Title: The development and validation of the Comprehensive assessment of Acceptance and Commitment Therapy processes (CompACT)

Running head: DEVELOPMENT AND VALIDATION OF THE COMPACT

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**Abstract**

Extant ACT process measures are typically circumscribed in their focus (limited to particular theoretical sub-processes or contexts of application) and have been subject to critique in terms of their discriminant validity and conflation of process and outcome variables. Conceptual questions therefore remain regarding how best to operationalize and measure core ACT processes.  In this study, we describe the development of a new general measure of ACT processes (the CompACT) and explore the measure's factor structure, validity and reliability. In phase one, ACT experts rated the face and content validity of 106 items using a Delphi consensus methodology, and produced an initial 37-itemed measure. In phase two, a non-clinical sample of participants ($N = 377$) completed the CompACT and measures of other theoretically related and unrelated variables. An exploratory factor analysis suggested a theoretically-coherent three-factor structure (clustering ACT's six processes into three dyadic processes) for a 23-itemed version of the CompACT. The CompACT demonstrated good internal consistency, and converged and diverged in theory-consistent ways with other measured variables: higher levels of psychological inflexibility were associated with higher levels of distress and lower levels of health and wellbeing. The CompACT shows initial promise as a general measure of ACT processes.

*Key words:* Acceptance and Commitment Therapy; psychological flexibility; assessment; measurement; AAQ-II.

**1. Introduction**

**1.1. Acceptance and Commitment Therapy**

Acceptance and Commitment Therapy (ACT) is a trans-diagnostic therapeutic approach that conceptualizes psychological suffering as primarily a function of attempts to avoid unwanted private experiences (*experiential avoidance*) and a resultant or contingent reduction in personally-meaningful pursuits (*values-inconsistent behavior*; Hayes, Strosahl, & Wilson, 1999). ACT aims to reduce experiential avoidance (in the service of increasing values-consistent behavior) by fostering *psychological flexibility* – "the ability to contact the present moment more fully as a conscious human being, and to change or persist in behavior when doing so serves valued ends" (Hayes, Luoma, Bond, Masuda, & Lillis, 2006, p.7).

Within ACT, psychological flexibility is conceptualized as a product of six distinct but interrelated sub-processes: *acceptance*; *defusion*; *self as context*; *present moment awareness*; *values*; and *committed action* (Hayes et al., 2006). Consistent with ACT theory, psychological flexibility has been found to mediate important therapeutic outcomes, with higher levels of psychological flexibility being associated with lower levels of psychological distress and improved quality of life (see Hayes, Levin, Plumb-Vilardaga, Villatte, & Pistorello, 2013, for an overview). While these findings are promising and provide strong credence to the ACT model of psychological suffering, some authors (e.g., Wolgast, 2014) have argued that the frequently identified relationship between psychological flexibility and psychological wellbeing may actually be an artefact of poor operationalization and measurement of the process (and sub-processes) of psychological flexibility, rather than *prima facie* evidence for the centrality of this process to psychological health.

**1.2. Problems with current measures of ACT processes**

      **1.2.1. Specific versus general measures.** There has been a proliferation of measures that examine ACT processes in specific clinical domains, including: chronic pain (e.g., Vowles,

McCracken, McLeod, & Eccleston, 2008); weight-related issues (e.g., Lillis & Hayes, 2008); and diabetes management (e.g., Gregg Callaghan, Hayes, & Glenn-Lawson, 2007). While measures assessing psychological flexibility in specific contexts (e.g., the workplace) are apt to predict context-specific outcomes (e.g., job satisfaction), such measures are limited in their generalizability and scope of application. There has also been somewhat of a focus on developing measures of single ACT sub-processes, including: acceptance/experiential avoidance (e.g., Gámez, Chmielewski, Kotov, & Ruggero, 2014); fusion/defusion (e.g., Gillanders et al., 2014); and values (e.g., Wilson, Sandoz, Kitchens, & Roberts, 2011). Although such measures might be useful for examining the differential impact of these single processes on behavior, they do not (and were not designed to) capture the broader ACT process of psychological flexibility. While it may be possible to combine individual single-process measures, we do not know how these idiosyncratically developed measures inter-relate (conceptually or empirically); moreover, without prior testing for dimensionality and data reduction, conjoined use of six full-scale process measures would present practical difficulties for data collection and interpretation in terms of undue respondent burden and overfitting of analytic models.

     **1.2.2. Limitations of the current general measure of ACT processes.** The Acceptance and Action Questionnaire (AAQ-II; Bond et al., 2011) is the most widely used general measure of ACT processes (Ruiz, Herrera, Luciano, Cangas & Beltran, 2013); however, despite its ubiquity, the AAQ-II has been subject to criticism. Most significantly, Wolgast (2014) has argued that the AAQ-II appears to conflate ACT processes with distress outcome variables. For example, items two ("I'm afraid of my feelings") three ("I worry about not being able to control my worries and feelings") and seven ("worries get in the way of my success") appear to overlap with distress and meta-distress constructs (i.e., "fear of feelings", "worry", and "worry about worry"). Gámez, Chmielewski, Kotov, Ruggero, and Watson

(2011) suggest that the focus on "distress leading to dysfunction" within the AAQ-II's item set makes it difficult to establish whether a person's responses to such items reflect either: (a) levels of psychological inflexibility/experiential avoidance; or (b) levels of actually experienced aversive emotions, memories, and worries. Conceptually, this is an important issue as ACT processes (the putative targets of ACT treatment) are purported to be related to, but ultimately distinct from, distress constructs. Whilst Bond et al.'s (2011) Confirmatory Factor Analysis (CFA) suggests that the AAQ-II can be discriminated from distress measures, contrary factor analytical evidence has been presented, albeit from a smaller sample (Wolgast, 2014).

We also argue that the AAQ-II is limited in its capture of ACT processes due to a preponderance of items that focus on acceptance/experiential avoidance and defusion/fusion processes, arguably neglecting other important processes within the ACT model. While some items appear to indirectly capture processes such as present moment awareness and values (e.g., "My painful experiences and memories make it difficult for me to live a life that I would value"; "My painful memories prevent me from having a fulfilling life"), we suggest that these processes remain somewhat implicit and secondary (e.g., from a struggle with "painful memories", we can *infer* difficulties maintaining contact with the present moment, but the process of present moment awareness is not a manifest focus). Similarly, the ACT process-relevance of the item "It seems like most people are handling their lives better than I am" (ostensibly an upward social comparison) appears somewhat oblique. There appear to be no items that overtly examine self as context or committed action processes, and thus it can be argued that the AAQ-II may not adequately capture the breadth and scope of core ACT processes (and therefore the breadth and scope of psychological flexibility). We also note, in line with Gámez et al. (2011), that, although now referred to as a measure of psychological flexibility (e.g., Hooper & Larsson, 2015), the AAQ was originally developed as a measure of experiential avoidance – a sub-process of psychological flexibility.

