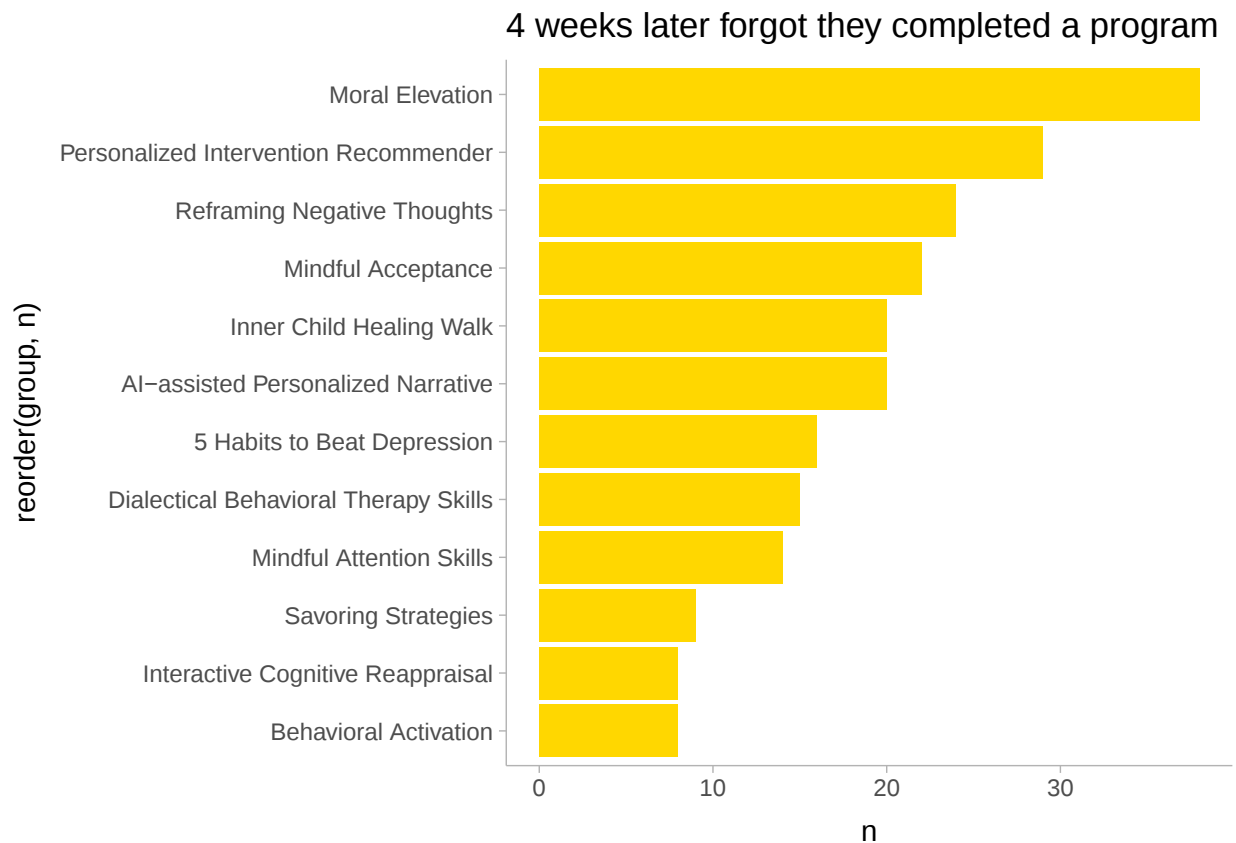
```
(program_helped_hist <- mega_alltimes %>% filter(!is.na(program_helped)) %>%
  mutate(program_helped = ifelse(
    program_helped == 999, "Don't remember SSI", program_helped)) %>%
  mutate(program_helped = as.factor(program_helped)) %>%
  ggplot(aes(program_helped)) + geom_bar(fill = 'brown3') +
  theme(axis.text.x = element_text(angle = 20, hjust = 1)) +
  xlab('The SSI 4 Weeks Ago Helped') +
  ggtitle('How Much the SSI Helped', '1 (Not at all) - 5 (A great deal)'))
```



```
mega_alltimes %>% filter(group!='Passive Control') %>%
  filter(!is.na(program_helped), program_helped!=999) %>%
  group_by(group) %>%
  summarize(mean_program_helped=mean(program_helped,na.rm=T),std.error=std.error(program_helped,na.rm=T),
  ggplot(aes(x = reorder(group, mean_program_helped), y = mean_program_helped)) +
  geom_bar(stat = "identity", fill = "brown2") +
  geom_errorbar(aes(ymin = mean_program_helped - std.error, ymax = mean_program_helped + std.error),
    width = 0.2) + coord_flip() +labs(x = "Term", y = "Estimate \u00B1 SE")
```



```
mega_alltimes %>% filter(group!='Passive Control') %>% group_by(group) %>% count(forgot=program_helped==)
```



5. Having accessed formal support for mental health as a moderator of SSIs' effects on depression from baseline to week 4

```
m1_received_help_moderating_change_in_phq9 <- lmer(
  phq9_score ~ time * received_help + (1|group/pid),
  data=mega_alltimes %>% filter(group!='Passive Control') %>%
  mutate(received_help=ifelse(
    str_detect(help4mental,'not accessed any')&
    str_detect(help4mental,',',negate=T),1,0)))

summary(m1_received_help_moderating_change_in_phq9)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: phq9_score ~ time * received_help + (1 | group/pid)
## Data:
## mega_alltimes %>% filter(group != "Passive Control") %>% mutate(received_help = ifelse(str_detect(help4mental,
## "not accessed any") & str_detect(help4mental, ",", negate = T), 1, 0))
##
```

```
## REML criterion at convergence: 64848.7
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -3.1662 -0.5411 -0.0477  0.5262  3.1232
##
## Random effects:
##   Groups      Name      Variance Std.Dev.
##   pid:group (Intercept) 12.59    3.548
##   group      (Intercept)  0.00    0.000
##   Residual                14.60    3.821
## Number of obs: 10746, groups:  pid:group, 5999; group, 12
##
## Fixed effects:
##              Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)      15.59865    0.08735 9101.93869 178.572 < 2e-16 ***
## timeWeek 4        -3.59155    0.10013 5415.35724 -35.870 < 2e-16 ***
## received_help      -0.38970    0.13708 9101.93868  -2.843  0.00448 **
## timeWeek 4:received_help  0.62100    0.15436 5326.75475   4.023 5.82e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) timWk4 rcvd_h
## timeWeek 4   -0.468
## receivd_hlp  -0.637  0.298
## tmWk4:rcvd_   0.304 -0.649 -0.477
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
add_cohens_d(m1_received_help_moderating_change_in_phq9)
```

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	15.599	0.00e+00	NA	NA	NA
timeWeek 4	-3.592	5.26e-253	-0.69	-0.73	-0.65
received_help	-0.390	0.004	-0.07	-0.13	-0.02
timeWeek 4:received_help	0.621	5.82e-05	0.12	0.06	0.18
sd__(Intercept)	3.548	NA	NA	NA	NA
sd__(Intercept)	0.000	NA	NA	NA	NA
sd__Observation	3.821	NA	NA	NA	NA

6. Addressing Duplicate IP Addresses

1. Complete dataset (n=7,733)

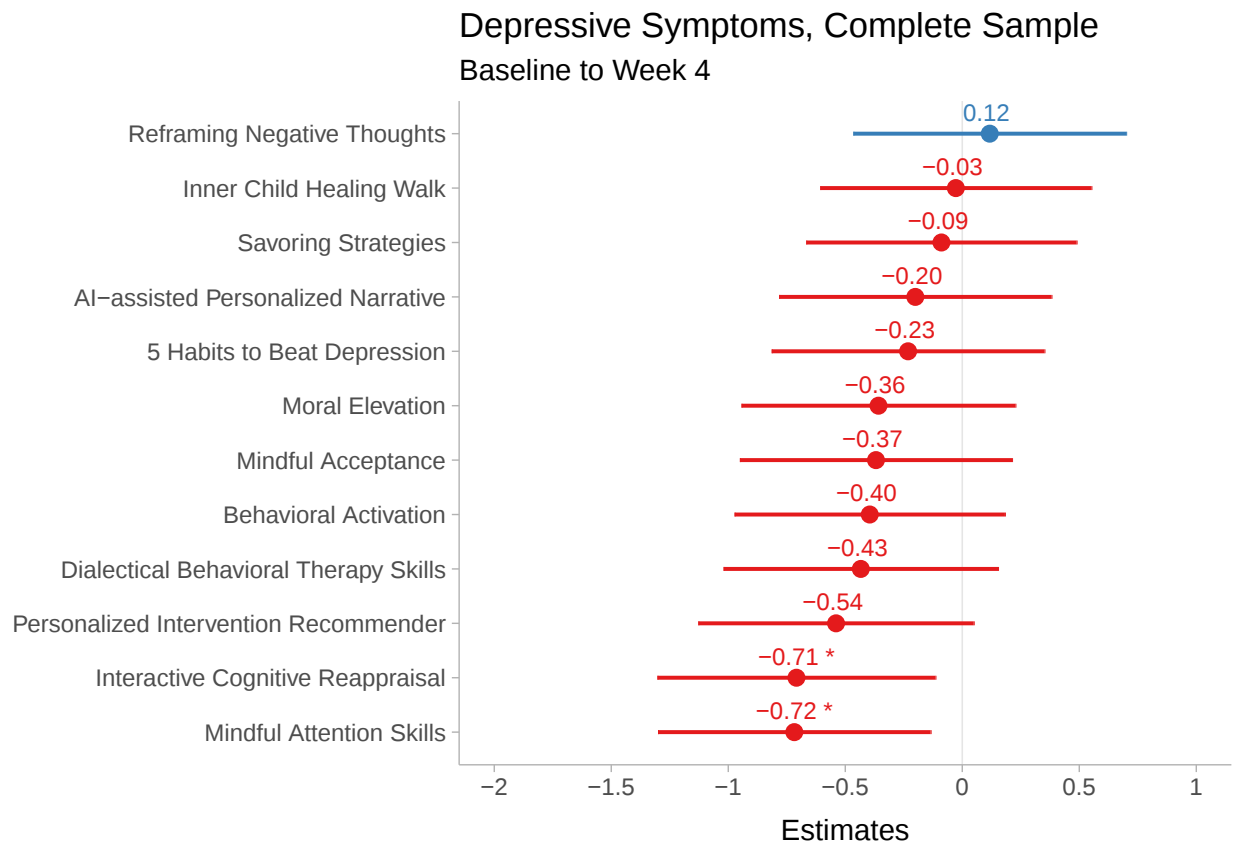
First, we'll re-run the central analyses with the complete dataset (n = 7,733 at baseline)

```
#### Primary analysis: condition predicting change in PHQ ####
```

```
m1_phq9_complete <- lmer(phq9_score ~ time * group + (1|pid),
  data=mega_alltimes_complete)
```

```
#plot showing Change in Depression over Four Weeks Compared to a passive control
```

```
(phq9_plot_complete <- plot_model(m1_phq9_complete,sort.est = T,terms=wk4_int_terms,auto_label=F,
  show.values = T, value.offset = .4,value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Depressive Symptoms, Complete Sample','Baseline to Week 4'))
```



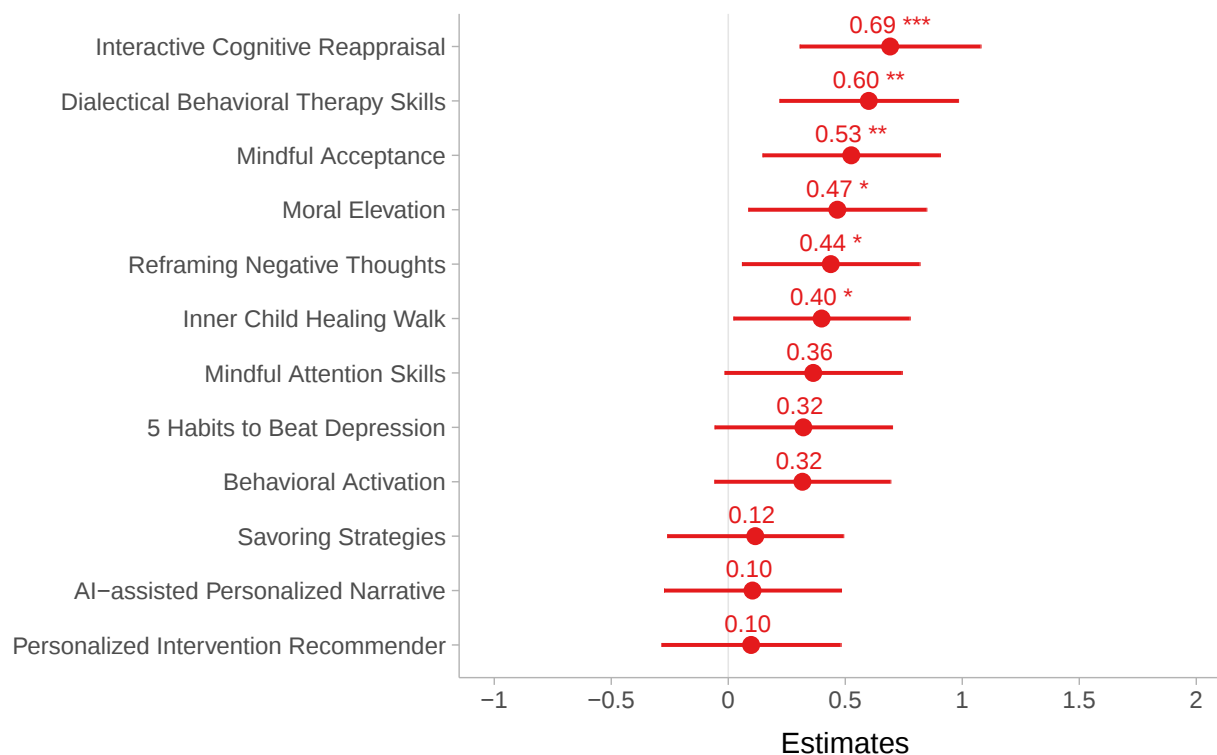
```
## agency ##
```

```
m1_agency_complete <- lmer(agency_score ~ time * group + (1|pid),data=mega_alltimes_complete)
```

```
(agency_wk4_plot_complete <- plot_model(
  m1_agency_complete,sort.est = T,terms=wk4_int_terms,auto_label=F,
  show.values = T, value.offset = .4,value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Agency, Complete Sample','Baseline to Week 4'))
```

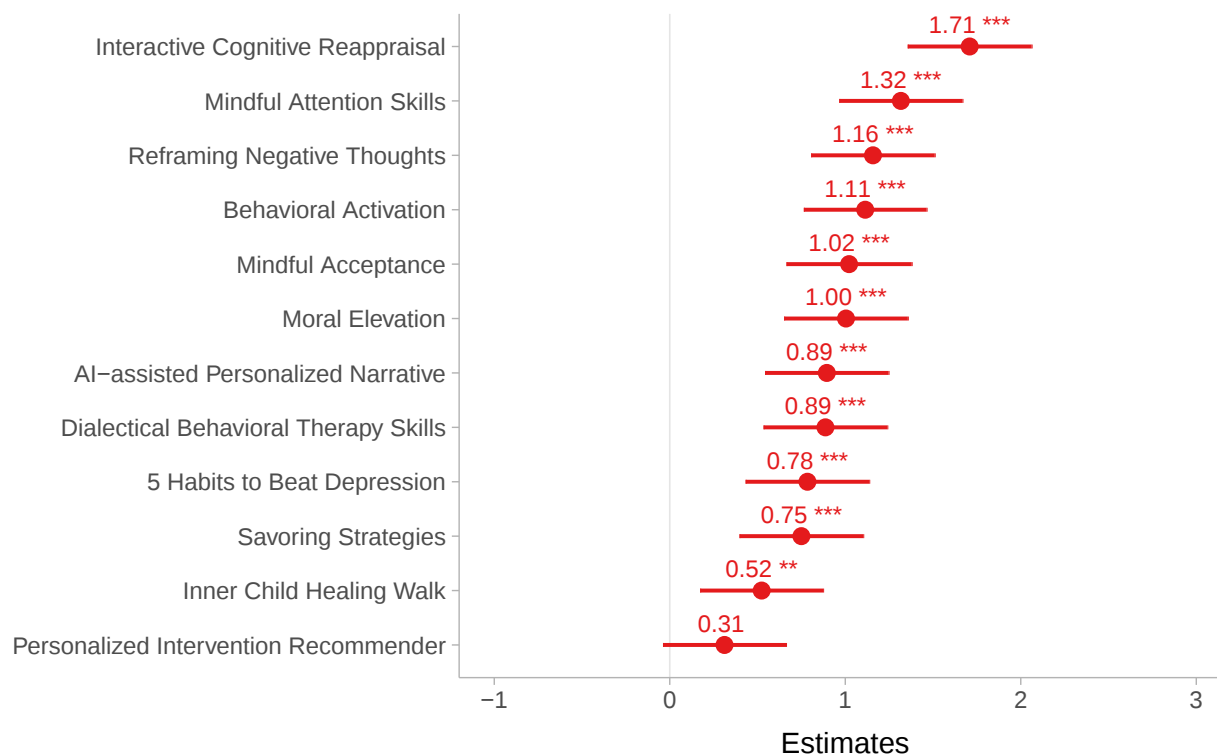
Agency, Complete Sample

Baseline to Week 4



```
(agency_posttest_plot_complete <- plot_model(
  m1_agency_complete, sort.est = T, terms=posttest_int_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Agency, Complete Sample', 'Baseline to Post-test'))
```

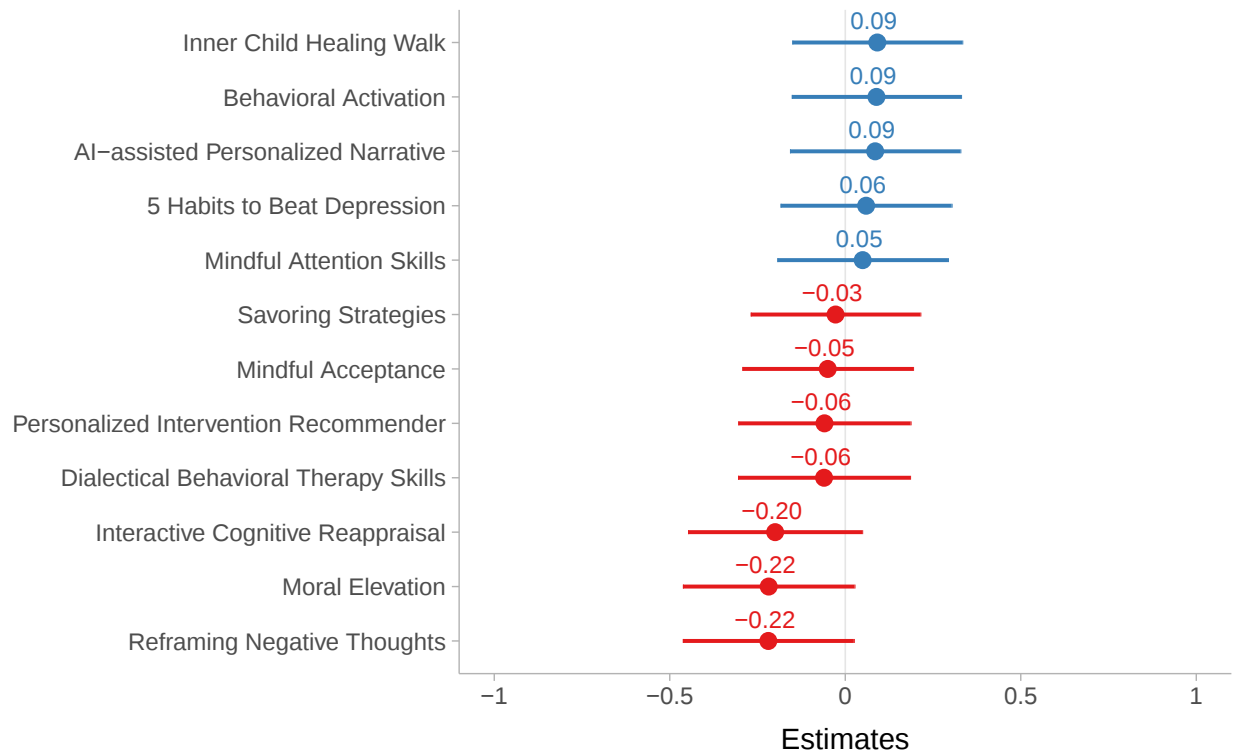
Agency, Complete Sample Baseline to Post-test



```
## hopelessness ##
m1_hopeless_complete <- lmer(hopeless_score ~ time * group + (1|pid), data=mega_alltimes_complete)

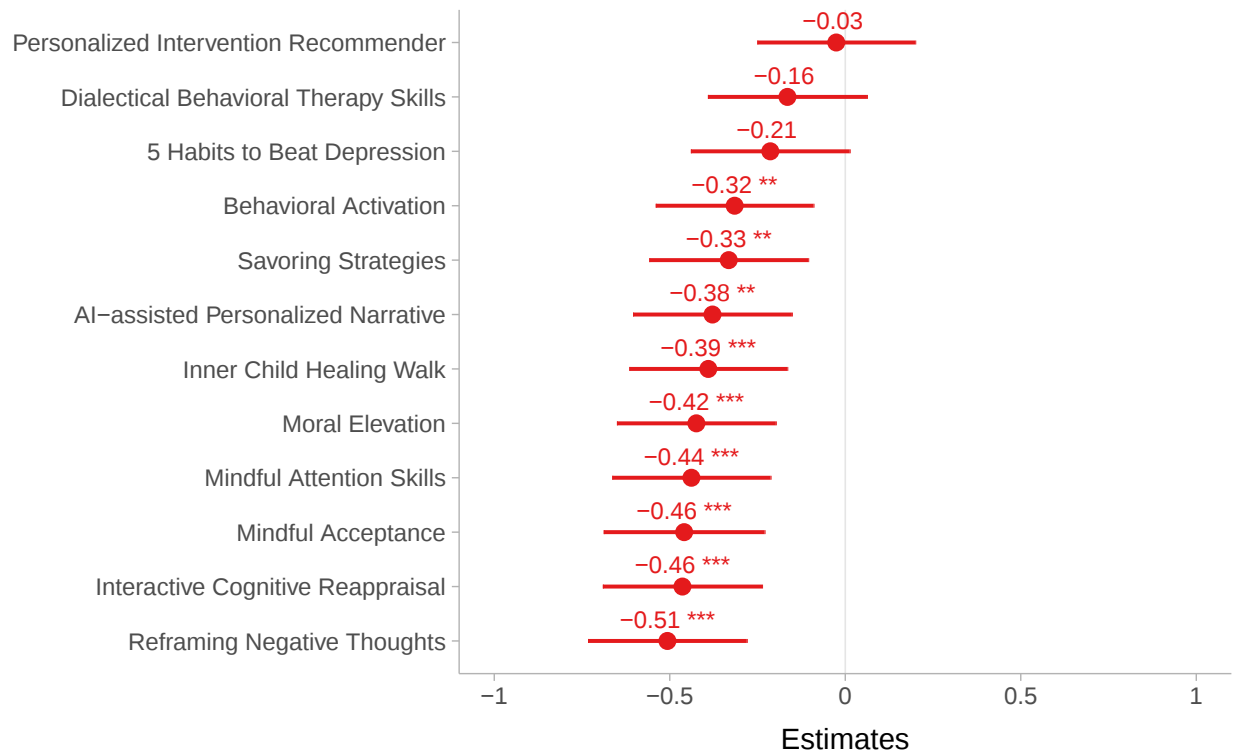
(hopelessness_wk4_plot <- plot_model(
  m1_hopeless_complete, sort.est = T, terms=wk4_int_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Hopelessness, Complete Sample', 'Baseline to Week 4'))
```

Hopelessness, Complete Sample Baseline to Week 4



```
(hopelessness_posttest_plot_complete <- plot_model(
  m1_hopeless_complete, sort.est = T, terms=posttest_int_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Hopelessness, Complete Sample', 'Baseline to Post-test'))
```

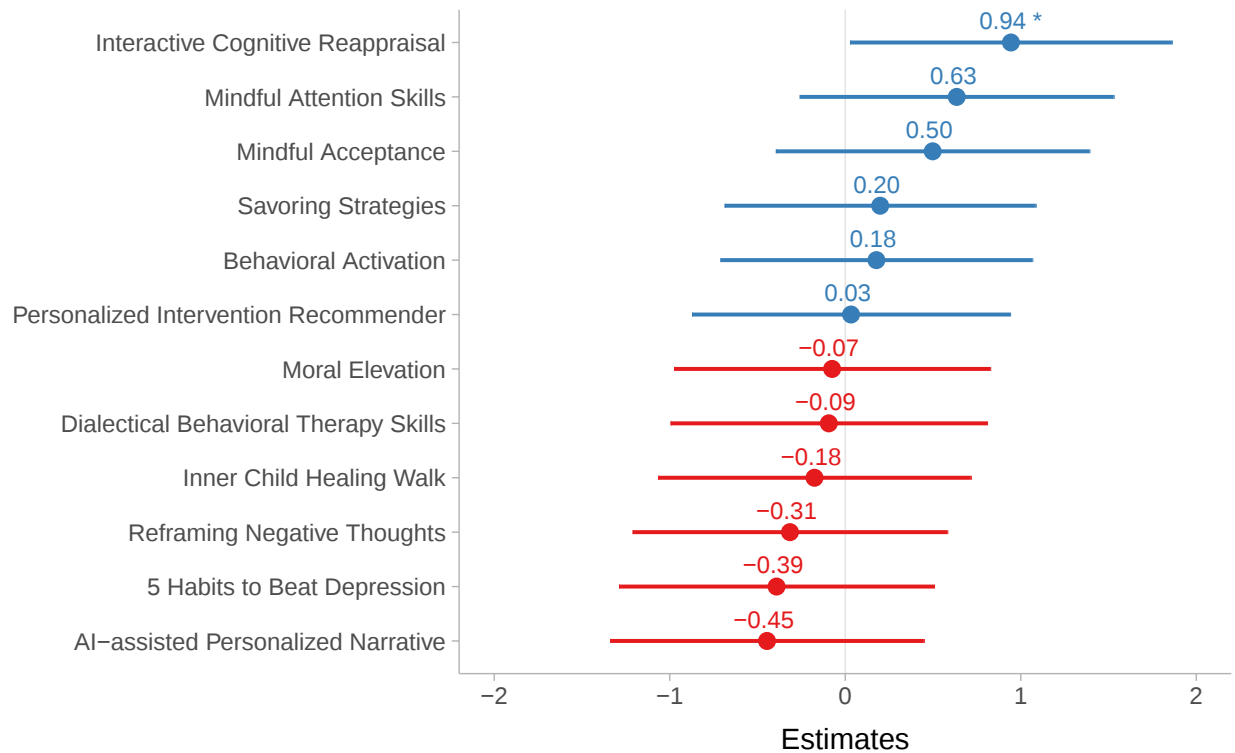
Hopelessness, Complete Sample Baseline to Post-test



```
## FATS ##
m1_fats_complete <- lmer(fats_score ~ time * group + (1|pid), data=mega_alltimes_complete)

(fats_wk4_plot_complete <- plot_model(m1_fats_complete, sort.est = T, terms=wk4_int_terms, auto_label=F,
                                     show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Positive Actions and Thinking, Complete Sample', 'Baseline to Week 4'))
```

Positive Actions and Thinking, Complete Sample Baseline to Week 4

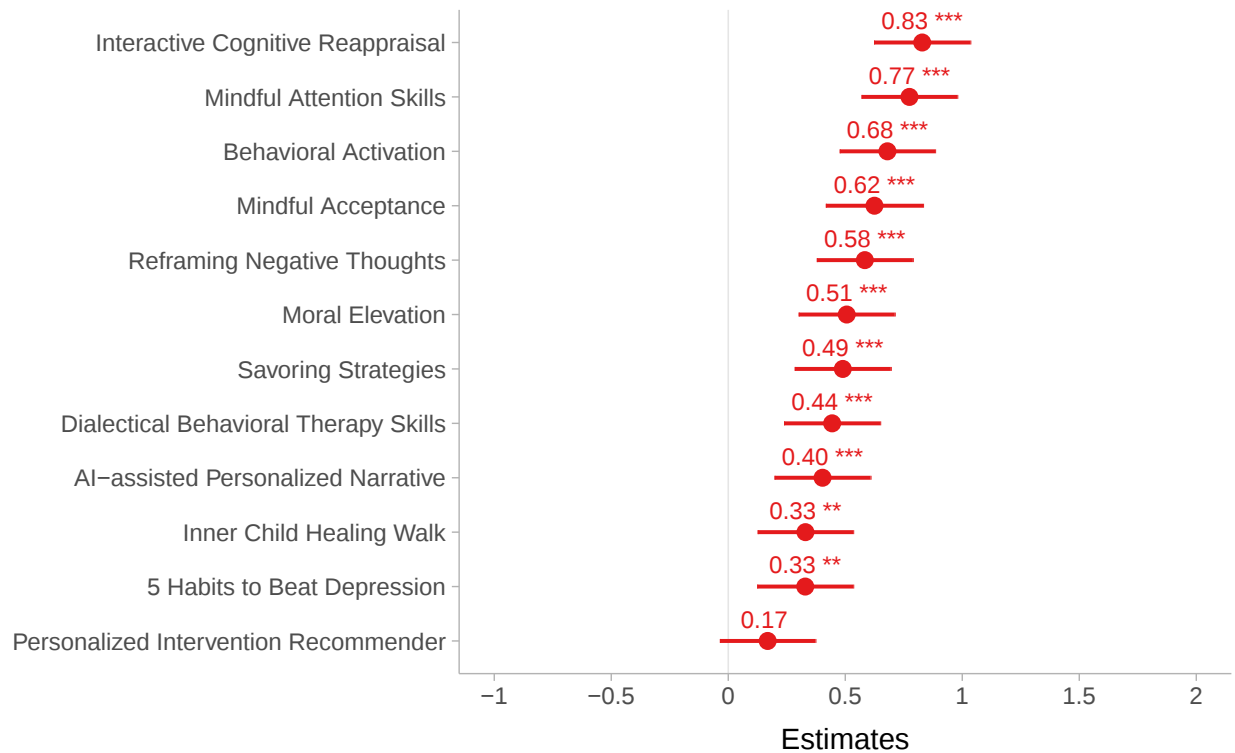


```
## Depression expectancies for Change ##
m1_dep_expect_complete <- lmer(dep_expectancies_score ~ time * group + (1|pid),data=mega_alltimes_compl

dep_expect_wk4_plot_complete <- plot_model(m1_dep_expect_complete,sort.est = T,terms=wk4_int_terms,auto
      show.values = T, value.offset = .4,value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Depression Change Expectancies, complete sample','Baseline to Week 4')

(dep_expect_posttest_plot_complete <- plot_model(
  m1_dep_expect_complete,sort.est = T,terms=posttest_int_terms,auto_label=F,
  show.values = T, value.offset = .4,value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Depression Change Expectancies, Complete Sample','Baseline to Post-test'))
```

