

# Testing the Preliminary Efficacy of a Mindfulness-Based Smartphone App Intervention for Nurses Traumatized from the COVID-19 Pandemic

*Presented by:*

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# Disclosure Statement

- The author/presenter declares NO conflict of interest.



# Acknowledgement

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  - MW CTR-IN BERD Core
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- Mentor: Jillian Inouye (University of Hawaii)
- Mentor: Lorraine Evangelista (Associate Dean for Research, UNLV School of Nursing)



# Purpose of the Study

- To explore the feasibility and acceptability of the mindfulness-based smartphone app intervention among frontline nurses who had been traumatized by the COVID-19 pandemic.





# Background

- The pandemic: increase in secondary behavioral and psychological problems among nurses (Preti et al., 2020)
- Up to 42% of nurses in hospitals developed PTSD (Blekas et al., 2020; Chen et al., 2021).



# Background

- Frontline nurses were repeatedly exposed to exacerbating factors of PTSD (Leng et al., 2020; Wang et al., 2020)
- Higher prevalence of nurses developing delayed-onset of PTSD, even months and years after the pandemic (Benfante et al., 2020).



# Background

- Mindfulness interventions have positive effects in alleviating PTSD symptoms (Meyer et al., 2018; Reyes et al., 2020)
- Nurses are increasingly accessing online resources for self-help with the adverse psychological effects of the pandemic (Blake et al., 2020; Kang et al., 2020; Maben & Bridges, 2020).



# Methods

- Two phases:
  - **Phase 1**
    - Refinement of the app
    - Single-arm feasibility study, explorative, qualitative (n=4)
  - **Phase 2**
    - Implementation of the refined app
      - n=30 (intervention); n=30 (control group)
    - Randomized controlled trial design
    - Six-week intervention study
    - Measures compared at pre-intervention, mid-intervention, post-intervention, and one-month follow-up



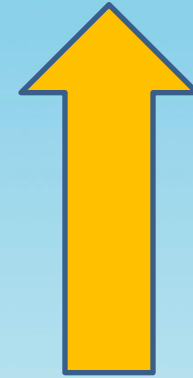


# Methods

- Measures
  - PTSD symptom severity
  - Resilience
  - Mindfulness
  - Rumination
  - Experiential avoidance



# Measures



- Resilience (Connor & Davidson, 2003)
  - I am able to adapt to change
  - I know where to turn for help
  - I can handle unpleasant feelings
  - Sometimes fate or God can help
  - I see the humorous side of things

**CD-RISC: 25 items**  
**Total scores range from 0 to 100**  
**Higher score means more resilient**



# Measures



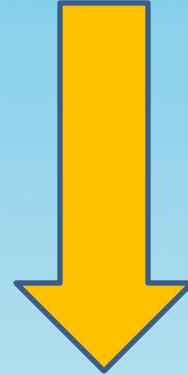
- Mindfulness (Brown & Ryan, 2003)
  - I drive to places on “automatic pilot” and then wonder why I went there
  - I find myself doing things without paying attention
  - I snack without being aware that I’m eating

**MAAS: 20 items**  
**Mean scores range from 1 to 6**  
**Higher score means more mindfulness traits**



# Measures

- Experiential avoidance (Bond et al., 2011)
  - I'm afraid of my feelings
  - I worry about not being able to control my worries and feelings
  - My painful memories prevent me from having a fulfilling life



**AAQ: 7 items**

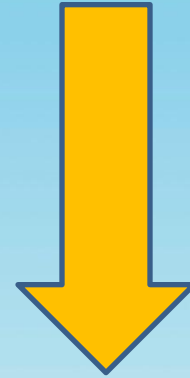
**Scores range from 7 to 49**

**Higher score means more use of experiential avoidance**





# Measures



- Rumination (Treyner et al., 2003)
  - How often do you...
    - Think “Why can’t I handle things better?”
    - Think “Why can’t I get going?”
    - Think about all your shortcomings, failings, faults, mistakes

**RSS: 22 items**

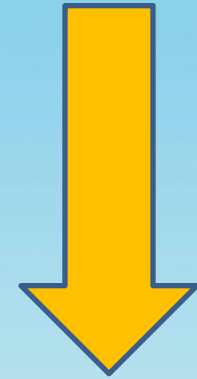
**Scores range from 22 to 48**

**Higher score means more use of ruminative coping**



# Measures

- PTSD symptom severity (Weathers et al., 2013)
  - Re-experiencing symptoms
  - Avoidance symptoms
  - Negative symptoms
  - Arousal symptoms