Certainly the AAQ-II may be considered the current 'gold standard' against which to compare any new measure of psychological flexibility (Schmalz & Murrell, 2010). Notwithstanding this, there are a number of outstanding questions regarding the face validity and scope of the AAQ-II items which invite the development and refinement of alternative instruments. Moreover, although the AAQ-II has performed well empirically across many contexts (Ruiz, 2010), possible conflation of ACT processes with distress outcomes may complicate interpretation of this evidence.

       **1.2.3. Number of core ACT processes.** There have been attempts to examine whether the overarching process of psychological flexibility can be usefully distilled into fewer than six distinct sub-processes (see Hayes et al., 1999; Hayes, 2004; Hayes, Villatte, Levin & Hildebrandt, 2011). In various conceptual, practical, and empirical models of psychological flexibility, we have seen two-factor (e.g., Ciarrochi, Bilich, & Godsel, 2010; Polk & Schoendorff, 2014; Bond & Bunce, 2003) and single-factor distillations (notably, the AAQ-II is a single-factor measure). In recent work, Hayes et al. (2011) propose that psychological flexibility can be pragmatically defined in terms of three "dyadic" processes: (1) "openness to experience and detachment from literality" (acceptance; defusion); (2) "self-awareness and perspective taking" (present moment awareness; self as context); and (3) "motivation and activation" (values; committed action). In view of these various plausible conceptualizations, and the limitations of extant measures, there is a need for further empirical work to clarify how best to capture the general process of psychological flexibility (and contributory sub-processes) – and thus potentially facilitate a more useful understanding of how this process is implicated in human suffering and its alleviation.

## 1.3. Aims and objectives

We aimed to develop a general measure of ACT processes (while holding in mind the limitations of current ACT process measures) and to explore the factor structure, validity, and

reliability of this measure. An exploratory approach was considered apt given that we were examining a novel item-set with multiple plausible structures (Floyd & Widaman, 1995; as described in 1.2.3). We named the measure the Comprehensive assessment of ACT processes (*CompACT*).

## 2. Method

Ethical approval for this research was obtained from the appropriate institutional ethics committee. The study was comprised of two phases: phase one sought to develop the CompACT through a psychometric review and the use of a Delphi methodology; phase two sought to test the psychometric properties of the developed CompACT.

### 2.1. Phase one: Measurement development

**2.1.1. Generation of initial item pool: Selecting measures and items.** 106 mixed-valence items formed the initial item pool. Items were taken from 11 existing measures, comprising both ACT process measures and measures of other theoretically-related constructs (e.g., the Philadelphia Mindfulness Scale [PMS; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008] and the Mindfulness Attention and Awareness Scale [MAAS; Brown & Ryan, 2003]). Measures were selected based on their established psychometric properties (see Table 1). Three items with the highest factor loadings from each measure were selected for inclusion in the initial item pool. Additionally, some items with lower factor loadings were selected based on their apparent face and content validity, and we generated 37 novel items – prioritizing face and content validity with respect to the six core ACT processes.

Table 1

*Psychometric properties of 11 ACT process measures used to extract items for 106-item pool*

| Measure | Source reference | Number of items | Description of measure and subscales | Example item | Reliability |
|---|---|---|---|---|---|
| *Acceptance process measures* | | | | | |
| Acceptance and Action Questionnaire (AAQ-II) | Bond et al. (2011) | 7 | Assesses psychological (in)flexibility. | I worry about not being able to control my worries and feelings. | Internal reliability: (.78-.88) Test-retest reliability: 3 months (.81) 12 months (.79) |
| Philadelphia Mindfulness Scale (PMS) | Cardaciotto et al. (2008) | 20 | Bi-dimensional measure of mindfulness, assessing it as two constructs: (1) present-moment awareness; and (2) acceptance*. | I tell myself that I shouldn't have certain thoughts. | Internal reliability: Awareness subscale (.81) Acceptance subscale (.85) Inter-item correlations: Awareness subscale (.13-.50) Acceptance subscale (.17-.54) |
| Brief Experiential Avoidance Questionnaire (BEAQ) | Gámez et al. (2014) | 15 | A measure of experiential avoidance, examining six domains: (1) behavioral avoidance; (2) distress aversion; (3) procrastination; (4) distraction and suppression; (5) repression and denial; and (6) distress endurance. | I rarely do something if there is a chance it will upset me. | Internal reliability: (.86) Mean Inter-item correlation (.30) |
| *Defusion process measures* | | | | | |
| Cognitive Fusion Questionnaire (CFQ) | Gillanders et al. (2014) | 7 | Measures cognitive fusion as a single factor. | I get upset with myself for having certain thoughts. | Internal reliability: (.88) |

| Measure | Source reference | Number of items | Description of measure and subscales | Example item | Reliability |
|---|---|---|---|---|---|
| Believability of Anxious Feelings and Thoughts Scale (BAFT) | Herzberg, Sheppard, Forsyth, Credé, Earleywine and Eifert (2012) | 16 | Measures cognitive fusion as three factors: (1) fusion with somatic concerns; (2) fusion with emotional regulation; and (3) fusion with negative evaluation. | I could lose control of myself when I feel anxious or afraid. | Internal reliability: BAFT total (.90) Somatic subscale (.81) Emotional subscale (.81) Negative evaluation subscale (.84) |
| Avoidance and Fusion for Youth Questionnaire (AFQ-Y) | Greco, Lambert and Baer (2008) | 17 | A measure of psychological inflexibility engendered by high levels of cognitive fusion and experiential avoidance. | I must get rid of my worries and fears so I can have a good life. | Internal reliability: (.90) |
| Drexel Defusion Scale (DDS) | Forman et al. (2012) | 10 | Measures cognitive fusion as a single factor. | *Thoughts of self*. Imagine you are having a thought such as "no one likes me". To what extent would you normally be able to *defuse* from negative thoughts about yourself? | Internal reliability: (.83) Inter-item correlations: (.15-.66) |
| *Present moment awareness process measure* | | | | | |
| Mindfulness Attention Awareness Scale (MAAS) | Brown and Ryan (2003) | 15 | Measures how inattentive and unaware an individual is of their present moment experience. | It seems I'm running on automatic pilot, without much awareness of what I am doing. | Test retest reliability: (.81) Internal reliability: (.80-.87) |
| *Self as context process measure* | | | | | |
| Self as Context Scale** | Gird and Zettle (2013) | 11 | Assesses self as context as two factors: (1) Transcending (an enduring perspective from which experience can be observed); and (2) Centering (an ability to find stability in the face of emotional turmoil). | Despite the many changes in my life, there is a basic part of who I am that remains unchanged. | Internal reliability: (.84) |

