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Longitudinal relationships between established and new ultra-brief measures of psychological flexibility, medication adherence and functioning in people with long-term health conditions.

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Disclosures

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Background/rationale

- **25-50% people LTCs non-adherent to medications, depends on measurement, regimen type/frequency**
  (Coleman et al., 2012)
- **Interventions suboptimal or worse still ineffective**
- **Increased risk of morbidity/mortality**
- **Adherence challenging to operationalise! Pragmatic subtypes: intentional/unintentional non-adherence**

Background/rationale contd.

- **Social cognitive models limited explanatory power** (Brandes & Mullan, 2014; Horne et al., 2013; Rich, Brandes, Mullan, & Hagger, 2015)

- **SCM informed interventions modest effects** (Binford, Kahana, & Altice, 2012; Chaiyachati et al., 2014; Conn, Ruppar, Enriquez, & Cooper, 2016).

- **Cognitive treatment targets too narrow, may overlook emotional, behavioural, motivational, wider socio-economic contextual processes** (Harrison, Graham & McCracken, 2017).

- **MBSR for ART in HIV review - mixed findings limited theory, no behavioural activation?** (Riley & Kalichman, 2015)

- **DBT adolescent diabetes - theory limited but shows promising efficacy** (Lois & Miller, 2018)

Why psychological inflexibility in non-adherence?

Unaware

Being overly influenced by, or entangled with, potentially unhelpful thoughts

Closed

Avoiding situations and trying to reduce or get rid of difficult emotional experience: thoughts, feelings, bodily sensations

Disengaged

Failing to clarify and pursue valued life directions and goals; persisting inflexibly or impulsively in potentially "unworkable" behaviour

- **Few studies evaluating PF in LTCs** (HIV: Harrison et al. in prep; Berghoff et al., 2018; diabetes: Kamody et al., 2017; influenza vaccination uptake chronic respiratory diseases: Cheung & Mak, 2016) – **Good case for PF, findings mixed…**
- **Few ACT trials – show promising efficacy** (Moitra, Herbert, & Forman, 2011; Nelson, Kenowitz, & Mulhall, 2014)
- **Few studies explore relationships between adherence and functioning**

Background/rationale contd.

- **Most PF studies cross-sectional group-level designs don't account for within-individual variability across contexts over time** (Hektner, Schmidt, & Csikszentmihalyi, 2007)
- **Retrospective self-report and aggregation bias** (Moskowitz & Young, 2006)
- **Few momentary PF measures validated in LTCs** (Kashdan et al., 2014; Machell, Goodman, & Kashdan, 2015; Scott & McCracken, unpublished)
- **Fewer developed with service-user feedback**
- **Limited guidance for validation of state measures**

Aims

1. 3-month longitudinal study: Assess utility of PF (i.e. established scales) to improve prediction and intervention development for non-adherence in LTCs

2. With expert feedback, develop and preliminarily evaluate new ultra-brief momentary measures of adherence, mood and PF for future EMA designs to further examine PF in this area

BOS
Bristol Online Surveys

Aim 1: Hypotheses

1. **Cross-sectional:** >PI to correlate with poorer adherence and appointment attendance last 3 and 12 months, independent demographic/illness factors. >PI predict more intentional and unintentional non-adherence and less attendance. >PI correlate with poorer general functioning.

2. **Longitudinal:** >baseline PI to predict poorer adherence/attendance (in previous directions) at 3-months, independent demographic/illness factors. >PI will correlate with poorer general functioning over time.

Aim 2: Hypotheses

1. New *9-item* scale fit either a single (PF), three (“Open, Aware, Engaged”) or three and overarching (PF), factor solution

2. New Reduced *3-item* scale fit a single factor solution (PF) – too few items to be 3

Aim 1: Longitudinal relationships

Established measures:

- **AAQ-II** (Bond et al., 2011)
- **CompACT ("Open, Aware, Engaged")** (Francis et al., 2016)
- **Mood: GAD-7** (Spitzer, Kroenke, Williams, & Löwe, 2006) **/ PHQ-8** (Kroenke, Strine, et al., 2009)
- **General functioning: WSAS** (Mundt, Marks, Shear, & Greist, 2002)
- **Self-reported adherence: MARS-5** (Horne, Hankins, & Jenkins, 2001) ('perfect' cut-off applied as skewed)
- **Self-reported attendance: 0-100% NRS** ('perfect' cut-off applied as skewed)