**PCL-5: 20 items**

**Total scores range from 0 to 80**

**Higher score means more severe PTSD**



# Additional Measures

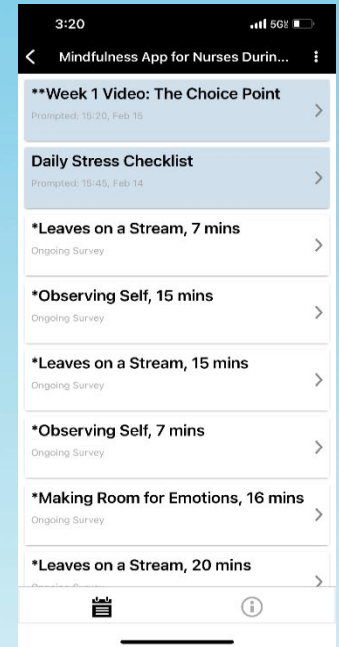
- Intervention Satisfaction Scale [\(Levin et al., 2015\)](#)
  - 8 items
  - Overall satisfaction, perceived helpfulness, comprehension, intention to use, and perceived fit
- System Usability Scale [\(Tullis & Albert, 2008\)](#)
  - 10 items



# Methods

- **Intervention Group**

- Mindfulness app, software (MetricWire)
- Six-week intervention
- Based on the principles of Acceptance and Commitment Therapy (Hayes, 2016)
- Audio-guided mindfulness meditations
- Weekly videos with writing reflections from the videos
- Daily stress checklist, abbreviated PTSD Checklist (Price et al., 2016)
- Weekly follow-up call
- Daily push notifications





# Methods

- **Control Group**

- Wait-list control group
- Access to the mindfulness app at Week 10
- Daily stress checklist, abbreviated PTSD Checklist through a MetricWire app (Price et al., 2016)



# Procedures

- Recruitment: Facebook ads throughout the U.S.
  - Screening using PTSD Checklist for DSM-5 or PCL-5  
(Weathers et al., 2013)
  - Zoom orientation to the study
  - Convenience sampling
- Stratified random assignment ([randomizer.org](https://randomizer.org))



# Methods

- Data Collection and Analysis
  - Qualtrics-based survey
    - baseline, mid-intervention, post-intervention, and one-month follow-up
  - Post-intervention semi-structured interviews



# Results

- **Intervention (n=30)**

- Mean age: 36.4 years (SD=8.22)
- Gender:
  - Male: n=10
  - Female: n=20
- Race/Ethnicity
  - NH White: n=14
  - NH African/American: n=14
  - Asian: n=1
  - Hispanic: n=1

- **Control (n=30)**

- Mean age: 34.3 years (SD=8.54)
- Gender:
  - Male: n=10
  - Female: n=20
- Race/Ethnicity
  - NH White: n=15
  - NH African/American: n=13
  - Asian: n=1
  - Hispanic: n=1



# Results

- **Intervention (n=30)**

- Employment:

- Full-time: n=28
- Part-time: n=1
- Unemployed: n=1

- Registration Status

- Registered Nurse:  
n=26
- Licensed Practical Nurse:  
n=4

- **Control (n=30)**

- Employment:

- Full-time: n=26
- Part-time: n=3
- Unemployed: n=1

- Registration Status

- Registered Nurse:  
n=25
- Licensed Practical Nurse:  
n=5



# Results

- **Intervention (n=30)**

- Marital Status:

- Married: n=21
- In a committed relationship but not married: n=4
- Single: n=4
- Separated/Divorced: n=1

- **Control (n=30)**

- Marital Status:

- Married: n=21
- In a committed relationship but not married: n=3
- Single: n=5
- Separated/Divorced: n=1



# Results: Area of Work

- **Intervention (n=30)**

- ICU: n=8
- Medical-Surgical: n=7
- Pediatric: n=4
- Home Health: n=2
- Long Term Care: n=2
- Psychiatric: n=2
- Emergency: n=1
- Oncology: n=1
- Perioperative: n=1
- Progressive Care: n=1
- School Nurse: n=1

- **Control (n=30)**

- ICU: n=11
- Medical-Surgical: n=5
- Pediatric: n=5
- Psychiatric: n=3
- Emergency: n=2
- Hospice: n=1
- Oncology: n=1
- Perioperative: n=1
- Progressive Care: n=1