| Measure | Source reference | Number of items | Description of measure and subscales | Example item | Reliability |
|---|---|---|---|---|---|
| *Values process measures* | | | | | |
| Engaged Living Scale (ELS) | Trompetter et al. (2013) | 16 | Assesses engaged living as two constructs: (1) Valued Living (recognition and knowledge of personal values and undertaking behavioral actions congruent with these values); and (2) Life Fulfilment (evaluation and sense of fulfilment in life as a consequence of recognizing and living in accordance with personal values) | I have values that give my life more meaning. | Internal reliability: ELS total (.90) Valued living subscale (.86) Life fulfilment subscale (.86) |
| Valuing Questionnaire (VQ) | Smout et al. (2014) | 10 | Assesses valued living as two factors: (1) Progress, reflecting enactment of identified values; and (2) Obstruction, reflecting disruptions to valued living. | It seemed like I was just 'going through the motions', rather than focusing on what was important to me. | Internal reliability: Progress subscale (..87) Obstruction subscale (.87) |
| *Committed action process measure* | | | | | |
| Committed Action Questionnaire, Short Form (CAQ-8) | McCracken, Chilcot and Norton (2015) | 8 | Assess committed action with both positive and negatively valenced items, which create two separate factors. | I am able to follow my long terms plans including times when progress is slow. | Internal reliability: CAQ-8 total (.87) Positive subscale (.87) Negative subscale (.80) |

*Note.* Internal reliabilities calculated using Cronbach's alpha ($\alpha$); Test-retest reliability calculated using Pearson's ($r$) correlations coefficients. * Items selected from the PMS were used to measure acceptance.

** Self as context items were only included for rating from round three of the Delphi phase of the study.

**2.1.2. Review of initial item pool by experts.** We employed a Delphi-consensus methodology (see Hsu & Sanford, 2007) to establish the face and content validity of items within the initial pool (DeVellis, 1991). The Delphi-consensus approach utilizes a "panel" of experts who independently rate each item against explicit criteria – in this case, face and content validity in relation to the six core ACT processes. Responses from experts at each round determine item retention/exclusion based on rating thresholds defined *a priori*; rating proceeds through successive rounds until these consensus thresholds are achieved.

Established ACT clinicians and researchers were targeted for recruitment into our expert panel via the website of the Association for Contextual Behavioral Science (ACBS). The ACBS website contains a membership directory and member profiles where individuals can document their expertise and experience in ACT. Our criteria for determining expertise were: (1) researchers with three or more publications relating to ACT; (2) clinicians who have an ACT professional accreditation through a professional body within their practicing country; and/or (3) clinicians who have been using ACT as their primary model of choice in clinical practice for > 5 years.

Based on published recommendations (see Netemeyer, Bearden & Sharma, 2003), we judged that 10-20 participants would be sufficient to achieve a necessary breadth of opinion whilst keeping the number of participants manageable enough to facilitate consensus building. Fifty ACT clinicians and researchers meeting our eligibility criteria were prospectively targeted for recruitment to the expert panel, allowing for non-response and non-participation. Thirteen ACT experts consented to participate in the study and completed the initial round of item rating. Ten participants completed all three rounds of rating.

Items were organized according to the core ACT process that they were designed to measure, forming six item-groupings (acceptance, defusion, present moment awareness, self as context, values, and committed action). When presented for rating, these six item-groupings were further organized into pairs and labelled according to clustering by Hayes et al. (2011): "Openness to experience and detachment from literality (acceptance; defusion)"; "Self-awareness and perspective taking (self-as-context; contact with present moment)"; and "Motivation and activation (values; committed action)". Panel members were asked to rate each item's face and content validity along a five-point Likert scale (1 = poor; 2 = fair; 3 = average; 4 = good; 5 = excellent) based on the extent to which the item was considered to reflect the process that it was intended to measure. Items that failed to achieve either a rating of 4 ("good") or 5 ("excellent") by $\geq$ 70% of panel members were excluded from subsequent rounds of rating. We also gathered qualitative feedback from the expert panel to supplement the quantitative ratings, and to establish whether the initial item pool was considered to adequately cover the breadth and scope of each ACT process; some additional items were added to the item-pool for rating based on the panel's suggestions.

Best practice guidelines suggest that consensus criteria should be defined a priori (Diamond, Grant, Feldman, Pencharz, Ling, Moore, & Wales 2014). Based on other Delphi studies (e.g., Singh, Aggarwal, Grantcharov, & Darzi, 2013; Zevin, Bonrath, Aggarwal, Dedy, Ahmed, & Grantcharov, 2013) we predefined consensus as a Cronbach's alpha ($\alpha$) agreement coefficient of $\geq$ .80. When consensus was achieved, only those items rated 4 ("good") or 5 ("excellent") by $\geq$ 70% of experts in the final round were included in the CompACT.

**2.1.5. Results of the Delphi process.** After three rounds of rating, consensus was achieved and the Delphi process completed. The first iteration of the CompACT

contained 37 items. Item comprehensibility was assessed through the use of Flesch Reading Ease Scores (FRES) and the Flesch Kincaid Grade Level test, based on recommendations in Streiner and Norman (1995). Ten community-based adults unfamiliar with ACT also completed the first iteration of the CompACT and provided feedback regarding the comprehensibility of items therein. Following minor revisions to item wording following this process, the revised items were sent to the expert panel for final review and approval.

## 2.2. Phase two: Testing the dimensionality, validity and reliability of the CompACT in a non-clinical sample

**2.2.1. Participants.** A non-clinical sample of adult participants (see Table 2) was targeted for recruitment via advertisements on social media platforms (Twitter and Facebook) and posters placed around two university campuses in the UK; 411 individuals consented to participate in the study, with 377 participants completing all measures in full.