Internet sample via voluntary organisations

Eligibility: (i) Any type of 'physical' LTC (ii) ≥13 years (iii) Prescribed meds to manage LTC

Baseline *n*=701 (all adults):

- White (97%) and female (73%) mid-50s, UK (50%)
- Diagnosed primary LTC for *M*=8.65 years (*SD*=10.08)
- 41% Parkinson's disease
- Mild levels of anxiety/depression and 'normal' general functioning
- 88.6% non-adherent (MARS-5 'perfect' cut-off): 75% intentionally, 84% unintentionally; Attendance last 2-3 (15%) and 12 months (16%)

Follow-up *n*=336 (similar, significantly older, more retired, less depressed)

*Both sufficiently powered (GPower3.1)

Aim 1: Results

- **PF small sig. *r* all intentional and unintentional non-adherence and attendance**
- **Medium-large sig. *r* with mood and general functioning**
- **PF and mood *r* similar but not the same** (Wolgast, 2014)
- **PF not generally sig. in binomial regressions adherence and attendance controlling for demographics/illness factors and baseline mood, only small amount of ΔR^2**

***Similar for baseline and follow-up samples**

Aim 2: Momentary scale development and evaluation

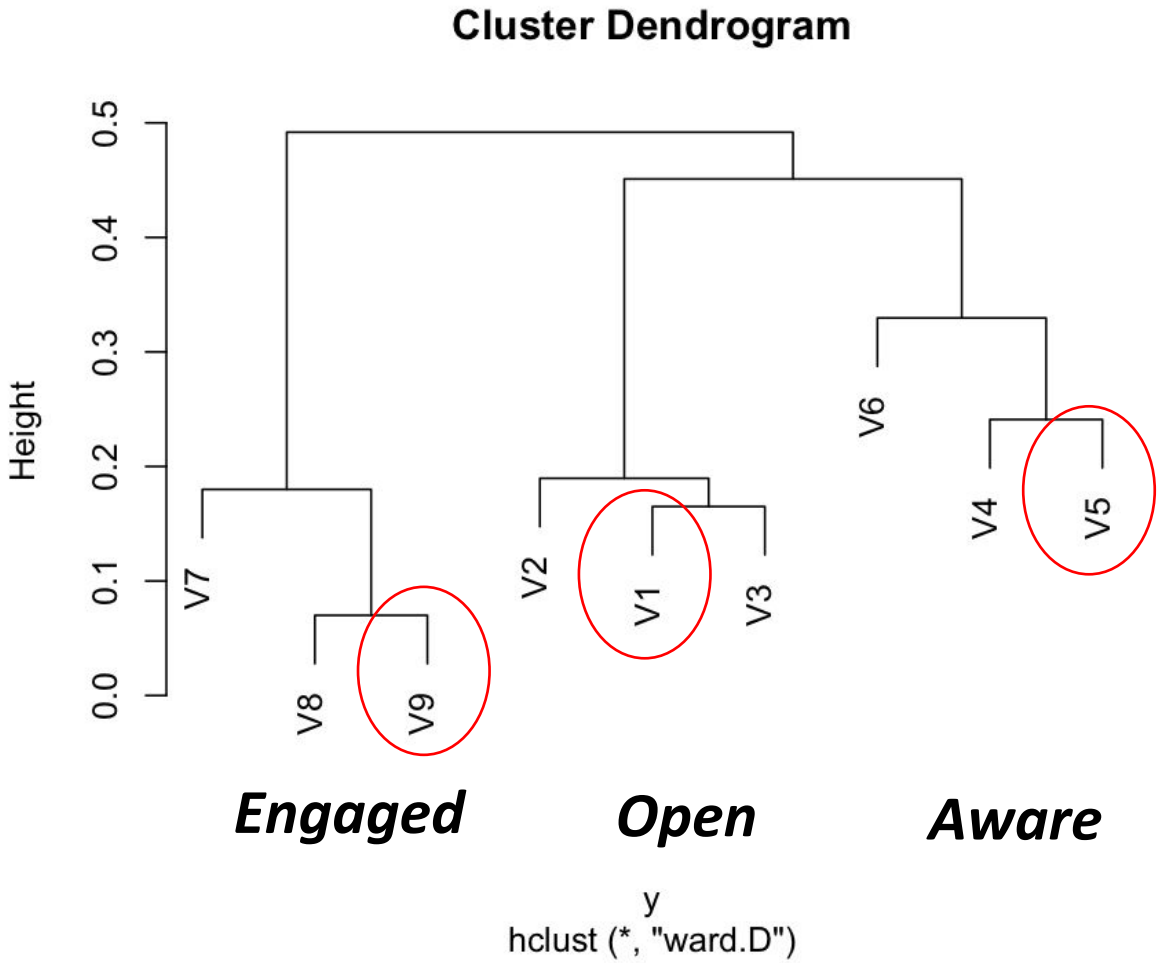
- Initial 22-item pool
- Ranked by 5 experts-by-experience over phone
- Top 9-items selected (3 per process: “Open, Aware, Engaged/Active”) (Hayes, et al. 2011).
- Baseline EFA daily/hourly 9-item: Minimum Rank Factor Analysis (MRFA) and Dendrogram/Plot after multidimensional scaling
- Baseline CFA daily/hourly 3-item: Maximum Likelihood estimation with Robust standard errors (MLR)
- Follow-up CFA daily/hourly 9- and 3-item: MLR

