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Testing a bifactor model of the comprehensive assessment of acceptance and Commitment Therapy Processes (CompACT) in Finnish and British populations

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ABSTRACT

Introduction: Psychological flexibility is a core concept in Acceptance and Commitment Therapy, with several self-report instruments developed to measure it. One multidimensional measure is the Comprehensive Assessment of Acceptance and Commitment Therapy Processes (CompACT). This study is the first to test a bifactor structure of the CompACT providing new insights into its dimensional structure and how scores should be computed. Additionally, the study validates the Finnish version of the instrument.
Methods: Data from five distinct non-clinical Finnish (n = 281) and British samples (n = 690) were obtained. The internal structure of the CompACT was examined through confirmatory factor analysis. For the Finnish samples, reliability, construct validity, and sensitivity to change were also performed.
Results: The bifactor structure was the best-fitting model across Finnish and British samples, supporting both a general psychological flexibility factor and three specific subcomponents: openness to experience, behavioral awareness, and valued action. The Finnish version of the CompACT demonstrated good internal consistency, strong construct validity, and significant correlations with mindfulness, well-being, stress, and depression measures. Additionally, the measure was sensitive to change in psychological flexibility following ACT-based interventions, with moderate-to-large effect sizes.
Discussion: This study represents a significant advancement in the psychometric evaluation of the CompACT, providing the first empirical evidence that a bifactor model offers the optimal structural representation of the measure. The bifactor structure supports, for the first time, the computation of both an overarching psychological flexibility score and subscale scores in the CompACT, reinforcing the theoretical conceptualization of psychological flexibility. These findings contribute to the refinement of psychological flexibility measurement and offer valuable insights for both research and clinical applications. Future studies should further investigate the bifactor model's added value over other established measures of psychological flexibility.

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1. Introduction

Pschological flexibility is defined as "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 et al., 2006, p. 7). In Acceptance and Commitment Therapy (ACT), psychological flexibility serves as the principal target and process of change, and encompasses a collection of trainable skills that can help people cope with stressors in life while concurrently promoting adaptive behavior in line with chosen values (Gloster et al., 2017). Psychological flexibility is recognized as a protective factor, acting as a buffer against negative psychological outcomes (Gloster et al., 2017; Masuda et al., 2011). Importantly, psychological flexibility is both a fundamental and malleable human capacity, with substantial evidence supporting interventions that enhance it (Gloster et al., 2017). Psychological flexibility is composed of six subprocesses: *acceptance* refers to willingness to experience thoughts, emotions and other inner experiences without attempting to change or suppress them, *defusion* to noticing thoughts and letting them appear and disappear rather than becoming entangled in them, *being present* is the process of becoming aware of what is occurring in the here and now, *self-as-context* is understanding that experiences, thoughts, and feelings are ever-changing, but they don't impact the core self which is bigger than these experiences, *values* or identifying what really matters in life, and *committed action* referring to engagement in behaviors in line with chosen values. In turn, these six sub-processes can be summarized as three pillars or behavior patterns (Hayes et al., 2022). The first pillar is *openness,* comprising the two psychological flexibility aspects of cognitive defusion and acceptance; the second, *awareness,* consists of self-as-context and mindfulness; and, finally, *engagement* comprises values and committed action processes (Hayes et al., 2022). The traditional six sub-processes are visually represented in the form of a Hexaflex, while the three pillars form a Triflex.

The beneficial role of psychological flexibility in relation to health and well-being has a strong evidence in both general (Gloster et al., 2017) and clinical populations (Hayes et al., 2006), with higher psychological flexibility being connected to improved quality of life, functioning, health and positive relationships (Freire et al., 2018; Gloster et al., 2017; Hayes et al., 2006, 2013). Conversely, individuals with low psychological flexibility are likely to report greater levels of psychological distress and lower levels of psychological well-being (Dawson & Golijani-Moghaddam, 2020). A closely linked construct is psychological *in*flexibility which denotes rigid behaviors led by inner experiences and efforts to avoid or control them, to the detriment of meaningful involvement in valued behaviors (Hayes et al., 2012). Psychological inflexibility—manifesting in maladaptive subprocesses such as self-as-content, disconnection from the present moment, disconnection from values, cognitive fusion, experiential avoidance, and inaction—is considered, within the ACT framework, a primary contributor to human suffering. Experiential avoidance is known as the process of avoiding undesirable internal experiences and the context in which it plays out (Kingston et al., 2010) and has been targeted as one of the main processes responsible for a vast range of problematic behaviors (Kingston et al., 2010).