# Results: Geographical Area

- **Intervention (n=30)**

- Pacific: n=5
- Mountain: n=1
- Central: n=12
- Eastern: n=12

- **Control (n=30)**

- Pacific: n=8
- Mountain: n=1
- Central: n=5
- Eastern: n=16

Pacific **(CA, WA)**

Mountain **(ID)**

Central **(AL, IL, MS, MO, OK, TN, TX)**

Eastern **(FL, GA, IN, NJ, NY, OH, PA)**

Pacific **(CA, OR)**

Mountain **(MT)**

Central **(IA, KS, OK, TX)**

Eastern **(FL, GA, KY, MD, NY, NC, PA)**





# Intervention Satisfaction

*1=Strongly Disagree TO 6=Strongly Agree*

- Overall satisfaction with quality of app: **5.57**
- App was helpful: **5.70**
- App was easy to use: **5.73**
- App was made for someone like me: **5.70**
- Would like to use the app in the future: **5.73**
- Would be helpful for nurses who are distressed: **5.83**
- Would recommend to nurses who are distressed: **5.77**
- Would recommend to nurses in general: **5.80**



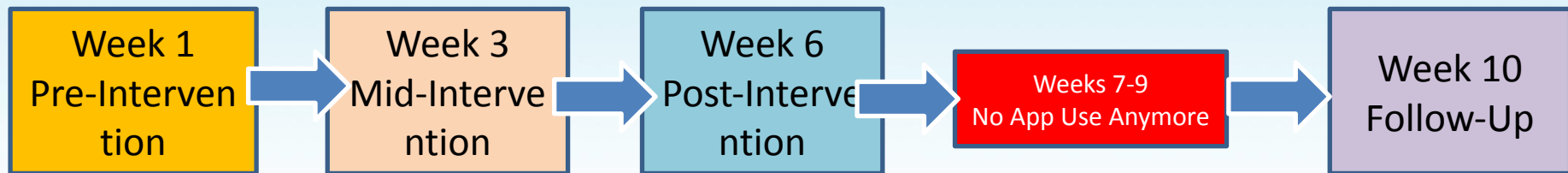
# System Usability Scale

- **SUS: 92.25**



# Data Analysis: Repeated Measures ANOVA

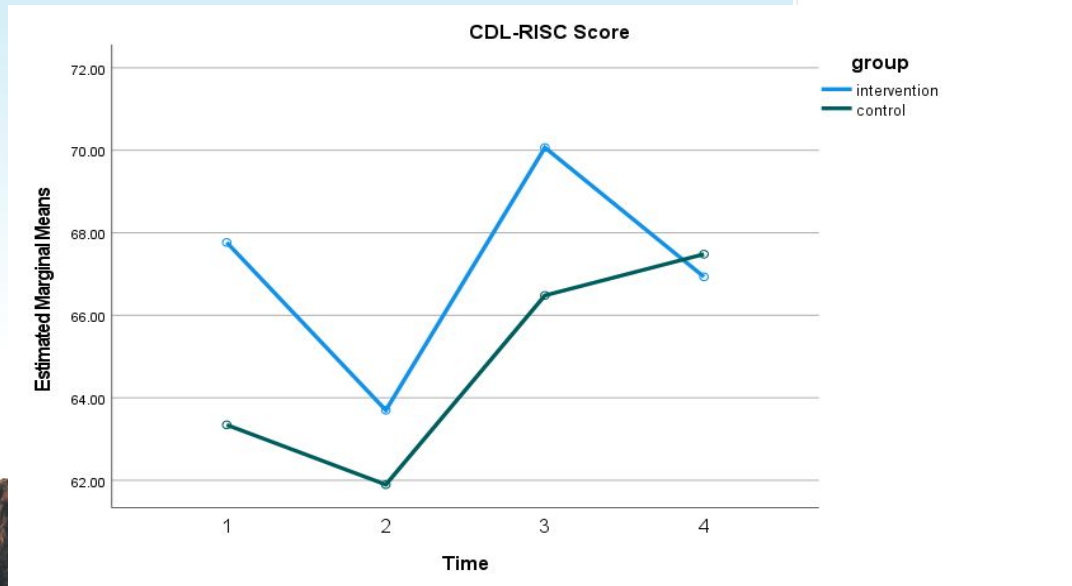
## Intervention Group



## Control Group

# Results: Resilience (CD-RISC)

Descriptive Statistics			
group		Mean	Std. Deviation
Time 1w: CDR-RISC Score	intervention	67.7667	13.61714
	control	63.3448	16.98166
Time 3w: CRD-RISC Score	intervention	63.7000	11.52853
	control	61.8966	15.97173
Time 6w: CRD-RISC Score	intervention	70.0667	11.72070
	control	66.4828	13.99903
Time 10w: CDR-RISC Score	intervention	66.9333	14.62858
	control	67.4828	15.47953