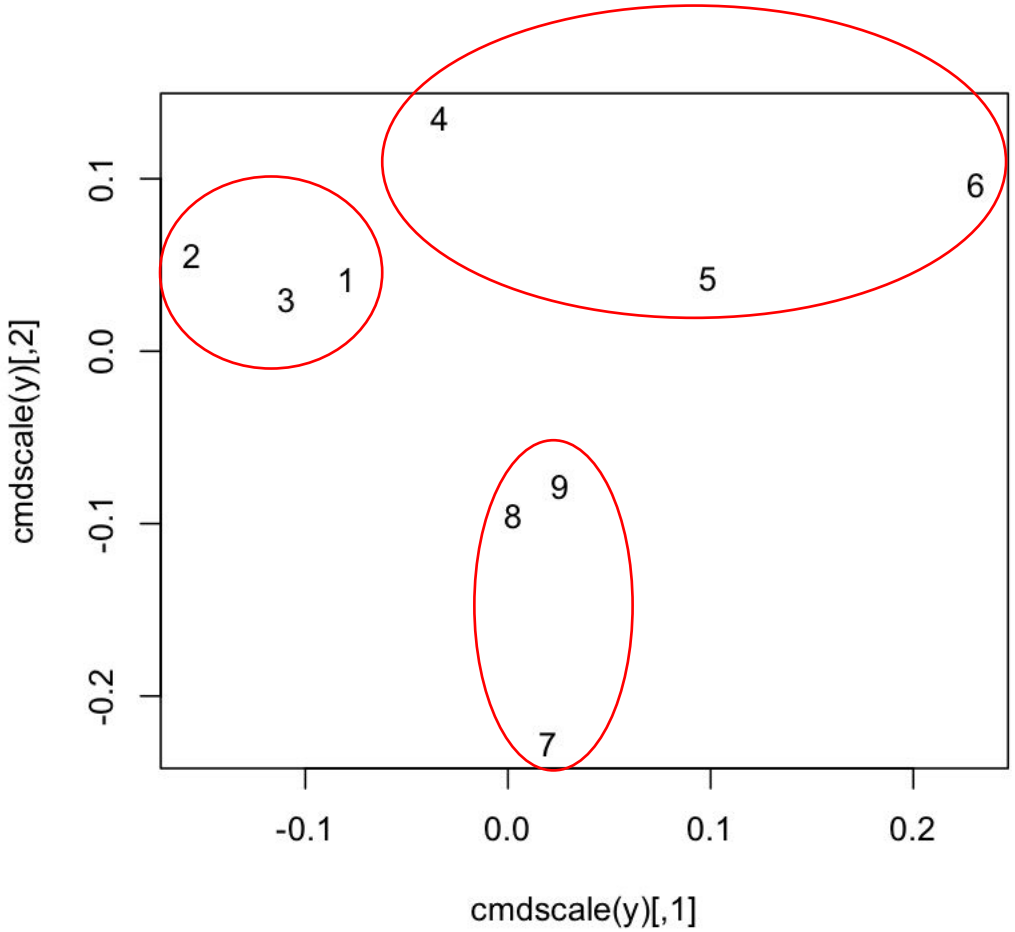
Momentary scale 9-items

Below you will find a list of statements. Please indicate how true each statement is for you by selecting the relevant number.
Today/in the last hour or so:

	Not at all					**Somewhat**					**Very much**
1. I struggled to control my thoughts or feelings	0	1	2	3	4	5	6	7	8	9	10
2. I put a lot of effort into making my thoughts or feelings stop or go away*	0	1	2	3	4	5	6	7	8	9	10
3. I got upset with myself for having certain thoughts or feelings.	0	1	2	3	4	5	6	7	8	9	10
4. I thought about things that happened in the past or worried about the future, instead of what was happening at the time.	0	1	2	3	4	5	6	7	8	9	10
5. I found it difficult to stay focused on what was happening in the present	0	1	2	3	4	5	6	7	8	9	10
6. I did jobs or tasks automatically, without being aware of what I was doing	0	1	2	3	4	5	6	7	8	9	10
7. I stopped doing things that were important to me when I felt bad.	0	1	2	3	4	5	6	7	8	9	10
8. My worries and fears got in the way of doing the things that mattered to me.	0	1	2	3	4	5	6	7	8	9	10
9. I got so wrapped up in what I was thinking or feeling that I couldn't do the things that mattered to me.	0	1	2	3	4	5	6	7	8	9	10

Aim 2: Baseline 9-items daily version (hourly version similar…)





Aim 2: Baseline FACTOR MRFA EFA 9-items daily = Single factor solution (*n*=684) (hourly version similar…)

Item	1	2	3	4	5	6	7	8	9
1	1								
2	0.831	1							
3	0.835	0.802	1						
4	0.735	0.691	0.770	1					
5	0.752	0.678	0.742	0.759	1				
6	0.664	0.601	0.626	0.634	0.751	1			
7	0.692	0.642	0.700	0.599	0.697	0.600	1		
8	0.785	0.732	0.785	0.739	0.780	0.674	0.858	1	
9	0.791	0.724	0.786	0.741	0.808	0.697	0.837	0.930	1
Reliability	If item deleted								
Ordinal Θ=.96	.955	.959	.956	.958	.956	.961	.959	.954	.953

Polychoric algorithm: Bayes modal estimation (Choi, Kim, Chen, & Dannels, 2011); Θ Ordinal theta

Item	Eigen value	Proportion of Variance	Cumulative Proportion of variance
1	6.89768	0.76641	0.76641
2	0.53274	0.05919	0.82560
3	0.49772	0.05530	0.88090
4	0.33474	0.03719	0.91810
5	0.19610	0.02179	
6	0.17733	0.01970	
7	0.15705	0.01745	
8	0.14016	0.01557	
9	0.06647	0.00739	

Aim 2: Follow-up MLR CFA 9-items daily = Single factor better than 3 factors (*n*=329) (hourly version similar…)

# Factors Tested: Label	Absolute model fit indices (goodness of fit value cut-offs)				Model comparison (less=best)	
	RMSEA (<.06)	TLI (>.95)	CFI (>.95)	SRMR (<.08)	AIC	BIC
1: PF	.13	.85	.80	.05	12763.40	12865.89
3: Open, Aware, Engaged	.05	.96	.97	.02	12500.99	12614.87
1 with 3	.05	.96	.97	.02	12500.99	12614.87

Aim 2: Baseline *and* follow-up Mplus MLR CFA 3-items daily = limited to single factor solution! (*n*=696; *n*=332) (hourly version similar…)

	Not at all					Somewhat					Very much
1. I struggled to control my thoughts or feelings	0	1	2	3	4	5	6	7	8	9	10
5. I found it difficult to stay focused on what was happening in the present	0	1	2	3	4	5	6	7	8	9	10
9. I got so wrapped up in what I was thinking or feeling that I couldn't do the things that mattered to me.	0	1	2	3	4	5	6	7	8	9	10

Follow-up absolute model fit indices (goodness of fit value cut-offs)			
RMSEA (<.06)	**TLI (>.95)**	**CFI (>.95)**	**SRMR (<.08)**
0.00	1.00	1.00	0.00