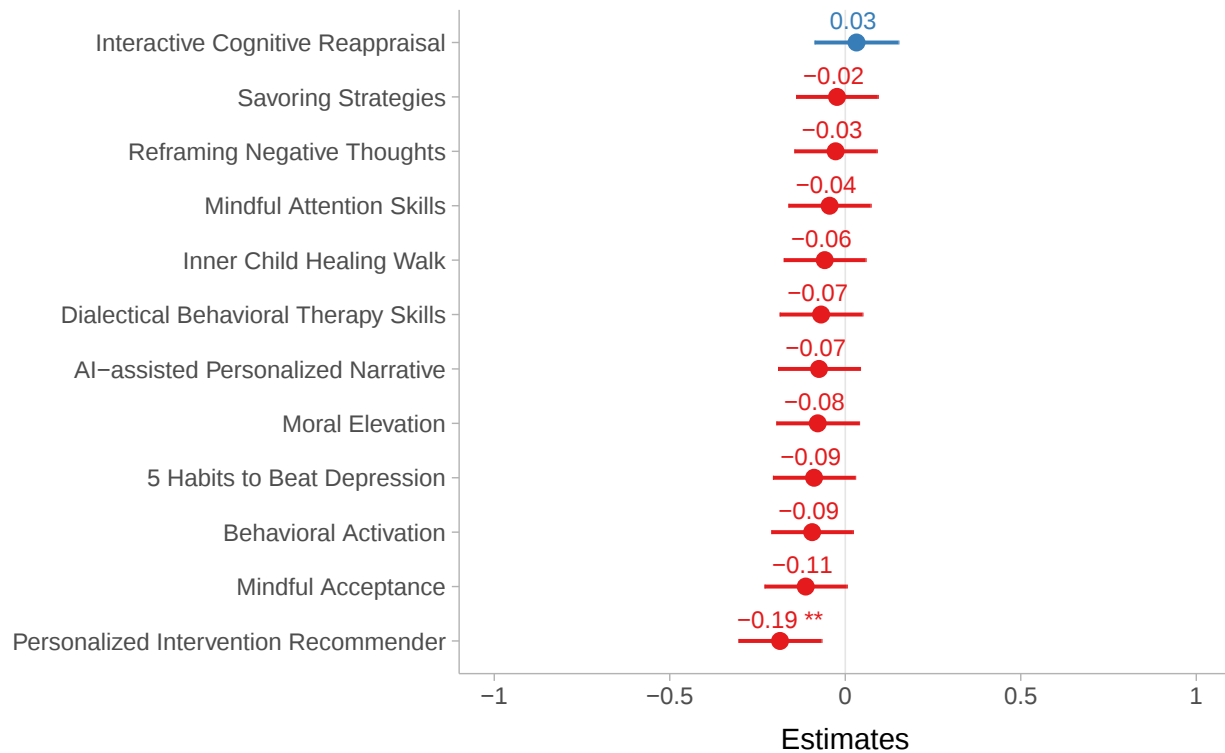
Depression Change Expectancies, Complete Samp Baseline to Post-test



```
## Depression Readiness for change ##
m1_readiness_complete <- lmer(readiness_score ~ time * group + (1|group/pid), data=mega_alltimes_complete)

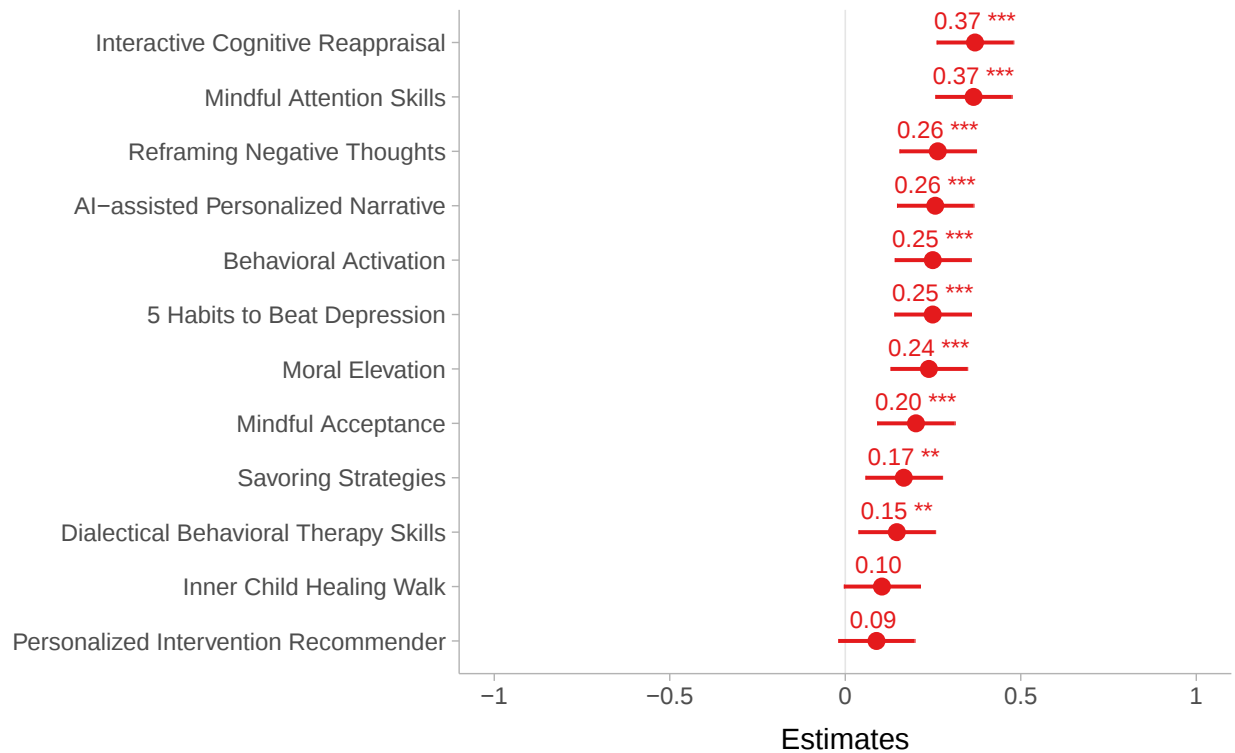
(readiness_wk4_plot <- plot_model(m1_readiness_complete, sort.est = T, terms=wk4_int_terms, auto_label=F,
                                show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Readiness for Change, Complete Sample', 'Baseline to Week 4'))
```

Readiness for Change, Complete Sample Baseline to Week 4



```
(readiness_posttest_plot_complete <- plot_model(
  m1_readiness_complete, sort.est = T, terms=posttest_int_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Readiness for Change, Complete Sample', 'Baseline to Post-test'))
```

Readiness for Change, Complete Sample Baseline to Post-test



```
#Credibility / Expectancy Questionnaire scores
df_for_acceptability_complete <- mega_alltimes_active_first %>%
  filter(group!='Passive Control') %>%
  filter(duplicate_ip=='No') %>%
  mutate(group=droplevels(group))

m1_ceq_complete <- lm(CEQ_score~group,data=df_for_acceptability_complete)
summary(m1_ceq_complete)
```

```
##
## Call:
## lm(formula = CEQ_score ~ group, data = df_for_acceptability_complete)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -27.845  -7.244   0.145   7.232  29.770
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    30.76778    0.48955   62.849  < 2e-16
## group5 Habits to Beat Depression    0.49318    0.70063    0.704   0.4815
## groupAI-assisted Personalized Narrative -1.81735    0.69753  -2.605   0.0092
## groupDialectical Behavioral Therapy Skills -0.91280    0.69829  -1.307   0.1912
## groupInner Child Healing Walk    -4.53831    0.69342  -6.545 6.49e-11
## groupInteractive Cognitive Reappraisal    0.70914    0.70102    1.012   0.3118
```

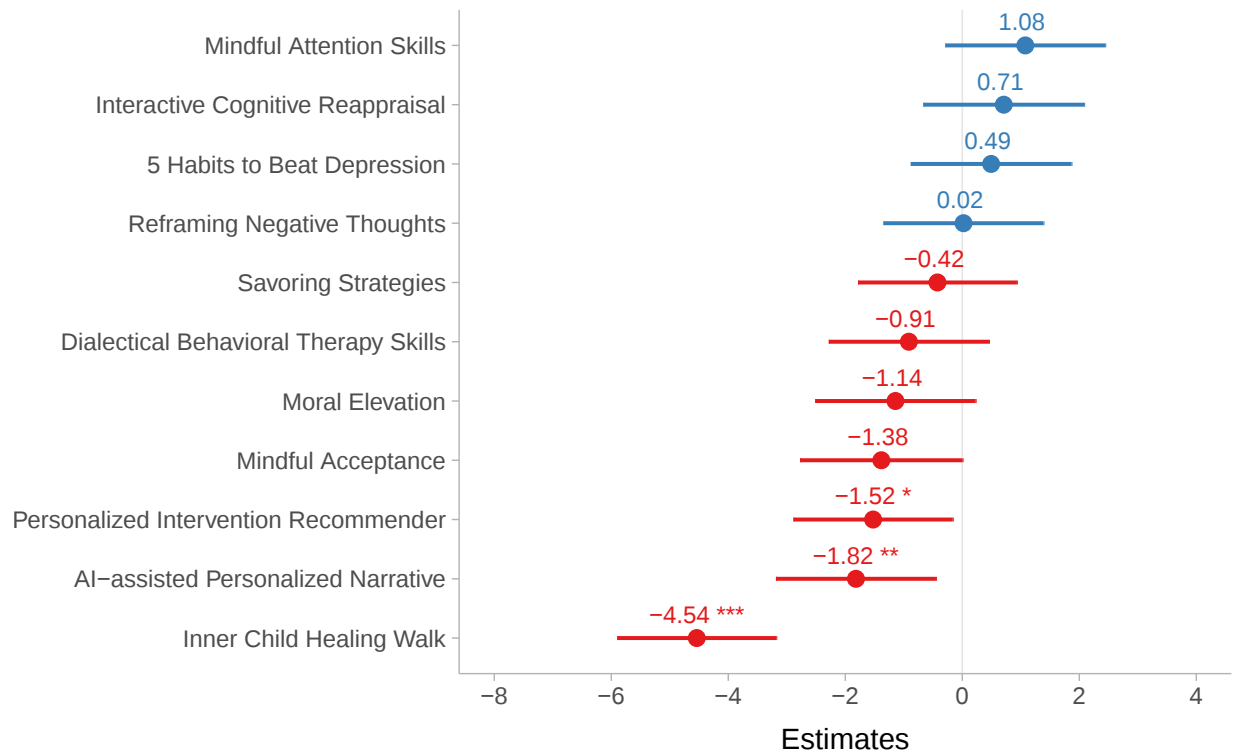
```
## groupMindful Acceptance -1.38334 0.70838 -1.953 0.0509
## groupMindful Attention Skills 1.07738 0.69715 1.545 0.1223
## groupMoral Elevation -1.14251 0.69945 -1.633 0.1024
## groupPersonalized Intervention Recommender -1.52414 0.69452 -2.195 0.0282
## groupReframing Negative Thoughts 0.02101 0.69753 0.030 0.9760
## groupSavoring Strategies -0.42397 0.69269 -0.612 0.5405
##
## (Intercept) ***
## group5 Habits to Beat Depression
## groupAI-assisted Personalized Narrative **
## groupDialectical Behavioral Therapy Skills
## groupInner Child Healing Walk ***
## groupInteractive Cognitive Reappraisal
## groupMindful Acceptance .
## groupMindful Attention Skills
## groupMoral Elevation
## groupPersonalized Intervention Recommender *
## groupReframing Negative Thoughts
## groupSavoring Strategies
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 10.7 on 5552 degrees of freedom
## (10294 observations deleted due to missingness)
## Multiple R-squared: 0.01806, Adjusted R-squared: 0.01611
## F-statistic: 9.283 on 11 and 5552 DF, p-value: < 2.2e-16
```

```
rstatix::cohens_d(CEQ_score~group,data=df_for_acceptability_complete) %>% select(-magnitude,-y.)
```

```
## # A tibble: 66 x 5
##   group1          group2          effsize    n1    n2
##   <chr>          <chr>          <dbl> <int> <int>
## 1 Behavioral Activation 5 Habits to Beat Depression -0.0497 478 456
## 2 Behavioral Activation AI-assisted Personalized Narrative 0.168 478 464
## 3 Behavioral Activation Dialectical Behavioral Therapy Sk~ 0.0900 478 462
## 4 Behavioral Activation Inner Child Healing Walk 0.418 478 475
## 5 Behavioral Activation Interactive Cognitive Reappraisal -0.0666 478 455
## 6 Behavioral Activation Mindful Acceptance 0.131 478 437
## 7 Behavioral Activation Mindful Attention Skills -0.106 478 465
## 8 Behavioral Activation Moral Elevation 0.107 478 459
## 9 Behavioral Activation Personalized Intervention Recomme~ 0.148 478 472
## 10 Behavioral Activation Reframing Negative Thoughts -0.00202 478 464
## # i 56 more rows
```

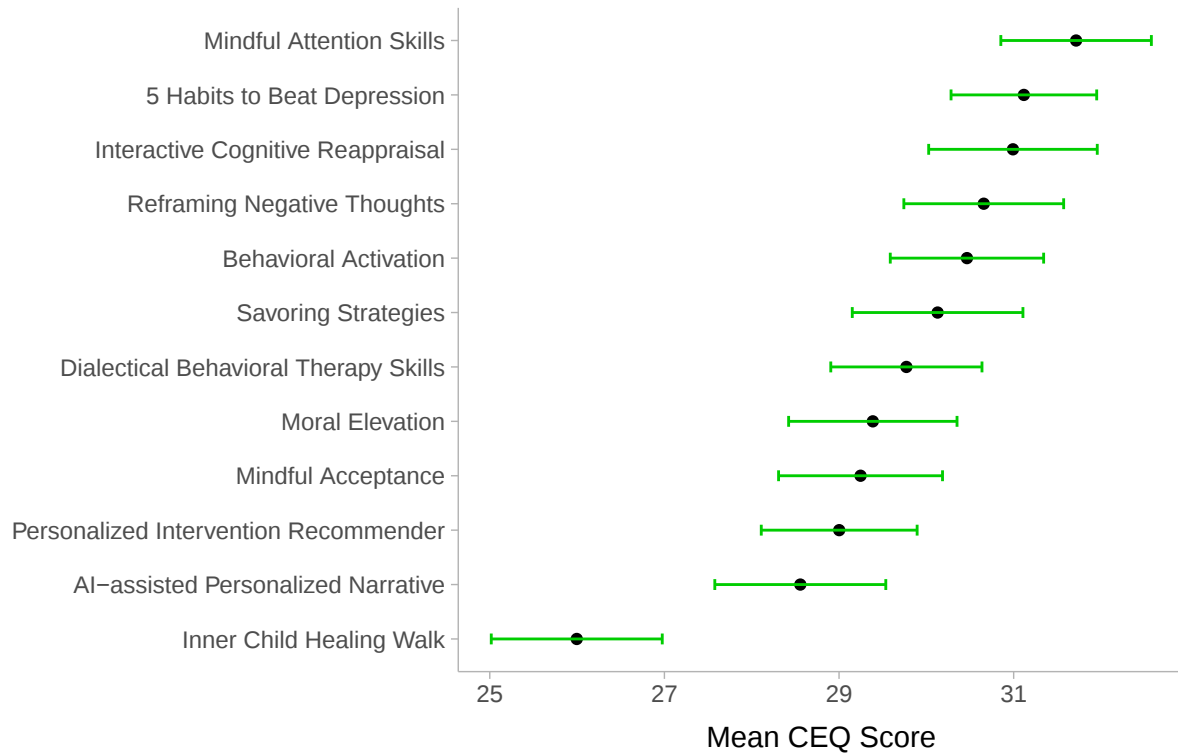
```
acceptability_terms <- m1_ceq_complete %>% tidy() %>%
  filter(term!='(Intercept)') %>% pull(term)
(ceq_plot <- plot_model(m1_ceq_complete,sort.est = T,terms=acceptability_terms,auto_label=F,
  show.values = T, value.offset = .4,value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Credibility and Expected Benefit, Complete Sample','At Post-test'))
```

Credibility and Expected Benefit, Complete Sample At Post-test



```
(ceq_pointplot_complete <- mega_alltimes_complete %>% filter(time=='Post-test'&group!='Passive Control')
  group_by(group) %>%
  summarize(
    mean_CEQ_score = mean(CEQ_score, na.rm = TRUE),
    se = sd(CEQ_score, na.rm = TRUE) / sqrt(n()),
    ci_lower = mean_CEQ_score - 1.96 * se,
    ci_upper = mean_CEQ_score + 1.96 * se) %>%
  ggplot(aes(x = reorder(group, mean_CEQ_score), y = mean_CEQ_score)) +
  geom_point(size=1.5) +
  geom_errorbar(aes(ymin = ci_lower, ymax = ci_upper),
    color='green3',width = 0.2,show.legend = F) +
  coord_flip() +labs(x = "", y = "Mean CEQ Score")+
  ggtitle("Credibility and Expected Benefit, Complete Sample","At Post-test, range 4-56"))
```

Credibility and Expected Benefit, Complete Sam At Post-test, range 4–56



#Frequency of Aha! moments at post-test

```
m1_aha_complete <- lm(aha~group,data=df_for_acceptability_complete %>% filter(time=='Post-test'))
summary(m1_aha_complete)
```

```
##
## Call:
## lm(formula = aha ~ group, data = df_for_acceptability_complete %>%
##   filter(time == "Post-test"))
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.4731 -0.4022 -0.2658  0.5636  0.7410
##
## Coefficients:
##              Estimate Std. Error t value
## (Intercept)    0.4456067  0.0219824  20.271
## group5 Habits to Beat Depression -0.0092032  0.0314606  -0.293
## groupAI-assisted Personalized Narrative -0.0856929  0.0313215  -2.736
## groupDialectical Behavioral Therapy Skills -0.0516673  0.0313558  -1.648
## groupInner Child Healing Walk -0.1866593  0.0311369  -5.995
## groupInteractive Cognitive Reappraisal -0.0004313  0.0314606  -0.014
## groupMindful Acceptance -0.1115106  0.0318087  -3.506
## groupMindful Attention Skills  0.0275116  0.0313044   0.879
## groupMoral Elevation -0.0434328  0.0313905  -1.384
## groupPersonalized Intervention Recommender -0.1797839  0.0311533  -5.771
## groupReframing Negative Thoughts -0.0404343  0.0313215  -1.291
```

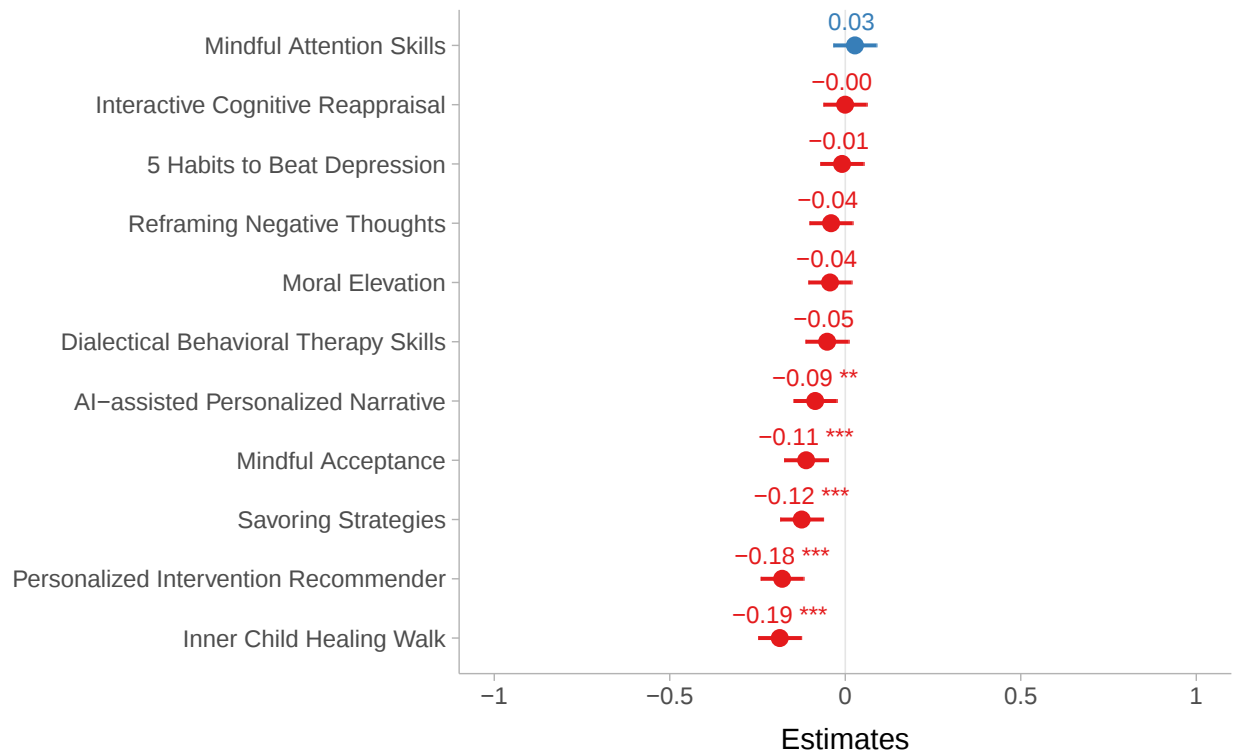
```
## groupSavoring Strategies -0.1241781 0.0311205 -3.990
## Pr(>|t|)
## (Intercept) < 2e-16 ***
## group5 Habits to Beat Depression 0.769892
## groupAI-assisted Personalized Narrative 0.006240 **
## groupDialectical Behavioral Therapy Skills 0.099456 .
## groupInner Child Healing Walk 2.17e-09 ***
## groupInteractive Cognitive Reappraisal 0.989064
## groupMindful Acceptance 0.000459 ***
## groupMindful Attention Skills 0.379525
## groupMoral Elevation 0.166528
## groupPersonalized Intervention Recommender 8.31e-09 ***
## groupReframing Negative Thoughts 0.196776
## groupSavoring Strategies 6.69e-05 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4806 on 5555 degrees of freedom
## (116 observations deleted due to missingness)
## Multiple R-squared: 0.01982, Adjusted R-squared: 0.01788
## F-statistic: 10.21 on 11 and 5555 DF, p-value: < 2.2e-16
```

```
rstatix::cohens_d(aha~group,data=df_for_acceptability_complete)%>% filter(time=='Post-test')) %>% select
```

```
## # A tibble: 66 x 5
##   group1          group2          effsize    n1    n2
##   <chr>          <chr>          <dbl> <int> <int>
## 1 Behavioral Activation 5 Habits to Beat Depression 1.85e-2 478 456
## 2 Behavioral Activation AI-assisted Personalized Narrative 1.75e-1 478 464
## 3 Behavioral Activation Dialectical Behavioral Therapy Sk~ 1.05e-1 478 462
## 4 Behavioral Activation Inner Child Healing Walk 3.98e-1 478 475
## 5 Behavioral Activation Interactive Cognitive Reappraisal 8.67e-4 478 456
## 6 Behavioral Activation Mindful Acceptance 2.30e-1 478 437
## 7 Behavioral Activation Mindful Attention Skills -5.52e-2 478 465
## 8 Behavioral Activation Moral Elevation 8.79e-2 478 460
## 9 Behavioral Activation Personalized Intervention Recomme~ 3.82e-1 478 474
## 10 Behavioral Activation Reframing Negative Thoughts 8.18e-2 478 464
## # i 56 more rows
```

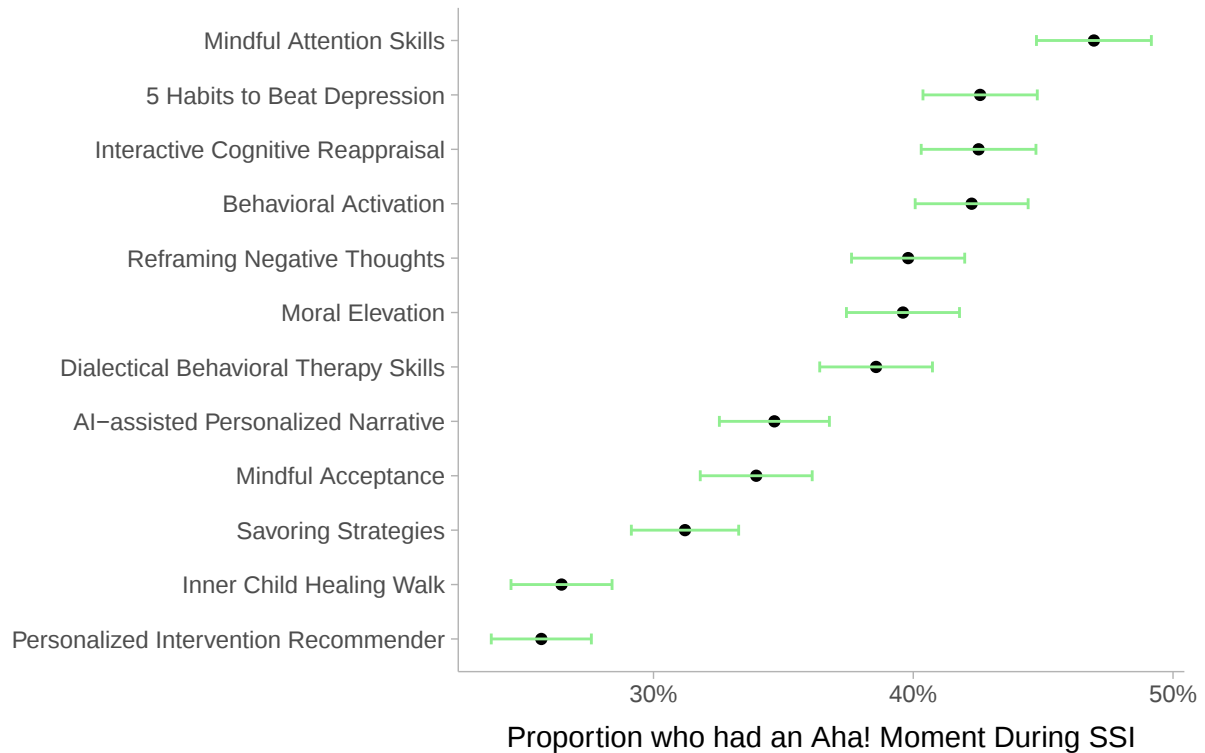
```
(aha_plot_complete <- plot_model(m1_aha_complete,sort.est = T,terms=acceptability_terms,auto_label=F,
  show.values = T, value.offset = .4,value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Probability of an Aha! Moment during SSI, Complete Sample','At Post-test'))
```

Probability of an Aha! Moment during SSI, Complete At Post-test



```
(aha_pointplot <- mega_alltimes_complete %>%
  filter(time=='Post-test'&group!='Passive Control') %>%
  group_by(group) %>%
  summarize(
    aha_prop = mean(aha, na.rm = TRUE),
    n = sum(!is.na(aha)),
    se = sqrt(aha_prop * (1 - aha_prop) / n)
  ) %>%
  ggplot(aes(x = reorder(group, aha_prop), y = aha_prop)) +
  geom_point(size=1.5) +
  geom_errorbar(aes(ymin = aha_prop - se, ymax = aha_prop +
    se),
    color='palegreen2',width = 0.2,show.legend = F) +
  labs(x = "", y = "Proportion who had an Aha! Moment During SSI")+
  scale_y_continuous(labels = scales::percent)+
  coord_flip() +
  ggtitle("Proportion of Aha! Moments, Complete Sample","At Post-test"))
```

Proportion of Aha! Moments, Complete Sample At Post-test



#significance of aha moments

```
m1_aha_significance_complete <- lm(aha_significant~group,
                                   data=df_for_acceptability_complete %>%
                                   filter(time=='Post-test'))
```

```
rstatix::cohens_d(aha_significant~group,data=df_for_acceptability_complete) %>% select(-magnitude,-y.)
kable()
```

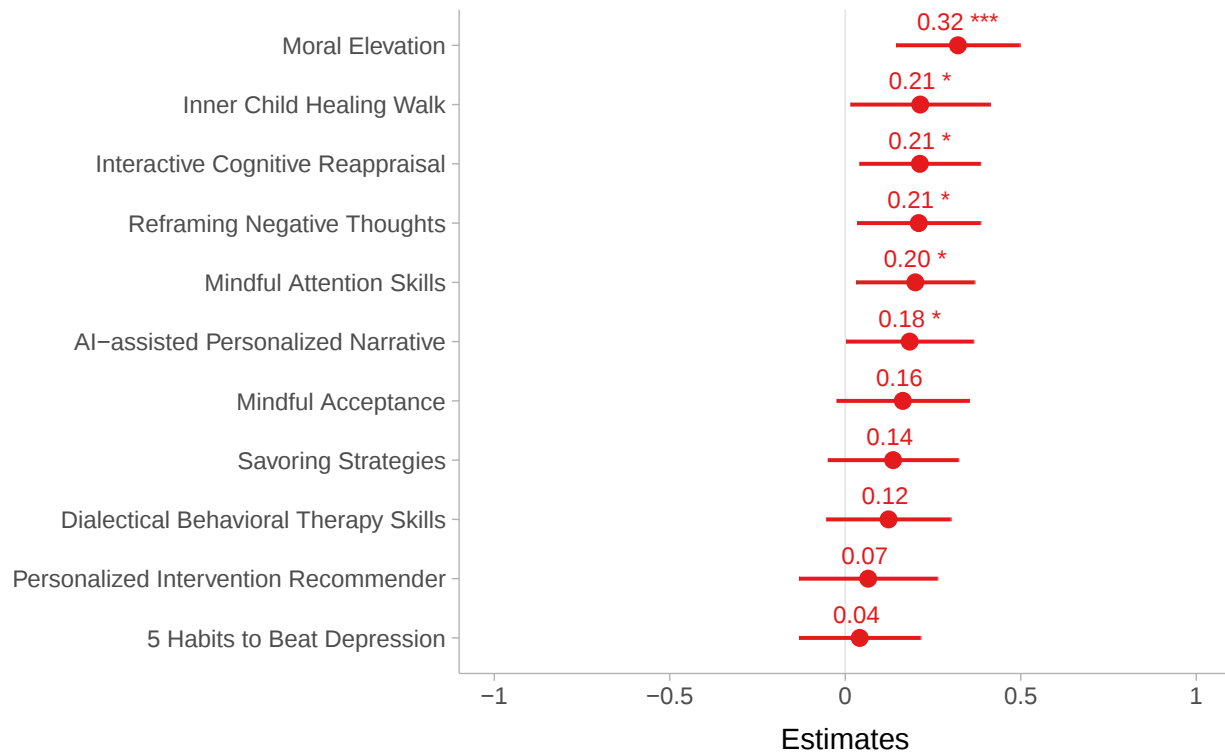
group1	group2	effsize	n1	n2
Behavioral Activation	5 Habits to Beat Depression	-0.0911469	312	287
Behavioral Activation	AI-assisted Personalized Narrative	-0.1309067	312	248
Behavioral Activation	Dialectical Behavioral Therapy Skills	-0.1890220	312	261
Behavioral Activation	Inner Child Healing Walk	-0.2704750	312	185
Behavioral Activation	Interactive Cognitive Reappraisal	-0.2026020	312	295
Behavioral Activation	Mindful Acceptance	-0.0732799	312	220
Behavioral Activation	Mindful Attention Skills	-0.2380527	312	309
Behavioral Activation	Moral Elevation	-0.2424643	312	281
Behavioral Activation	Personalized Intervention Recommender	-0.0357780	312	202
Behavioral Activation	Reframing Negative Thoughts	-0.1647922	312	276
Behavioral Activation	Savoring Strategies	-0.0364539	312	263
5 Habits to Beat Depression	AI-assisted Personalized Narrative	-0.0402856	287	248
5 Habits to Beat Depression	Dialectical Behavioral Therapy Skills	-0.0905361	287	261
5 Habits to Beat Depression	Inner Child Healing Walk	-0.1755873	287	185

group1	group2	effsize	n1	n2
5 Habits to Beat Depression	Interactive Cognitive Reappraisal	-0.1111780	287	295
5 Habits to Beat Depression	Mindful Acceptance	0.0142348	287	220
5 Habits to Beat Depression	Mindful Attention Skills	-0.1457337	287	309
5 Habits to Beat Depression	Moral Elevation	-0.1514609	287	281
5 Habits to Beat Depression	Personalized Intervention	0.0552873	287	202
	Recommender			
5 Habits to Beat Depression	Reframing Negative Thoughts	-0.0751471	287	276
5 Habits to Beat Depression	Savoring Strategies	0.0516394	287	263
AI-assisted Personalized Narrative	Dialectical Behavioral Therapy Skills	-0.0467044	248	261
AI-assisted Personalized Narrative	Inner Child Healing Walk	-0.1328007	248	185
AI-assisted Personalized Narrative	Interactive Cognitive Reappraisal	-0.0701908	248	295
AI-assisted Personalized Narrative	Mindful Acceptance	0.0529510	248	220
AI-assisted Personalized Narrative	Mindful Attention Skills	-0.1041935	248	309
AI-assisted Personalized Narrative	Moral Elevation	-0.1104540	248	281
AI-assisted Personalized Narrative	Personalized Intervention	0.0952266	248	202
	Recommender			
AI-assisted Personalized Narrative	Reframing Negative Thoughts	-0.0350908	248	276
AI-assisted Personalized Narrative	Savoring Strategies	0.0903953	248	263
Dialectical Behavioral Therapy Skills	Inner Child Healing Walk	-0.0945213	261	185
Dialectical Behavioral Therapy Skills	Interactive Cognitive Reappraisal	-0.0284760	261	295
Dialectical Behavioral Therapy Skills	Mindful Acceptance	0.1019690	261	220
Dialectical Behavioral Therapy Skills	Mindful Attention Skills	-0.0646512	261	309
Dialectical Behavioral Therapy Skills	Moral Elevation	-0.0718388	261	281
Dialectical Behavioral Therapy Skills	Personalized Intervention	0.1500952	261	202
	Recommender			
Dialectical Behavioral Therapy Skills	Reframing Negative Thoughts	0.0084425	261	276
Dialectical Behavioral Therapy Skills	Savoring Strategies	0.1427552	261	263
Inner Child Healing Walk	Interactive Cognitive Reappraisal	0.0607456	185	295
Inner Child Healing Walk	Mindful Acceptance	0.1836619	185	220
Inner Child Healing Walk	Mindful Attention Skills	0.0265207	185	309
Inner Child Healing Walk	Moral Elevation	0.0183233	185	281
Inner Child Healing Walk	Personalized Intervention	0.2329502	185	202
	Recommender			
Inner Child Healing Walk	Reframing Negative Thoughts	0.0949163	185	276
Inner Child Healing Walk	Savoring Strategies	0.2235620	185	263
Interactive Cognitive Reappraisal	Mindful Acceptance	0.1213819	295	220
Interactive Cognitive Reappraisal	Mindful Attention Skills	-0.0336524	295	309
Interactive Cognitive Reappraisal	Moral Elevation	-0.0408555	295	281
Interactive Cognitive Reappraisal	Personalized Intervention	0.1665394	295	202
	Recommender			
Interactive Cognitive Reappraisal	Reframing Negative Thoughts	0.0341435	295	276
Interactive Cognitive Reappraisal	Savoring Strategies	0.1595471	295	263
Mindful Acceptance	Mindful Attention Skills	-0.1547822	220	309
Mindful Acceptance	Moral Elevation	-0.1602672	220	281
Mindful Acceptance	Personalized Intervention	0.0389012	220	202
	Recommender			
Mindful Acceptance	Reframing Negative Thoughts	-0.0864755	220	276
Mindful Acceptance	Savoring Strategies	0.0359335	220	263
Mindful Attention Skills	Moral Elevation	-0.0076798	309	281
Mindful Attention Skills	Personalized Intervention	0.2015991	309	202
	Recommender			
Mindful Attention Skills	Reframing Negative Thoughts	0.0675071	309	276

group1	group2	effsize	n1	n2
Mindful Attention Skills	Savoring Strategies	0.1934949	309	263
Moral Elevation	Personalized Intervention Recommender	0.2065423	281	202
Moral Elevation	Reframing Negative Thoughts	0.0741851	281	276
Moral Elevation	Savoring Strategies	0.1984896	281	263
Personalized Intervention Recommender	Reframing Negative Thoughts	-0.1294802	202	276
Personalized Intervention Recommender	Savoring Strategies	-0.0018729	202	263
Reframing Negative Thoughts	Savoring Strategies	0.1237407	276	263

```
plot_model(
  m1_aha_significance_complete, sort.est = T, terms=acceptability_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Significance of Aha! Moment, Complete Sample', 'At Post-test, compared to a Behavioral Activation SSI')
```