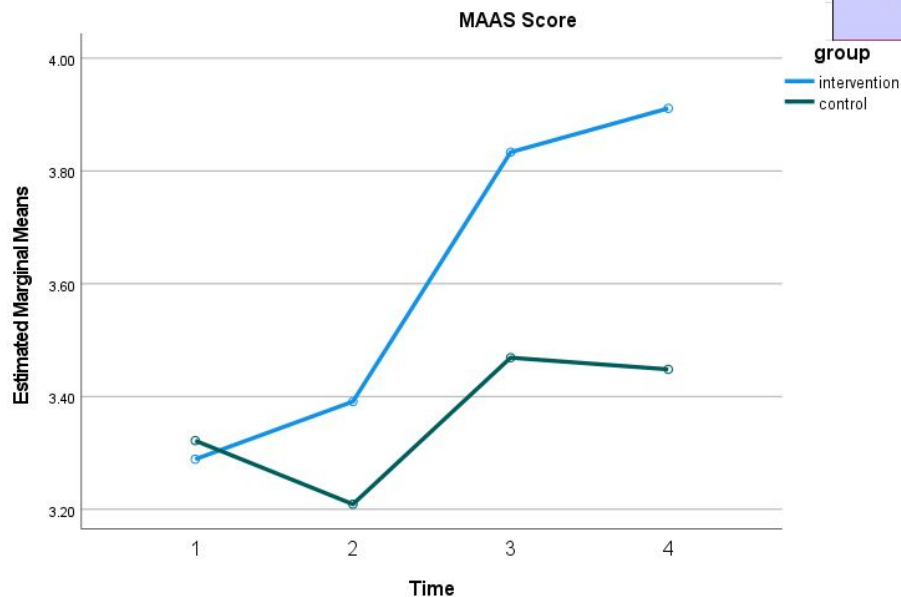




# Results: Mindfulness (MAAS)

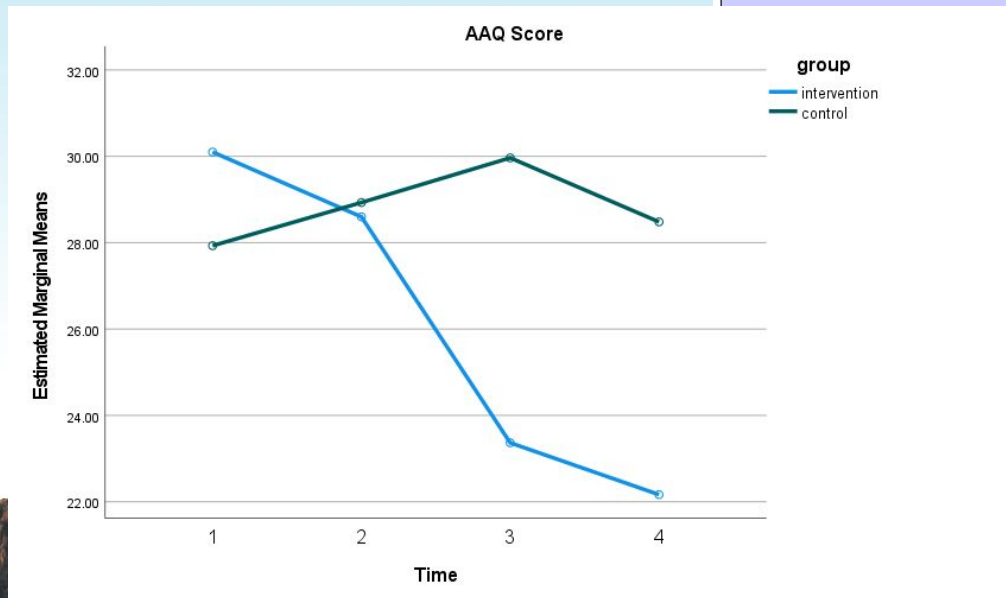
**Descriptive Statistics**

group		Mean	Std. Deviation
Time 1w: MAAS Score	intervention	3.2889	1.12299
	control	3.3218	0.72069
Time 3w: MAAS Score	intervention	3.3911	0.91806
	control	3.2092	0.73952
Time 6w: MAAS Score	intervention	3.8333	0.97364
	control	3.4690	0.72539
Time 10w: MAAS Score	intervention	3.9111	1.13669
	control	3.4483	0.81395