Table 2

*Participant demographics (N = 377)*

| Variable | N (%) |
| --- | --- |
| Gender | |
|     Male | 96 (25.5) |
|     Female | 279 (74.0) |
| Mean Age (years) | 31.34 (SD = 11.12) |
| Ethnicity | |
|     White | 356 (94.4) |
|     Asian British | 10 (2.7) |
|     Mixed Race | 7 (1.9) |
|     Other | 3 (0.8) |

**2.2.2. Measures.** Items on the CompACT were scored on a seven-point Likert scale, ranging from 0 ("strongly disagree") to 6 ("strongly agree"). Further to completing the CompACT, participants were also required to complete additional self-report

measures (Table 3) to assess whether the CompACT: (1) converged with measures of theoretically related variables (AAQ-II); (2) diverged from measures of theoretically distinct variables (Short form Marlowe-Crowne Social Desirability scale [MCSD; Ballard, 1992]); and (3) correlated in expected ways with measured outcome variables (Depression Anxiety Stress Scale [DASS-21; Henry & Crawford, 2005]; Short Form Health Survey [SF-12v2; Ware, Kosinski, Turner-Bowker & Gandek, 2002]). In line with ACT theory, we predicted that higher levels of psychological inflexibility would be associated with higher levels of psychological distress and lower levels of health and wellbeing.

Table 3

*Measures used to assess differential aspects of the CompACT's construct validity*

| Measure | Source reference | Number of items | Description of measure and subscales | Example item | Scoring | Reliability |
|---|---|---|---|---|---|---|
| Short form Marlowe-Crowne Social Desirability scale (MCSD) | Ballard (1992) | 13 | Assesses when a participant's responding is constrained by social desirability. | I sometimes feel resentful when I don't get my way. | Participants are asked to provide dichotomous "yes" or "no" responses to items. Higher scores indicate more socially desirable responses. | Internal reliability: (.62-.76) |
| Depression Anxiety Stress Scale (DASS-21) | Henry and Crawford (2005) | 21 | Distress measure assessing three separate constructs: (1) Depression; (2) Anxiety; and (3) Stress. | Depression item: I couldn't seem to experience any positive feeling at all. | Each item is scored from 0 (did not apply to me at all over the past week) to 3 (applied to me very much or most of the time over the past week). Higher scores indicate greater levels of distress. | Internal reliability: (.82-.97) |
| Short Form Health Survey (SF-12v2) | Ware et al. (1996; 2002) | 12 | A general measure of health and wellbeing with two factors: (1) Physical health; and (2) Mental health. | In general would you say your health is: Excellent; Very Good; Good; Fair; Poor? | Participants provide ratings on five-point Likert scale (from "poor" to "excellent") of their functioning over the last four weeks across eight domains: (1) physical functioning; (2) role limitations due to physical problems; (3) social functioning; (4) bodily pain; (5) mental health; (6) role limitations due to emotional problems; (7) vitality; and (8) general health perceptions. Higher scores indicate better health and quality of life. | Internal reliability: Physical health scale (.92) Mental health scale (.88) Test-retest reliability: two weeks (.76-.89) |

*Note.* Internal reliability scores are calculated using Cronbach's alpha ($\alpha$); Test-retest reliability scores use Pearson's ($r$) correlation coefficients.

**3. Results**

**3.1. Examination and elimination of poor, overlapping, and redundant items**

Corrected item-total correlations were examined to determine whether any items fell below Nunnally and Bernstein's (1994) recommended threshold (i.e., $r < .30$). Items falling below this threshold were considered to be conceptually distinct and were thus removed. Inter-item correlations were also examined to identify redundant items: items with extensive overlap ($r > .80$) were considered to lack incremental validity and were removed to minimize multicollinearity (Cohen & Swerdlik, 2005). None of the CompACT's initial 37 items met these exclusion criteria and were thus retained in the first instance.

An examination of the correlation matrix revealed some evidence of multicollinearity among the CompACT's initial 37 items as the determinant of the correlation matrix (.00001 [1.506E-10]) was below recommended threshold values (see Field, 2013). However, multicollinearity did not emerge as a major issue, and we were able to find a stable factor structure for the CompACT (see 3.4.). Bartlett's Test of Sphericity was found to be significant ($\chi^2 = 7640.56$, df = 666, $p < .001$), suggesting that the CompACT's items are indeed intercorrelated and therefore related – as theoretically expected.

**3.2. Removing multivariate outliers**

In order to ensure that the CompACT was not overly influenced by the presence of multivariate outliers, we examined our dataset using Mahalanobis distance values. Cases are considered to be multivariate outliers if the probability associated with their Mahalanobis distance value is $p < .001$. Twenty five cases meeting this criterion were removed; the CompACT's factor structure was therefore analyzed based on the remaining 352 cases.

**3.3. Identification of the CompACT's factor structure**

Given that we were examining a novel item-set with multiple plausible structures, we judged that the measure's dimensionality should be determined via an inductive versus deductive

process. An exploratory factor analysis (EFA) was therefore performed in the first instance. Results from a Kaiser Meyer Olkin Test (Kaiser, 1970) (.92) and Bartlett's Test of Sphericity ($\chi^2$ = 7640.56, df = 666, $p$ < .001) suggested that our sample size ($n$ = 352) was more than adequate for EFA. Factors were extracted via Principle Axis Factoring (PAF), and an oblique rotation method (direct Oblimin) was used. Factors were extracted based on: (1) Kaiser's (1974) criterion (i.e., retain factors with an eigenvalue > 1); (2) a *scree test* (retain factors that are to the left of the first inflection point on a scree plot; Cattell & Vogelmann, 1977); and (3) Horn's (1965) Parallel Analysis (retain factors with eigenvalues that exceed randomly generated eigenvalues at $p$ < .05).

PAF of the CompACT's 37 items ($n$ = 352) suggested an initial four-factor solution, but this proved to be unstable: after removal of eight poorly loading items, the eigenvalue for the fourth factor (1.336) fell below the criterion eigenvalue (1.431) randomly generated by a Parallel Analysis. Consequently, a three-factor solution was implicated as the most suitable factor structure for the CompACT. We therefore re-ran the PAF analysis on the CompACT's 37 items and specified a three-factor solution. Three factors accounted for 50.1% of the variance and 46.2% of the cumulative variance following extraction.