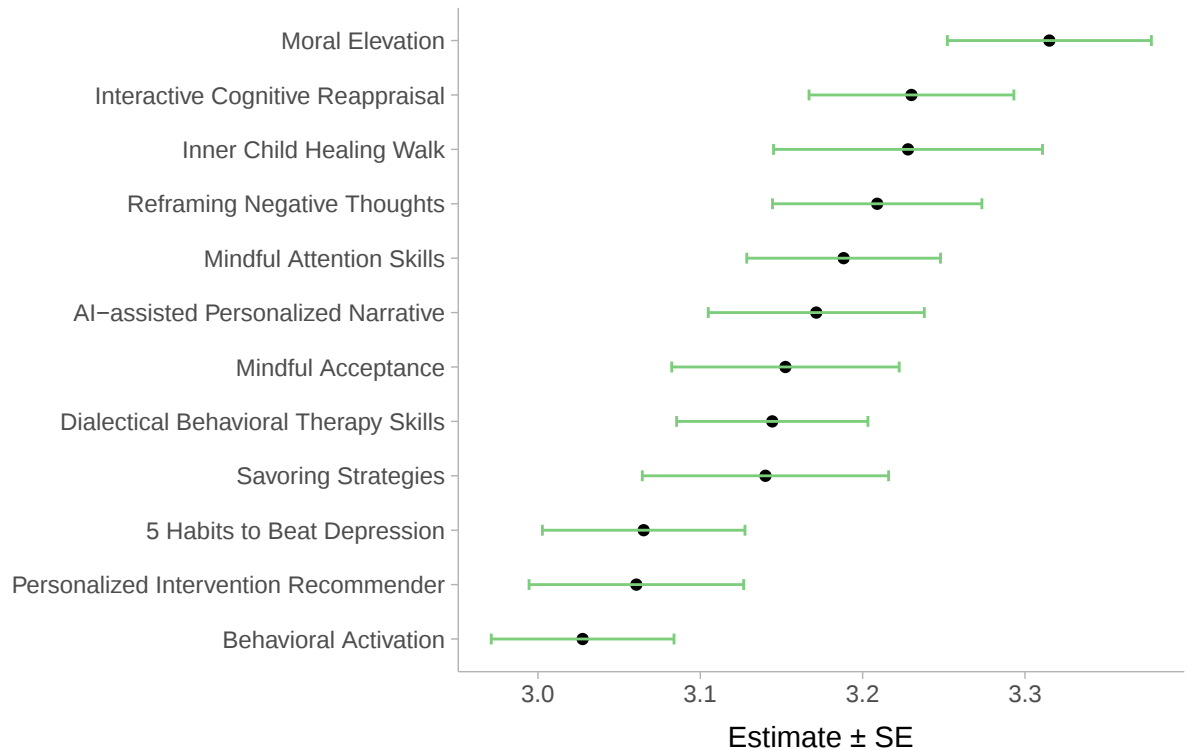
Significance of Aha! Moment, Complete Sample At Post-test, compared to a Behavioral Activation SSI



```
(aha_signif_pointplot <- mega_alltimes_complete %>%
  filter(time=='Post-test' & group!='Passive Control') %>%
  group_by(group) %>%
  summarize(mean_aha_signif_score=mean(aha_significant, na.rm=T), std.error=std.error(aha_significant, na.rm=T)) +
  ggplot(aes(x = reorder(group, mean_aha_signif_score), y = mean_aha_signif_score)) +
  geom_point(size=1.5) +
```

```
geom_errorbar(aes(ymin = mean_aha_signif_score - std.error,
  ymax = mean_aha_signif_score +
    std.error),
  color='palegreen3',width = 0.2,show.legend = F) +
coord_flip() +labs(x = "", y = "Estimate \u00B1 SE")+
ggtitle("Significance of Aha! Moment, Complete Sample",
  "At Post-test, range 0-5"))
```

Significance of Aha! Moment, Complete Sample At Post-test, range 0-5



```
#star ratings
m1_star_complete <- lm(star_rating_1~group,data=df_for_acceptability_complete %>%
  filter(time=='Post-test'))
rstatix::cohens_d(star_rating_1~group,data=df_for_acceptability_complete %>% filter(time=='Post-test'))
```

group1	group2	effsize	n1	n2
Behavioral Activation	5 Habits to Beat Depression	-0.0836809	477	456
Behavioral Activation	AI-assisted Personalized Narrative	0.1106011	477	464
Behavioral Activation	Dialectical Behavioral Therapy Skills	-0.0211994	477	462
Behavioral Activation	Inner Child Healing Walk	0.4071513	477	475
Behavioral Activation	Interactive Cognitive Reappraisal	-0.0534805	477	454
Behavioral Activation	Mindful Acceptance	-0.0894911	477	436
Behavioral Activation	Mindful Attention Skills	-0.1638395	477	465
Behavioral Activation	Moral Elevation	-0.1796550	477	459

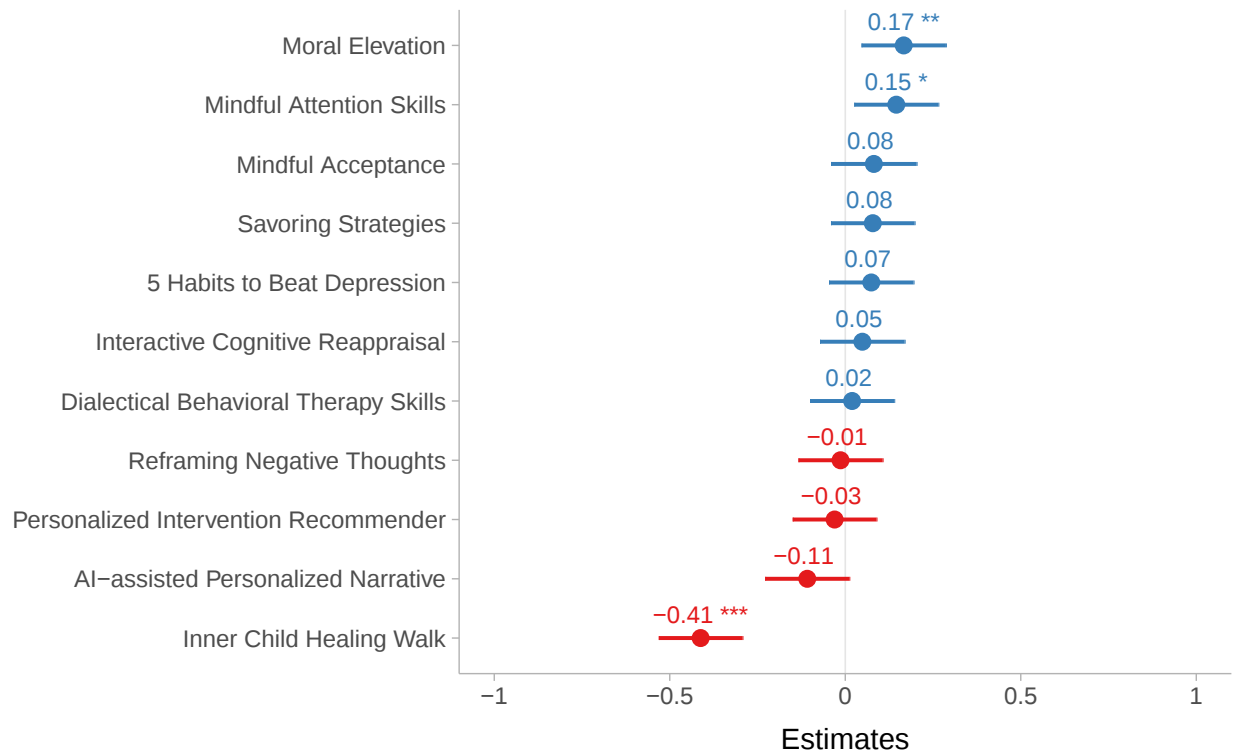
group1	group2	effsize	n1	n2
Behavioral Activation	Personalized Intervention	0.0326769	477	472
	Recommender			
Behavioral Activation	Reframing Negative Thoughts	0.0143484	477	464
Behavioral Activation	Savoring Strategies	-0.0842980	477	475
5 Habits to Beat Depression	AI-assisted Personalized Narrative	0.1931252	456	464
5 Habits to Beat Depression	Dialectical Behavioral Therapy Skills	0.0618637	456	462
5 Habits to Beat Depression	Inner Child Healing Walk	0.4967706	456	475
5 Habits to Beat Depression	Interactive Cognitive Reappraisal	0.0292445	456	454
5 Habits to Beat Depression	Mindful Acceptance	-0.0083227	456	436
5 Habits to Beat Depression	Mindful Attention Skills	-0.0838793	456	465
5 Habits to Beat Depression	Moral Elevation	-0.1037083	456	459
5 Habits to Beat Depression	Personalized Intervention	0.1170878	456	472
	Recommender			
5 Habits to Beat Depression	Reframing Negative Thoughts	0.0969855	456	464
5 Habits to Beat Depression	Savoring Strategies	-0.0048056	456	475
AI-assisted Personalized Narrative	Dialectical Behavioral Therapy Skills	-0.1308586	464	462
AI-assisted Personalized Narrative	Inner Child Healing Walk	0.2855510	464	475
AI-assisted Personalized Narrative	Interactive Cognitive Reappraisal	-0.1623460	464	454
AI-assisted Personalized Narrative	Mindful Acceptance	-0.1962043	464	436
AI-assisted Personalized Narrative	Mindful Attention Skills	-0.2682014	464	465
AI-assisted Personalized Narrative	Moral Elevation	-0.2795837	464	459
AI-assisted Personalized Narrative	Personalized Intervention	-0.0791307	464	472
	Recommender			
AI-assisted Personalized Narrative	Reframing Negative Thoughts	-0.0952954	464	464
AI-assisted Personalized Narrative	Savoring Strategies	-0.1892878	464	475
Dialectical Behavioral Therapy Skills	Inner Child Healing Walk	0.4274570	462	475
Dialectical Behavioral Therapy Skills	Interactive Cognitive Reappraisal	-0.0321306	462	454
Dialectical Behavioral Therapy Skills	Mindful Acceptance	-0.0682544	462	436
Dialectical Behavioral Therapy Skills	Mindful Attention Skills	-0.1423039	462	465
Dialectical Behavioral Therapy Skills	Moral Elevation	-0.1590613	462	459
Dialectical Behavioral Therapy Skills	Personalized Intervention	0.0538285	462	472
	Recommender			
Dialectical Behavioral Therapy Skills	Reframing Negative Thoughts	0.0352078	462	464
Dialectical Behavioral Therapy Skills	Savoring Strategies	-0.0635198	462	475
Inner Child Healing Walk	Interactive Cognitive Reappraisal	-0.4607117	475	454
Inner Child Healing Walk	Mindful Acceptance	-0.4933851	475	436
Inner Child Healing Walk	Mindful Attention Skills	-0.5689200	475	465
Inner Child Healing Walk	Moral Elevation	-0.5696991	475	459
Inner Child Healing Walk	Personalized Intervention	-0.3750699	475	472
	Recommender			
Inner Child Healing Walk	Reframing Negative Thoughts	-0.3879636	475	464
Inner Child Healing Walk	Savoring Strategies	-0.4812638	475	475
Interactive Cognitive Reappraisal	Mindful Acceptance	-0.0365643	454	436
Interactive Cognitive Reappraisal	Mindful Attention Skills	-0.1107423	454	465
Interactive Cognitive Reappraisal	Moral Elevation	-0.1289949	454	459
Interactive Cognitive Reappraisal	Personalized Intervention	0.0862615	454	472
	Recommender			
Interactive Cognitive Reappraisal	Reframing Negative Thoughts	0.0670493	454	464
Interactive Cognitive Reappraisal	Savoring Strategies	-0.0324891	454	475
Mindful Acceptance	Mindful Attention Skills	-0.0732051	436	465
Mindful Acceptance	Moral Elevation	-0.0930901	436	459

group1	group2	effsize	n1	n2
Mindful Acceptance	Personalized Intervention	0.1220182	436	472
	Recommender			
Mindful Acceptance	Reframing Negative Thoughts	0.1023966	436	464
Mindful Acceptance	Savoring Strategies	0.0032302	436	475
Mindful Attention Skills	Moral Elevation	-0.0236527	465	459
Mindful Attention Skills	Personalized Intervention	0.1966278	465	472
	Recommender			
Mindful Attention Skills	Reframing Negative Thoughts	0.1755864	465	464
Mindful Attention Skills	Savoring Strategies	0.0747401	465	475
Moral Elevation	Personalized Intervention	0.2110170	459	472
	Recommender			
Moral Elevation	Reframing Negative Thoughts	0.1907684	459	464
Moral Elevation	Savoring Strategies	0.0941912	459	475
Personalized Intervention	Reframing Negative Thoughts	-0.0178452	472	464
Recommender				
Personalized Intervention	Savoring Strategies	-0.1161522	472	475
Recommender				
Reframing Negative Thoughts	Savoring Strategies	-0.0970507	464	475

```
(star_plot_complete <- plot_model(
  m1_star_complete, sort.est = T, terms=acceptability_terms,
  auto_label=F, show.values = T, value.offset = .4, value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Star Rating, Complete Sample', 'At Post-test, compared to a Behavioral Activation SSI'))
```

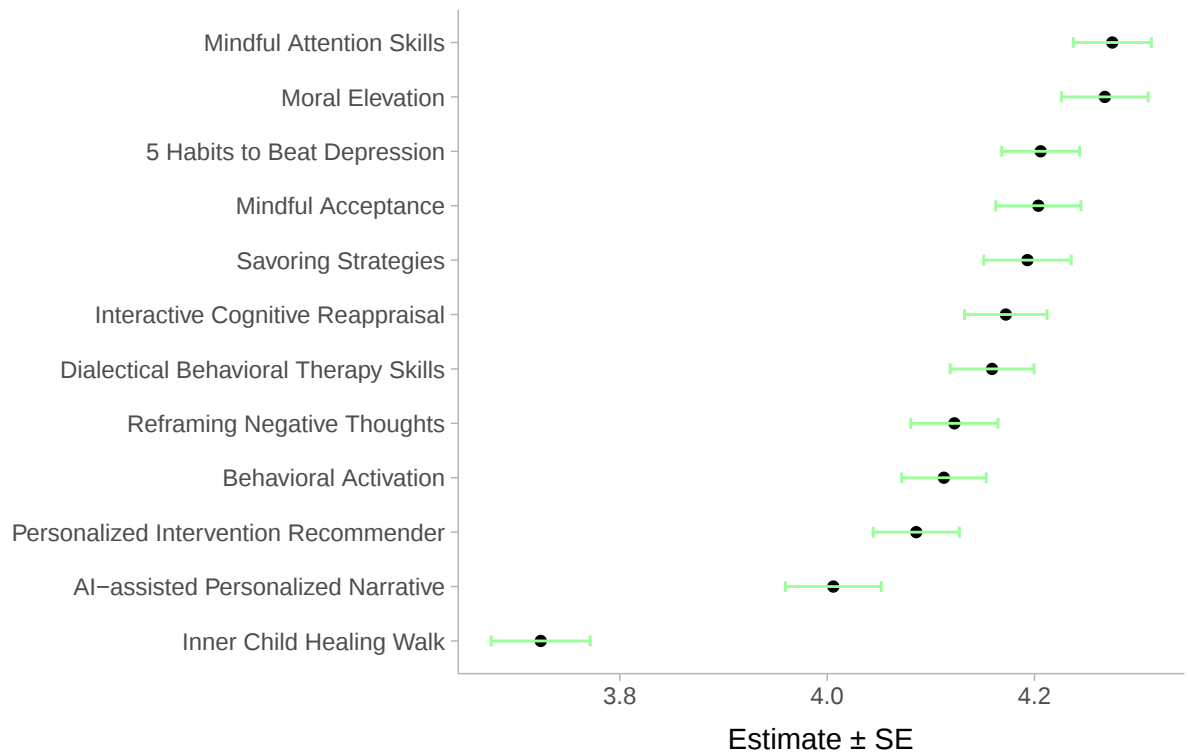
Star Rating, Complete Sample

At Post-test, compared to a Behavioral Activation SSI



```
(star_pointplot_complete <- mega_alltimes_complete %>%
  filter(time=='Post-test'&group!='Passive Control') %>%
  group_by(group) %>%
  summarize(mean_star_score=mean(star_rating_1,na.rm=T),
            std.error=std.error(star_rating_1,na.rm=T)) %>%
  ggplot(aes(x = reorder(group, mean_star_score), y = mean_star_score)) +
  geom_point(size=1.5) +
  geom_errorbar(aes(ymin = mean_star_score - std.error, ymax = mean_star_score +
                    std.error),
               color='palegreen1',width = 0.2,show.legend = F) +
  coord_flip() +labs(x = "", y = "Estimate \u00B1 SE")+
  ggtitle("Star Rating, Complete Sample","At Post-test, range 1-5"))
```

Star Rating, Complete Sample At Post-test, range 1–5



2. Remove all Duplicate IPs

Next, we'll remove all responses from anyone who had a duplicate IP. This leaves 91% of the complete data

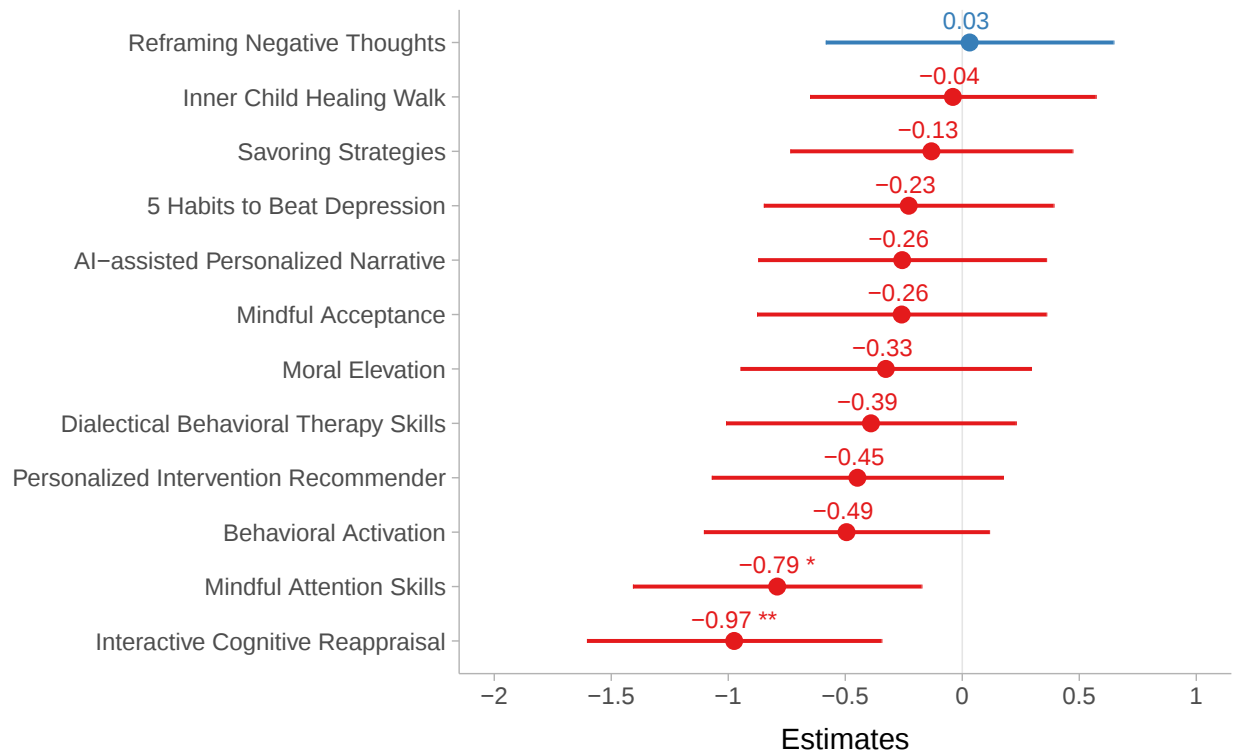
```
mega_alltimes_nodups <- mega_alltimes_complete %>% filter(duplicate_ip=='No')

#### Primary analysis: condition predicting change in PHQ ####

m1_phq9_nodups <- lmer(phq9_score ~ time * group + (1|pid),
  data=mega_alltimes_nodups)

#plot showing Change in Depression over Four Weeks Compared to a passive control
(phq9_plot_nodups <- plot_model(m1_phq9_nodups, sort.est = T, terms=wk4_int_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Depressive Symptoms, no Duplicate IPs', 'Baseline to Week 4'))
```

Depressive Symptoms, no Duplicate IPs Baseline to Week 4

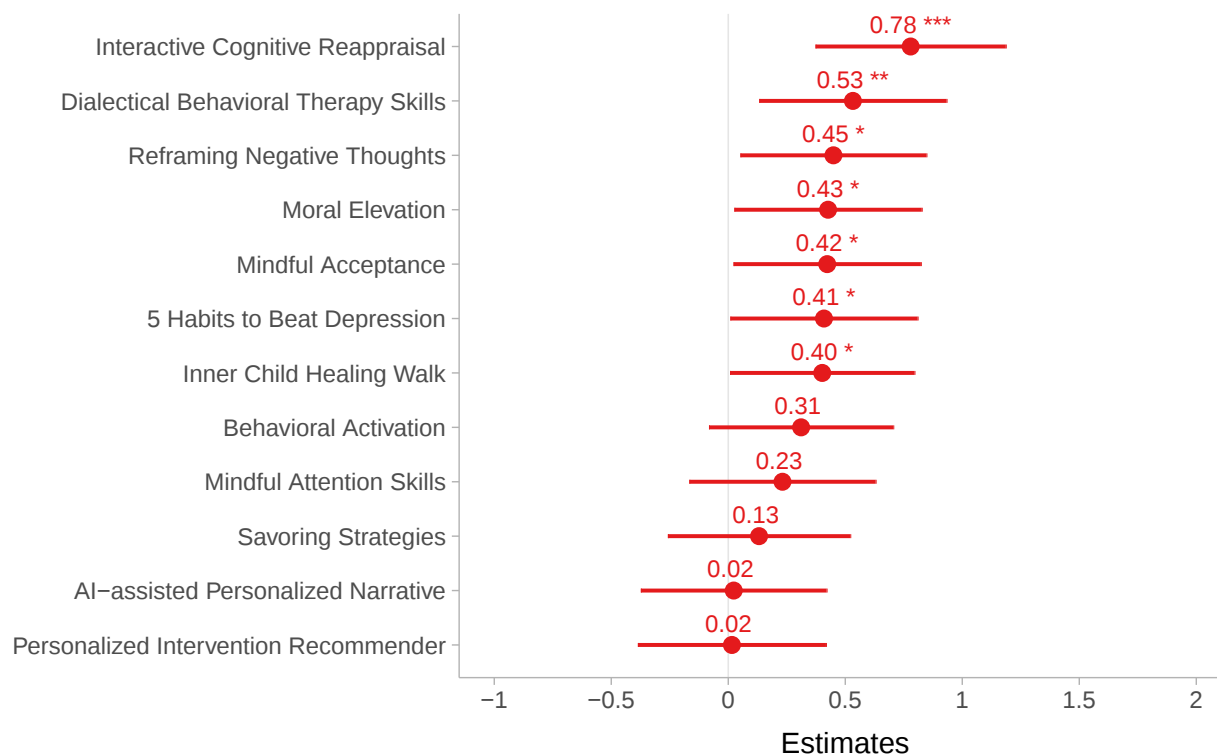


```
## agency ##
m1_agency_nodups <- lmer(agency_score ~ time * group + (1|pid), data=mega_alltimes_nodups)

(agency_wk4_plot_nodups <- plot_model(
  m1_agency_nodups, sort.est = T, terms=wk4_int_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Agency, no Duplicate IPs', 'Baseline to Week 4'))
```

Agency, no Duplicate IPs

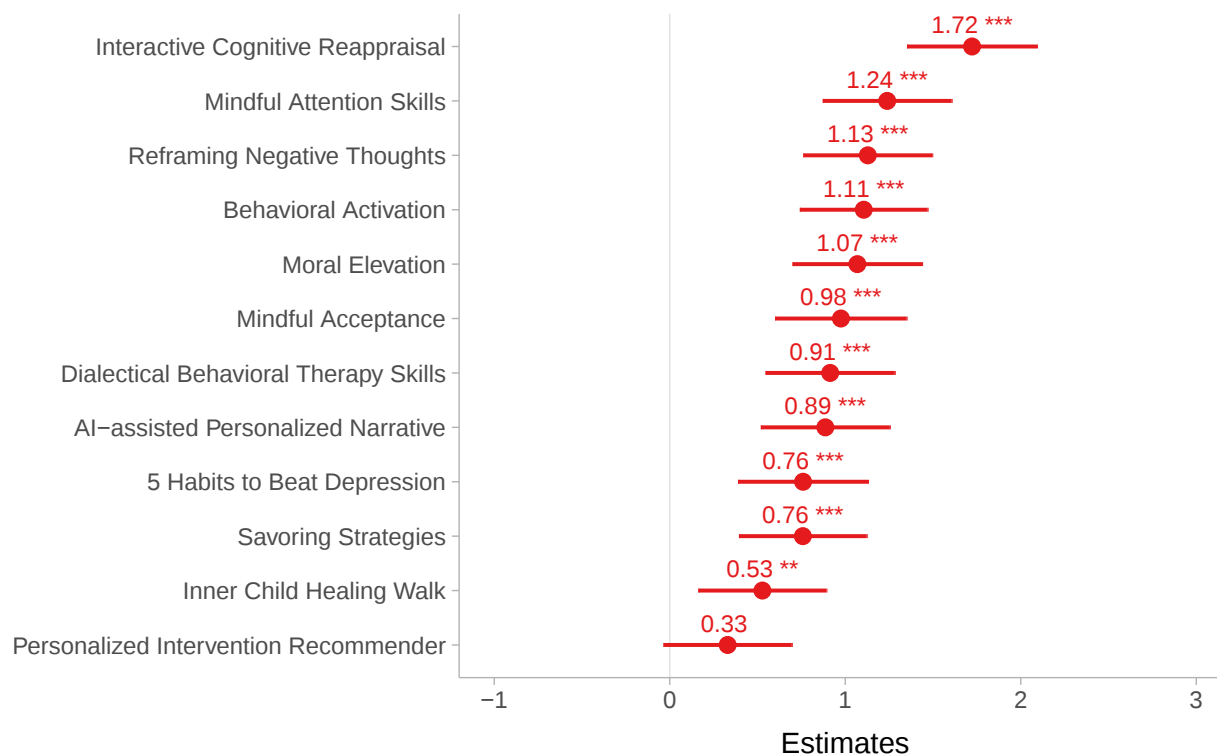
Baseline to Week 4



```
(agency_posttest_plot_nodups <- plot_model(
  m1_agency_nodups, sort.est = T, terms=posttest_int_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Agency, no Duplicate IPs', 'Baseline to Post-test'))
```