# Results: Experiential Avoidance (AAQ)

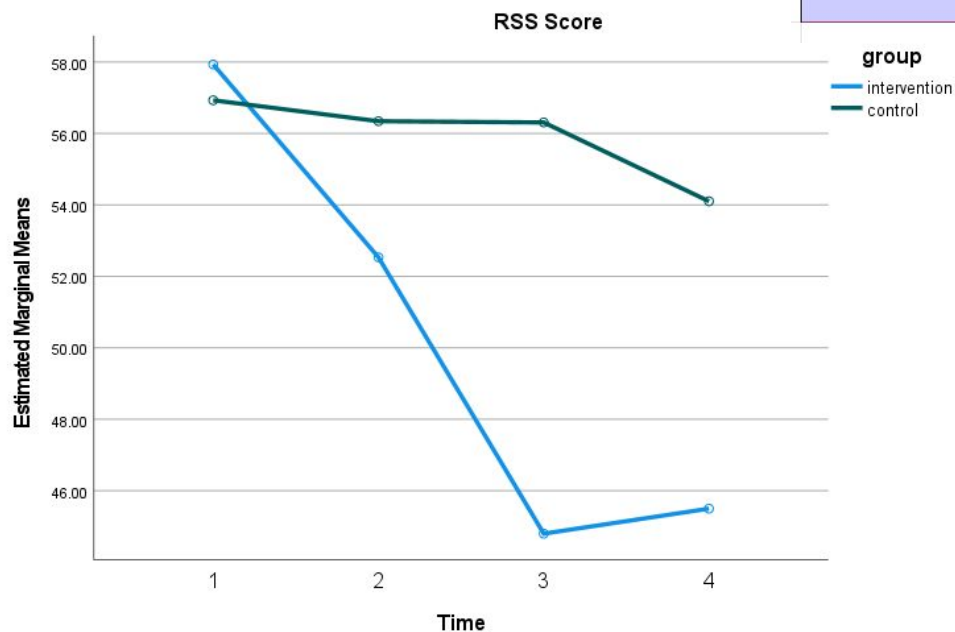
Descriptive Statistics			
group		Mean	Std. Deviation
Time 1w: AAQ Score	intervention	30.1000	7.22233
	control	27.9310	10.12046
Time 3w: AAQ Score	intervention	28.6000	7.46301
	control	28.9310	6.72379
Time 6w: AAQ Score	intervention	23.3667	7.85859
	control	29.9655	7.39924
Time 10w: AAQ Score	intervention	22.1667	7.46062
	control	28.4828	7.86775



# Results: Rumination (RSS)

**Descriptive Statistics**

group		Mean	Std. Deviation
Time 1w: RSS Score	intervention	57.9333	12.06000
	control	56.9310	11.65250
Time 3w: RSS Score	intervention	52.5333	8.88134
	control	56.3448	11.13321
Time 6w: RSS Score	intervention	44.8000	11.82750
	control	56.3103	11.10696
Time 10w: RSS Score	intervention	45.5000	11.34035
	control	54.1034	9.49942



# Results: PTSD Symptoms (PCL-5)

Descriptive Statistics			
group		Mean	Std. Deviation
Time 1w: PCL-5 Score	intervention	57.7667	13.17700
	control	54.6552	12.02758
Time 3w: PCL-5 Score	intervention	33.2000	13.00504
	control	41.2069	15.90009
Time 6w: PCL-5 Score	intervention	20.2000	12.28793
	control	43.1379	15.48438
Time 10w: PCL-5 Score	intervention	23.2000	13.66193
	control	39.8966	16.11198





# Resilience (CD-RISC):

## Tests of Within Subjects Contrasts

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Level 1 vs. Level 2	448.486	1	448.486	2.294	0.135	0.039
	Level 2 vs. Level 3	1768.982	1	1768.982	13.674	0.000	0.193
	Level 3 vs. Level 4	67.110	1	67.110	0.317	0.576	0.006
Time * group	Level 1 vs. Level 2	101.097	1	101.097	0.517	0.475	0.009
	Level 2 vs. Level 3	46.745	1	46.745	0.361	0.550	0.006
	Level 3 vs. Level 4	251.923	1	251.923	1.189	0.280	0.020
Error(Time)	Level 1 vs. Level 2	11145.039	57	195.527			
	Level 2 vs. Level 3	7374.001	57	129.368			
	Level 3 vs. Level 4	12081.467	57	211.956			

