



# Evaluating Meditation Program using JMP SEM Platform

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## P&G priorities

Protecting the health and wellbeing of P&G people is our priority during these trying times.

We have a strong focus on doing what it takes to take care of employees' physical and mental health while they serve our customers and consumers and support the communities in which we live.

P&G has both internal and external programs in place that can improve employee wellbeing – physical, mental, emotional, social, aspects to a person's health.





# Adapting our support

During the pandemic, we had to alter how we work and offer support to individuals and departments.

- Employee needs vary by location, role and personal situation.
- All our in-person stress & resiliency workshops and meditation classes offered at a physical site were **switched to live-streaming with global audiences in all time zones.**

We asked: How effective is each program? **Does the content and new format - global livestreaming - impact top mental & emotional health domains?**



# 'Meditation Without Expectations'

LIVE-STREAMING 8-WEEK GLOBAL COURSES (45 MIN X 8 SESSIONS)

- **Highly experiential** training designed for participants to learn science-based practices that increase long term mental, emotional, social wellbeing. Goal is to become more self-sufficient with personal mindfulness, resiliency, empathy, and stress reduction skills.
- Course offers 8 practices to increase awareness, reduce stress, improve joy through **Insight / Self-observance Discipline, and Compassion**. Selected approaches include:
  - Being here: 5 senses, body scan, and 20+ senses
  - Introspection and gratitude: Reward-based learning and Naikan
  - Dealing with distractions: counting and mantra
  - Metta (loving kindness)
  - Tonglen (giving and receiving)
  - Choiceless awareness (not doing)
- ~1100 people registered in 2021. ~50% completed courses. Statistics demo from one of the offerings.



# Domains, latent variables

We surveyed participants' attitudes and behaviors before and after the course using 45 medical-based standard questions. Additional questions for region, gender, time and level in company, and open comments. Surveys are voluntary and anonymous.

1. **Five Facet Mindfulness Questionnaire (FFMQ)** - Observation, Description, Acting with awareness, Non-judgment, Non-reactivity
2. **Interpersonal Reactivity Index (IRI)** – Perspective Taking, Empathetic Concern
3. **Brief Resilience Scale (BRS)**
4. **Perceived Stress Scale (PSS)** – widely used, assesses the stressfulness of situations and the effectiveness of stress-reducing interventions. The standard statements tap into how unpredictable, uncontrollable, and overloaded respondents find their lives, and their perceived level of helplessness and self-efficacy. Two of the three subscales in our survey:
  - **Overloaded** – past capacity, filled to excess so that function is impaired; implies feeling overwhelmed, and is associated with symptoms of hypersensitivity to stimuli like fatigue/shutting down, worry, difficulty concentrating, sleeplessness, panic, and more.
  - **Uncontrollable** – incapable of being managed or corrected, implying turbulence, disorder, or threat.





## Stress is a top risk

An increasing number of organizations are developing integrated wellbeing programs to respond to announcements over the past decade, such as by the World Health Organization (WHO) which identify **chronic or unresolved stress** as the top lifestyle risk factor, exceeding obesity and lack of physical activity, contributing to physical and mental chronic illnesses worldwide.



# Summary of Results

## MEDITATION WITHOUT EXPECTATIONS, 8 WEEK LIVE-STREAMING COURSE

- Simple means from the pilots (January-May 2021) indicated that in just 8-weeks of practice - in class and on their own a few times a week - participants had notable increases in Mindfulness, Empathy, Resiliency, and clear reductions in Stress.
  - This is worth a deeper investigation.
- A sample of paired pre- and post- survey responses identified significant changes at the indicator level in all domains.
- We will demonstrate JMP functionality for Stress domain for one sample (n=51 paired pre- & post-),
- After establishing longitudinal measurement invariance, we saw statistically significant improvement in the two sub-domains of overloaded and uncontrollable:

Means/Intercepts		Estimate	Std Error	Wald Z	Prob>  Z
1	Constant → Overloaded_Opt_Post	-0.95	0.19	-4.99	<.0001
2	Constant → Uncontrollable_Opt_Post	0.77	0.22	3.45	0.0006



# Psychometric Principles of Survey Instrument

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Two important concepts of reliability and validity of survey questionnaire items are discussed here



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Factor Model Modification & Questionnaire Optimization

Important Psychometric Ideas for Factor Model Evaluation

Classical Test Theory Ideas

- **Two Important Concepts:**
- **Reliability is concerned with consistency of measurement. Are items within a construct measuring the same thing?**