Agency, no Duplicate IPs

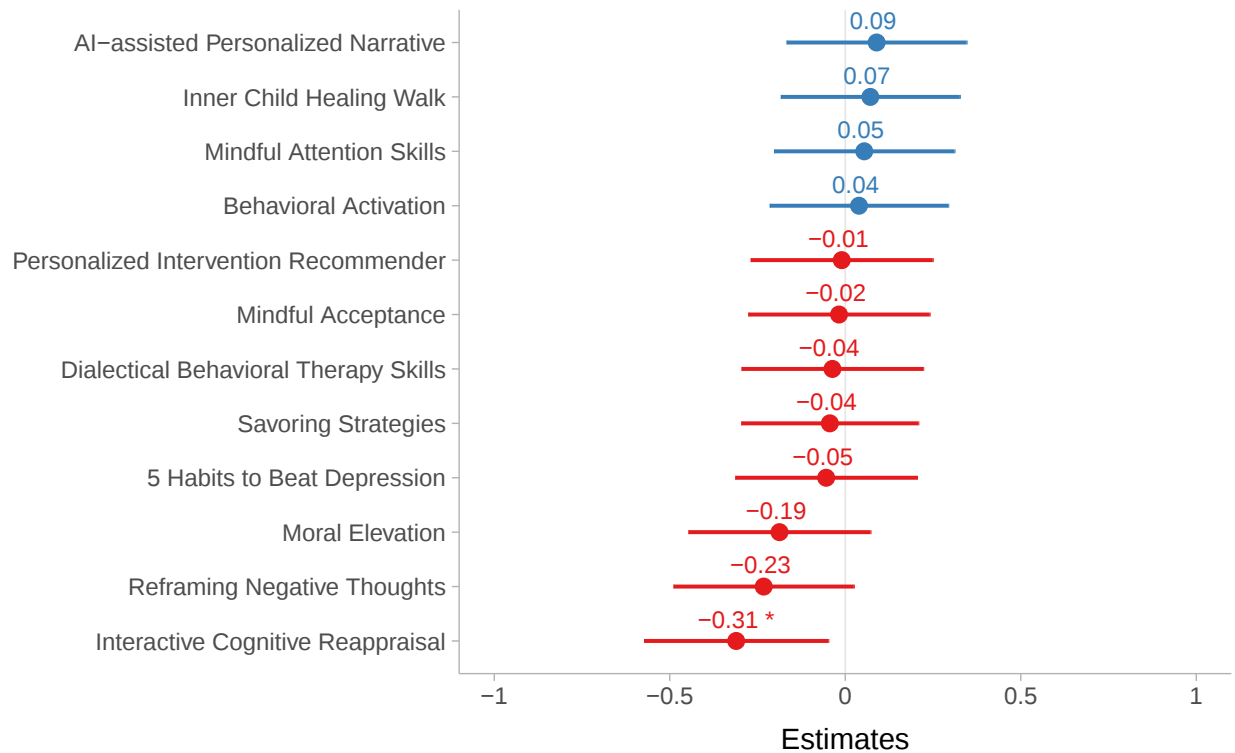
Baseline to Post-test



```
## hopelessness ##
m1_hopeless_nodups <- lmer(hopeless_score ~ time * group + (1|pid), data=mega_alltimes_nodups)

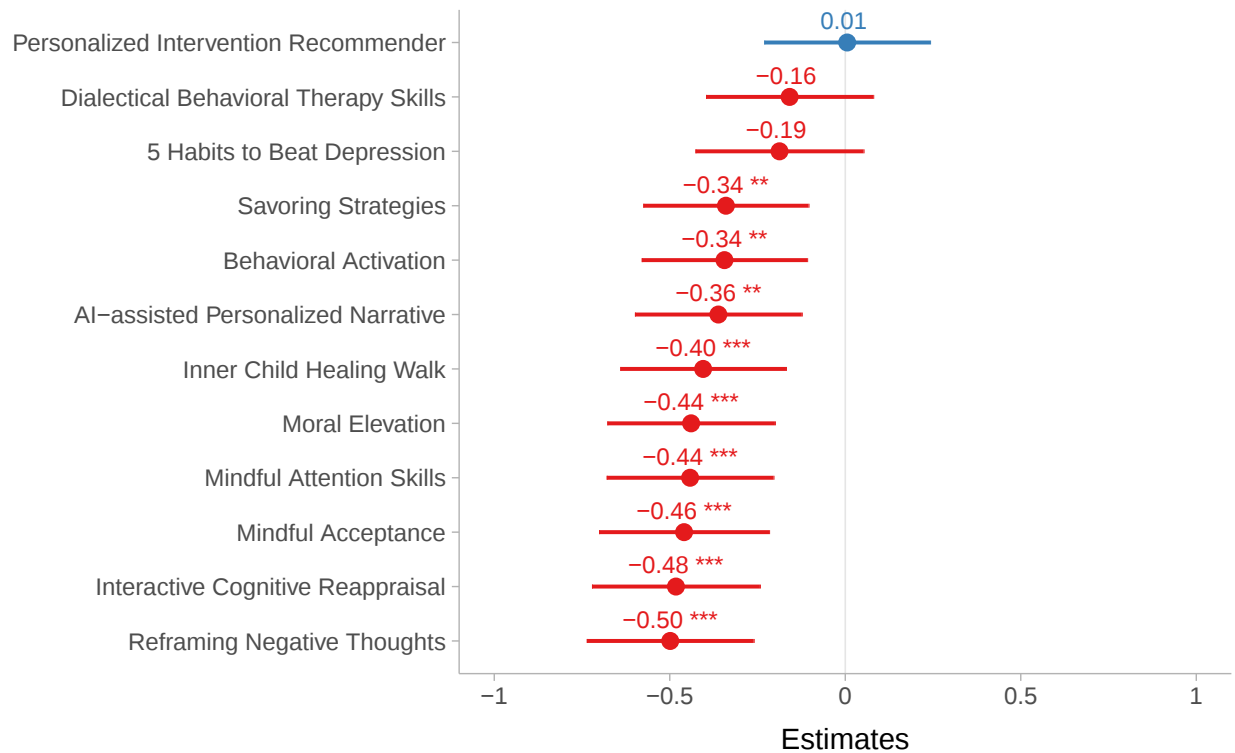
(hopelessness_wk4_plot <- plot_model(m1_hopeless_nodups, sort.est = T, terms=wk4_int_terms, auto_label=F,
                                   show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Hopelessness, no Duplicate IPs', 'Baseline to Week 4'))
```

Hopelessness, no Duplicate IPs Baseline to Week 4



```
(hopelessness_posttest_plot_nodups <- plot_model(
  m1_hopeless_nodups, sort.est = T, terms=posttest_int_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Hopelessness, no Duplicate IPs', 'Baseline to Post-test'))
```

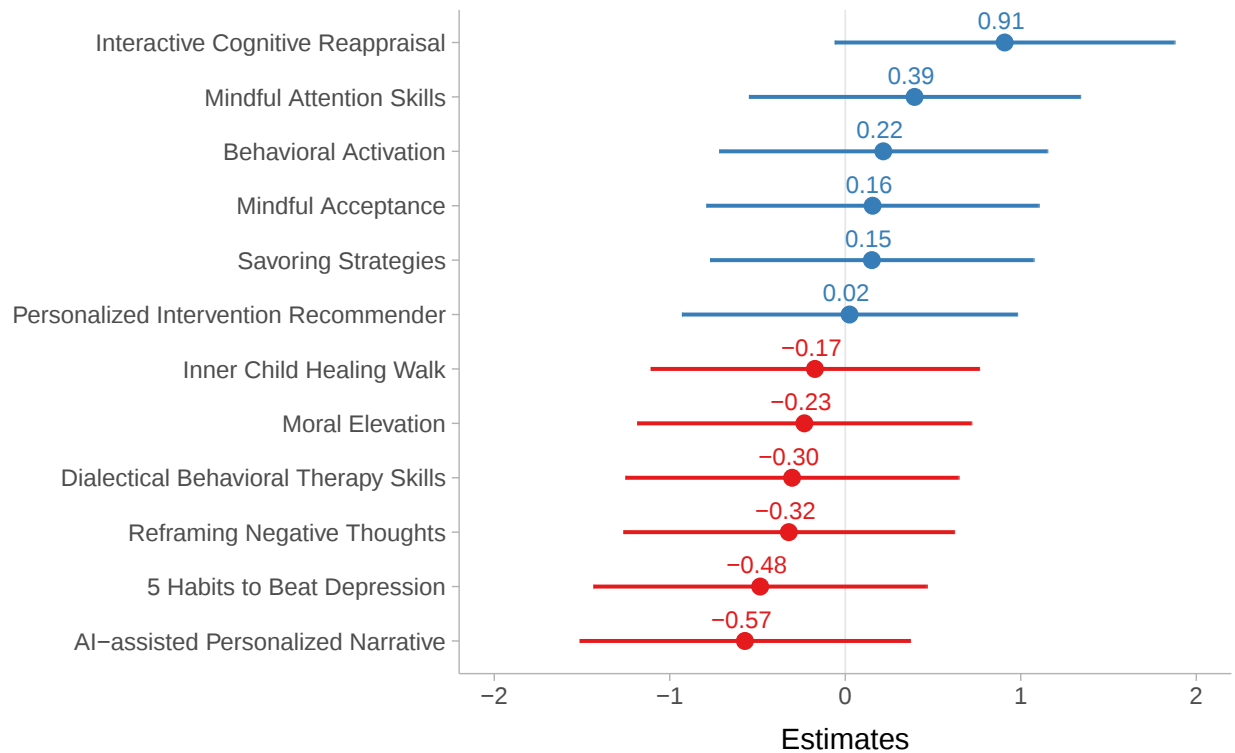
Hopelessness, no Duplicate IPs Baseline to Post-test



```
## FATS ##
m1_fats_nodups <- lmer(fats_score ~ time * group + (1|pid), data=mega_alltimes_nodups)

(fats_wk4_plot_nodups <- plot_model(m1_fats_nodups, sort.est = T, terms=wk4_int_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Positive Actions and Thinking, no Duplicate IPs', 'Baseline to Week 4'))
```

Positive Actions and Thinking, no Duplicate IPs Baseline to Week 4

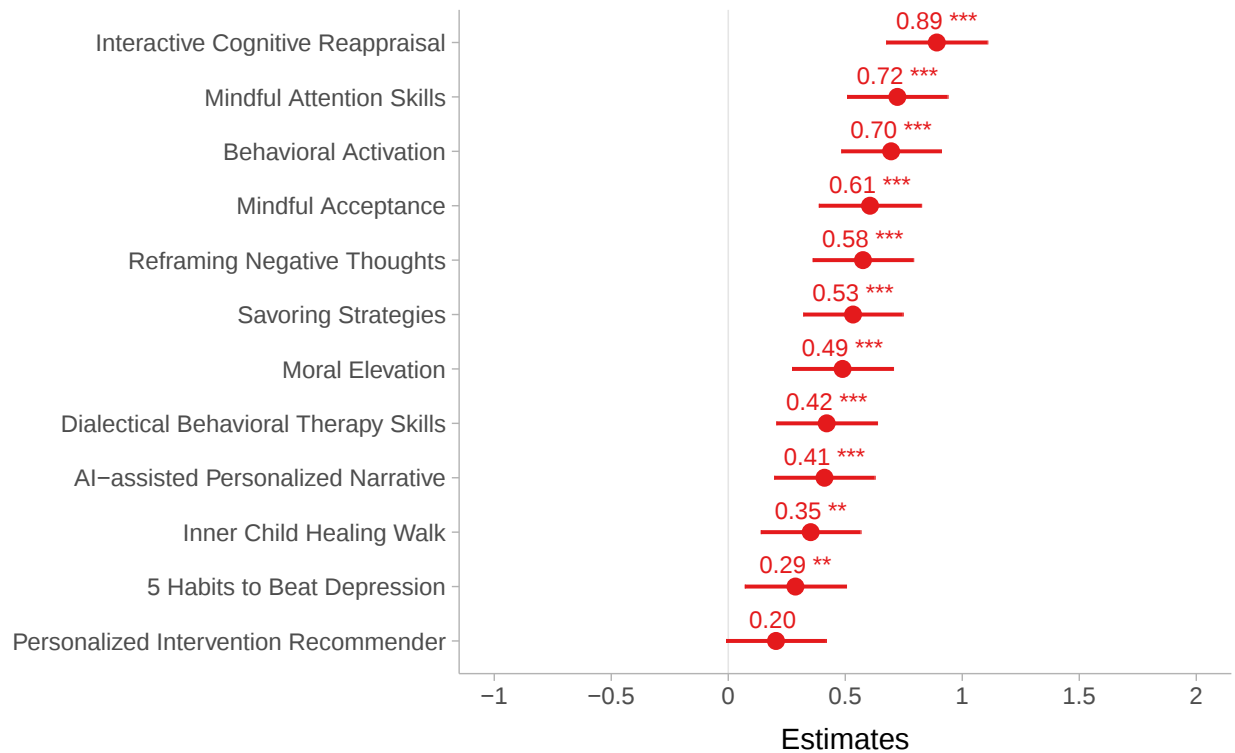


```
## Depression expectancies for Change ##
m1_dep_expect_nodups <- lmer(dep_expectancies_score ~ time * group + (1|pid),data=mega_alltimes_nodups)

dep_expect_wk4_plot_nodups <- plot_model(m1_dep_expect_nodups,sort.est = T,terms=wk4_int_terms,auto_label=
  show.values = T, value.offset = .4,value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Depression Change Expectancies, no Duplicate IPs','Baseline to Week 4')

(dep_expect_posttest_plot_nodups <- plot_model(
  m1_dep_expect_nodups,sort.est = T,terms=posttest_int_terms,auto_label=F,
  show.values = T, value.offset = .4,value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Depression Change Expectancies, no Duplicate IPs',
    'Baseline to Post-test'))
```

Depression Change Expectancies, no Duplicate IPs Baseline to Post-test



Depression Readiness for change

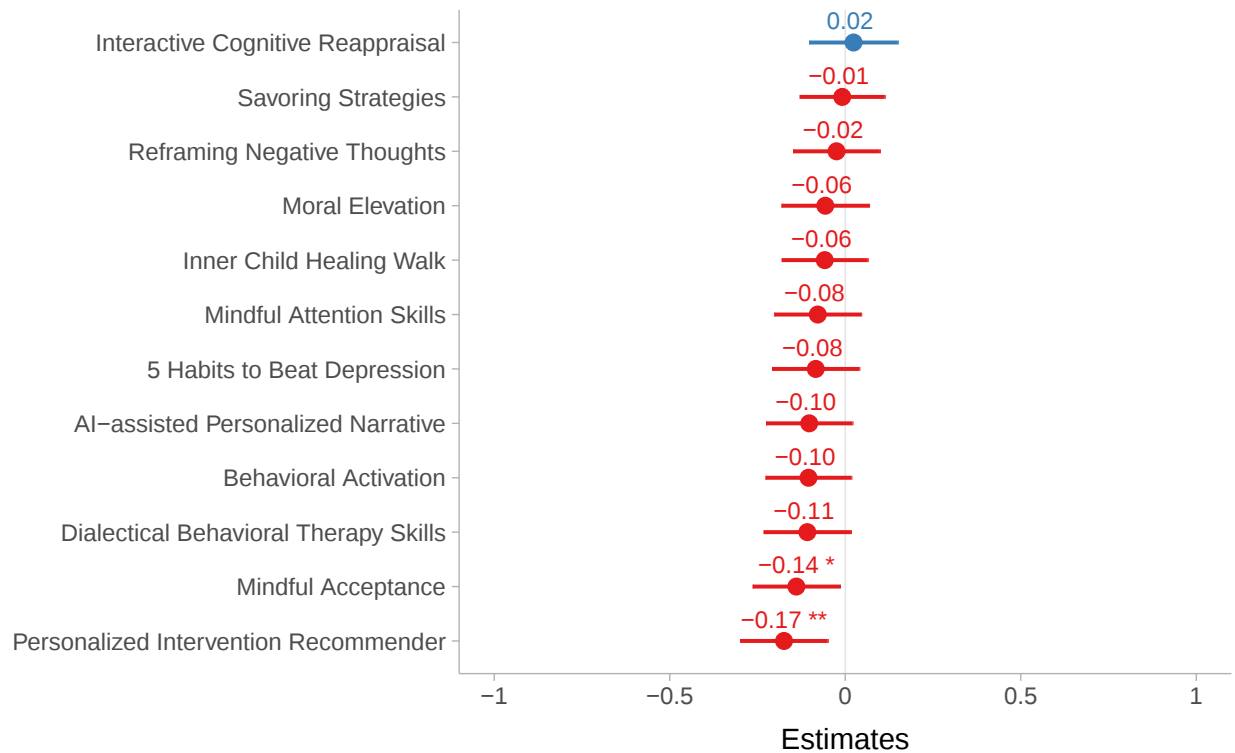
```
m1_readiness_nodups <- lmer(readiness_score ~ time * group + (1|group/pid), data=mega_alltimes_nodups)
add_cohens_d(m1_readiness_nodups)
```

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	5.172	1.000	NA	NA	NA
timePost-test	0.054	0.063	0.04	0.00	0.09
timeWeek 4	0.230	2.30e-13	0.18	0.13	0.22
group5 Habits to Beat Depression	0.067	1.000	0.05	-Inf	Inf
groupAI-assisted Personalized Narrative	0.050	1.000	0.04	-Inf	Inf
groupBehavioral Activation	0.129	1.000	0.10	-Inf	Inf
groupDialectical Behavioral Therapy Skills	0.083	1.000	0.06	-Inf	Inf
groupInner Child Healing Walk	0.069	1.000	0.05	-Inf	Inf
groupInteractive Cognitive Reappraisal	0.057	1.000	0.04	-Inf	Inf
groupMindful Acceptance	0.070	1.000	0.05	-Inf	Inf
groupMindful Attention Skills	0.005	1.000	0.00	-Inf	Inf
groupMoral Elevation	0.041	1.000	0.03	-Inf	Inf
groupPersonalized Intervention Recommender	0.138	1.000	0.11	-Inf	Inf
groupReframing Negative Thoughts	0.056	1.000	0.04	-Inf	Inf
groupSavoring Strategies	0.038	1.000	0.03	-Inf	Inf
timePost-test:group5 Habits to Beat Depression	0.228	1.06e-04	0.18	0.09	0.26
timeWeek 4:group5 Habits to Beat Depression	-0.084	0.185	-0.06	-0.16	0.03

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
timePost-test:groupAI-assisted Personalized Narrative	0.243	3.03e-05	0.19	0.10	0.27
timeWeek 4:groupAI-assisted Personalized Narrative	-0.103	0.103	-0.08	-0.17	0.02
timePost-test:groupBehavioral Activation	0.247	1.96e-05	0.19	0.10	0.28
timeWeek 4:groupBehavioral Activation	-0.105	0.093	-0.08	-0.17	0.01
timePost-test:groupDialectical Behavioral Therapy Skills	0.130	0.026	0.10	0.01	0.19
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.108	0.088	-0.08	-0.18	0.01
timePost-test:groupInner Child Healing Walk	0.107	0.064	0.08	0.00	0.17
timeWeek 4:groupInner Child Healing Walk	-0.058	0.350	-0.04	-0.14	0.05
timePost-test:groupInteractive Cognitive Reappraisal	0.355	1.46e-09	0.27	0.18	0.36
timeWeek 4:groupInteractive Cognitive Reappraisal	0.024	0.714	0.02	-0.08	0.12
timePost-test:groupMindful Acceptance	0.190	0.001	0.15	0.06	0.24
timeWeek 4:groupMindful Acceptance	-0.139	0.028	-0.11	-0.20	-0.01
timePost-test:groupMindful Attention Skills	0.354	1.29e-09	0.27	0.18	0.36
timeWeek 4:groupMindful Attention Skills	-0.078	0.214	-0.06	-0.16	0.03
timePost-test:groupMoral Elevation	0.257	1.17e-05	0.20	0.11	0.29
timeWeek 4:groupMoral Elevation	-0.057	0.370	-0.04	-0.14	0.05
timePost-test:groupPersonalized Intervention Recommender	0.091	0.118	0.07	-0.02	0.16
timeWeek 4:groupPersonalized Intervention Recommender	-0.175	0.006	-0.13	-0.23	-0.04
timePost-test:groupReframing Negative Thoughts	0.240	3.87e-05	0.18	0.10	0.27
timeWeek 4:groupReframing Negative Thoughts	-0.025	0.693	-0.02	-0.11	0.08
timePost-test:groupSavoring Strategies	0.173	0.003	0.13	0.05	0.22
timeWeek 4:groupSavoring Strategies	-0.009	0.888	-0.01	-0.10	0.09
sd__(Intercept)	1.048	NA	NA	NA	NA
sd__(Intercept)	0.134	NA	NA	NA	NA
sd__Observation	0.771	NA	NA	NA	NA

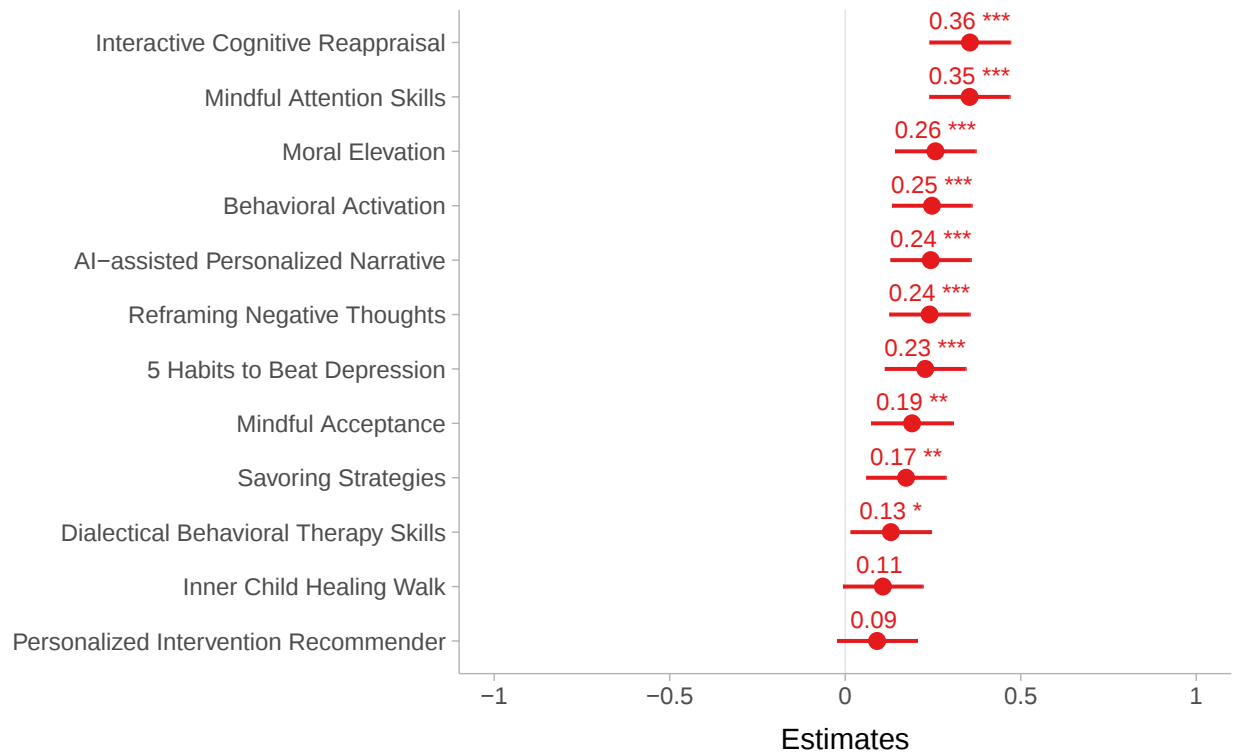
```
(readiness_wk4_plot <- plot_model(m1_readiness_nodups, sort.est = T, terms=wk4_int_terms, auto_label=F,
                                show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Readiness for Change, no Duplicate IPs', 'Baseline to Week 4'))
```

Readiness for Change, no Duplicate IPs Baseline to Week 4



```
(readiness_posttest_plot_nodups <- plot_model(
  m1_readiness_nodups, sort.est = T, terms=posttest_int_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Readiness for Change, no Duplicate IPs', 'Baseline to Post-test'))
```

Readiness for Change, no Duplicate IPs Baseline to Post-test

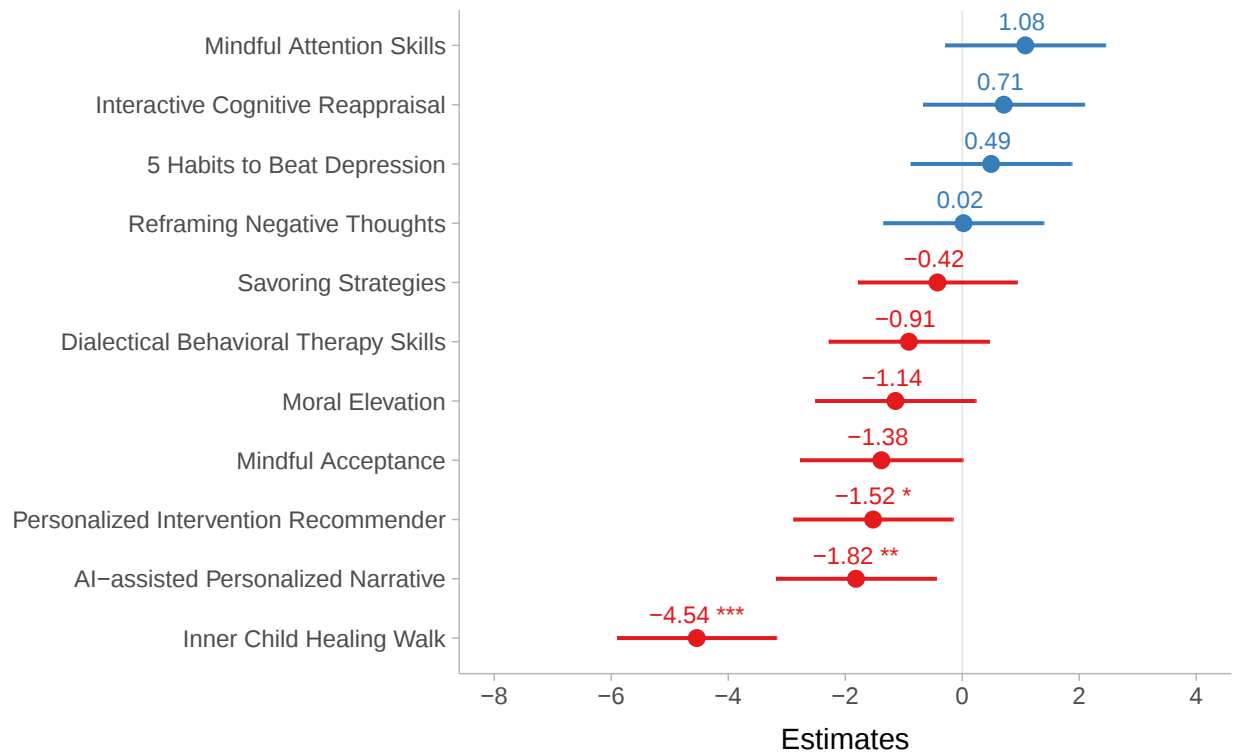


```
#Credibility / Expectancy Questionnaire scores
df_for_acceptability_nodups <- mega_alltimes_active_first %>%
  filter(group!='Passive Control') %>%
  filter(duplicate_ip=='No') %>%
  mutate(group=droplevels(group))

m1_ceq_nodups <- lm(CEQ_score~group,data=df_for_acceptability_nodups)

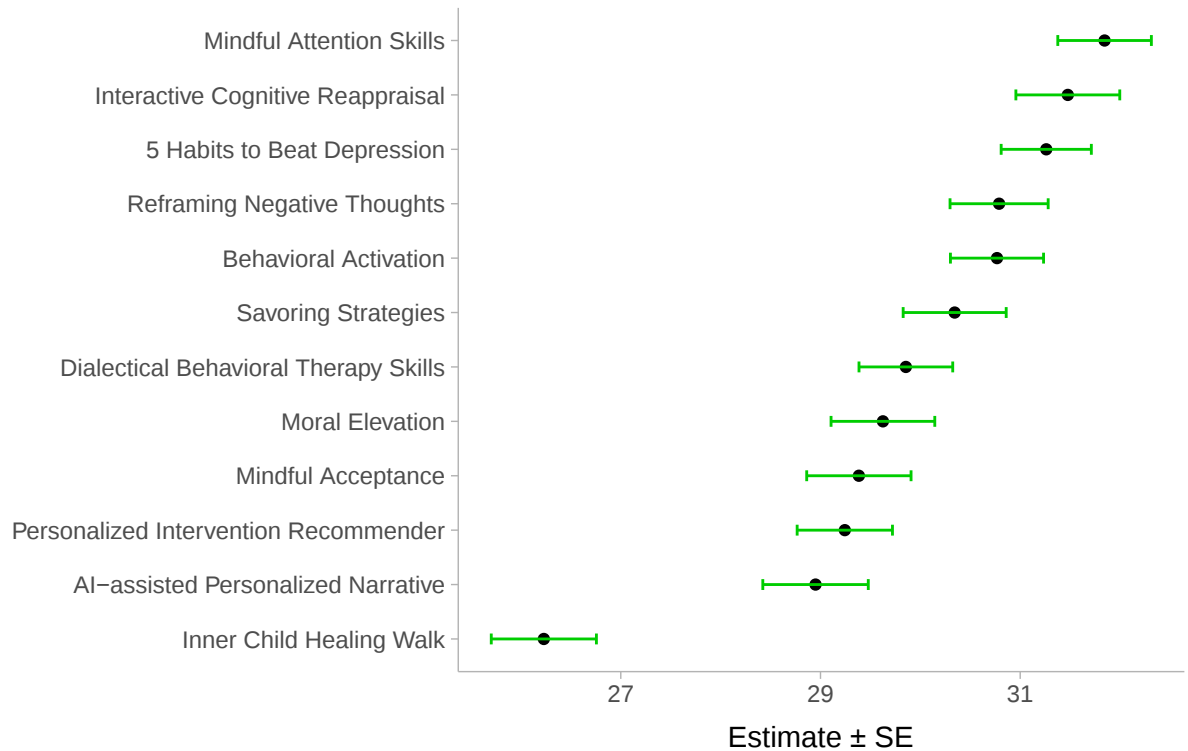
acceptability_terms <- m1_ceq_nodups %>% tidy() %>%
  filter(term!='(Intercept)') %>% pull(term)
(ceq_plot <- plot_model(m1_ceq_nodups,sort.est = T,terms=acceptability_terms,auto_label=F,
  show.values = T, value.offset = .4,value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Credibility and Expected Benefit, no Duplicate IPs','At Post-test'))
```

Credibility and Expected Benefit, no Duplicate IPs At Post-test



```
(ceq_pointplot_nodups <- mega_alltimes_nodups %>% filter(time=='Post-test'&group!='Passive Control') %>%
  group_by(group) %>%
  summarize(mean_CEQ_score=mean(CEQ_score,na.rm=T),std.error=std.error(CEQ_score,na.rm=T)) %>%
  ggplot(aes(x = reorder(group, mean_CEQ_score), y = mean_CEQ_score)) +
  geom_point(size=1.5) +
  geom_errorbar(aes(ymin = mean_CEQ_score - std.error, ymax = mean_CEQ_score +
    std.error),
    color='green3',width = 0.2,show.legend = F) +
  coord_flip() +labs(x = "", y = "Estimate ± SE")+
  ggtitle("Credibility and Expected Benefit, no Duplicate IPs",
    "At Post-test, range 4-56"))
```