# Mindfulness (MAAS):

## Tests of Within Subjects Contrasts

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Level 1 vs. Level 2	0.002	1	0.002	0.002	0.961	0.000
	Level 2 vs. Level 3	7.267	1	7.267	12.980	0.001	0.185
	Level 3 vs. Level 4	0.048	1	0.048	0.051	0.823	0.001
Time * group	Level 1 vs. Level 2	0.681	1	0.681	1.016	0.318	0.018
	Level 2 vs. Level 3	0.491	1	0.491	0.877	0.353	0.015
	Level 3 vs. Level 4	0.143	1	0.143	0.151	0.699	0.003
Error(Time)	Level 1 vs. Level 2	38.176	57	0.670			
	Level 2 vs. Level 3	31.910	57	0.560			
	Level 3 vs. Level 4	54.019	57	0.948			

# Experiential Avoidance (AAQ): Tests of Within Subjects Contrasts

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Level 1 vs. Level 2	3.686	1	3.686	0.050	0.824	0.001
	Level 2 vs. Level 3	259.973	1	259.973	5.023	0.029	0.081
	Level 3 vs. Level 4	106.128	1	106.128	1.807	0.184	0.031
Time * group	Level 1 vs. Level 2	92.161	1	92.161	1.254	0.268	0.022
	Level 2 vs. Level 3	579.295	1	579.295	11.192	0.001	0.164
	Level 3 vs. Level 4	1.179	1	1.179	0.020	0.888	0.000
Error(Time)	Level 1 vs. Level 2	4189.500	57	73.500			
	Level 2 vs. Level 3	2950.332	57	51.760			
	Level 3 vs. Level 4	3348.041	57	58.738			



# Rumination (RSS):

## Tests of Within Subjects Contrasts

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Level 1 vs. Level 2	528.410	1	528.410	5.609	0.021	0.090
	Level 2 vs. Level 3	889.744	1	889.744	9.978	0.003	0.149
	Level 3 vs. Level 4	33.484	1	33.484	0.294	0.590	0.005
Time * group	Level 1 vs. Level 2	341.698	1	341.698	3.627	0.062	0.060
	Level 2 vs. Level 3	874.015	1	874.015	9.801	0.003	0.147
	Level 3 vs. Level 4	124.602	1	124.602	1.094	0.300	0.019
Error(Time)	Level 1 vs. Level 2	5370.234	57	94.215			
	Level 2 vs. Level 3	5082.832	57	89.172			
	Level 3 vs. Level 4	6493.059	57	113.913			



# PTSD Symptoms (PCL-5): Tests of Within Subjects Contrasts

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Level 1 vs. Level 2	21309.630	1	21309.630	117.102	0.000	0.673
	Level 2 vs. Level 3	1806.680	1	1806.680	10.667	0.002	0.158
	Level 3 vs. Level 4	0.859	1	0.859	0.005	0.946	0.000
Time * group	Level 1 vs. Level 2	1822.851	1	1822.851	10.017	0.002	0.149
	Level 2 vs. Level 3	3287.358	1	3287.358	19.410	0.000	0.254
	Level 3 vs. Level 4	574.418	1	574.418	3.103	0.084	0.052
Error(Time)	Level 1 vs. Level 2	10372.539	57	181.974			
	Level 2 vs. Level 3	9653.862	57	169.366			
	Level 3 vs. Level 4	10551.310	57	185.111			

# Summary of Results

- PTSD symptom severity
  - Overall significant difference between intervention and control
- Rumination
  - Overall significant difference between intervention and control
- Experiential avoidance
  - Significant difference at post-intervention
- Mindfulness
  - No significant overall group difference
- Resilience
  - No significant overall group difference



# Limitations of the Study

- Convenience sampling
- Small sample



# Implications of Findings

- High intervention satisfaction and usability ratings
- The app significantly reduced rumination and PTSD symptom severity at mid- and post-intervention
- The app significantly reduced experiential avoidance at post-intervention only





# Implications of Findings

- Results imply that continued use of the mindfulness app effectively improves trauma-related constructs such as experiential avoidance, rumination, and PTSD symptom severity.



# Implications of Findings

- Offer a comprehensive framework for developing and implementing self-help programs for COVID-related posttraumatic stress.



# Recommendations for Future Research

- Large randomized controlled trial study on the mindfulness app intervention
- Mindfulness measure: Five Facet Mindfulness Questionnaire [\(Baer et al., 2006\)](#)
- Pragmatic trials



# Thank you.

## Questions/Comments?

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