Empirical Measures of Reliability

- Reliability Coefficient

$$r_{kk} = \frac{k\bar{r}}{1 + (k-1)\bar{r}}$$

$k = \# \text{ items}$

Reliability of a Composite

If different measures have different reliabilities use Average Variance Extracted (AVE) from a Factor Model:

$$AVE = \frac{\sum_{i=1}^k \text{loading}_i^2}{\sum_{i=1}^k \text{loading}_i^2 + \sum_{i=1}^k \text{error variance}_{ii}}$$

- **Validity is concerned with whether a variable measures what it is supposed to measure**



# CFA of 'Meditation Without Expectations' Data

## JMP DEMONSTRATION

### Confirmatory Factor Analysis of Meditation Without Expectations Data

#### Vibrant Living Data from 8-week Mindfulness Program

- 8-week internal online program to build resiliency
- Used external validated instrument from UC College of Medicine. Four major dimensions were measured:
- Empathy (F1): Two 7-item subscale from IRI to measure Perspective Taking and Empathetic concern
- Stress (F2): A 10-item Perceived Stress Scale to measure two aspects of stress (Overloaded and Uncontrollable)
- Resiliency (F3): 6-item self reported measure assessing individual's ability to bounce back from stress
- Mindfulness (F4): A 15-item scale from the Five Facet Mindfulness Questionnaire measuring Observation, Description, Awareness, Non-judgement, Non-reactivity

**Key Question to answer: Is there improvement in mean scores on these underlying dimensions from the 8-week program?**

In this presentation, we are going to focus only on the Stress scale and its two sub-dimensions



# Longitudinal Measurement Invariance

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When data are measured over time (pre & post), we need to make sure that the latent variable structure (LV) is invariant over time. In other words, the LV and its indicators hold together, and the meaning of the LV has not changed over time. This is done using the steps of Longitudinal Measurement Invariance:

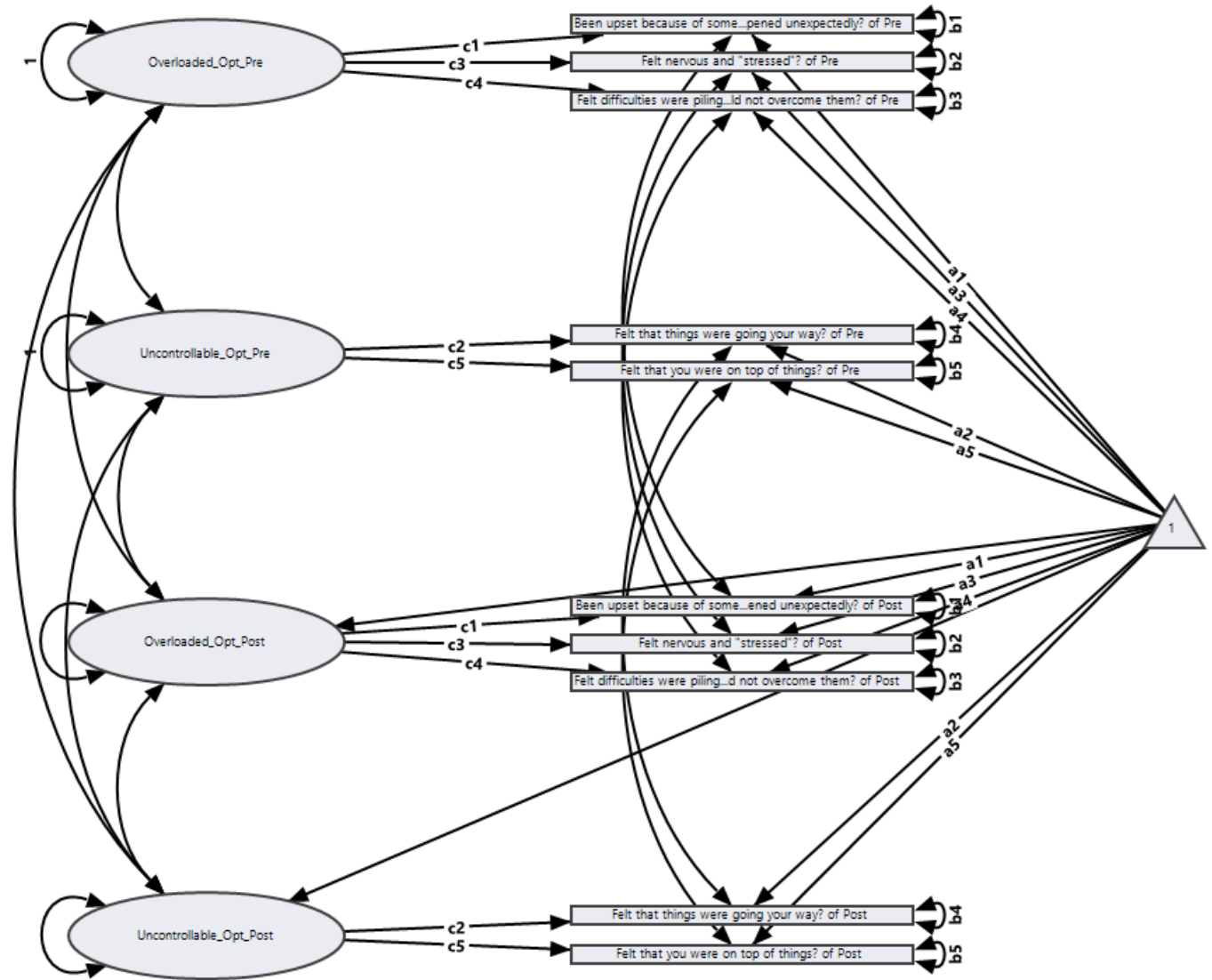
- Configural Model
- Weak Invariance Model
- Strong Invariance Model
- Strict Invariance Model