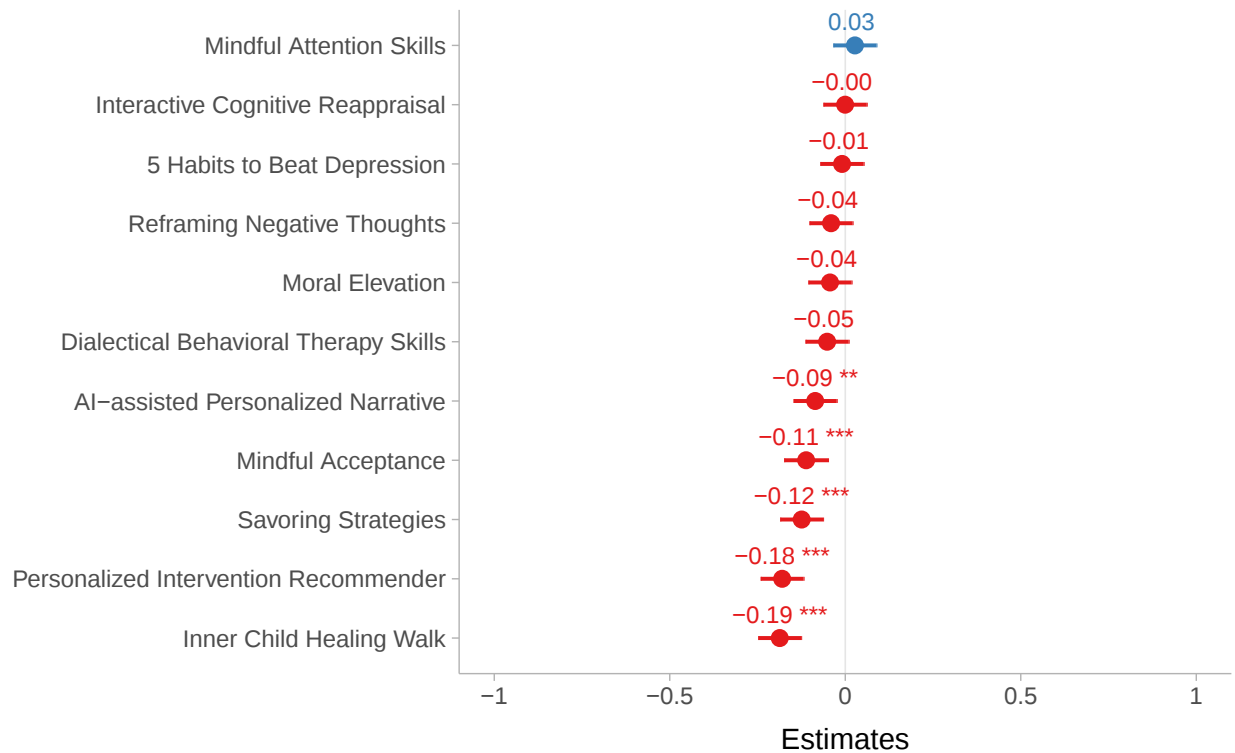
Credibility and Expected Benefit, no Duplicate IP At Post-test, range 4–56



```
#Frequency of Aha! moments at post-test
m1_aha_nodups <- lm(aha~group,data=df_for_acceptability_nodups %>% filter(time=='Post-test'))

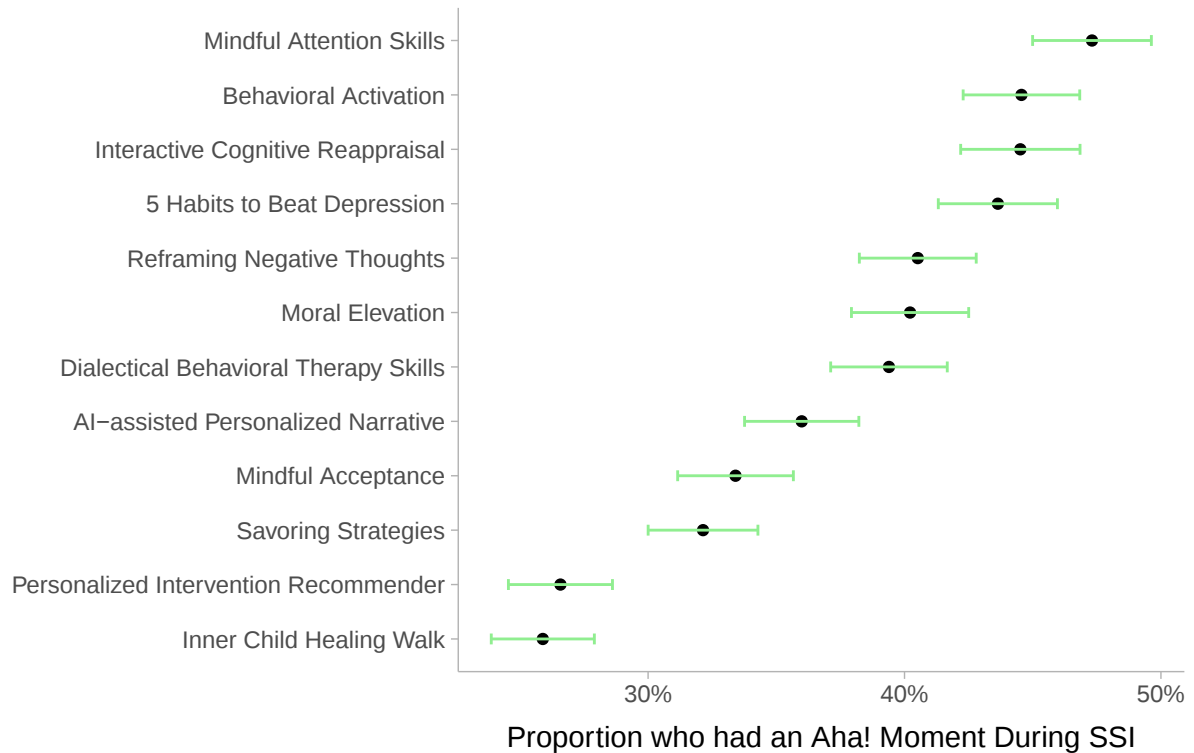
(aha_plot_nodups <- plot_model(m1_aha_nodups,sort.est = T,terms=acceptability_terms,auto_label=F,
                              show.values = T, value.offset = .4,value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Probability of an Aha! Moment during SSI, no Duplicate IPs','At Post-test'))
```

Probability of an Aha! Moment during SSI, no Dupli At Post-test



```
(aha_pointplot <- mega_alltimes_nodups %>%
  filter(time=='Post-test'&group!='Passive Control') %>%
  group_by(group) %>%
  summarize(
    aha_prop = mean(aha, na.rm = TRUE),
    n = sum(!is.na(aha)),
    se = sqrt(aha_prop * (1 - aha_prop) / n)
  ) %>%
  ggplot(aes(x = reorder(group, aha_prop), y = aha_prop)) +
  geom_point(size=1.5) +
  geom_errorbar(aes(ymin = aha_prop - se, ymax = aha_prop +
    se),
    color='palegreen2',width = 0.2,show.legend = F) +
  labs(x = "", y = "Proportion who had an Aha! Moment During SSI")+
  scale_y_continuous(labels = scales::percent)+
  coord_flip() +
  ggtitle("Proportion of Aha! Moments, no duplicate IPs","At Post-test"))
```

Proportion of Aha! Moments, no duplicate IPs At Post-test



#significance of aha moments

```
m1_aha_significance_nodups <- lm(aha_significant~group,
                                data=df_for_acceptability_nodups %>%
                                  filter(time=='Post-test'))
```

```
rstatix::cohens_d(aha_significant~group,data=df_for_acceptability_nodups) %>%select(-magnitude,-.y.) %>%
  kable()
```

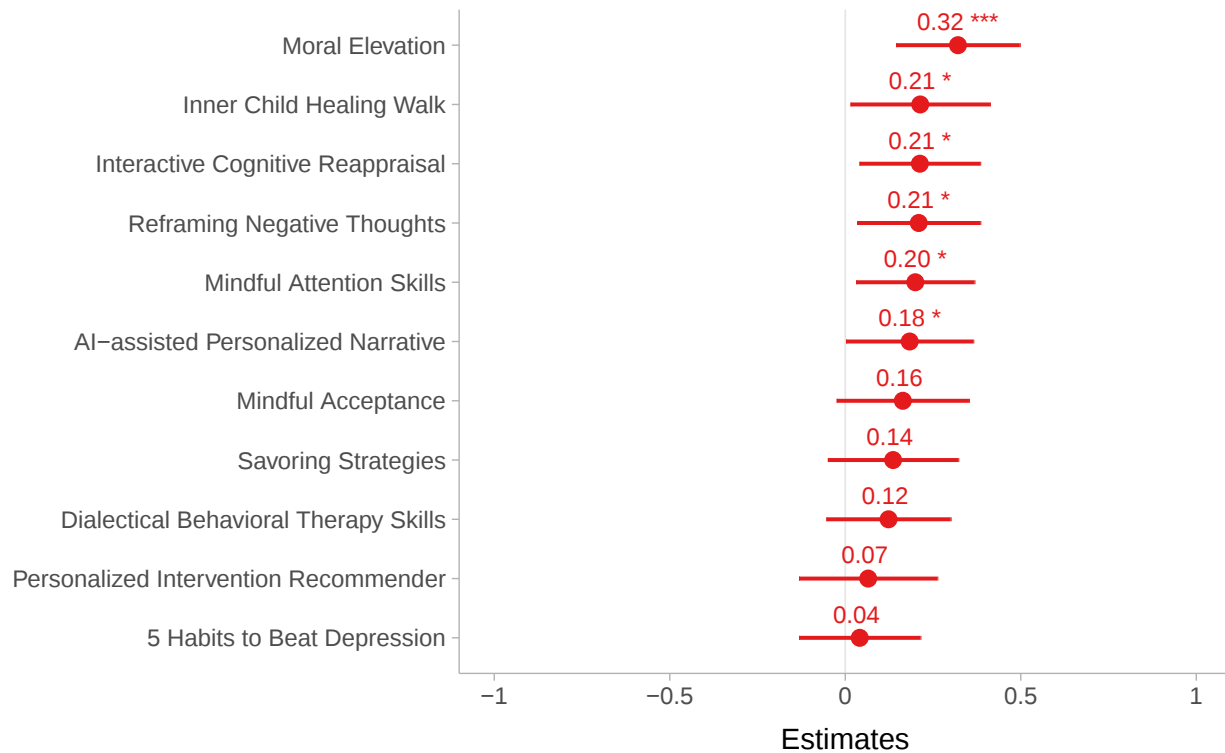
group1	group2	effsize	n1	n2
Behavioral Activation	5 Habits to Beat Depression	-0.0911469	312	287
Behavioral Activation	AI-assisted Personalized Narrative	-0.1309067	312	248
Behavioral Activation	Dialectical Behavioral Therapy Skills	-0.1890220	312	261
Behavioral Activation	Inner Child Healing Walk	-0.2704750	312	185
Behavioral Activation	Interactive Cognitive Reappraisal	-0.2026020	312	295
Behavioral Activation	Mindful Acceptance	-0.0732799	312	220
Behavioral Activation	Mindful Attention Skills	-0.2380527	312	309
Behavioral Activation	Moral Elevation	-0.2424643	312	281
Behavioral Activation	Personalized Intervention Recommender	-0.0357780	312	202
Behavioral Activation	Reframing Negative Thoughts	-0.1647922	312	276
Behavioral Activation	Savoring Strategies	-0.0364539	312	263
5 Habits to Beat Depression	AI-assisted Personalized Narrative	-0.0402856	287	248
5 Habits to Beat Depression	Dialectical Behavioral Therapy Skills	-0.0905361	287	261
5 Habits to Beat Depression	Inner Child Healing Walk	-0.1755873	287	185

group1	group2	effsize	n1	n2
5 Habits to Beat Depression	Interactive Cognitive Reappraisal	-0.1111780	287	295
5 Habits to Beat Depression	Mindful Acceptance	0.0142348	287	220
5 Habits to Beat Depression	Mindful Attention Skills	-0.1457337	287	309
5 Habits to Beat Depression	Moral Elevation	-0.1514609	287	281
5 Habits to Beat Depression	Personalized Intervention	0.0552873	287	202
	Recommender			
5 Habits to Beat Depression	Reframing Negative Thoughts	-0.0751471	287	276
5 Habits to Beat Depression	Savoring Strategies	0.0516394	287	263
AI-assisted Personalized Narrative	Dialectical Behavioral Therapy Skills	-0.0467044	248	261
AI-assisted Personalized Narrative	Inner Child Healing Walk	-0.1328007	248	185
AI-assisted Personalized Narrative	Interactive Cognitive Reappraisal	-0.0701908	248	295
AI-assisted Personalized Narrative	Mindful Acceptance	0.0529510	248	220
AI-assisted Personalized Narrative	Mindful Attention Skills	-0.1041935	248	309
AI-assisted Personalized Narrative	Moral Elevation	-0.1104540	248	281
AI-assisted Personalized Narrative	Personalized Intervention	0.0952266	248	202
	Recommender			
AI-assisted Personalized Narrative	Reframing Negative Thoughts	-0.0350908	248	276
AI-assisted Personalized Narrative	Savoring Strategies	0.0903953	248	263
Dialectical Behavioral Therapy Skills	Inner Child Healing Walk	-0.0945213	261	185
Dialectical Behavioral Therapy Skills	Interactive Cognitive Reappraisal	-0.0284760	261	295
Dialectical Behavioral Therapy Skills	Mindful Acceptance	0.1019690	261	220
Dialectical Behavioral Therapy Skills	Mindful Attention Skills	-0.0646512	261	309
Dialectical Behavioral Therapy Skills	Moral Elevation	-0.0718388	261	281
Dialectical Behavioral Therapy Skills	Personalized Intervention	0.1500952	261	202
	Recommender			
Dialectical Behavioral Therapy Skills	Reframing Negative Thoughts	0.0084425	261	276
Dialectical Behavioral Therapy Skills	Savoring Strategies	0.1427552	261	263
Inner Child Healing Walk	Interactive Cognitive Reappraisal	0.0607456	185	295
Inner Child Healing Walk	Mindful Acceptance	0.1836619	185	220
Inner Child Healing Walk	Mindful Attention Skills	0.0265207	185	309
Inner Child Healing Walk	Moral Elevation	0.0183233	185	281
Inner Child Healing Walk	Personalized Intervention	0.2329502	185	202
	Recommender			
Inner Child Healing Walk	Reframing Negative Thoughts	0.0949163	185	276
Inner Child Healing Walk	Savoring Strategies	0.2235620	185	263
Interactive Cognitive Reappraisal	Mindful Acceptance	0.1213819	295	220
Interactive Cognitive Reappraisal	Mindful Attention Skills	-0.0336524	295	309
Interactive Cognitive Reappraisal	Moral Elevation	-0.0408555	295	281
Interactive Cognitive Reappraisal	Personalized Intervention	0.1665394	295	202
	Recommender			
Interactive Cognitive Reappraisal	Reframing Negative Thoughts	0.0341435	295	276
Interactive Cognitive Reappraisal	Savoring Strategies	0.1595471	295	263
Mindful Acceptance	Mindful Attention Skills	-0.1547822	220	309
Mindful Acceptance	Moral Elevation	-0.1602672	220	281
Mindful Acceptance	Personalized Intervention	0.0389012	220	202
	Recommender			
Mindful Acceptance	Reframing Negative Thoughts	-0.0864755	220	276
Mindful Acceptance	Savoring Strategies	0.0359335	220	263
Mindful Attention Skills	Moral Elevation	-0.0076798	309	281
Mindful Attention Skills	Personalized Intervention	0.2015991	309	202
	Recommender			
Mindful Attention Skills	Reframing Negative Thoughts	0.0675071	309	276

group1	group2	effsize	n1	n2
Mindful Attention Skills	Savoring Strategies	0.1934949	309	263
Moral Elevation	Personalized Intervention Recommender	0.2065423	281	202
Moral Elevation	Reframing Negative Thoughts	0.0741851	281	276
Moral Elevation	Savoring Strategies	0.1984896	281	263
Personalized Intervention Recommender	Reframing Negative Thoughts	-0.1294802	202	276
Personalized Intervention Recommender	Savoring Strategies	-0.0018729	202	263
Reframing Negative Thoughts	Savoring Strategies	0.1237407	276	263

```
plot_model(
  m1_aha_significance_nodups, sort.est = T, terms=acceptability_terms, auto_label=F,
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Significance of Aha! Moment, complete dataset', 'At Post-test, compared to a Behavioral Act.
```

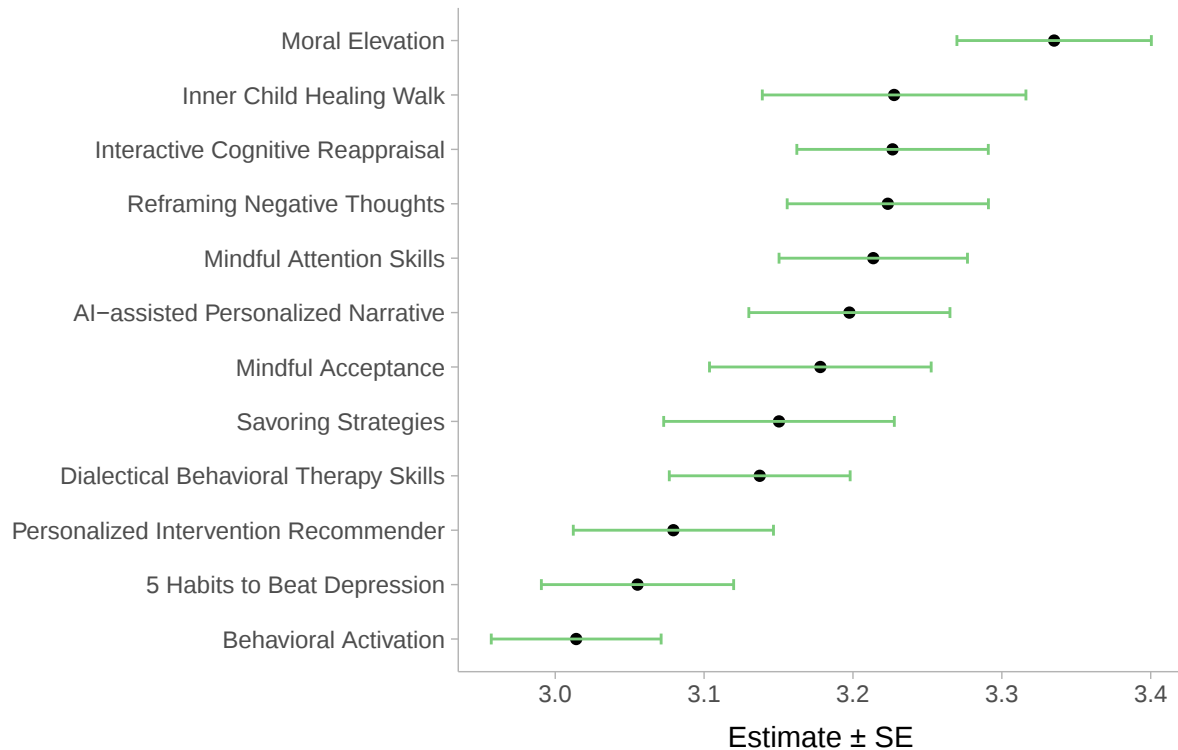
Significance of Aha! Moment, complete dataset At Post-test, compared to a Behavioral Activation SSI



```
(aha_signif_pointplot <- mega_alltimes_nodups %>%
  filter(time=='Post-test' & group!='Passive Control') %>%
  group_by(group) %>%
  summarize(mean_aha_signif_score=mean(aha_significant, na.rm=T),
    std.error=std.error(aha_significant, na.rm=T)) %>%
  ggplot(aes(x = reorder(group, mean_aha_signif_score), y = mean_aha_signif_score)) +
```

```
geom_point(size=1.5) +
geom_errorbar(aes(ymin = mean_aha_signif_score - std.error,
                  ymax = mean_aha_signif_score +
                    std.error),
              color='palegreen3',width = 0.2,show.legend = F) +
coord_flip() +labs(x = "", y = "Estimate \u00B1 SE")+
ggtitle("Significance of Aha! Moment, no Duplicate IPs","At Post-test, range 0-5"))
```

Significance of Aha! Moment, no Duplicate IPs At Post-test, range 0-5



```
#star ratings
m1_star_nodups <- lm(star_rating_1~group,data=df_for_acceptability_nodups %>%
  filter(time=='Post-test'))
rstatix::cohens_d(star_rating_1~group,data=df_for_acceptability_nodups %>%filter(time=='Post-test'))%
```

group1	group2	effsize	n1	n2
Behavioral Activation	5 Habits to Beat Depression	-0.0836809	477	456
Behavioral Activation	AI-assisted Personalized Narrative	0.1106011	477	464
Behavioral Activation	Dialectical Behavioral Therapy Skills	-0.0211994	477	462
Behavioral Activation	Inner Child Healing Walk	0.4071513	477	475
Behavioral Activation	Interactive Cognitive Reappraisal	-0.0534805	477	454
Behavioral Activation	Mindful Acceptance	-0.0894911	477	436
Behavioral Activation	Mindful Attention Skills	-0.1638395	477	465
Behavioral Activation	Moral Elevation	-0.1796550	477	459

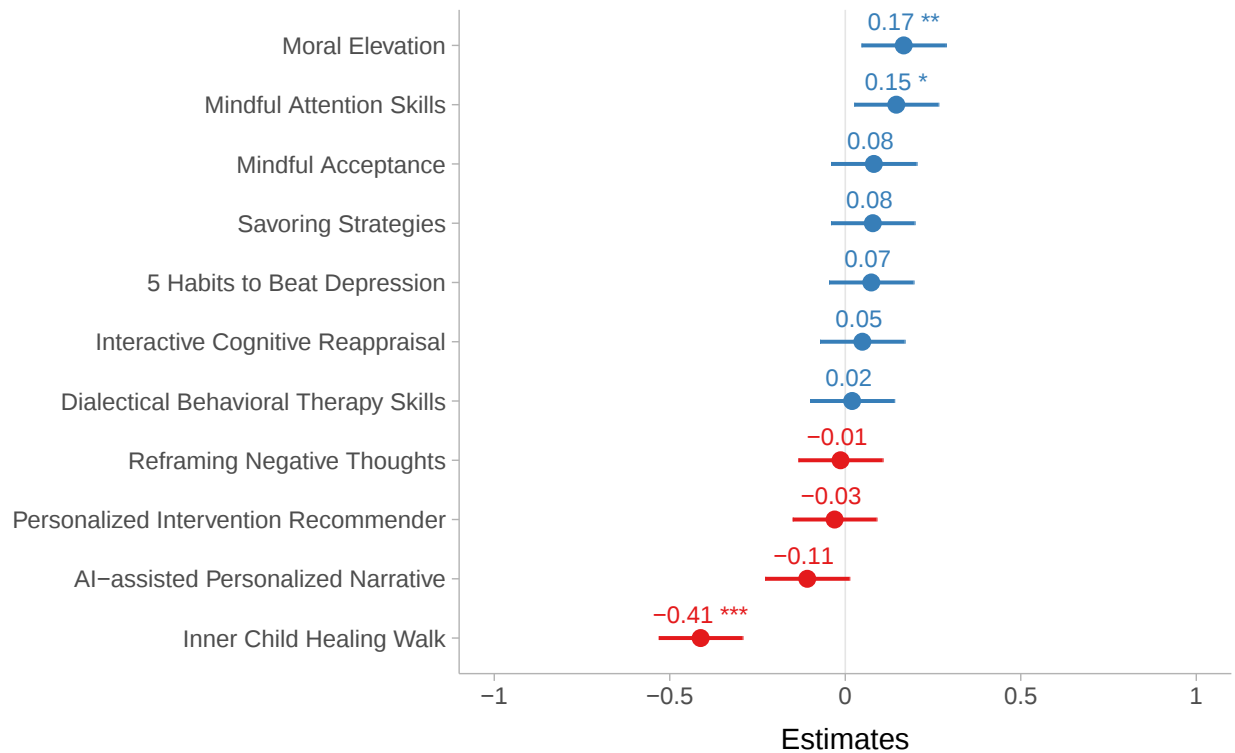
group1	group2	effsize	n1	n2
Behavioral Activation	Personalized Intervention	0.0326769	477	472
	Recommender			
Behavioral Activation	Reframing Negative Thoughts	0.0143484	477	464
Behavioral Activation	Savoring Strategies	-0.0842980	477	475
5 Habits to Beat Depression	AI-assisted Personalized Narrative	0.1931252	456	464
5 Habits to Beat Depression	Dialectical Behavioral Therapy Skills	0.0618637	456	462
5 Habits to Beat Depression	Inner Child Healing Walk	0.4967706	456	475
5 Habits to Beat Depression	Interactive Cognitive Reappraisal	0.0292445	456	454
5 Habits to Beat Depression	Mindful Acceptance	-0.0083227	456	436
5 Habits to Beat Depression	Mindful Attention Skills	-0.0838793	456	465
5 Habits to Beat Depression	Moral Elevation	-0.1037083	456	459
5 Habits to Beat Depression	Personalized Intervention	0.1170878	456	472
	Recommender			
5 Habits to Beat Depression	Reframing Negative Thoughts	0.0969855	456	464
5 Habits to Beat Depression	Savoring Strategies	-0.0048056	456	475
AI-assisted Personalized Narrative	Dialectical Behavioral Therapy Skills	-0.1308586	464	462
AI-assisted Personalized Narrative	Inner Child Healing Walk	0.2855510	464	475
AI-assisted Personalized Narrative	Interactive Cognitive Reappraisal	-0.1623460	464	454
AI-assisted Personalized Narrative	Mindful Acceptance	-0.1962043	464	436
AI-assisted Personalized Narrative	Mindful Attention Skills	-0.2682014	464	465
AI-assisted Personalized Narrative	Moral Elevation	-0.2795837	464	459
AI-assisted Personalized Narrative	Personalized Intervention	-0.0791307	464	472
	Recommender			
AI-assisted Personalized Narrative	Reframing Negative Thoughts	-0.0952954	464	464
AI-assisted Personalized Narrative	Savoring Strategies	-0.1892878	464	475
Dialectical Behavioral Therapy Skills	Inner Child Healing Walk	0.4274570	462	475
Dialectical Behavioral Therapy Skills	Interactive Cognitive Reappraisal	-0.0321306	462	454
Dialectical Behavioral Therapy Skills	Mindful Acceptance	-0.0682544	462	436
Dialectical Behavioral Therapy Skills	Mindful Attention Skills	-0.1423039	462	465
Dialectical Behavioral Therapy Skills	Moral Elevation	-0.1590613	462	459
Dialectical Behavioral Therapy Skills	Personalized Intervention	0.0538285	462	472
	Recommender			
Dialectical Behavioral Therapy Skills	Reframing Negative Thoughts	0.0352078	462	464
Dialectical Behavioral Therapy Skills	Savoring Strategies	-0.0635198	462	475
Inner Child Healing Walk	Interactive Cognitive Reappraisal	-0.4607117	475	454
Inner Child Healing Walk	Mindful Acceptance	-0.4933851	475	436
Inner Child Healing Walk	Mindful Attention Skills	-0.5689200	475	465
Inner Child Healing Walk	Moral Elevation	-0.5696991	475	459
Inner Child Healing Walk	Personalized Intervention	-0.3750699	475	472
	Recommender			
Inner Child Healing Walk	Reframing Negative Thoughts	-0.3879636	475	464
Inner Child Healing Walk	Savoring Strategies	-0.4812638	475	475
Interactive Cognitive Reappraisal	Mindful Acceptance	-0.0365643	454	436
Interactive Cognitive Reappraisal	Mindful Attention Skills	-0.1107423	454	465
Interactive Cognitive Reappraisal	Moral Elevation	-0.1289949	454	459
Interactive Cognitive Reappraisal	Personalized Intervention	0.0862615	454	472
	Recommender			
Interactive Cognitive Reappraisal	Reframing Negative Thoughts	0.0670493	454	464
Interactive Cognitive Reappraisal	Savoring Strategies	-0.0324891	454	475
Mindful Acceptance	Mindful Attention Skills	-0.0732051	436	465
Mindful Acceptance	Moral Elevation	-0.0930901	436	459

group1	group2	effsize	n1	n2
Mindful Acceptance	Personalized Intervention	0.1220182	436	472
	Recommender			
Mindful Acceptance	Reframing Negative Thoughts	0.1023966	436	464
Mindful Acceptance	Savoring Strategies	0.0032302	436	475
Mindful Attention Skills	Moral Elevation	-0.0236527	465	459
Mindful Attention Skills	Personalized Intervention	0.1966278	465	472
	Recommender			
Mindful Attention Skills	Reframing Negative Thoughts	0.1755864	465	464
Mindful Attention Skills	Savoring Strategies	0.0747401	465	475
Moral Elevation	Personalized Intervention	0.2110170	459	472
	Recommender			
Moral Elevation	Reframing Negative Thoughts	0.1907684	459	464
Moral Elevation	Savoring Strategies	0.0941912	459	475
Personalized Intervention	Reframing Negative Thoughts	-0.0178452	472	464
Recommender				
Personalized Intervention	Savoring Strategies	-0.1161522	472	475
Recommender				
Reframing Negative Thoughts	Savoring Strategies	-0.0970507	464	475

```
(star_plot_nodups <- plot_model(
  m1_star_nodups, sort.est = T, terms=acceptability_terms,
  auto_label=F, show.values = T, value.offset = .4, value.size = 3.2)+
  scale_x_discrete(labels = function(x) gsub(".*group", "", x)) +
  ggtitle('Star Rating no Duplicate IPs', 'At Post-test, compared to a Behavioral Activation SSI'))
```

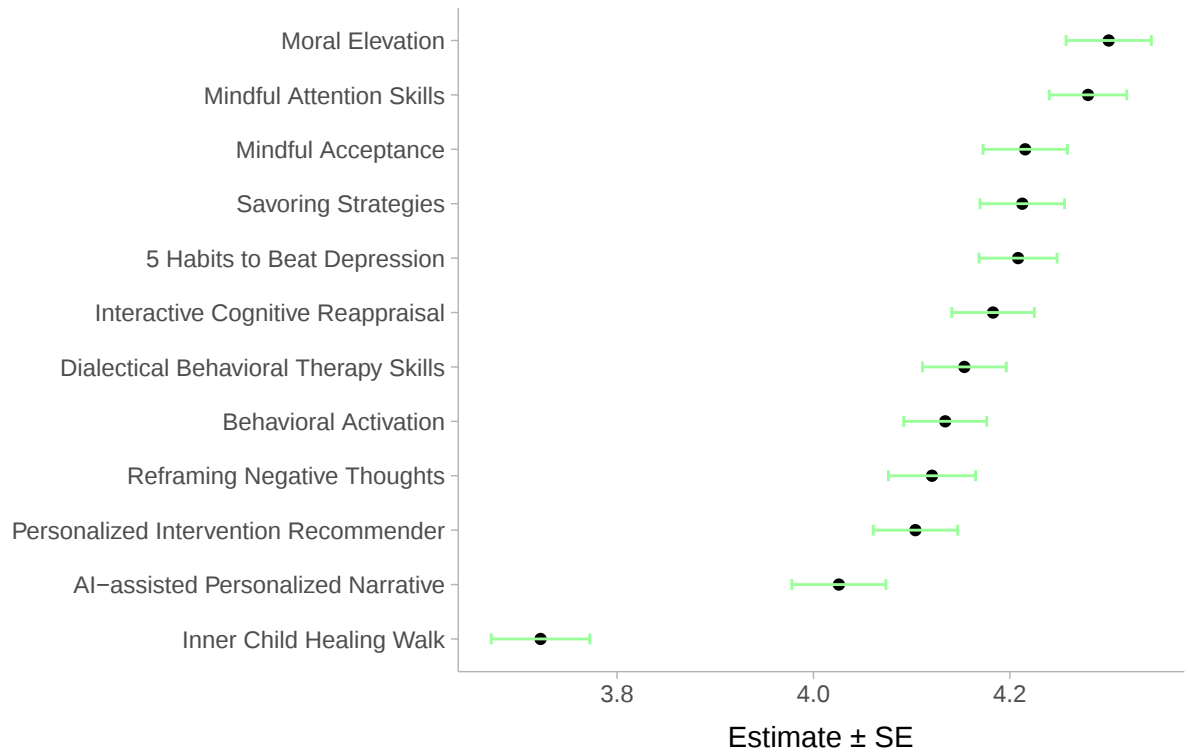
Star Rating no Duplicate IPs

At Post-test, compared to a Behavioral Activation SSI



```
(star_pointplot_nodups <- mega_alltimes_nodups %>%
  filter(time=='Post-test'&group!='Passive Control') %>%
  group_by(group) %>%
  summarize(mean_star_score=mean(star_rating_1,na.rm=T),
            std.error=std.error(star_rating_1,na.rm=T)) %>%
  ggplot(aes(x = reorder(group, mean_star_score), y = mean_star_score)) +
  geom_point(size=1.5) +
  geom_errorbar(aes(ymin = mean_star_score - std.error, ymax = mean_star_score +
                    std.error),
               color='palegreen1',width = 0.2,show.legend = F) +
  coord_flip() +labs(x = "", y = "Estimate \u00B1 SE")+
  ggtitle("Star Rating no Duplicate IPs","At Post-test, range 1-5"))
```

Star Rating no Duplicate IPs At Post-test, range 1–5



7. Accounting for differential attrition with inverse probability weighting (pre-registered)

First, checking for differential attrition at post-test and 4-week follow-up by experimental condition

- Re-run analyses with inverse-probability weighting to account for differential dropout