### 3.4. Choosing items to exclude/retain

To maximize stability, items with insufficient loadings on the CompACT's three factors were removed. We applied Tabachnick and Fidell's (2007) criteria of removing: (1) items with loadings < .45 on all factors; and (2) cross-loading items with a difference < .20 between the primary and secondary (cross-loaded) factor(s). Seven items were removed on the basis of these criteria, leaving 30 items remaining. A PAF analysis was re-run specifying a three-factor solution with the same extraction and rotation procedures. Again, the KMO Test (.91) and Bartlett's Test of Sphericity ($\chi^2$ = 6323.15, df = 435, $p$ <.001) suggested that the sample size was adequate. When modelled as a three-factor solution, all items loaded > .45, and there were

no cross-loadings within .20 of a primary loading; thus, all 30 items were retained at this stage (see Table 4). In contrast to the attempted four-factor solution, the three-factor solution remained stable when subjected to a final PAF analysis of retained items, with the eigenvalue on the third factor (2.297) exceeding the random eigenvalue (1.495). A three-factor solution on the CompACT's initial 30 items explained 54.6% of the total variance and 49.9% of the cumulative variance.

These 30 items met a priori criteria for expert consensus, and produced a theoretically-coherent and stable factor structure. Nonetheless, we aimed to refine the item-set further where possible, reasoning that the precision and usability of the CompACT would be improved by removing redundant items and reducing concomitant response burden. In particular, given item over-representation for Factors 1 (14 items) and 3 (11 items) – relative to Factor 2 (5 items) – we selectively examined these factors to identify items that could be omitted whilst preserving adequate content coverage and internal consistency. Specifically, we aimed to remove items that (1) had substantive content overlap with other (retained) items, and (2) demonstrated the lowest item-total correlations (for both factor and overall totals). For example, we removed item 3 ("I try to distract myself when I feel unpleasant emotions") because (1) we judged that the item-content was adequately covered by items 2 ("I try to stay busy to keep thoughts or feelings from coming") and 7 ("I work hard to keep out upsetting feelings"), and (2) this item had the lowest ranked item-total correlations with respect to Factor 1 and overall summary scores. Ultimately, this process of refinement led to us removing four items from Factor 1 (items 3, 8, 9, and 13) and three items from Factor 3 (items 20, 21, and 30) – see Table 4 for the final 23-item CompACT (items emboldened); all subsequent analyses pertain to this 23-item version of the CompACT. A three-factor solution on the refined CompACT's 23 items explained 59.6% of the total variance and 53.8% of the cumulative variance (representing an improvement on the 30-item model).

Each of the three factors was examined to identify the items that most strongly loaded onto, and therefore best represented, the factor (see Table 4). The content of these items was analyzed to help define the factors; following Henson and Robert's (2006) recommendation, factors were defined on the basis of ACT processes for which they contained > 3 theoretically-derived items, with final labelling refined to reflect the particular scope and wording of these items. The following three *subscales* were identified, all of which demonstrated high levels of internal consistency: Factor 1 *openness to experience* (8 acceptance items; 2 defusion items; Cronbach's alpha = .90); Factor 2 *behavioral awareness* (5 contact with present moment/mindfulness items; Cronbach's alpha = .87); and Factor 3 *valued action* (8 values/committed action items; Cronbach's alpha = .90). These subscales were inter-related (*r*s = .30-.43) but distinguishable (i.e., *r*s < .50) − as would be expected from theoretical conceptualizations of psychological flexibility. Cronbach's alpha for the overall CompACT score (23 items, collapsing the three subscales) was .91.

Table 4

*The CompACT's items and factor loadings*

| | Three Factor Solution | | |
| --- | --- | --- | --- |
| CompACT item | Factor 1 | Factor 2 | Factor 3 |
| **1. I tell myself that I shouldn't have certain thoughts** | .68 | | |
| **2. I try to stay busy to keep thoughts or feelings from coming** | .68 | | |
| 3. I try to distract myself when I feel unpleasant emotions | .62 | | |
| **4. One of my big goals is to be free from painful emotions** | .74 | | |
| **5. I go out of my way to avoid situations that might bring difficult thoughts, feelings, or sensations** | .67 | | |
| **6. Even when something is important to me, I'll rarely do it if there is a chance it will upset me** | .56 | | |
| **7. I work hard to keep out upsetting feelings** | .78 | | |
| 8. When unpleasant memories come to me, I try to put them out of my mind | .56 | | |
| 9. I can experience my thoughts and feelings as they are, without trying to change them* | .62 | | |
| **10. I can take thoughts and feelings as they come, without attempting to control or avoid them*** | .76 | | |
| **11. I am willing to fully experience whatever thoughts, feelings and sensations come up for me, without trying to change or defend against them*** | .72 | | |
| **12. I get so caught up in my thoughts that I am unable to do the things that I most want to do** | .46 | | |
| 13. I don't allow thoughts to interfere with what I want to do* | .50 | | |
| **14. Thoughts are just thoughts – they don't control what I do*** | .57 | | |
| **15. It seems I am "running on automatic" without much awareness of what I'm doing** | | | .64 |
| **16. Even when doing the things that matter to me, I find myself doing them without paying attention** | | | .89 |
| **17. I rush through meaningful activities without being really attentive to them** | | | .77 |
| **18. I do jobs or tasks automatically, without being aware of what I'm doing** | | | .74 |
| **19. I find it difficult to stay focused on what's happening in the present** | | | .53 |
| 20. I have values that give my life more meaning* | | .56 | |
| 21. I have important values I choose to live by* | | .69 | |
| **22. I make choices based on what is important to me, even if it is stressful*** | | .70 | |
| **23. My values are really reflected in my behavior*** | | .76 | |
| **24. I am able to follow my long terms plans including times when progress is slow*** | | .69 | |
| **25. I can keep going with something when it's important to me*** | | .70 | |
| **26. I behave in line with my personal values*** | | .75 | |
| **27. I undertake things that are meaningful to me, even when I find it hard to do so*** | | .73 | |
| **28. I act in ways that are consistent with how I wish to live my life*** | | .70 | |
| **29. I can identify the things that really matter to me in life and pursue them*** | | .74 | |
| 30. I know what matters to me and where I want to end up in life* | | .59 | |

*Note.* * denotes a reverse-scored item. Items in bold are the 23 items retained in the final scale.

## 3.5. Reliability of the CompACT

Cronbach's alpha values are sensitive to the number of items and degree of inter-correlation between items, such that they are susceptible to artificial inflation (Cortina, 1993). Clark and Watson (1995) therefore advocate calculating an average of the inter-item correlations to

determine a measure's internal consistency. Average inter-item correlation for the CompACT (.34, based on 23 items and 352 cases) fell within the recommended range for adequate internal consistency (i.e., .15-.50; see Briggs & Cheek, 1986).