# CFA Model Structure with Indicators

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Two sub-domains of Overloaded and Uncontrollable are shown here with Pre and Post indicators





# Model Comparison

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Using the Stress scale, we met partial invariance since two of the three Chi-Square Difference test was supported by the data. Now, we can safely compare difference in LV means

Model Comparison																		
#	Show	Model Name	-2 Log Likelihood	Number of Parameters	AICc	AICc Weight	.2	.4	.6	.8	BIC	ChiSquare	DF	Prob>ChiSq	CFI	RMSEA	Lower 90%	Upper 90%
1	<input type="checkbox"/>	Unrestricted	4240.8446	65	.	.					4496.4132	0.0000	0	.	1.0000	0.0000	0.0000	0.0000
2	<input type="checkbox"/>	Independence	4466.7913	20	4534.7913	0.0000					4545.4279	225.9468	45	<.0001*	0.0000	0.2808	0.2450	0.3177
3	<input checked="" type="checkbox"/>	Model 3	4279.3418	41	4744.0085	0.0000					4440.5466	38.4972	24	0.0308*	0.9199	0.1088	0.0337	0.1703
4	<input checked="" type="checkbox"/>	Weak Invariance	4287.3979	38	4610.3979	0.0000					4436.8073	46.5533	27	0.0111*	0.8919	0.1192	0.0569	0.1757
5	<input checked="" type="checkbox"/>	Strong Invariance	4289.9304	35	4527.9304	0.0000					4427.5443	49.0858	30	0.0154*	0.8945	0.1117	0.0493	0.1664
6	<input checked="" type="checkbox"/>	Strict Invariance	4293.6665	30	4446.6665	1.0000					4411.6213	52.8219	35	0.0271*	0.9015	0.0999	0.0347	0.1524

Compare Selected Models Clear Selection

Chi-Square Difference Test								
Model nested...	...in model	ΔChiSquare	ΔDF	Prob>ChiSq	ΔCFI	ΔRMSEA		
Weak Invariance	Model 3	8.0561	3	0.0449*	-0.028	0.0103	<input checked="" type="checkbox"/>	
Strong Invariance	Weak Invariance	2.5325	3	0.4695	0.0026	-0.007	<input checked="" type="checkbox"/>	
Strict Invariance	Strong Invariance	3.7361	5	0.5880	0.0070	-0.012	<input checked="" type="checkbox"/>	

Difference tests are meaningful only for nested models





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everyday life.**



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# Author biographies

- **A Narayanan** is a multivariate data scientist in the Advanced Consumer Modeling and Statistics department at Procter & Gamble. His experience at P&G includes development of special webtools and JMP add-ins, to enhance productivity. His interests include classical and modern multivariate methods and has published several papers in technical journals.
- **Annie Weisbrod**, Ph.D. is a Principal Sustainability Scientist and leads the Vibrant Living Mind Wellness program at Procter & Gamble. She is a certified Health Coach, Reiki Master, advanced meditation and yoga teacher. She has taught >3000 people through corporate and public workshops on meditation, stress resiliency, communication, and behavior change.
- **Mark Bailey** is a Human Resources expert and co-leader of the Winton Hill site-wide Vibrant Living program at Procter & Gamble. With one of his passions being mental wellness, Mark assisted Annie with the facilitation of the global meditation program.