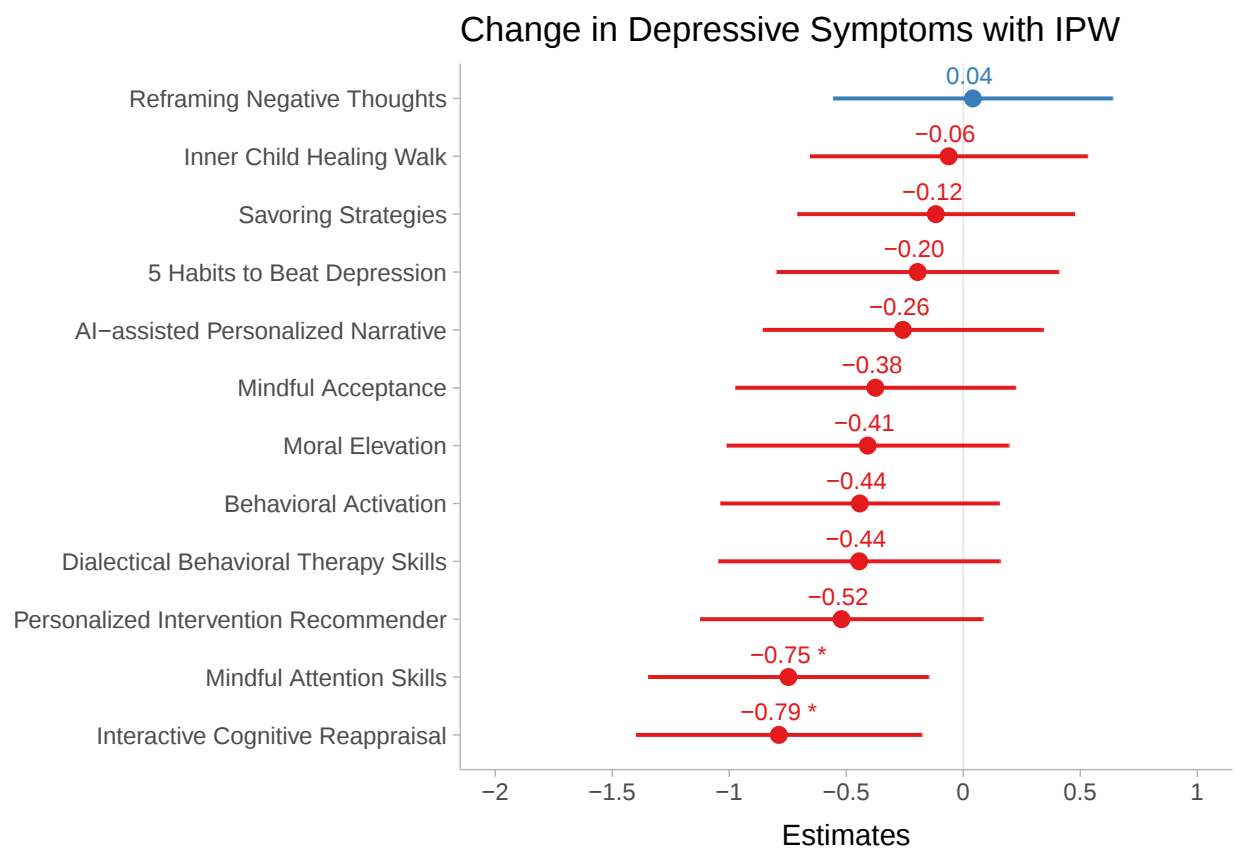
```
ipw_m1_phq9 <- lmer(phq9_score ~ time * group +(1|pid),
                    data=mega_alltimes,weights = weights_followup)
add_cohens_d(ipw_m1_phq9,'Predicting: change in depressive symptoms')
```

Table 51: Predicting: change in depressive symptoms

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	15.453	0.00e+00	NA	NA	NA
timeWeek 4	-2.997	3.75e-84	-0.56	-0.62	-0.51
group5 Habits to Beat Depression	-0.211	0.437	-0.04	-0.14	0.06
groupAI-assisted Personalized Narrative	-0.219	0.418	-0.04	-0.14	0.06

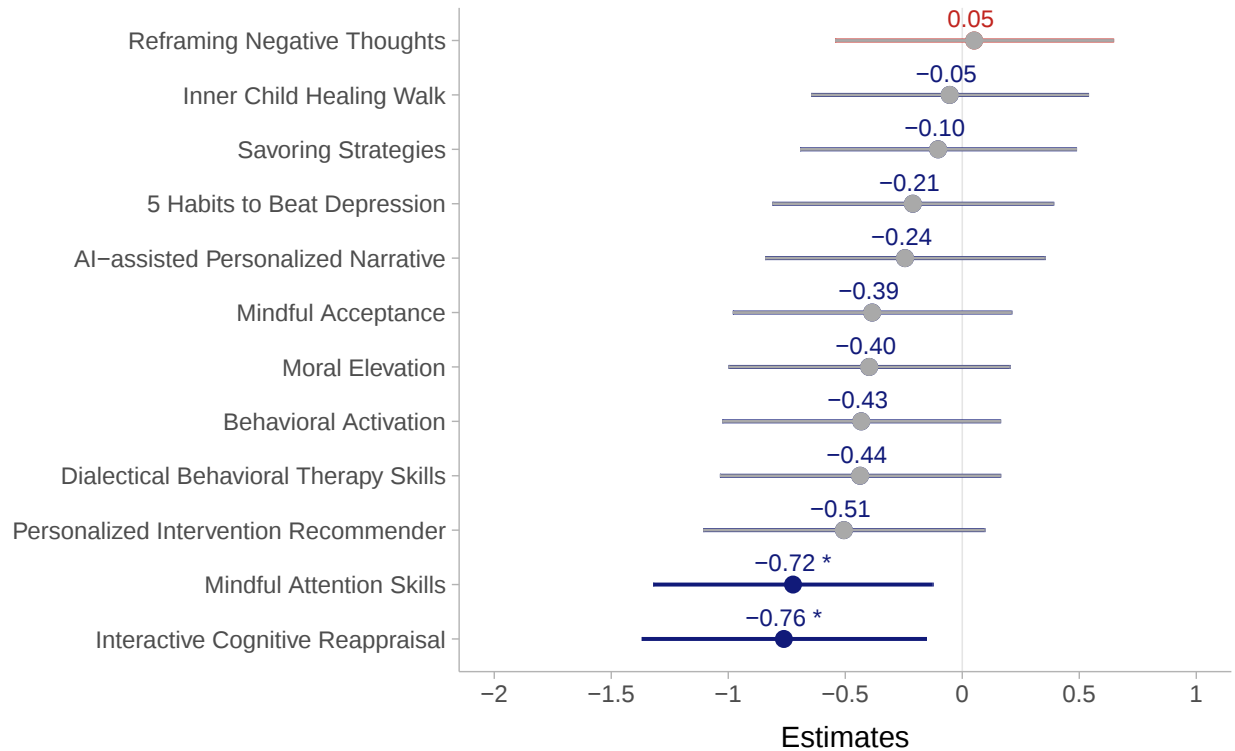
term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
groupBehavioral Activation	0.412	0.126	0.08	-0.02	0.18
groupDialectical Behavioral Therapy Skills	0.092	0.735	0.02	-0.08	0.12
groupInner Child Healing Walk	0.016	0.951	0.00	-0.10	0.10
groupInteractive Cognitive Reappraisal	0.166	0.537	0.03	-0.07	0.13
groupMindful Acceptance	-0.375	0.164	-0.07	-0.17	0.03
groupMindful Attention Skills	0.043	0.873	0.01	-0.09	0.11
groupMoral Elevation	0.090	0.739	0.02	-0.08	0.12
groupPersonalized Intervention Recommender	0.087	0.747	0.02	-0.08	0.12
groupReframing Negative Thoughts	-0.235	0.383	-0.04	-0.14	0.05
groupSavoring Strategies	-0.004	0.988	0.00	-0.10	0.10
timeWeek 4:group5 Habits to Beat Depression	-0.195	0.525	-0.04	-0.15	0.08
timeWeek 4:groupAI-assisted Personalized Narrative	-0.258	0.398	-0.05	-0.16	0.06
timeWeek 4:groupBehavioral Activation	-0.442	0.145	-0.08	-0.19	0.03
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.445	0.147	-0.08	-0.20	0.03
timeWeek 4:groupInner Child Healing Walk	-0.063	0.836	-0.01	-0.12	0.10
timeWeek 4:groupInteractive Cognitive Reappraisal	-0.788	0.011	-0.15	-0.26	-0.03
timeWeek 4:groupMindful Acceptance	-0.376	0.218	-0.07	-0.18	0.04
timeWeek 4:groupMindful Attention Skills	-0.747	0.014	-0.14	-0.25	-0.03
timeWeek 4:groupMoral Elevation	-0.408	0.184	-0.08	-0.19	0.04
timeWeek 4:groupPersonalized Intervention Recommender	-0.520	0.091	-0.10	-0.21	0.02
timeWeek 4:groupReframing Negative Thoughts	0.041	0.893	0.01	-0.10	0.12
timeWeek 4:groupSavoring Strategies	-0.117	0.697	-0.02	-0.13	0.09
sd__(Intercept)	3.507	NA	NA	NA	NA
sd__Observation	4.016	NA	NA	NA	NA

```
(phq9_plot_ipw <- plot_model(ipw_m1_phq9, sort.est = T, terms=wk4_int_terms, auto_label=F,
                             show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Change in Depressive Symptoms with IPW'))
```



```
phq9_plot + ggtitle('Original depresssion plot, to compare')
```

Original depression plot, to compare
Baseline to Week Four, PHQ-9 (range 0-27)



```
ipw_m1_phq9_activefirst <- lmer(
  phq9_score ~ time * group + (1|pid), data=mega_alltimes_active_first %>%
  left_join(mega_alltimes %>% select(pid,time,weights_followup)),
  weights= weights_followup)
add_cohens_d(ipw_m1_phq9_activefirst)
```

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	15.865	0.00e+00	NA	NA	NA
timeWeek 4	-3.440	9.63e-39	-0.65	-0.74	-0.55
groupPassive Control	-0.412	0.126	-0.08	-0.18	0.02
group5 Habits to Beat Depression	-0.623	0.060	-0.12	-0.24	0.01
groupAI-assisted Personalized Narrative	-0.631	0.056	-0.12	-0.24	0.00
groupDialectical Behavioral Therapy Skills	-0.321	0.332	-0.06	-0.18	0.06
groupInner Child Healing Walk	-0.396	0.230	-0.07	-0.20	0.05
groupInteractive Cognitive Reappraisal	-0.246	0.457	-0.05	-0.17	0.08
groupMindful Acceptance	-0.788	0.017	-0.15	-0.27	-0.03
groupMindful Attention Skills	-0.369	0.263	-0.07	-0.19	0.05
groupMoral Elevation	-0.322	0.331	-0.06	-0.18	0.06
groupPersonalized Intervention Recommender	-0.325	0.323	-0.06	-0.18	0.06
groupReframing Negative Thoughts	-0.647	0.050	-0.12	-0.24	0.00
groupSavoring Strategies	-0.416	0.207	-0.08	-0.20	0.04
timeWeek 4:groupPassive Control	0.442	0.145	0.08	-0.03	0.19

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
timeWeek 4:group5 Habits to Beat Depression	0.247	0.509	0.05	-0.09	0.18
timeWeek 4:groupAI-assisted Personalized Narrative	0.184	0.621	0.03	-0.10	0.17
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.002	0.995	0.00	-0.14	0.14
timeWeek 4:groupInner Child Healing Walk	0.380	0.305	0.07	-0.06	0.21
timeWeek 4:groupInteractive Cognitive Reappraisal	-0.346	0.360	-0.06	-0.20	0.07
timeWeek 4:groupMindful Acceptance	0.067	0.858	0.01	-0.12	0.15
timeWeek 4:groupMindful Attention Skills	-0.305	0.414	-0.06	-0.19	0.08
timeWeek 4:groupMoral Elevation	0.034	0.928	0.01	-0.13	0.14
timeWeek 4:groupPersonalized Intervention Recommender	-0.078	0.835	-0.01	-0.15	0.12
timeWeek 4:groupReframing Negative Thoughts	0.483	0.194	0.09	-0.05	0.23
timeWeek 4:groupSavoring Strategies	0.325	0.380	0.06	-0.08	0.20
sd__(Intercept)	3.507	NA	NA	NA	NA
sd__Observation	4.016	NA	NA	NA	NA

```
ipw_m1_phq9_w_demcovars <- lmer(phq9_score ~ time * group + Age + Gender + Race +
  Education + `Relationship/Marital Status` +
  `Political Party` + `Employment Status` +
  `Household Income` + `Social ladder` +
  disability +(1|pid),
  data=mega_alltimes,weights = weights_followup)
add_cohens_d(ipw_m1_phq9_w_demcovars,'Predicting: change in depressive symptoms')
```

Table 53: Predicting: change in depressive symptoms

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	20.404	1.38e-21	NA	NA	NA
timeWeek 4	-3.019	1.61e-85	-0.58	-0.64	-0.52
group5 Habits to Beat Depression	-0.222	0.403	-0.04	-0.14	0.06
groupAI-assisted Personalized Narrative	-0.166	0.530	-0.03	-0.13	0.07
groupBehavioral Activation	0.422	0.109	0.08	-0.02	0.18
groupDialectical Behavioral Therapy Skills	-0.028	0.915	-0.01	-0.11	0.09
groupInner Child Healing Walk	-0.019	0.944	0.00	-0.10	0.10
groupInteractive Cognitive Reappraisal	0.154	0.558	0.03	-0.07	0.13
groupMindful Acceptance	-0.447	0.090	-0.09	-0.19	0.01
groupMindful Attention Skills	0.116	0.658	0.02	-0.08	0.12
groupMoral Elevation	0.115	0.663	0.02	-0.08	0.12
groupPersonalized Intervention Recommender	0.092	0.727	0.02	-0.08	0.12

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
groupReframing Negative Thoughts	-0.255	0.332	-0.05	-0.15	0.05
groupSavoring Strategies	0.108	0.681	0.02	-0.08	0.12
Age	-0.030	4.05e-08	-0.01	-0.01	0.00
GenderAgender	-0.833	0.377	-0.16	-0.52	0.20
GenderMan	0.055	0.934	0.01	-0.24	0.26
GenderNon-binary	-0.077	0.913	-0.01	-0.28	0.25
GenderPrefer not to say	-1.219	0.256	-0.23	-0.64	0.17
GenderTwo-spirit	-1.397	0.363	-0.27	-0.85	0.31
GenderWoman	0.094	0.885	0.02	-0.23	0.26
RaceAsian Indian	0.292	0.685	0.06	-0.22	0.33
RaceAsian or Pacific Islander - Other	-0.514	0.692	-0.10	-0.59	0.39
RaceBlack or African American	-0.410	0.412	-0.08	-0.27	0.11
RaceChinese	-0.180	0.787	-0.03	-0.28	0.22
RaceFilipino	0.149	0.825	0.03	-0.23	0.28
RaceGuamanian	-0.376	0.893	-0.07	-1.13	0.99
RaceHawaiian	3.152	0.097	0.61	-0.11	1.32
RaceJapanese	-0.399	0.655	-0.08	-0.41	0.26
RaceKorean	-0.552	0.461	-0.11	-0.39	0.18
RaceOther	-0.190	0.725	-0.04	-0.24	0.17
RacePrefer not to say	-0.219	0.761	-0.04	-0.31	0.23
RaceSamoan	4.407	0.185	0.85	-0.41	2.10
RaceVietnamese	-1.097	0.133	-0.21	-0.49	0.06
RaceWhite	-0.623	0.198	-0.12	-0.30	0.06
EducationLess than a high school diploma	-0.513	0.796	-0.10	-0.85	0.65
EducationHigh school graduate - high school diploma or the equivalent (for example: GED)	-1.090	0.571	-0.21	-0.94	0.52
EducationSome college, but no degree	-1.117	0.561	-0.22	-0.94	0.51
EducationAssociate degree (for example: AA, AS)	-1.168	0.544	-0.22	-0.95	0.50
EducationBachelor's degree (for example: BA, AB, BS)	-1.572	0.414	-0.30	-1.03	0.42
EducationMaster's degree (for example: MA, MS, MEng, MEd, MSW, MBA)	-1.338	0.488	-0.26	-0.99	0.47

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
EducationDoctorate degree (for example: PhD, EdD)	- 0.546	-0.23	-0.97	0.51	
	1.181				
EducationProfessional degree (for example: MD, DDS, DVM, LLB, JD)	- 0.611	-0.19	-0.94	0.55	
	1.004				
EducationPrefer not to say	0.317	0.888	0.06	-0.79	0.91
Relationship/Marital StatusI'd Rather Not Say	0.434	0.248	0.08	-0.06	0.23
Relationship/Marital StatusIn a civil union/partnership	0.848	0.059	0.16	-0.01	0.33
Relationship/Marital StatusIn a relationship	0.321	0.200	0.06	-0.03	0.16
Relationship/Marital StatusMarried	0.269	0.257	0.05	-0.04	0.14
Relationship/Marital StatusSeparated	1.095	0.017	0.21	0.04	0.38
Relationship/Marital StatusSingle	0.483	0.047	0.09	0.00	0.18
Relationship/Marital StatusWidowed	1.159	0.023	0.22	0.03	0.42
Political PartyIndependent	- 0.065	-0.04	-0.09	0.00	
	0.233				
Political PartyPrefer not to say	0.159	0.617	0.03	-0.09	0.15
Political PartyRepublican	0.397	0.005	0.08	0.02	0.13
Political PartySomething else	0.016	0.941	0.00	-0.08	0.09
Employment StatusFull-time	- 0.706	-0.02	-0.11	0.08	
	0.095				
Employment StatusNot in paid work (e.g., homemaker, disabled)	- 0.386	-0.05	-0.16	0.06	
	0.256				
Employment StatusPart-time	- 0.440	-0.04	-0.14	0.06	
	0.207				
Employment StatusPrefer not to say	0.072	0.896	0.01	-0.19	0.22
Employment StatusRetired	- 0.050	-0.17	-0.33	0.00	
	0.857				
Employment StatusStudent	- 0.353	-0.06	-0.18	0.06	
	0.294				
Employment StatusUnemployed	0.209	0.468	0.04	-0.07	0.15
Household Income\$10,000-\$19,999	- 0.198	-0.07	-0.18	0.04	
	0.372				
Household Income\$20,000-\$29,999	- 0.004	-0.15	-0.25	-0.05	
	0.787				
Household Income\$30,000-\$39,999	- 3.95e-04	-0.18	-0.29	-0.08	
	0.955				
Household Income\$40,000-\$49,999	- 0.044	-0.11	-0.21	0.00	
	0.555				
Household Income\$50,000-\$59,999	- 5.96e-04	-0.18	-0.29	-0.08	
	0.955				
Household Income\$60,000-\$69,999	- 0.054	-0.11	-0.22	0.00	
	0.565				
Household Income\$70,000-\$79,999	- 0.033	-0.12	-0.23	-0.01	
	0.629				
Household Income\$80,000-\$89,999	- 0.039	-0.13	-0.26	-0.01	
	0.680				
Household Income\$90,000-\$99,999	- 0.010	-0.16	-0.27	-0.04	
	0.807				
Household Income\$100,000-\$124,999	- 0.050	-0.11	-0.22	0.00	
	0.566				
Household Income\$125,000-\$149,999	- 0.053	-0.12	-0.24	0.00	
	0.626				

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
Household Income\$150,000-\$174,999	- 1.018	0.006	-0.20	-0.33	-0.06
Household Income\$175,000-\$199,999	- 0.354	0.449	-0.07	-0.24	0.11
Household Income\$200,000-\$224,999	- 0.526	0.324	-0.10	-0.30	0.10
Household Income\$225,000-\$249,999	- 0.054	0.941	-0.01	-0.28	0.26
Household Income\$250,000 or more	- 0.387	0.445	-0.07	-0.27	0.12
Household IncomePrefer not to say	- 1.045	0.003	-0.20	-0.33	-0.07
Social ladder	- 0.499	1.78e-40	-0.10	-0.11	-0.08
disabilityPrefer not to Answer	0.665	0.021	0.13	0.02	0.24
disabilityYes	1.011	2.20e-20	0.19	0.15	0.24
timeWeek 4:group5 Habits to Beat Depression	- 0.168	0.584	-0.03	-0.15	0.08
timeWeek 4:groupAI-assisted Personalized Narrative	- 0.256	0.401	-0.05	-0.16	0.07
timeWeek 4:groupBehavioral Activation	- 0.437	0.150	-0.08	-0.20	0.03
timeWeek 4:groupDialectical Behavioral Therapy Skills	- 0.444	0.147	-0.09	-0.20	0.03
timeWeek 4:groupInner Child Healing Walk	- 0.059	0.845	-0.01	-0.13	0.10
timeWeek 4:groupInteractive Cognitive Reappraisal	- 0.789	0.011	-0.15	-0.27	-0.03
timeWeek 4:groupMindful Acceptance	- 0.369	0.226	-0.07	-0.19	0.04
timeWeek 4:groupMindful Attention Skills	- 0.731	0.016	-0.14	-0.26	-0.03
timeWeek 4:groupMoral Elevation	- 0.377	0.219	-0.07	-0.19	0.04
timeWeek 4:groupPersonalized Intervention Recommender	- 0.532	0.083	-0.10	-0.22	0.01
timeWeek 4:groupReframing Negative Thoughts	0.049	0.873	0.01	-0.11	0.12
timeWeek 4:groupSavoring Strategies	- 0.129	0.668	-0.02	-0.14	0.09
sd__(Intercept)	3.292	NA	NA	NA	NA
sd__Observation	4.016	NA	NA	NA	NA

```

ipw_m1_phq9_w_all_covars <- lmer(phq9_score ~ time * group + Age + Gender + Race +
  Education + `Relationship/Marital Status` +
  `Political Party` + `Employment Status` +
  `Household Income` + `Social ladder` +
  disability + dep_expect_bl+readiness_bl+
  agency_bl+hopeless_bl+ fats_bl + (1|pid),
  data=mega_alltimes,weights = weights_followup)
add_cohens_d(ipw_m1_phq9_w_all_covars,'Predicting: change in depressive symptoms')

```

Table 54: Predicting: change in depressive symptoms

term	estimate	p.value	cohens_d	cohens_d_95%ci	cohens_d_97.5%ci
(Intercept)	15.073	5.08e-14	NA	NA	NA
timeWeek 4	-3.042	1.04e-87	-0.62	-0.68	-0.56
group5 Habits to Beat Depression	-0.017	0.944	0.00	-0.10	0.10
groupAI-assisted Personalized Narrative	0.069	0.781	0.01	-0.09	0.11
groupBehavioral Activation	0.349	0.159	0.07	-0.03	0.17
groupDialectical Behavioral Therapy Skills	-0.050	0.842	-0.01	-0.11	0.09
groupInner Child Healing Walk	0.026	0.915	0.01	-0.09	0.10
groupInteractive Cognitive Reappraisal	0.034	0.892	0.01	-0.09	0.11
groupMindful Acceptance	-0.387	0.119	-0.08	-0.18	0.02
groupMindful Attention Skills	0.245	0.322	0.05	-0.05	0.15
groupMoral Elevation	0.152	0.540	0.03	-0.07	0.13
groupPersonalized Intervention Recommender	0.131	0.596	0.03	-0.07	0.13
groupReframing Negative Thoughts	-0.209	0.398	-0.04	-0.14	0.06
groupSavoring Strategies	0.225	0.362	0.05	-0.05	0.14
Age	-0.029	1.73e-08	-0.01	-0.01	0.00
GenderAgender	-0.602	0.488	-0.12	-0.47	0.22
GenderMan	0.238	0.693	0.05	-0.19	0.29
GenderNon-binary	0.192	0.767	0.04	-0.22	0.30
GenderPrefer not to say	-1.089	0.270	-0.22	-0.62	0.17
GenderTwo-spirit	-0.323	0.819	-0.07	-0.63	0.50
GenderWoman	0.389	0.516	0.08	-0.16	0.32
RaceAsian Indian	0.323	0.626	0.07	-0.20	0.33
RaceAsian or Pacific Islander - Other	-0.089	0.940	-0.02	-0.50	0.46
RaceBlack or African American	-0.022	0.962	0.00	-0.19	0.18
RaceChinese	-0.125	0.838	-0.03	-0.27	0.22
RaceFilipino	0.444	0.473	0.09	-0.16	0.34
RaceGuamanian	2.239	0.390	0.46	-0.59	1.50
RaceHawaiian	2.533	0.147	0.52	-0.18	1.22
RaceJapanese	-0.333	0.685	-0.07	-0.40	0.26
RaceKorean	-0.609	0.376	-0.12	-0.40	0.15
RaceOther	0.112	0.822	0.02	-0.18	0.22
RacePrefer not to say	-0.115	0.862	-0.02	-0.29	0.24
RaceSamoan	4.194	0.173	0.86	-0.37	2.09
RaceVietnamese	-0.765	0.255	-0.16	-0.43	0.11

term	estimate	p.value	cohens_d	cohens_d_95%ci	cohens_d_97.5%ci
RaceWhite	-0.356	0.423	-0.07	-0.25	0.11
EducationLess than a high school diploma	0.603	0.740	0.12	-0.60	0.85
EducationHigh school graduate - high school diploma or the equivalent (for example: GED)	0.427	0.809	0.09	-0.62	0.79
EducationSome college, but no degree	0.402	0.820	0.08	-0.62	0.79
EducationAssociate degree (for example: AA, AS)	0.368	0.835	0.08	-0.63	0.78
EducationBachelor's degree (for example: BA, AB, BS)	-0.103	0.953	-0.02	-0.73	0.68
EducationMaster's degree (for example: MA, MS, MEng, MEd, MSW, MBA)	0.286	0.872	0.06	-0.65	0.77
EducationDoctorate degree (for example: PhD, EdD)	0.297	0.868	0.06	-0.66	0.78
EducationProfessional degree (for example: MD, DDS, DVM, LLB, JD)	0.434	0.810	0.09	-0.64	0.81
EducationPrefer not to say	1.546	0.456	0.32	-0.51	1.14
Relationship/Marital StatusI'd Rather Not Say	0.435	0.209	0.09	-0.05	0.23
Relationship/Marital StatusIn a civil union/partnership	0.435	0.293	0.09	-0.08	0.25
Relationship/Marital StatusIn a relationship	0.339	0.141	0.07	-0.02	0.16
Relationship/Marital StatusMarried	0.162	0.460	0.03	-0.05	0.12
Relationship/Marital StatusSeparated	0.992	0.019	0.20	0.03	0.37
Relationship/Marital StatusSingle	0.286	0.201	0.06	-0.03	0.15
Relationship/Marital StatusWidowed	0.980	0.037	0.20	0.01	0.39
Political PartyIndependent	-0.115	0.325	-0.02	-0.07	0.02
Political PartyPrefer not to say	0.475	0.104	0.10	-0.02	0.21
Political PartyRepublican	0.479	2.95e-04	0.10	0.04	0.15
Political PartySomething else	0.300	0.142	0.06	-0.02	0.14
Employment StatusFull-time	-0.341	0.140	-0.07	-0.16	0.02
Employment StatusNot in paid work (e.g., homemaker, disabled)	-0.331	0.222	-0.07	-0.18	0.04
Employment StatusPart-time	-0.339	0.170	-0.07	-0.17	0.03
Employment StatusPrefer not to say	-0.186	0.713	-0.04	-0.24	0.16
Employment StatusRetired	-0.667	0.097	-0.14	-0.30	0.02
Employment StatusStudent	-0.429	0.141	-0.09	-0.20	0.03
Employment StatusUnemployed	-0.073	0.783	-0.01	-0.12	0.09
Household Income\$10,000-\$19,999	-0.208	0.433	-0.04	-0.15	0.06
Household Income\$20,000-\$29,999	-0.655	0.009	-0.13	-0.23	-0.03
Household Income\$30,000-\$39,999	-0.640	0.010	-0.13	-0.23	-0.03
Household Income\$40,000-\$49,999	-0.397	0.117	-0.08	-0.18	0.02

term	estimate	p.value	cohens_d	cohens_d_97.5	cohens_d_2.5
Household Income\$50,000-\$59,999	-0.663	0.010	-0.14	-0.24	-0.03
Household Income\$60,000-\$69,999	-0.559	0.039	-0.11	-0.22	-0.01
Household Income\$70,000-\$79,999	-0.470	0.084	-0.10	-0.20	0.01
Household Income\$80,000-\$89,999	-0.621	0.041	-0.13	-0.25	-0.01
Household Income\$90,000-\$99,999	-0.659	0.022	-0.13	-0.25	-0.02
Household Income\$100,000-\$124,999	-0.469	0.078	-0.10	-0.20	0.01
Household Income\$125,000-\$149,999	-0.609	0.041	-0.12	-0.24	-0.01
Household Income\$150,000-\$174,999	-0.824	0.015	-0.17	-0.30	-0.03
Household Income\$175,000-\$199,999	-0.346	0.421	-0.07	-0.24	0.10
Household Income\$200,000-\$224,999	-0.467	0.341	-0.10	-0.29	0.10
Household Income\$225,000-\$249,999	-0.386	0.564	-0.08	-0.35	0.19
Household Income\$250,000 or more	-0.440	0.346	-0.09	-0.28	0.10
Household IncomePrefer not to say	-0.936	0.004	-0.19	-0.32	-0.06
Social ladder	-0.204	1.78e-08	-0.04	-0.06	-0.03
disabilityPrefer not to Answer	0.291	0.274	0.06	-0.05	0.17
disabilityYes	0.817	5.47e-16	0.17	0.13	0.21
dep_expect_bl	-0.314	2.08e-35	-0.06	-0.07	-0.05
readiness_bl	0.120	0.006	0.02	0.01	0.04
agency_bl	-0.020	0.138	0.00	-0.01	0.00
hopeless_bl	0.544	1.36e-126	0.11	0.10	0.12
fats_bl	0.038	1.07e-08	0.01	0.01	0.01
timeWeek 4:group5 Habits to Beat Depression	-0.149	0.626	-0.03	-0.15	0.09
timeWeek 4:groupAI-assisted Personalized Narrative	-0.255	0.401	-0.05	-0.17	0.07
timeWeek 4:groupBehavioral Activation	-0.389	0.196	-0.08	-0.20	0.04
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.470	0.122	-0.10	-0.22	0.03
timeWeek 4:groupInner Child Healing Walk	-0.032	0.915	-0.01	-0.13	0.11
timeWeek 4:groupInteractive Cognitive Reappraisal	-0.835	0.007	-0.17	-0.29	-0.05

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
timeWeek 4:groupMindful Acceptance	-0.362	0.232	-0.07	-0.20	0.05
timeWeek 4:groupMindful Attention Skills	-0.682	0.024	-0.14	-0.26	-0.02
timeWeek 4:groupMoral Elevation	-0.360	0.238	-0.07	-0.20	0.05
timeWeek 4:groupPersonalized Intervention Recommender	-0.527	0.085	-0.11	-0.23	0.01
timeWeek 4:groupReframing Negative Thoughts	0.048	0.873	0.01	-0.11	0.13
timeWeek 4:groupSavoring Strategies	0.155	0.606	-0.03	-0.15	0.09
sd__(Intercept)	2.817	NA	NA	NA	NA
sd__Observation	4.008	NA	NA	NA	NA

agency

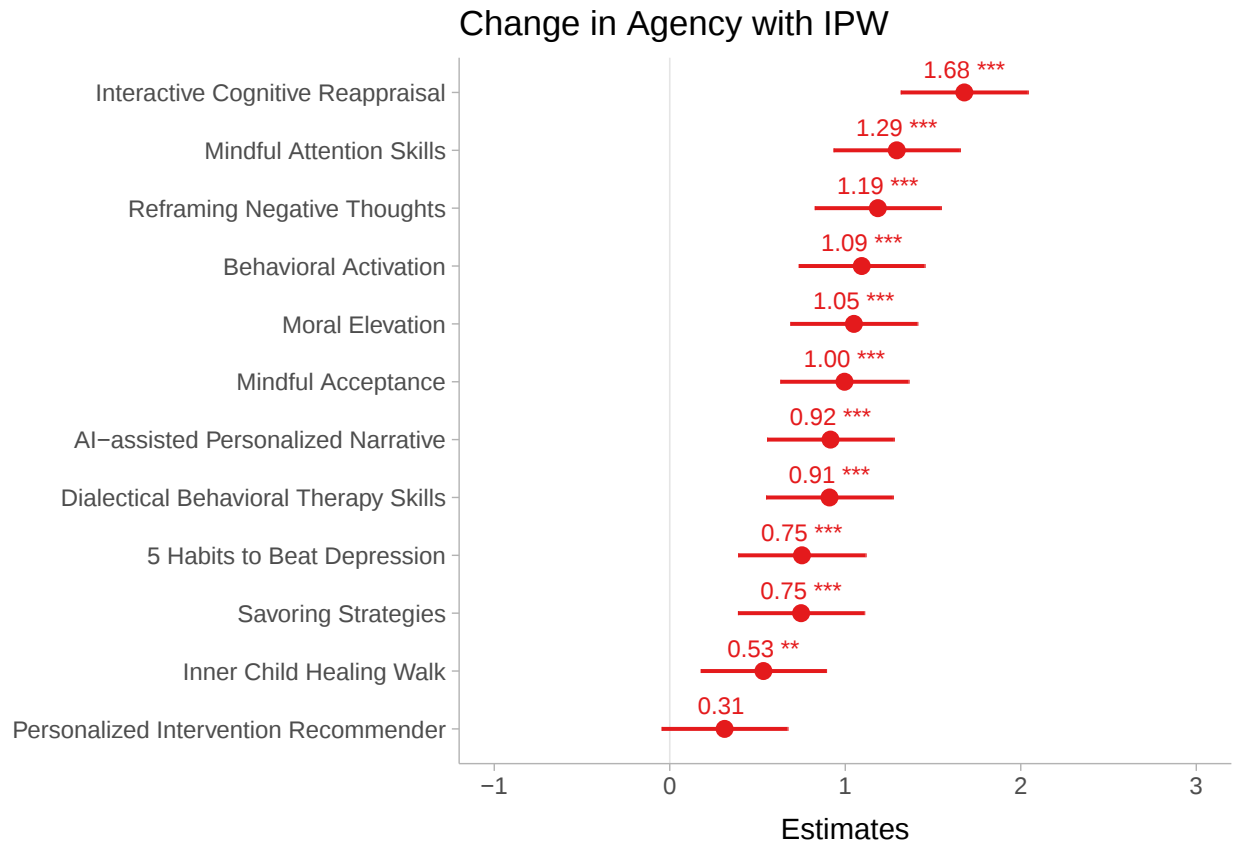
```
ipw_m1_agency <- lmer(agency_score ~ time * group + (1|pid),data=mega_alltimes,
                      weights=weights_followup)
add_cohens_d(ipw_m1_agency,'Predicting: change in agency')
```