**3.6. Validity of the CompACT**

Table 5 summarizes the associations between the CompACT and the measures of theoretically related and unrelated variables employed in this study.

**3.6.1. Convergent validity.** The CompACT demonstrated a large significant correlation with the AAQ-II ($r = .79$) indicating good convergent validity with an established ACT process measure[1]. The CompACT's openness to experience subscale had the strongest association with the AAQ-II ($r = .78$) followed by the behavioral awareness ($r = .50$) and valued action ($r = .41$) subscales.

**3.6.2. Discriminant validity.** As expected, no significant correlation was found between the CompACT and the short-form MCSD ($r$s = -.01-.03).

**3.6.3. Concurrent validity.** The CompACT was found to have large positive correlations ($r$s = .57-.65) with all three subscales of the DASS-21, and correlated most strongly with the depression subscale ($r = .65$; see Table 5). Of the CompACT's subscales, openness to experience exhibited the strongest correlations with DASS-21 subscales ($r$s = .53-55).

The CompACT demonstrated a large negative correlation with the mental health subscale of the SF-12v2 ($r = -.67$), and a small but significant negative correlation with its physical health subscale ($r = -.23$). This pattern was mirrored when examining CompACT

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[1] The final version of the CompACT did not include any AAQ-II items and thus correspondence between the measures was not artificially inflated due to shared items. For parity and ease of interpretation with respect to the AAQ-II, within this paper we scored the CompACT such that higher scores indicated greater psychological *inflexibility*. However, in general use the CompACT may be scored such that higher scores are indicative of greater psychological *flexibility*/*presence* of openness to experience, behavioural awareness, and valued action. This latter approach is the recommended default (better reflecting the directionality of subscale labels); the CompACT and scoring key are available from the corresponding author.

subscales (mental health *r*s ranging from -.39 to -.60; physical health *r*s ranging from -.17 to -.19). Of the CompACT's subscales, openness to experience exhibited the strongest correlations with mental and physical health subscales

Table 5

*Correlations between the CompACT and other measures (n = 352)*

| Measure | CompACT Total score | CompACT Openness to experience subscale | CompACT Behavioral awareness subscale | CompACT Valued action subscale | AAQ-II |
|---|---|---|---|---|---|
| | | | Correlation (*r*) | | |
| AAQ-II | .79* | .78* | .50* | .41* | - |
| DASS-21: | | | | | |
| *Depression* | .65* | .56* | .48* | .43* | .72* |
| *Anxiety* | .57* | .54* | .43* | .28* | .66* |
| *Stress* | .57* | .56* | .45* | .23* | .66* |
| SF-12v2 | | | | | |
| Physical health Subscale: | -.23* | -.19* | -.19* | -.17* | -.23* |
| *General health* | .04 | .01 | .09 | .02 | .01 |
| *Physical functioning* | -.14* | -.06 | -.18 | -.11 | -.10* |
| *Role physical* | -.29* | -.23* | -.25* | -.19* | -.27* |
| *Bodily pain* | -.28* | -.24* | -.12* | -.18* | -.28* |
| Mental health subscale: | -.67*: | -.60* | -.51* | -.39* | -.72* |
| *Role emotion* | -.60* | -.55* | -.41* | -.37* | -.65* |
| *Mental health* | -.62* | -.56* | -.68* | -.32* | -.68* |
| *Vitality* | -.45* | -.36* | -.40* | -.28* | -.44* |
| *Social Functioning* | -.55* | -.50* | -.41* | -.33* | -.62* |
| Short-form MCSD | .01 | .03 | -.01 | .01 | -.01 |

*Abbreviations:* AAQ-II (Acceptance and Action Questionnaire, version 2); DASS-21 (Depression Anxiety and Stress Scales, 21-item version); SF-12v2 (Short-form Health and Survey, 12-item version); MCSD (Marlowe Crowne Social Desirability Scale, 12-item version). *Note.* *significant at *p*< .01

### 3.6.4 Relative overlap with distress outcomes

While strong associations with distress outcomes are theoretically expected of ACT process measures, and indicative of concurrent validity, relationships between process and outcome measures should not be so high that they appear to be measuring the same thing. We undertook a further exploratory factor analysis to examine the separability of items from the CompACT (ACT process measure) and DASS (distress outcome measure); we also included items from

the AAQ-II for comparison and to determine how the AAQ-II loaded with respect to dimensions identified for the CompACT

Factors were extracted as before (via PAF with direct Oblimin rotation) and extraction criteria supported a four-factor solution (e.g., only the first four factors had eigenvalues exceeding randomly generated eigenvalues). As can be seen in Table 6, the 23 CompACT items loaded as before onto three conceptually coherent factors (with no cross-loadings > .32; Tabachnick & Fidell, 2007); all 21 DASS items loaded onto a separate single factor representing general distress. Consistent with the conceptual focus of the AAQ-II on experiential avoidance versus acceptance, the AAQ-II items primarily loaded onto the same factor as CompACT openness to experience items. However, in contrast to the CompACT items, six of the seven AAQ-II items showed substantial secondary loadings (> .32) on the distress factor.

Table 6

*Factor loadings (and cross-loadings) for items from the CompACT, DASS, and AAQ-II*

| Scale | Item | Factor | | | |
|-------|------|--------|--------|--------|--------|
| | | **1** | **2** | **3** | **4** |
| C: OE | 1. I tell myself that I shouldn't have certain thoughts | | -.63 | | |
| C: OE | 2. I try to stay busy to keep thoughts or feelings from coming | | -.62 | | |
| C: OE | 4. One of my big goals is to be free from painful emotions | | -.71 | | |
| C: OE | 5. I go out of my way to avoid situations that might bring difficult thoughts, feelings, or sensations | | -.71 | | |
| C: OE | 6. Even when something is important to me, I'll rarely do it if there is a chance it will upset me | | -.55 | | |
| C: OE | 7. I work hard to keep out upsetting feelings | | -.82 | | |
| C: OE | 10. I can take thoughts and feelings as they come, without attempting to control or avoid them* | | -.74 | | |
| C: OE | 11. I am willing to fully experience whatever thoughts, feelings and sensations come up for me, without trying to change or defend against them* | | -.69 | | |
| C: OE | 12. I get so caught up in my thoughts that I am unable to do the things that I most want to do | | -.39 | | |
| C: OE | 14. Thoughts are just thoughts – they don't control what I do* | | -.51 | | |
| C: BA | 15. It seems I am "running on automatic" without much awareness of what I'm doing | | | | .63 |
| C: BA | 16. Even when doing the things that matter to me, I find myself doing them without paying attention | | | | .82 |
| C: BA | 17. I rush through meaningful activities without being really attentive to them | | | | .74 |
| C: BA | 18. I do jobs or tasks automatically, without being aware of what I'm doing | | | | .74 |
| C: BA | 19. I find it difficult to stay focused on what's happening in the present | | | | .47 |
| C: VA | 22. I make choices based on what is important to me, even if it is stressful* | | | .70 | |
| C: VA | 23. My values are really reflected in my behavior* | | | .76 | |
| C: VA | 24. I am able to follow my long terms plans including times when progress is slow* | | | .68 | |
| C: VA | 25. I can keep going with something when it's important to me* | | | .73 | |
| C: VA | 26. I behave in line with my personal values* | | | .75 | |
| C: VA | 27. I undertake things that are meaningful to me, even when I find it hard to do so* | | | .73 | |
| C: VA | 28. I act in ways that are consistent with how I wish to live my life* | | | .70 | |
| C: VA | 29. I can identify the things that really matter to me in life and pursue them* | | | .68 | |
| D: S | I found it hard to wind down | .71 | | | |
| D: A | I was aware of dryness of my mouth | .50 | | | |
| D: D | I couldn't seem to experience any positive feeling at all | .67 | | | |
| D: A | I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion) | .69 | | | |