Aim 2: Results

- 3- and 9-item PF scales showed similar *r* expected directions to established adherence/attendance (but poor convergence and internal consistency), mood and functioning outcomes cross-sectionally and longitudinally.
- Concurrent validity with AAQ-II and CompACT/subscales
- Also… Momentary Mood scales (GAD-2 and PHQ-2) similar to GAD-7 and PHQ-8
- Internal consistencies and ICCs of most established and momentary measures were acceptable

Summary

Aim 1:

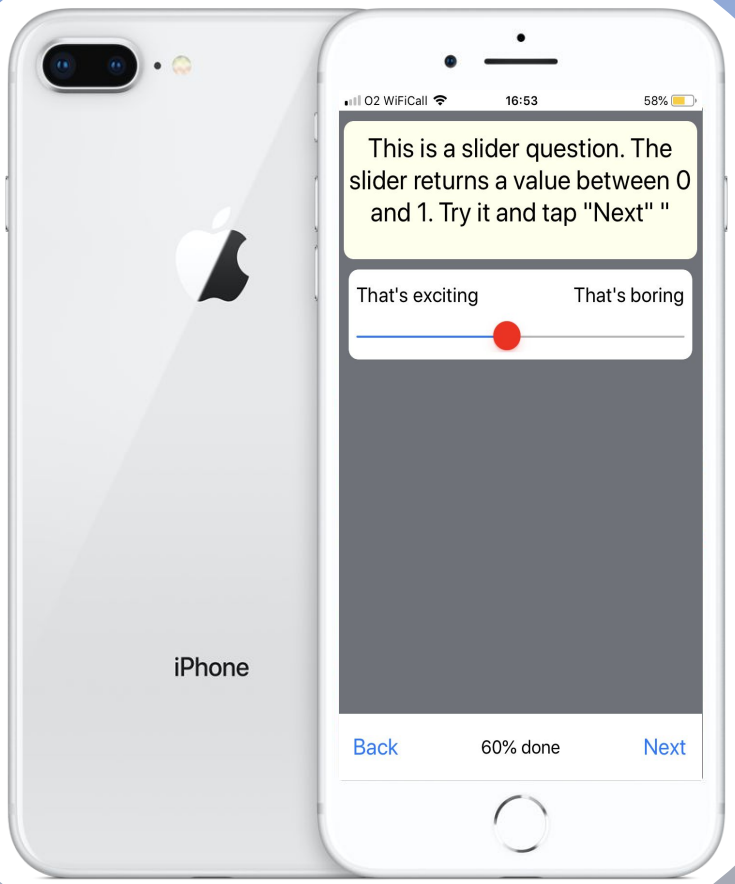
- **PF showed small correlations with self-report adherence (higher for intentional), but not sig. after controlling for demographic and disease variables – too 'broad-brush'?**
- **Longer illness duration, being older having Parkinson's disease and higher levels of depression were correlated with adherence**
- **But… PF showed medium/large with emotional and general functioning**
- **Poor convergence between adherence measures**

Aim 2:

- **Preliminary findings support face, concurrent, construct, criterion and predictive validity and reliability of new 9-item ("Open, Aware, Engaged") and 3-item momentary PF scales.**

Limitations

1. Self-report adherence = under / over estimates; attendance may be due to other problems.
2. Disease-specific severity / functioning type of meds/regimens or polypharmacy not measured/not confirmed by clinician
3. Causation cannot be inferred… possible exogeneous processes
4. Common-method variance and conceptual overlap with other psychological/emotional processes – but sensitivity for mood
5. Two timepoints only reflect measurement error rather than change (Ployhart & Vandenberg, 2010)
6. Sampling: Online/self-selection (more adherent?), 48% attrition, UK health system-centric, no adolescents (i.e. most non-adherent) and unlikely to representative (i.e. 40% PD)
7. Can we generalise group longitudinal findings to EMA?



Next steps:

- **EMA validation studies using new 3-item PF and mood scales within LTCs**
- **Set against established PF scales at baseline and end of sampling period**
- **More objective outcomes (e.g. nebulisers in cystic fibrosis)** (Latchord et al., 2013)
- **Multilevel analyses** (Nezlek, 2012)
- **Depending on findings, feasibility trials for ACT-based interventions (e.g. FACT)** (Strosahl, Robinson, & Gustavsson, 2012).

Experts by experience:

Sarah Bittlestone
Rachel Sawyer
Alison Potts
Maisie Stewart
Elom Nyonator

All participants involved in the study