Table 55: Predicting: change in agency

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	14.528	0.00e+00	NA	NA	NA
timePost-test	0.147	0.112	0.03	-0.01	0.07
timeWeek 4	1.234	5.06e-36	0.27	0.22	0.31
group5 Habits to Beat Depression	0.036	0.882	0.01	-0.09	0.11
groupAI-assisted Personalized Narrative	0.422	0.075	0.09	-0.01	0.19
groupBehavioral Activation	-0.277	0.242	-0.06	-0.16	0.04
groupDialectical Behavioral Therapy Skills	-0.236	0.320	-0.05	-0.15	0.05
groupInner Child Healing Walk	-0.179	0.447	-0.04	-0.14	0.06
groupInteractive Cognitive Reappraisal	-0.572	0.016	-0.12	-0.22	-0.02
groupMindful Acceptance	-0.354	0.134	-0.08	-0.18	0.02
groupMindful Attention Skills	0.154	0.514	0.03	-0.07	0.13
groupMoral Elevation	0.183	0.440	0.04	-0.06	0.14
groupPersonalized Intervention Recommender	-0.165	0.483	-0.04	-0.14	0.06
groupReframing Negative Thoughts	-0.372	0.115	-0.08	-0.18	0.02
groupSavoring Strategies	0.024	0.918	0.01	-0.09	0.11
timePost-test:group5 Habits to Beat Depression	0.753	4.81e-05	0.16	0.08	0.24
timeWeek 4:group5 Habits to Beat Depression	0.341	0.086	0.07	-0.01	0.16
timePost-test:groupAI-assisted Personalized Narrative	0.916	6.70e-07	0.20	0.12	0.28
timeWeek 4:groupAI-assisted Personalized Narrative	0.055	0.781	0.01	-0.07	0.10
timePost-test:groupBehavioral Activation	1.094	2.32e-09	0.24	0.16	0.31
timeWeek 4:groupBehavioral Activation	0.260	0.185	0.06	-0.03	0.14

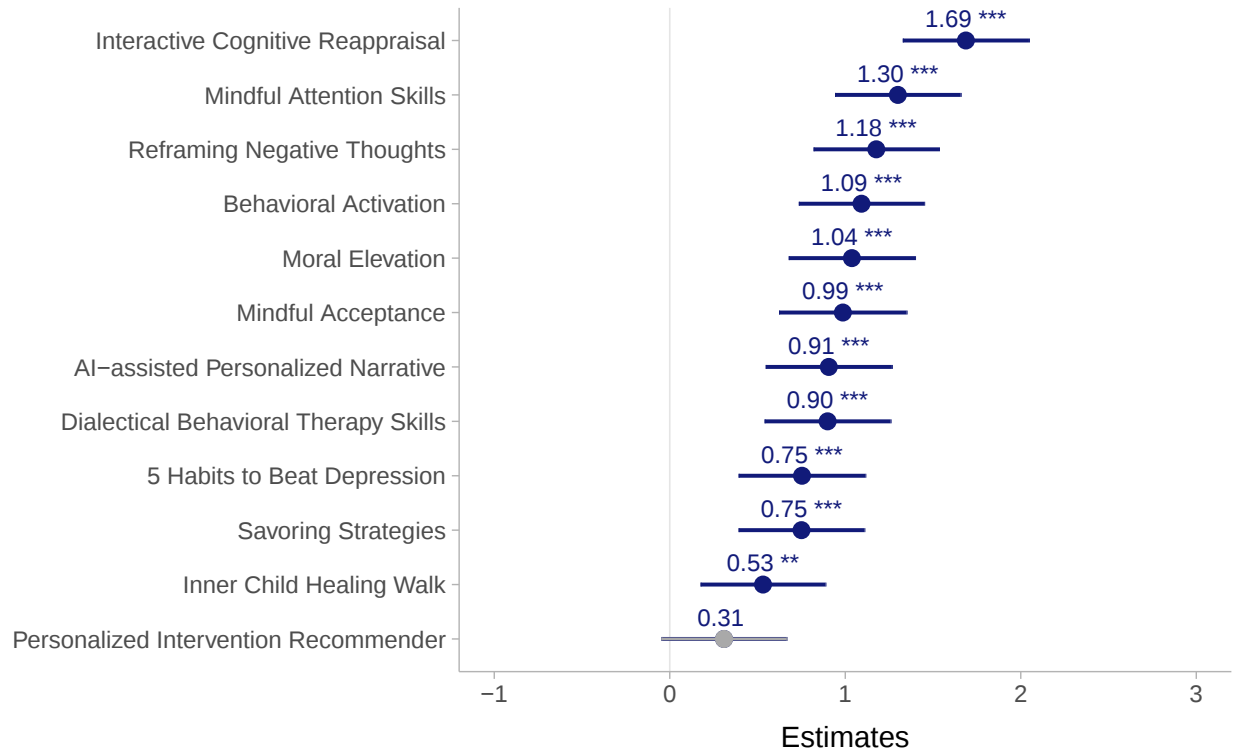
term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
timePost-test:groupDialectical Behavioral Therapy Skills	0.910	7.93e-07	0.20	0.12	0.27
timeWeek 4:groupDialectical Behavioral Therapy Skills	0.598	0.003	0.13	0.05	0.21
timePost-test:groupInner Child Healing Walk	0.534	0.003	0.12	0.04	0.19
timeWeek 4:groupInner Child Healing Walk	0.389	0.046	0.08	0.00	0.17
timePost-test:groupInteractive Cognitive Reappraisal	1.678	1.20e-19	0.36	0.28	0.44
timeWeek 4:groupInteractive Cognitive Reappraisal	0.706	4.38e-04	0.15	0.07	0.24
timePost-test:groupMindful Acceptance	0.996	9.44e-08	0.21	0.14	0.29
timeWeek 4:groupMindful Acceptance	0.523	0.008	0.11	0.03	0.20
timePost-test:groupMindful Attention Skills	1.293	1.97e-12	0.28	0.20	0.36
timeWeek 4:groupMindful Attention Skills	0.336	0.088	0.07	-0.01	0.16
timePost-test:groupMoral Elevation	1.049	1.35e-08	0.23	0.15	0.30
timeWeek 4:groupMoral Elevation	0.477	0.016	0.10	0.02	0.19
timePost-test:groupPersonalized Intervention Recommender	0.313	0.088	0.07	-0.01	0.14
timeWeek 4:groupPersonalized Intervention Recommender	0.074	0.708	0.02	-0.07	0.10
timePost-test:groupReframing Negative Thoughts	1.186	1.04e-10	0.26	0.18	0.33
timeWeek 4:groupReframing Negative Thoughts	0.466	0.018	0.10	0.02	0.18
timePost-test:groupSavoring Strategies	0.748	4.59e-05	0.16	0.08	0.24
timeWeek 4:groupSavoring Strategies	0.083	0.671	0.02	-0.06	0.10
sd__(Intercept)	3.841	NA	NA	NA	NA
sd__Observation	2.595	NA	NA	NA	NA

```
(agency_posttest_plot_ipw <- plot_model(ipw_m1_agency, sort.est = T, terms=posttest_int_terms, auto_label=
  show.values = T, value.offset = .4, value.size = 3.2) +
  scale_x_discrete(labels = function(x) gsub(".*:group", "", x)) +
  ggtitle('Change in Agency with IPW'))
```



```
agency_posttest_plot+ggtitle('Original agency plot, to compare')
```

Original agency plot, to compare
Baseline to Post-test, Hope Pathways (range 3–24)



hopelessness

```
ipw_m1_hopeless <- lmer(hopeless_score ~ time * group + (1|pid), data=mega_alltimes,
  weights=weights_followup)
add_cohens_d(ipw_m1_hopeless, 'Predicting: change in hopelessness')
```

Table 56: Predicting: change in hopelessness

term	estimate	p.value	cohen's_d	cohen's_d_2.5	cohen's_d_97.5
(Intercept)	7.136	0.00e+00	NA	NA	NA
timePost-test	-0.337	1.39e-08	-0.12	-0.16	-0.08
timeWeek 4	-1.174	6.93e-76	-0.40	-0.44	-0.36
group5 Habits to Beat Depression	-0.191	0.204	-0.07	-0.17	0.04
groupAI-assisted Personalized Narrative	-0.335	0.025	-0.11	-0.21	-0.01
groupBehavioral Activation	-0.013	0.930	0.00	-0.10	0.10
groupDialectical Behavioral Therapy Skills	0.108	0.470	0.04	-0.06	0.14
groupInner Child Healing Walk	-0.149	0.316	-0.05	-0.15	0.05
groupInteractive Cognitive Reappraisal	0.237	0.112	0.08	-0.02	0.18
groupMindful Acceptance	0.030	0.838	0.01	-0.09	0.11
groupMindful Attention Skills	-0.249	0.095	-0.09	-0.19	0.01
groupMoral Elevation	-0.149	0.321	-0.05	-0.15	0.05
groupPersonalized Intervention Recommender	-0.050	0.736	-0.02	-0.12	0.08

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
groupReframing Negative Thoughts	0.003	0.984	0.00	-0.10	0.10
groupSavoring Strategies	-0.119	0.424	-0.04	-0.14	0.06
timePost-test:group5 Habits to Beat Depression	-0.179	0.135	-0.06	-0.14	0.02
timeWeek 4:group5 Habits to Beat Depression	0.049	0.702	0.02	-0.07	0.10
timePost-test:groupAI-assisted Personalized Narrative	-0.370	0.002	-0.13	-0.21	-0.05
timeWeek 4:groupAI-assisted Personalized Narrative	0.117	0.355	0.04	-0.04	0.13
timePost-test:groupBehavioral Activation	-0.318	0.007	-0.11	-0.19	-0.03
timeWeek 4:groupBehavioral Activation	0.072	0.567	0.02	-0.06	0.11
timePost-test:groupDialectical Behavioral Therapy Skills	-0.158	0.183	-0.05	-0.13	0.03
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.041	0.747	-0.01	-0.10	0.07
timePost-test:groupInner Child Healing Walk	-0.392	8.46e-04	-0.13	-0.21	-0.06
timeWeek 4:groupInner Child Healing Walk	0.104	0.408	0.04	-0.05	0.12
timePost-test:groupInteractive Cognitive Reappraisal	-0.460	1.12e-04	-0.16	-0.24	-0.08
timeWeek 4:groupInteractive Cognitive Reappraisal	-0.219	0.090	-0.07	-0.16	0.01
timePost-test:groupMindful Acceptance	-0.457	1.46e-04	-0.16	-0.24	-0.08
timeWeek 4:groupMindful Acceptance	-0.010	0.939	0.00	-0.09	0.08
timePost-test:groupMindful Attention Skills	-0.457	1.15e-04	-0.16	-0.24	-0.08
timeWeek 4:groupMindful Attention Skills	0.066	0.605	0.02	-0.06	0.11
timePost-test:groupMoral Elevation	-0.434	2.68e-04	-0.15	-0.23	-0.07
timeWeek 4:groupMoral Elevation	-0.208	0.103	-0.07	-0.16	0.01
timePost-test:groupPersonalized Intervention Recommender	-0.021	0.860	-0.01	-0.09	0.07
timeWeek 4:groupPersonalized Intervention Recommender	-0.036	0.781	-0.01	-0.10	0.07
timePost-test:groupReframing Negative Thoughts	-0.505	1.96e-05	-0.17	-0.25	-0.09
timeWeek 4:groupReframing Negative Thoughts	-0.217	0.087	-0.07	-0.16	0.01
timePost-test:groupSavoring Strategies	-0.332	0.005	-0.11	-0.19	-0.03
timeWeek 4:groupSavoring Strategies	-0.029	0.817	-0.01	-0.09	0.07
sd__(Intercept)	2.396	NA	NA	NA	NA
sd__Observation	1.674	NA	NA	NA	NA

FATS

```
ipw_m1_fats <- lmer(fats_score ~ time * group + (1|pid),data=mega_alltimes,
                    weights=weights_followup)
add_cohens_d(ipw_m1_fats,'Predicting: change in thoughts and actions')
```

Table 57: Predicting: change in thoughts and actions

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	17.223	0.00e+00	NA	NA	NA
timeWeek 4	3.470	3.38e-49	0.36	0.31	0.41
group5 Habits to Beat Depression	0.505	0.306	0.05	-0.05	0.15
groupAI-assisted Personalized Narrative	0.720	0.142	0.07	-0.03	0.17
groupBehavioral Activation	0.826	0.092	0.09	-0.01	0.19
groupDialectical Behavioral Therapy Skills	0.207	0.672	0.02	-0.08	0.12
groupInner Child Healing Walk	0.336	0.491	0.03	-0.06	0.13
groupInteractive Cognitive Reappraisal	-0.921	0.060	-0.10	-0.20	0.00
groupMindful Acceptance	0.064	0.896	0.01	-0.09	0.11
groupMindful Attention Skills	0.581	0.235	0.06	-0.04	0.16
groupMoral Elevation	0.365	0.458	0.04	-0.06	0.14
groupPersonalized Intervention Recommender	0.273	0.575	0.03	-0.07	0.13
groupReframing Negative Thoughts	0.224	0.646	0.02	-0.08	0.12
groupSavoring Strategies	0.213	0.662	0.02	-0.08	0.12
timeWeek 4:group5 Habits to Beat Depression	-0.368	0.436	-0.04	-0.13	0.06
timeWeek 4:groupAI-assisted Personalized Narrative	-0.360	0.442	-0.04	-0.13	0.06
timeWeek 4:groupBehavioral Activation	0.347	0.457	0.04	-0.06	0.13
timeWeek 4:groupDialectical Behavioral Therapy Skills	-0.023	0.961	0.00	-0.10	0.09
timeWeek 4:groupInner Child Healing Walk	-0.155	0.738	-0.02	-0.11	0.08
timeWeek 4:groupInteractive Cognitive Reappraisal	0.961	0.045	0.10	0.00	0.20
timeWeek 4:groupMindful Acceptance	0.447	0.339	0.05	-0.05	0.14
timeWeek 4:groupMindful Attention Skills	0.690	0.141	0.07	-0.02	0.17
timeWeek 4:groupMoral Elevation	-0.093	0.844	-0.01	-0.11	0.09
timeWeek 4:groupPersonalized Intervention Recommender	0.106	0.823	0.01	-0.09	0.11
timeWeek 4:groupReframing Negative Thoughts	-0.271	0.561	-0.03	-0.12	0.07
timeWeek 4:groupSavoring Strategies	0.244	0.598	0.03	-0.07	0.12
sd__(Intercept)	7.435	NA	NA	NA	NA
sd__Observation	6.118	NA	NA	NA	NA

Depression Change Expectancies

```
ipw_m1_dep_expect <- lmer(dep_expectancies_score ~ time * group + (1|pid),data=mega_alltimes,
                           weights=weights_followup)
add_cohens_d(ipw_m1_dep_expect,'Predicting: change in depression change expectancies')
```

Table 58: Predicting: change in depression change expectancies

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	8.651	0.00e+00	NA	NA	NA
timePost-test	0.251	2.82e-06	0.10	0.06	0.15

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
timeWeek 4	0.860	7.48e-51	0.36	0.31	0.40
group5 Habits to Beat Depression	0.370	0.003	0.15	0.05	0.25
groupAI-assisted Personalized Narrative	0.365	0.003	0.15	0.05	0.25
groupBehavioral Activation	0.004	0.977	0.00	-0.10	0.10
groupDialectical Behavioral Therapy Skills	0.003	0.981	0.00	-0.10	0.10
groupInner Child Healing Walk	-0.005	0.968	0.00	-0.10	0.10
groupInteractive Cognitive Reappraisal	-0.090	0.463	-0.04	-0.14	0.06
groupMindful Acceptance	0.076	0.536	0.03	-0.07	0.13
groupMindful Attention Skills	0.144	0.242	0.06	-0.04	0.16
groupMoral Elevation	-0.018	0.886	-0.01	-0.11	0.09
groupPersonalized Intervention Recommender	0.088	0.473	0.04	-0.06	0.14
groupReframing Negative Thoughts	0.247	0.044	0.10	0.00	0.20
groupSavoring Strategies	0.266	0.031	0.11	0.01	0.21
timePost-test:group5 Habits to Beat Depression	0.279	0.010	0.12	0.03	0.20
timeWeek 4:group5 Habits to Beat Depression	-0.055	0.633	-0.02	-0.12	0.07
timePost-test:groupAI-assisted Personalized Narrative	0.385	3.32e-04	0.16	0.07	0.25
timeWeek 4:groupAI-assisted Personalized Narrative	-0.017	0.882	-0.01	-0.10	0.09
timePost-test:groupBehavioral Activation	0.675	2.45e-10	0.28	0.19	0.37
timeWeek 4:groupBehavioral Activation	0.210	0.066	0.09	-0.01	0.18
timePost-test:groupDialectical Behavioral Therapy Skills	0.448	3.08e-05	0.18	0.10	0.27
timeWeek 4:groupDialectical Behavioral Therapy Skills	0.200	0.083	0.08	-0.01	0.18
timePost-test:groupInner Child Healing Walk	0.334	0.002	0.14	0.05	0.22
timeWeek 4:groupInner Child Healing Walk	0.060	0.599	0.02	-0.07	0.12
timePost-test:groupInteractive Cognitive Reappraisal	0.831	1.23e-14	0.34	0.26	0.43
timeWeek 4:groupInteractive Cognitive Reappraisal	0.165	0.159	0.07	-0.03	0.16
timePost-test:groupMindful Acceptance	0.614	1.58e-08	0.25	0.17	0.34
timeWeek 4:groupMindful Acceptance	0.042	0.713	0.02	-0.08	0.11
timePost-test:groupMindful Attention Skills	0.760	1.25e-12	0.31	0.23	0.40
timeWeek 4:groupMindful Attention Skills	0.105	0.361	0.04	-0.05	0.14
timePost-test:groupMoral Elevation	0.500	3.35e-06	0.21	0.12	0.29
timeWeek 4:groupMoral Elevation	0.222	0.054	0.09	0.00	0.19
timePost-test:groupPersonalized Intervention Recommender	0.188	0.078	0.08	-0.01	0.16
timeWeek 4:groupPersonalized Intervention Recommender	0.065	0.576	0.03	-0.07	0.12
timePost-test:groupReframing Negative Thoughts	0.591	3.21e-08	0.24	0.16	0.33
timeWeek 4:groupReframing Negative Thoughts	-0.039	0.734	-0.02	-0.11	0.08
timePost-test:groupSavoring Strategies	0.501	2.75e-06	0.21	0.12	0.29
timeWeek 4:groupSavoring Strategies	0.144	0.203	0.06	-0.03	0.15

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
sd__(Intercept)	1.892	NA	NA	NA	NA
sd__Observation	1.512	NA	NA	NA	NA

```
#Acceptability across SSIs
```

```
df_for_acceptability_with_weights <- df_for_acceptability%>%
  left_join(mega_alltimes %>% select(pid,time,weights_followup,weights_post_test))
```

```
#Credibility / Expectancy Questionnaire scores
```

```
# i computed this by summing the likert scales and the percentages / 10
```

```
ipw_m1_ceq <- lm(CEQ_score~group,data= df_for_acceptability_with_weights,
  weights=df_for_acceptability_with_weights$weights_post_test)
summary(ipw_m1_ceq)
```

```
##
```

```
## Call:
```

```
## lm(formula = CEQ_score ~ group, data = df_for_acceptability_with_weights,
##     weights = df_for_acceptability_with_weights$weights_post_test)
```

```
##
```

```
## Weighted Residuals:
```

```
##      Min       1Q   Median       3Q      Max
## -28.188  -7.218  -0.053   7.325  30.407
```

```
##
```

```
## Coefficients:
```

```
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    30.67243    0.48093   63.777 < 2e-16
## group5 Habits to Beat Depression      0.56268    0.68513    0.821  0.41152
## groupAI-assisted Personalized Narrative -1.95631    0.68293   -2.865  0.00419
## groupDialectical Behavioral Therapy Skills -0.86010    0.68257   -1.260  0.20769
## groupInner Child Healing Walk      -4.61944    0.67823   -6.811 1.07e-11
## groupInteractive Cognitive Reappraisal   0.52766    0.68299    0.773  0.43981
## groupMindful Acceptance      -1.49018    0.68709   -2.169  0.03013
## groupMindful Attention Skills    1.16052    0.68145    1.703  0.08862
## groupMoral Elevation      -1.12784    0.68366   -1.650  0.09905
## groupPersonalized Intervention Recommender -1.53261    0.67899   -2.257  0.02403
## groupReframing Negative Thoughts    0.05747    0.68051    0.084  0.93270
## groupSavoring Strategies     -0.38213    0.68096   -0.561  0.57471
```

```
##
```

```
## (Intercept) ***
```

```
## group5 Habits to Beat Depression
```

```
## groupAI-assisted Personalized Narrative **
```

```
## groupDialectical Behavioral Therapy Skills
```

```
## groupInner Child Healing Walk ***
```

```
## groupInteractive Cognitive Reappraisal
```

```
## groupMindful Acceptance *
```

```
## groupMindful Attention Skills .
```

```
## groupMoral Elevation .
```

```
## groupPersonalized Intervention Recommender *
```

```
## groupReframing Negative Thoughts
```

```
## groupSavoring Strategies
```

```
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 10.76 on 5868 degrees of freedom
## (10905 observations deleted due to missingness)
## Multiple R-squared:  0.01885,    Adjusted R-squared:  0.01701
## F-statistic: 10.25 on 11 and 5868 DF,  p-value: < 2.2e-16

#Star rating
ipw_m1_star <- lm(star_rating_1~group,data=df_for_acceptability_with_weights %>%
  filter(time=='Post-test'),
  weights=df_for_acceptability_with_weights %>%
  filter(time=='Post-test') %>% pull(weights_post_test))
summary(ipw_m1_star)

##
## Call:
## lm(formula = star_rating_1 ~ group, data = df_for_acceptability_with_weights %>%
##   filter(time == "Post-test"), weights = df_for_acceptability_with_weights %>%
##   filter(time == "Post-test") %>% pull(weights_post_test))
##
## Weighted Residuals:
##      Min       1Q   Median       3Q      Max
## -3.3336 -0.2847 -0.0942  0.8076  1.3251
##
## Coefficients:
##                                Estimate Std. Error t value Pr(>|t|)
## (Intercept)                   4.12906    0.04223   97.771 < 2e-16
## group5 Habits to Beat Depression    0.07472    0.06013    1.243  0.21408
## groupAI-assisted Personalized Narrative -0.11935    0.05994   -1.991  0.04651
## groupDialectical Behavioral Therapy Skills  0.02701    0.05991    0.451  0.65214
## groupInner Child Healing Walk    -0.41039    0.05953   -6.894 5.99e-12
## groupInteractive Cognitive Reappraisal  0.04674    0.05998    0.779  0.43581
## groupMindful Acceptance           0.07353    0.06037    1.218  0.22331
## groupMindful Attention Skills       0.15419    0.05981    2.578  0.00996
## groupMoral Elevation              0.16462    0.06000    2.744  0.00610
## groupPersonalized Intervention Recommender -0.03511    0.05959   -0.589  0.55580
## groupReframing Negative Thoughts    -0.01404    0.05973   -0.235  0.81420
## groupSavoring Strategies           0.07573    0.05983    1.266  0.20562
##
## (Intercept)                    ***
## group5 Habits to Beat Depression
## groupAI-assisted Personalized Narrative *
## groupDialectical Behavioral Therapy Skills
## groupInner Child Healing Walk      ***
## groupInteractive Cognitive Reappraisal
## groupMindful Acceptance
## groupMindful Attention Skills       **
## groupMoral Elevation                **
## groupPersonalized Intervention Recommender
## groupReframing Negative Thoughts
## groupSavoring Strategies
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
```

```
## Residual standard error: 0.9442 on 5862 degrees of freedom
## (127 observations deleted due to missingness)
## Multiple R-squared: 0.02386, Adjusted R-squared: 0.02203
## F-statistic: 13.02 on 11 and 5862 DF, p-value: < 2.2e-16
```

```
ipw_m1_star_wk4 <- lm(star_rating_1~group,data=df_for_acceptability_with_weights %>%
  filter(time=='Week 4'),
  weights=df_for_acceptability_with_weights %>%
  filter(time=='Week 4') %>% pull(weights_post_test))
summary(ipw_m1_star_wk4)
```

```
##
## Call:
## lm(formula = star_rating_1 ~ group, data = df_for_acceptability_with_weights %>%
##   filter(time == "Week 4"), weights = df_for_acceptability_with_weights %>%
##   filter(time == "Week 4") %>% pull(weights_post_test))
##
## Weighted Residuals:
##      Min       1Q   Median       3Q      Max
## -3.0855 -0.9355  0.0453  1.0302  1.1653
##
## Coefficients:
##                                     Estimate Std. Error t value
## (Intercept)                        3.985265   0.048555  82.077
## group5 Habits to Beat Depression      0.059786   0.069176   0.864
## groupAI-assisted Personalized Narrative -0.023858   0.068792  -0.347
## groupDialectical Behavioral Therapy Skills -0.035395   0.069045  -0.513
## groupInner Child Healing Walk        -0.058592   0.068474  -0.856
## groupInteractive Cognitive Reappraisal -0.055130   0.069901  -0.789
## groupMindful Acceptance              -0.001765   0.068476  -0.026
## groupMindful Attention Skills        -0.030341   0.068890  -0.440
## groupMoral Elevation                 -0.007705   0.069228  -0.111
## groupPersonalized Intervention Recommender -0.023855   0.069409  -0.344
## groupReframing Negative Thoughts     -0.118044   0.068736  -1.717
## groupSavoring Strategies             -0.048035   0.068181  -0.705
##                                     Pr(>|t|)
## (Intercept)                        <2e-16 ***
## group5 Habits to Beat Depression      0.387
## groupAI-assisted Personalized Narrative 0.729
## groupDialectical Behavioral Therapy Skills 0.608
## groupInner Child Healing Walk        0.392
## groupInteractive Cognitive Reappraisal 0.430
## groupMindful Acceptance              0.979
## groupMindful Attention Skills        0.660
## groupMoral Elevation                 0.911
## groupPersonalized Intervention Recommender 0.731
## groupReframing Negative Thoughts     0.086 .
## groupSavoring Strategies             0.481
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9775 on 4735 degrees of freedom
## (36 observations deleted due to missingness)
## Multiple R-squared: 0.00175, Adjusted R-squared: -0.000569
```

```
## F-statistic: 0.7546 on 11 and 4735 DF, p-value: 0.6861
```

```
#Frequency of Aha! moments
```

```
ipw_m1_aha <- lm(aha~group,data=df_for_acceptability_with_weights %>%  
  filter(time=='Post-test'),  
  weights=df_for_acceptability_with_weights %>%  
  filter(time=='Post-test') %>% pull(weights_post_test))  
summary(ipw_m1_aha)
```

```
##  
## Call:  
## lm(formula = aha ~ group, data = df_for_acceptability_with_weights %>%  
##   filter(time == "Post-test"), weights = df_for_acceptability_with_weights %>%  
##   filter(time == "Post-test") %>% pull(weights_post_test))  
##  
## Weighted Residuals:  
##      Min       1Q   Median       3Q      Max   
## -0.4966 -0.4003 -0.3163  0.5727  0.7608   
##  
## Coefficients:  
##                                Estimate Std. Error t value  
## (Intercept)                   0.4318598  0.0215565  20.034  
## group5 Habits to Beat Depression -0.0002687  0.0307091  -0.009  
## groupAI-assisted Personalized Narrative -0.0759938  0.0306107  -2.483  
## groupDialectical Behavioral Therapy Skills -0.0406535  0.0305944  -1.329  
## groupInner Child Healing Walk -0.1714225  0.0304000  -5.639  
## groupInteractive Cognitive Reappraisal -0.0002919  0.0305971  -0.010  
## groupMindful Acceptance -0.0947351  0.0307969  -3.076  
## groupMindful Attention Skills  0.0418649  0.0305444   1.371  
## groupMoral Elevation -0.0325287  0.0306274  -1.062  
## groupPersonalized Intervention Recommender -0.1690982  0.0304039  -5.562  
## groupReframing Negative Thoughts -0.0317072  0.0305023  -1.040  
## groupSavoring Strategies -0.1155310  0.0305379  -3.783  
##                                Pr(>|t|)  
## (Intercept)                   < 2e-16 ***  
## group5 Habits to Beat Depression  0.993020  
## groupAI-assisted Personalized Narrative  0.013071 *  
## groupDialectical Behavioral Therapy Skills 0.183969  
## groupInner Child Healing Walk 1.79e-08 ***  
## groupInteractive Cognitive Reappraisal  0.992388  
## groupMindful Acceptance 0.002107 **  
## groupMindful Attention Skills 0.170545  
## groupMoral Elevation 0.288243  
## groupPersonalized Intervention Recommender 2.79e-08 ***  
## groupReframing Negative Thoughts 0.298614  
## groupSavoring Strategies 0.000156 ***  
## ---  
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
##  
## Residual standard error: 0.4824 on 5871 degrees of freedom  
## (118 observations deleted due to missingness)  
## Multiple R-squared:  0.01863, Adjusted R-squared:  0.01679  
## F-statistic: 10.13 on 11 and 5871 DF, p-value: < 2.2e-16
```

```

ipw_m1_aha_wk4 <- lm(aha_wk4~group,data=df_for_acceptability_with_weights %>%
  filter(time=='Week 4'),
  weights=df_for_acceptability_with_weights %>%
  filter(time=='Week 4') %>% pull(weights_post_test))
summary(ipw_m1_aha_wk4)

##
## Call:
## lm(formula = aha_wk4 ~ group, data = df_for_acceptability_with_weights %>%
##   filter(time == "Week 4"), weights = df_for_acceptability_with_weights %>%
##   filter(time == "Week 4") %>% pull(weights_post_test))
##
## Weighted Residuals:
##      Min       1Q   Median       3Q      Max
## -0.2878 -0.2431 -0.2122 -0.1598  0.8598
##
## Coefficients:
##
##              Estimate Std. Error t value
## (Intercept)      0.2532721  0.0209269  12.103
## group5 Habits to Beat Depression      -0.0177610  0.0297946  -0.596
## groupAI-assisted Personalized Narrative      -0.0459716  0.0296674  -1.550
## groupDialectical Behavioral Therapy Skills      -0.0410422  0.0297765  -1.378
## groupInner Child Healing Walk      -0.0934789  0.0295116  -3.168
## groupInteractive Cognitive Reappraisal       0.0004495  0.0301056   0.015
## groupMindful Acceptance      -0.0524612  0.0295305  -1.777
## groupMindful Attention Skills      -0.0132569  0.0296906  -0.447
## groupMoral Elevation       0.0075368  0.0298560   0.252
## groupPersonalized Intervention Recommender     -0.0508153  0.0299147  -1.699
## groupReframing Negative Thoughts      -0.0157440  0.0296053  -0.532
## groupSavoring Strategies       0.0242352  0.0294032   0.824
##
##              Pr(>|t|)
## (Intercept)      < 2e-16 ***
## group5 Habits to Beat Depression      0.55113
## groupAI-assisted Personalized Narrative      0.12131
## groupDialectical Behavioral Therapy Skills      0.16816
## groupInner Child Healing Walk      0.00155 **
## groupInteractive Cognitive Reappraisal      0.98809
## groupMindful Acceptance      0.07571 .
## groupMindful Attention Skills      0.65525
## groupMoral Elevation      0.80071
## groupPersonalized Intervention Recommender      0.08945 .
## groupReframing Negative Thoughts      0.59489
## groupSavoring Strategies      0.40985
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4213 on 4733 degrees of freedom
## (38 observations deleted due to missingness)
## Multiple R-squared:  0.005681, Adjusted R-squared:  0.00337
## F-statistic: 2.458 on 11 and 4733 DF, p-value: 0.004609