| Scale | Item | Factor 1 | 2 | 3 | 4 |
|-------|------|------|------|------|------|
| D: D | I found it difficult to work up the initiative to do things | .73 | | | |
| D: S | I tended to over-react to situations | .69 | | | |
| D: A | I experienced trembling (e.g., in the hands) | .67 | | | |
| D: S | I felt that I was using a lot of nervous energy | .37 | | | |
| D: A | I was worried about situations in which I might panic and make a fool of myself | .57 | | | |
| D: D | I felt that I had nothing to look forward to | .60 | | | |
| D: S | I found myself getting agitated | .58 | | | |
| D: S | I found it difficult to relax | .76 | | | |
| D: D | I felt down-hearted and blue | .42 | | | |
| D: S | I was intolerant of anything that kept me from getting on with what I was doing | .64 | | | |
| D: A | I felt I was close to panic | .50 | | | |
| D: D | I was unable to become enthusiastic about anything | .59 | | | |
| D: D | I felt I wasn't worth much as a person | .65 | | | |
| D: S | I felt that I was rather touchy | .67 | | | |
| D: A | I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat) | .64 | | | |
| D: A | I felt scared without any good reason | .49 | | | |
| D: D | I felt that life was meaningless | .61 | | | |
| AAQ | My painful experiences and memories make it difficult for me to live a life that I would value. | .38 | -.39 | | |
| AAQ | I'm afraid of my feelings. | | -.60 | | |
| AAQ | I worry about not being able to control my worries and feelings. | .35 | -.57 | | |
| AAQ | My painful memories prevent me from having a fulfilling life. | .36 | -.43 | | |
| AAQ | Emotions cause problems in my life. | .33 | -.54 | | |
| AAQ | It seems like most people are handling their lives better than I am. | .45 | -.42 | | |
| AAQ | Worries get in the way of my success. | .40 | -.40 | | |

Suppressing loadings with absolute value ≤ .32 (Tabachnick & Fidell, 2007 – suggest that secondary loadings should not be > .32). C: OE = CompACT Openness to Experience; C: BA = CompACT Behavioral Awareness; C: VA = CompACT Valued Action; D: D = DASS Depression; D: A = DASS Anxiety; D: S = DASS Stress; AAQ = Acceptance and Action Questionnaire-II

### 3.6.5 Incremental validity

We examined whether the CompACT was able to account for any incremental variance in distress outcomes, over and above variance accounted for by the AAQ-II; preliminary evidence of incremental validity would support the potential utility of our comprehensive measure of psychological flexibility, indicating additive value beyond the (conceptually narrower) scope of the AAQ-II. For each of the three distress outcome variables (DASS depression, anxiety, and stress subscales), we constructed a two-step hierarchical linear regression model: entering the AAQ-II as an explanatory variable at step one, and entering the CompACT scales (openness to experience, behavioral awareness, and valued action) as explanatory variables at step two. As shown in Table 7, the CompACT scales explained a significant amount of additional variance (2-4%) in all models[2]; specifically, behavioral awareness emerged as a significant independent explanatory variable for three distress outcomes (depression, anxiety, and stress) and valued action emerged as a significant independent explanatory variable for depression. Consistent with its high degree of (conceptual and empirical) overlap with the AAQ-II, openness to experience did not emerge as a significant independent predictor of distress outcomes.

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[2] To assess the explanatory value of the CompACT as a standalone measure, we additionally conducted analyses regressing the three DASS subscales onto CompACT scales in the absence of the AAQ-II. These analyses demonstrated that the CompACT scales alone accounted for the following proportions of variance in the three DASS subscales: depression (42%), anxiety (34%), and stress (36%) – all statistically significant at $p < .001$.

Table 7

*Incremental validity*

| Variable | B | SE | β | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|
| DASS Depression | | | | | |
| Step 1 | | | | .51*** | |
| AAQ-II | .34 | .02 | .72*** | | |
| Step 2 | | | | .55*** | .04*** |
| AAQ-II | .29 | .03 | .62*** | | |
| CompACT Openness to experience | -.01 | .02 | -.04 | | |
| CompACT Behavioral awareness | .09 | .03 | .14** | | |
| CompACT Valued action | .09 | .03 | .14** | | |
| DASS Anxiety | | | | | |
| Step 1 | | | | .43*** | |
| AAQ-II | .26 | .02 | .66*** | | |
| Step 2 | | | | .44*** | .02* |
| AAQ-II | .22 | .03 | .56*** | | |
| CompACT Openness to experience | .01 | .02 | .04 | | |
| CompACT Behavioral awareness | .07 | .03 | .14** | | |
| CompACT Valued action | -.00 | .02 | -.01 | | |
| DASS Stress | | | | | |
| Step 1 | | | | .44*** | |
| AAQ-II | .31 | .02 | .66*** | | |
| Step 2 | | | | .47*** | .03** |
| AAQ-II | .26 | .03 | .56*** | | |
| CompACT Openness to experience | .02 | .02 | .06 | | |
| CompACT Behavioral awareness | .11 | .03 | .17*** | | |
| CompACT Valued action | -.05 | .03 | -.08 | | |

*$p < .05$, **$p < .01$, ***$p < .001$

## 4. Discussion

Extant measures of ACT processes have been argued to be limited due to their circumscribed focus and questionable validity. We aimed to develop a more comprehensive general measure

of ACT processes – based on expert consensus understanding of how these processes should be operationalized and measured – and ascertain its structure, validity, reliability, and comprehensibility to ACT-naïve respondents.