```

```

#significance of Aha! moments
ipw_m1_aha_significance <- lm(aha_significant~group,data=df_for_acceptability_with_weights %>%
                             filter(time=='Post-test'),
                             weights=df_for_acceptability_with_weights %>%
                             filter(time=='Post-test') %>% pull(weights_followup))
summary(ipw_m1_aha_significance)

##
## Call:
## lm(formula = aha_significant ~ group, data = df_for_acceptability_with_weights %>%
##     filter(time == "Post-test"), weights = df_for_acceptability_with_weights %>%
##     filter(time == "Post-test") %>% pull(weights_followup))
##
## Weighted Residuals:
##      Min       1Q   Median       3Q      Max
## -2.5257 -0.3345 -0.1550  0.8068  2.1817
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      3.01840    0.06083   49.618 < 2e-16
## group5 Habits to Beat Depression      0.04957    0.08687    0.571 0.568273
## groupAI-assisted Personalized Narrative 0.14710    0.09110    1.615 0.106511
## groupDialectical Behavioral Therapy Skills 0.12029    0.08885    1.354 0.175934
## groupInner Child Healing Walk      0.20972    0.09856    2.128 0.033472
## groupInteractive Cognitive Reappraisal 0.22045    0.08675    2.541 0.011114
## groupMindful Acceptance      0.15160    0.09355    1.621 0.105257
## groupMindful Attention Skills 0.18715    0.08437    2.218 0.026643
## groupMoral Elevation      0.31018    0.08840    3.509 0.000459
## groupPersonalized Intervention Recommender 0.04577    0.09891    0.463 0.643589
## groupReframing Negative Thoughts 0.19321    0.08799    2.196 0.028211
## groupSavoring Strategies      0.13069    0.09381    1.393 0.163736
##
## (Intercept)          ***
## group5 Habits to Beat Depression
## groupAI-assisted Personalized Narrative
## groupDialectical Behavioral Therapy Skills
## groupInner Child Healing Walk      *
## groupInteractive Cognitive Reappraisal  *
## groupMindful Acceptance
## groupMindful Attention Skills      *
## groupMoral Elevation          ***
## groupPersonalized Intervention Recommender
## groupReframing Negative Thoughts      *
## groupSavoring Strategies
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9283 on 2186 degrees of freedom
## (3803 observations deleted due to missingness)
## Multiple R-squared:  0.008957, Adjusted R-squared:  0.00397
## F-statistic: 1.796 on 11 and 2186 DF, p-value: 0.04951

```

```

ipw_m1_aha_significance_wk4 <- lm(aha_significant~group,data=df_for_acceptability_with_weights %>%
                                filter(time=='Week 4'),
                                weights=df_for_acceptability_with_weights %>%
                                filter(time=='Week 4') %>% pull(weights_followup))
summary(ipw_m1_aha_significance_wk4)

```

```

##
## Call:
## lm(formula = aha_significant ~ group, data = df_for_acceptability_with_weights %>%
##   filter(time == "Week 4"), weights = df_for_acceptability_with_weights %>%
##   filter(time == "Week 4") %>% pull(weights_followup))
##
## Weighted Residuals:
##      Min       1Q   Median       3Q      Max
## -2.8143 -0.4585 -0.2947  0.6584  1.9539
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.27995    0.09029   25.251  <2e-16
## group5 Habits to Beat Depression      0.14978    0.13100    1.143   0.2532
## groupAI-assisted Personalized Narrative  0.02259    0.13480    0.168   0.8669
## groupDialectical Behavioral Therapy Skills 0.21160    0.13497    1.568   0.1172
## groupInner Child Healing Walk      0.33822    0.14434    2.343   0.0193
## groupInteractive Cognitive Reappraisal  0.13534    0.13018    1.040   0.2987
## groupMindful Acceptance      -0.05432    0.13615   -0.399   0.6900
## groupMindful Attention Skills    0.22146    0.12994    1.704   0.0886
## groupMoral Elevation      0.13744    0.12804    1.073   0.2833
## groupPersonalized Intervention Recommender 0.10822    0.13735    0.788   0.4309
## groupReframing Negative Thoughts    0.01317    0.13002    0.101   0.9193
## groupSavoring Strategies      0.07474    0.12420    0.602   0.5475
##
## (Intercept)          ***
## group5 Habits to Beat Depression
## groupAI-assisted Personalized Narrative
## groupDialectical Behavioral Therapy Skills
## groupInner Child Healing Walk          *
## groupInteractive Cognitive Reappraisal
## groupMindful Acceptance
## groupMindful Attention Skills          .
## groupMoral Elevation
## groupPersonalized Intervention Recommender
## groupReframing Negative Thoughts
## groupSavoring Strategies
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9608 on 1070 degrees of freedom
## (3701 observations deleted due to missingness)
## Multiple R-squared:  0.01198,    Adjusted R-squared:  0.001827
## F-statistic:  1.18 on 11 and 1070 DF,  p-value: 0.2963

```

```

ipw_m1_aha_significance <- lm(aha_significant~group,data=df_for_acceptability_with_weights %>%
  filter(time=='Post-test'),
  weights=df_for_acceptability_with_weights %>%
  filter(time=='Post-test') %>% pull(weights_post_test))
summary(ipw_m1_aha_significance)

```

```

##
## Call:
## lm(formula = aha_significant ~ group, data = df_for_acceptability_with_weights %>%
##   filter(time == "Post-test"), weights = df_for_acceptability_with_weights %>%
##   filter(time == "Post-test") %>% pull(weights_post_test))
##
## Weighted Residuals:
##      Min       1Q   Median       3Q      Max
## -2.3551 -0.3255 -0.1500  0.7857  2.0266
##
## Coefficients:
##                                Estimate Std. Error t value Pr(>|t|)
## (Intercept)                   3.01948    0.06109  49.424 < 2e-16
## group5 Habits to Beat Depression    0.05226    0.08705   0.600  0.54834
## groupAI-assisted Personalized Narrative 0.14484    0.09130   1.586  0.11280
## groupDialectical Behavioral Therapy Skills 0.12860    0.08895   1.446  0.14837
## groupInner Child Healing Walk        0.21182    0.09926   2.134  0.03295
## groupInteractive Cognitive Reappraisal 0.21633    0.08673   2.494  0.01269
## groupMindful Acceptance              0.14605    0.09333   1.565  0.11775
## groupMindful Attention Skills         0.18288    0.08462   2.161  0.03079
## groupMoral Elevation                 0.30602    0.08857   3.455  0.00056
## groupPersonalized Intervention Recommender 0.04140    0.09900   0.418  0.67585
## groupReframing Negative Thoughts     0.19481    0.08814   2.210  0.02720
## groupSavoring Strategies             0.12943    0.09414   1.375  0.16934
##
## (Intercept) ***
## group5 Habits to Beat Depression
## groupAI-assisted Personalized Narrative
## groupDialectical Behavioral Therapy Skills
## groupInner Child Healing Walk *
## groupInteractive Cognitive Reappraisal *
## groupMindful Acceptance
## groupMindful Attention Skills *
## groupMoral Elevation ***
## groupPersonalized Intervention Recommender
## groupReframing Negative Thoughts *
## groupSavoring Strategies
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8985 on 2186 degrees of freedom
## (3803 observations deleted due to missingness)
## Multiple R-squared:  0.008684, Adjusted R-squared:  0.003696
## F-statistic: 1.741 on 11 and 2186 DF, p-value: 0.05921

```

```

ipw_m1_aha_significance_wk4 <- lm(aha_significant~group,data=df_for_acceptability_with_weights %>%
  filter(time=='Week 4'),
  weights=df_for_acceptability_with_weights %>%
  filter(time=='Week 4') %>% pull(weights_post_test))
summary(ipw_m1_aha_significance_wk4)

```

```

##
## Call:
## lm(formula = aha_significant ~ group, data = df_for_acceptability_with_weights %>%
##   filter(time == "Week 4"), weights = df_for_acceptability_with_weights %>%
##   filter(time == "Week 4") %>% pull(weights_post_test))
##
## Weighted Residuals:
##      Min       1Q   Median       3Q      Max
## -2.5166 -0.4281 -0.2658  0.6198  1.8178
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.26510    0.09050   25.030  <2e-16
## group5 Habits to Beat Depression      0.16086    0.13128    1.225  0.2207
## groupAI-assisted Personalized Narrative  0.03318    0.13525    0.245  0.8063
## groupDialectical Behavioral Therapy Skills 0.22961    0.13492    1.702  0.0891
## groupInner Child Healing Walk      0.35162    0.14500    2.425  0.0155
## groupInteractive Cognitive Reappraisal  0.14535    0.13013    1.117  0.2643
## groupMindful Acceptance      -0.03691    0.13575   -0.272  0.7858
## groupMindful Attention Skills    0.23254    0.13017    1.786  0.0743
## groupMoral Elevation      0.15173    0.12816    1.184  0.2367
## groupPersonalized Intervention Recommender 0.12056    0.13740    0.877  0.3804
## groupReframing Negative Thoughts    0.01764    0.13013    0.136  0.8922
## groupSavoring Strategies      0.08599    0.12438    0.691  0.4895
##
## (Intercept)          ***
## group5 Habits to Beat Depression
## groupAI-assisted Personalized Narrative
## groupDialectical Behavioral Therapy Skills .
## groupInner Child Healing Walk          *
## groupInteractive Cognitive Reappraisal
## groupMindful Acceptance
## groupMindful Attention Skills          .
## groupMoral Elevation
## groupPersonalized Intervention Recommender
## groupReframing Negative Thoughts
## groupSavoring Strategies
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9169 on 1070 degrees of freedom
## (3701 observations deleted due to missingness)
## Multiple R-squared:  0.01243, Adjusted R-squared:  0.00228
## F-statistic: 1.225 on 11 and 1070 DF, p-value: 0.2654

```

```
#how much Aha! changed behavior at 4-week follow-up
ipw_m1_aha_howchanged <- lm(aha_howchanged~group,data=df_for_acceptability_with_weights,
                             weights=df_for_acceptability_with_weights %>%
                             pull(weights_post_test))
summary(ipw_m1_aha_howchanged)
```

```
##
## Call:
## lm(formula = aha_howchanged ~ group, data = df_for_acceptability_with_weights,
##     weights = df_for_acceptability_with_weights %>% pull(weights_post_test))
##
## Weighted Residuals:
##      Min       1Q   Median       3Q      Max
## -2.3506 -1.0426 -0.1002  0.8605  2.0768
##
## Coefficients:
##                                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)                        2.03994     0.10314  19.778  <2e-16
## group5 Habits to Beat Depression      0.02654     0.14963   0.177   0.8593
## groupAI-assisted Personalized Narrative 0.05973     0.15415   0.388   0.6985
## groupDialectical Behavioral Therapy Skills 0.12102     0.15377   0.787   0.4314
## groupInner Child Healing Walk          0.29893     0.16526   1.809   0.0707
## groupInteractive Cognitive Reappraisal  0.12772     0.14831   0.861   0.3894
## groupMindful Acceptance               -0.06418     0.15472  -0.415   0.6783
## groupMindful Attention Skills          0.19440     0.14835   1.310   0.1903
## groupMoral Elevation                   0.10168     0.14606   0.696   0.4865
## groupPersonalized Intervention Recommender 0.18114     0.15660   1.157   0.2477
## groupReframing Negative Thoughts       0.05703     0.14831   0.385   0.7007
## groupSavoring Strategies              0.08132     0.14176   0.574   0.5663
##
## (Intercept) ***
## group5 Habits to Beat Depression
## groupAI-assisted Personalized Narrative
## groupDialectical Behavioral Therapy Skills
## groupInner Child Healing Walk
## groupInteractive Cognitive Reappraisal
## groupMindful Acceptance
## groupMindful Attention Skills
## groupMoral Elevation
## groupPersonalized Intervention Recommender
## groupReframing Negative Thoughts
## groupSavoring Strategies
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.045 on 1070 degrees of freedom
## (15703 observations deleted due to missingness)
## Multiple R-squared:  0.006905, Adjusted R-squared: -0.003304
## F-statistic: 0.6764 on 11 and 1070 DF, p-value: 0.762
```

```
#expectancies at baseline predicting PHQ-9
ipw_m1_expect_on_phq9 <- lmer(
  phq9_score ~ time * dep_expect_bl + (1|group/pid),
```

```
data=mega_alltimes,
weights=weights_followup)
add_cohens_d(ipw_m1_expect_on_phq9, 'Predicting: change in depressive symptoms')
```

Table 59: Predicting: change in depressive symptoms

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	20.403	0.00e+00	NA	NA	NA
timeWeek 4	-2.573	5.30e-22	-0.50	-0.60	-0.4
dep_expect_bl	-0.567	9.90e-109	-0.11	-0.12	-0.1
timeWeek 4:dep_expect_bl	-0.083	0.005	-0.02	-0.03	0.0
sd__(Intercept)	3.226	NA	NA	NA	NA
sd__(Intercept)	0.000	NA	NA	NA	NA
sd__Observation	4.013	NA	NA	NA	NA

```
#passive vs all
mega_alltimes <- mega_alltimes %>% mutate(passive_vs_all=ifelse(
  group=='Passive Control','Passive Control','active'))%>% factor %>% fct_rev()
ipw_m1_phq9_all_vs_passive <- lmer(phq9_score ~ time * passive_vs_all + (1|group/pid),data=mega_alltimes,
  weights=weights_followup)
summary(ipw_m1_phq9_all_vs_passive)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: phq9_score ~ time * passive_vs_all + (1 | group/pid)
## Data: mega_alltimes
## Weights: weights_followup
##
## REML criterion at convergence: 81277.4
##
## Scaled residuals:
## Min 1Q Median 3Q Max
## -3.3633 -0.5403 -0.0521 0.5262 3.2703
##
## Random effects:
## Groups Name Variance Std.Dev.
## pid:group (Intercept) 12.30 3.507
## group (Intercept) 0.00 0.000
## Residual 16.12 4.015
## Number of obs: 13462, groups: pid:group, 7505; group, 13
##
## Fixed effects:
## Estimate Std. Error df t value
## (Intercept) 1.545e+01 1.347e-01 1.151e+04 114.716
## timeWeek 4 -2.997e+00 1.520e-01 6.715e+03 -19.718
## passive_vs_allactive -1.124e-02 1.506e-01 1.151e+04 -0.075
## timeWeek 4:passive_vs_allactive -3.560e-01 1.702e-01 6.721e+03 -2.092
## Pr(>|t|)
## (Intercept) <2e-16 ***
## timeWeek 4 <2e-16 ***
## passive_vs_allactive 0.9405
```

```
## timeWeek 4:passive_vs_allactive    0.0365 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##          (Intr) timWk4 pssv__
## timeWeek 4  -0.482
## pssv_vs_llc -0.894  0.431
## tmW4:pssv__  0.431 -0.893 -0.482
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
add_cohens_d(ipw_m1_phq9_all_vs_passive, 'Predicting: change in depressive symptoms')
```

Table 60: Predicting: change in depressive symptoms

term	estimate	p.value	cohens_d	cohens_d_2.5	cohens_d_97.5
(Intercept)	15.453	0.00e+00	NA	NA	NA
timeWeek 4	-2.997	3.48e-84	-0.56	-0.62	-0.51
passive_vs_allactive	-0.011	0.941	0.00	-0.06	0.05
timeWeek 4:passive_vs_allactive	-0.356	0.036	-0.07	-0.13	0.00
sd__(Intercept)	3.507	NA	NA	NA	NA
sd__(Intercept)	0.000	NA	NA	NA	NA
sd__Observation	4.015	NA	NA	NA	NA

Participant Characteristics

```
##Summary statistics for outcomes at their first measurement timepoint (baseline or post-test)##
mega_alltimes %>% filter(time=='Baseline') %>% #baseline ones
  select(ends_with('score'), -CEQ_score) %>%
  get_summary_stats(type = "common") %>% bind_rows(
  mega_alltimes %>% filter(time=='Post-test') %>% #post-test ones
    select(CEQ_score, star_rating_1, aha, aha_significant, aha_howchanged) %>%
    get_summary_stats(type = "common"))
```

```
## # A tibble: 10 x 10
##   variable          n    min    max median   iqr  mean    sd    se    ci
##   <fct>          <dbl> <dbl> <dbl>   <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1 phq9_score      7505     0    27     15     6 15.4   4.62  0.053 0.104
## 2 fats_score      7505     0    48     16    12 17.4   9.05  0.104 0.205
## 3 readiness_score 7505     2     8      5     2  5.21  1.27  0.015 0.029
## 4 hopeless_score  7505     0    12      7     4  7.08  2.7   0.031 0.061
## 5 agency_score    7505     3    24     15     6 14.4   4.52  0.052 0.102
## 6 dep_expectancies_sc~ 7505     3    15      9     3  8.75  2.29  0.026 0.052
```

## 7	CEQ_score	7342	4	56	29	16	28.3	11.4	0.133	0.26
## 8	star_rating_1	7337	1	5	4	2	4.05	1.01	0.012	0.023
## 9	aha	7344	0	1	0	1	0.337	0.473	0.006	0.011
## 10	aha_significant	2477	1	5	3	1	3.16	0.902	0.018	0.036

```

load('demogs_before_impute.Rdata')
demog_notimputed_filtered <- demog_notimputed %>%
  left_join(mega_alltimes_complete %>%filter(time=='Baseline') %>% select(pid,ip_gender_race_age_same_
group_by(IP_address_id, time) %>%
arrange(StartDate, .by_group = TRUE) %>%
filter( ip_gender_race_age_same_at_bl==0 |
(ip_gender_race_age_same_at_bl==1 & row_number() == 1 )) %>%
ungroup())

#Baseline demographics of sample
#need to use the data before we imputed missing values
chars <- demog_notimputed_filtered %>%
  mutate(Race=ifelse(str_detect(Race,'not listed'),'Other',Race)) %>%
  add_count(Race,name='race_count') %>%
  add_count(Ethnicity,name='ethnicity_count') %>%
  add_count(Gender,name='gender_count') %>%
  add_count(`Political Party`,name='political_count') %>%
  add_count(`Relationship/Marital Status`,name='relation_count') %>%
  add_count(`Employment Status`,name='employment_count') %>%
  add_count(disability,name='disability_count') %>%
  mutate(Race=fct_relevel(fct_reorder(factor(Race),race_count,.desc=T),
    "Other", after = Inf),
    Ethnicity=fct_relevel(fct_reorder(factor(Ethnicity),
    ethnicity_count,.desc=T),
    "Other", after = Inf),
    Gender=fct_reorder(factor(Gender),gender_count,.desc=T),
    `Political Party`=fct_reorder(
    factor(`Political Party`),political_count,.desc=T),
    `Relationship/Marital Status`=fct_reorder(
    factor(`Relationship/Marital Status`),relation_count,.desc=T),
    `Employment Status`=fct_reorder(
    factor(`Employment Status`),employment_count,.desc=T),
    disability=fct_reorder(factor(disability),
    disability_count,.desc=T)) %>%
  select(Age,Race,Ethnicity, Gender,
    'Disability or Health Condition'=disability,Education,
    `Political Party`,`Relationship/Marital Status`,`Employment Status`,
    `Household Income`,`Social Ladder (1-10)'=`Social ladder`) %>%
  tbl_summary(statistic = list(
    'Age' ~ "{mean} ({sd})", 'Social Ladder (1-10)' ~ "{mean} ({sd})",
    digits = list('Age' ~ c(2,2), 'Social Ladder (1-10)' ~c(2,2)),missing='no')

times_chars <- chars %>%
  as_gt() %>%
  gt::tab_options(table.font.names = "Times New Roman")
#gt::gtsave(times_chars,"baseline_characteristics_mega_final.docx")

help_received_past_month_df <- mega_alltimes %>% filter(!is.na(help4mental)) %>%

```

```

filter(time=='Baseline') %>%
mutate(item = str_split(help4mental, ",")) %>%
unnest(item) %>%
count(item, sort = TRUE) %>%
mutate(`Percent Who Endorsed`=
      (n/nrow(mega_alltimes %>% filter(time=='Baseline'))*100))

#received any formal support
mega_alltimes %>%
  filter(time=='Baseline') %>%
  count(str_detect(help4mental,'not accessed')&str_detect(help4mental,',',negate=T)) %>% mutate(n/sum(n))

```

```

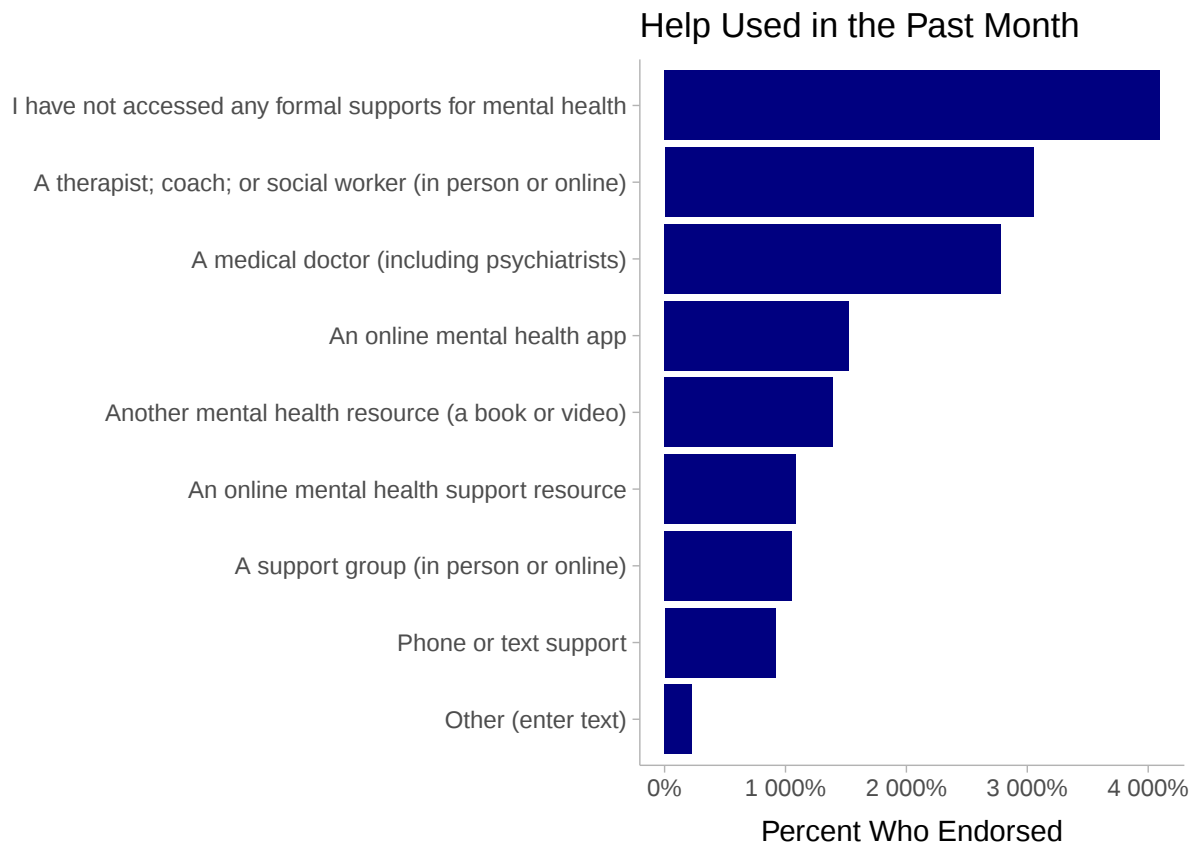
## # A tibble: 3 x 3
##   '&...'      n 'n/sum(n)'
##   <lgl>   <int>     <dbl>
## 1 FALSE   4475     0.596
## 2 TRUE    3026     0.403
## 3 NA        4     0.000533

```

```

ggplot(help_received_past_month_df,
      aes(x = reorder(item, n), y = `Percent Who Endorsed`)) +
  geom_col(fill = "navy") + coord_flip() +
  scale_y_continuous(labels=scales::percent) +
  labs( title = "Help Used in the Past Month", x = "" )

```



```

#creating plots of well-being outcomes at baseline

# Histogram plotting function with auto bins and smart x limits
plot_histogram_with_median <- function(data, variable, label, fill_color) {
  x <- data[[variable]]
  ggplot(data, aes_string(variable)) +
    geom_histogram(fill = fill_color, alpha = 0.7, color = "white", bins = nclass.FD(x), na.rm = TRUE) +
    xlab(label) +
    ylab(NULL) +
    geom_vline(xintercept = median(x, na.rm = TRUE),
               color = 'forestgreen', linewidth = 1, linetype = 'twodash', alpha = 0.7) +
    scale_x_continuous(limits = range(x, na.rm = TRUE) + c(-0.5, 0.5)) +
    theme(axis.title.x = element_text(margin = grid::unit(c(10, 0, 0, 0), "pt"))))
}

# Define the outcome variables and their labels
outcomes <- list(
  list(variable = 'phq9_score', label = 'Depressive Symptoms'),
  list(variable = 'agency_score', label = 'Agency'),
  list(variable = 'hopeless_score', label = 'Hopelessness'),
  list(variable = 'fats_score', label = 'Positive Actions and Thinking'),
  list(variable = 'dep_expectancies_score', label = 'Depression Change Expectancies'),
  list(variable = 'readiness_score', label = 'Readiness for Change')
)

# Filter for baseline data
baseline_data <- mega_alltimes%>% filter(time == 'Baseline') # update if needed

# Use a colorful but distinct palette
colors <- viridis(length(outcomes), option = "plasma")

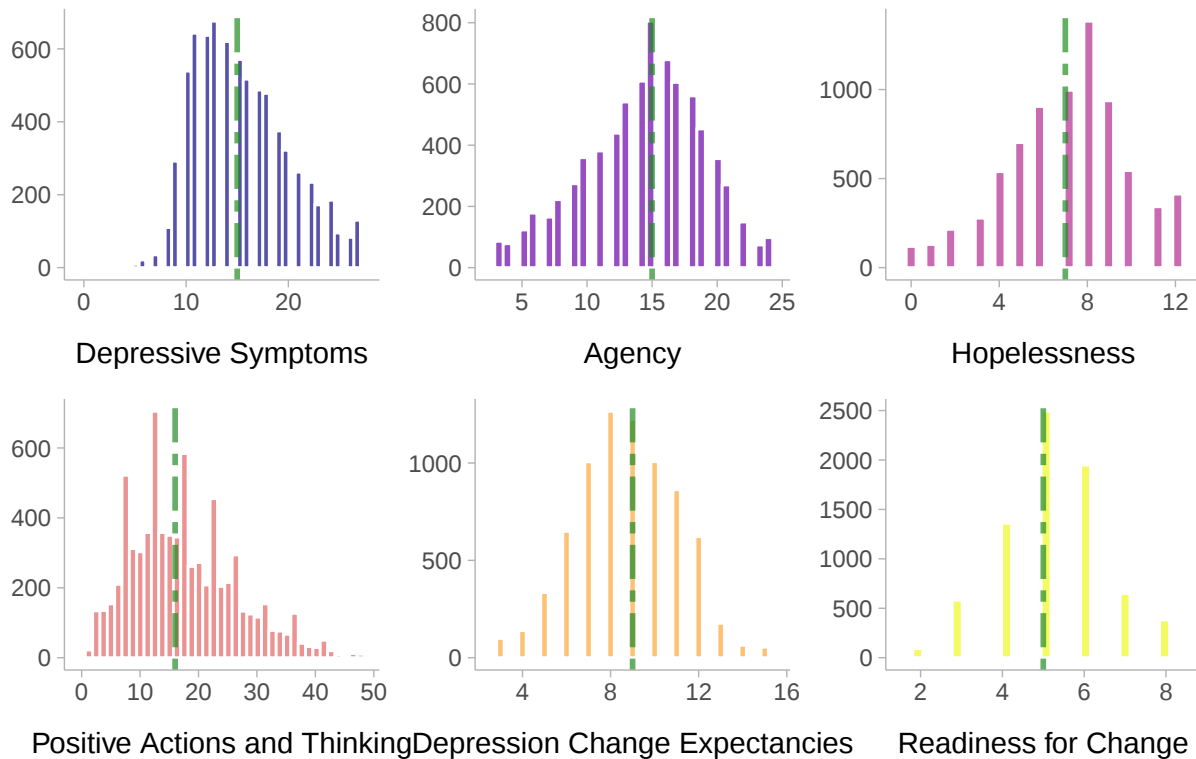
# Generate the plots
plots <- lapply(seq_along(outcomes), function(i) {
  outcome <- outcomes[[i]]
  plot_histogram_with_median(baseline_data, outcome$variable, outcome$label, colors[i])
})

# Combine and title the plots
combined_plot <- wrap_plots(plots) +
  plot_annotation(title = "Outcomes at Baseline",
                  theme = theme(plot.title = element_text(hjust = 0.5, size = 16)))

# Show or save
combined_plot

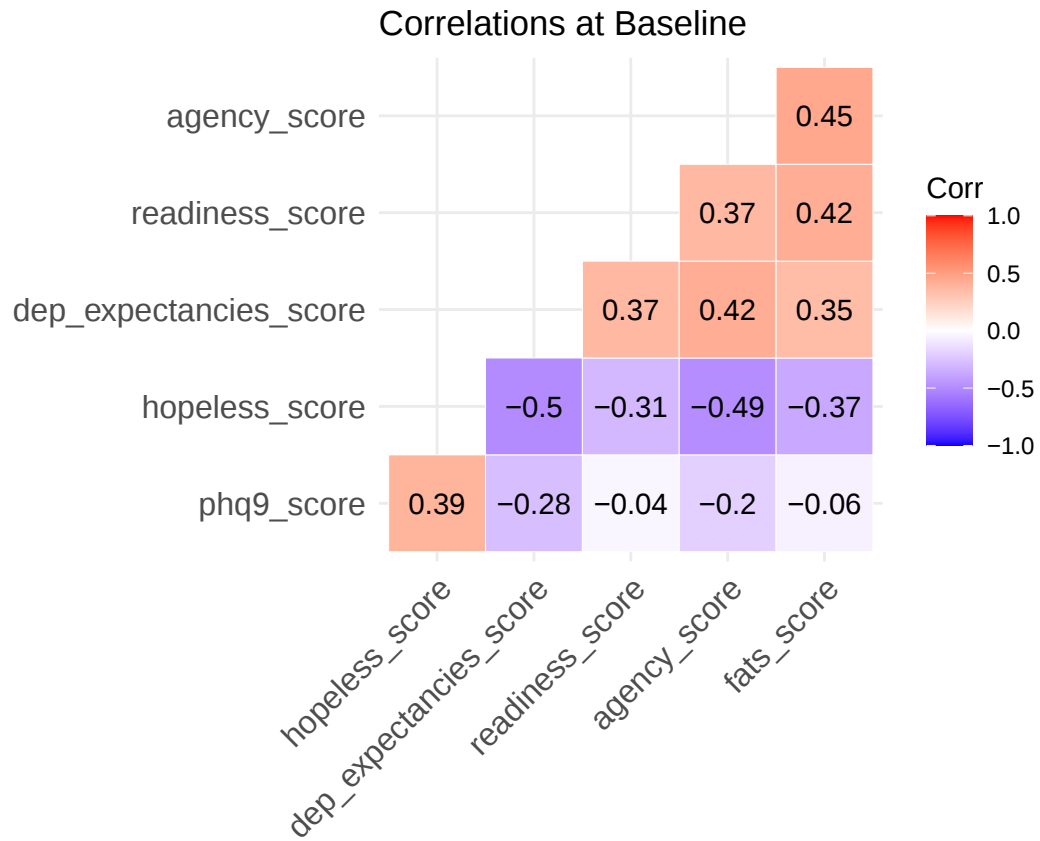
```

Outcomes at Baseline



```
# ggsave("~/megastudy stuff/mega_figures/outcome_dists.png", combined_plot, width = 12, height = 8)

#Correlations between outcomes at baseline
corr <- round(cor(mega_alltimes %>% filter(time=='Baseline') %>% select(
  phq9_score,agency_score,hopeless_score,fats_score,
  dep_expectancies_score,readiness_score)), 2)
ggcorrplot(corr, hc.order = TRUE, type = "lower",
  outline.col = "white",lab=T,title = 'Correlations at Baseline')
```



Thanks for reading :)