The measure development process resulted in a 23-item instrument with a stable and theoretically coherent three-factor structure. These factors demonstrated strong internal consistency and were found to converge/diverge in theoretically congruent ways with existing measures of ACT processes, socially desirable responding, psychological distress, and general health and wellbeing. Furthermore, the Delphi methodology helped to maximize the face and content validity of items in the developed measure, as judged by a panel of ACT experts.

Notably, no items originating from the AAQ-II (a frequently-used measure of ACT processes) met consensus thresholds for inclusion in the CompACT, supporting previous criticisms of the AAQ-II in terms of its content validity. A potential strength of the Delphi methodology is that item selection and development is undertaken via a distributed and anonymous process, thereby reducing the impact of individual researcher bias and group conformity, and thus facilitating a more bracketed and democratized approach to measure construction. This approach to development appears to have enabled the CompACT items to be refined in relation to coherence with theoretical tenets (first principles) as opposed to coherence with seminal ACT process measures (the AAQ-II). A potential drawback of this process is that item selection and refinement is driven by individuals already socialized to the ACT model and measure development more broadly, rather than reflecting the language-use and different understandings that non-expert respondents might contribute; against this, we incorporated checks for readability and comprehensibility, and final item selection/refinement was based on factor analysis of responses from a large, non-specialist sample.

The CompACT contains both positively- and negatively-valenced items. Research suggests that incorporating items of opposing valence within a single measure can undermine

the resolution of a stable factor structure; specifically, differentially valenced items can load onto separate factors due to common method variance (DiStefano & Motl, 2006; Marsh, 1996; Roszkowski & Soven, 2010). Notwithstanding this, we were able to find a stable and theoretically coherent three-factor structure for the CompACT, which was inclusive of differentially valenced items.

Both the CompACT and the AAQ-II infer psychological flexibility by reverse scoring negatively-valenced items. Conceptually, however, Kashdan and Rottenberg (2010) have argued that psychological flexibility and inflexibility may not be simple polar-opposites; accordingly, reverse-scoring of items may be a less accurate way of measuring specific ACT processes. For example, we may not be able to infer the *presence* of psychological *flexibility* from a reported *absence* of psychological *inflexibility*. Many of the ACT process measures from which we extracted items for the initial Delphi stages adopted a similar practice of attempting to measure ACT processes by gauging (and reverse-scoring) their absence. It certainly seems that some aspects of psychological flexibility are more readily operationalized in terms of their absence.

The three-factor structure emerging from the CompACT is concordant with recent accounts of psychological flexibility in terms of three dyadic processes; broadly defined as: (1) "openness to experience and detachment from literality" (acceptance; defusion); (2) "self-awareness and perspective taking" (present moment awareness; self as context); and (3) "motivation and activation" (values; committed action; Hayes et al., 2011). The three factors of the CompACT (openness to experience, behavioral awareness, and valued action) correspond to these processes (in terms of conceptual focus) but we refined labelling to accurately reflect the particular content of constituent items. Consistent with ACT theory, we found that factors within the CompACT were somewhat inter-related but distinguishable.

Of the CompACT's subscales, openness to experience demonstrated the strongest association with the AAQ-II. This finding is perhaps not surprising given our earlier suggestion that the AAQ-II's items primarily reflect acceptance/experiential avoidance and defusion/fusion processes – certainly, evidence from our factor analysis suggested that the AAQ-II did not load on domains of behavioral awareness or valued action (i.e., other domains of psychological flexibility that are captured by the CompACT) and is thus somewhat limited in scope. In our test of incremental validity, we were able to show that the broader domain coverage of the CompACT added to our ability to explain distress outcomes of interest within this sample. In addition, unlike the AAQ-II, none of the three CompACT subscales cross-loaded onto a factor comprised of distress items. In the context of these data, the finding that the CompACT had incremental validity over and above the AAQ-II, while demonstrating separability from distress items, is particularly encouraging – especially in the light of evidence (from the outcome of our Delphi consensus process) that the CompACT possesses greater face and content validity than the AAQ-II.

Notwithstanding the above, in terms of comprehensiveness, it is important to highlight that the final CompACT contained an uneven distribution of items representing different ACT processes; in particular, no items explicitly gauging the ACT process of "self as context" are included within the measure. In part, this reflected a lack of established measures within the literature from which we could extract items for the initial item pool; although we added self-generated items and items contributed by our expert panel, none remained following the Delphi consensus process. Some panel members suggested that the process of self as context (and indeed other ACT processes) are difficult to capture with verbal descriptors (particularly for prospective respondents who have not yet been socialized to the ACT model) and emphasized that part of ACT's reliance on metaphors is to better convey such abstract principles. While this is undoubtedly the case, accurate operationalization and measurement of principles is

essential if ACT is to continue its progress as a theoretically comprehensive and empirically validated behavioral approach for the alleviation of psychological suffering.

## 4.1. Future research

Given the scope of the CompACT, in terms of its breadth of coverage with respect to constituent ACT sub-processes, the measure may prove useful for researchers and clinicians aiming to understand (and differentiate) the active components of ACT interventions – for example, within therapy component and mediational analyses (Lundgren, Dahl & Hayes, 2008) and single case experimental designs (Smith, 2012) – and may have applied utility as a general process measure in clinical practice. Data from such studies will help to further develop the CompACT, and to assess its performance within different contexts and different populations.

The CompACT's factor structure, validity, and reliability also require additional testing and cross-validation. In particular, based on established test construction principles (e.g. DeVellis, 1991) we recommend that future work proceeds to: (1) confirm the three-factor structure of the CompACT via an a priori confirmatory factor analysis (CFA) in a separate sample; (2) examine the performance of the CompACT among different populations (cross-validation and replication); and (3) establish the CompACT's suitability for repeated administration (i.e. test-retest reliability).

## 5. Conclusion

The CompACT shows initial promise as a comprehensive measure of psychological flexibility (and constituent sub-processes) as conceptualized within the ACT model (Hayes et al., 2011). While the measure was developed to possess strong face and content validity, further research is needed to empirically determine the theoretical scope of the CompACT, and to assess whether the instrument represents a psychometrically robust and workable alternative to existing ACT process measures.

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