Psychological flexibility is a complex construct, which makes it challenging to measure (Ong & Eustis, 2021), leading to the evolution of multiple measurement instruments. The pioneering instrument for assessing psychological flexibility was the Acceptance and Action Questionnaire (AAQ-I; Hayes, 2004), and its updated version the AAQ-II (Bond et al., 2011), which remains the most commonly utilized measure for the assessment of psychological flexibility. Nonetheless, in recent years, the discriminant validity of the AAQ-II has been subject to criticism, and the measure has been criticized for providing a metric of unidimensional psychological inflexibility or experiential avoidance instead of a comprehensive measure of psychological flexibility (Gámez et al., 2011; Kashdan et al., 2020; Rochefort et al., 2018; Rolffs et al., 2018; Wolgast, 2014). Ruiz and colleagues (2024) suggest deploying the AAQ-II solely as an instrument of psychological inflexibility, as the problem might be the inconsistent utilization of the AAQ-II as tool for measuring psychological flexibility and experiential avoidance instead of psychological inflexibility.

In the last decade, alternative self-reported instruments assessing psychological flexibility have been developed. One of the most prominent among these is the Comprehensive Assessment of ACT Processes (CompACT; Francis et al., 2016). The CompACT, a 23-item self-report measure, is structured into three dyadic subscales: *Openness to experience* (OE), *Behavioral awareness* (BA), and *Valued Action* (VA) designed to assess the six processes of PF. The CompACT was developed to tackle the limitations of established instruments (such as the AAQ-II) by developing a comprehensive measure that captures and differentiates the core theoretical components of psychological flexibility. As the original CompACT is relatively long at 23-items, abbreviated versions of the scale have been developed, such as the CompACT-8 (Morris, 2019), and, recently, the CompACT-10 (Golijani-Moghaddam et al., 2023), and the CompACT-15 (Hsu et al., 2023), which have been found to be a reliable and valid instruments for the short evaluation of psychological flexibility.

In addition to the CompACT, other multidimensional measures have been developed. The Multidimensional Psychological Flexibility Inventory (MPFI) is unique in that it assesses both the six processes of psychological flexibility and those of psychological inflexibility. The instrument has a hierarchical structure, with six factors for psychological inflexibility and six for flexibility, yielding two factors. The original 60-item MPFI was shortened to a 24-item version (MPFI-24) and validated by Grégoire and colleagues (2020), consisting of the two items with the highest factor loadings in their respective MPFI subscale (Grégoire et al., 2020). However, the MPFI, with its 60 or even 24 items, may be unsuitable for all measurement contexts—particularly those with time limitations or participant burden, such as clinical work. To address the limitations of longer instruments, Gloster and colleagues (2021) developed the Psy-Flex. This is a brief, six-item unidimensional measure of psychological flexibility designed to be easy to administer and interpret (Gloster et al., 2021). Both the Psych-Flex and the MPFI assess psychological flexibility in a context-sensitive manner.

While several sound measures of psychological flexibility exist—including the Psy-Flex and the MPFI—the CompACT remains a strong measure for the following reasons. First, unlike the AAQ-II, which has faced criticism regarding its construct validity, the CompACT was explicitly developed to operationalize the six core ACT processes in a more differentiated and theory-consistent manner. Second, compared to the MPFI, the CompACT offers a balance between comprehensiveness and feasibility: the original MPFI comprises 60 items, whereas the CompACT has a more manageable length (23 items), making it more suitable for clinical and applied contexts. Although the short form of the MPFI has a similar number of items (24), its attempt to represent all 12 ACT-related processes in such a short format (2 items per dimension) may compromise the robustness of its dimensionality as recently demonstrated by Navarrete et al. (2025). Third, unlike the Psy-Flex, which is unidimensional, the CompACT allows for both a global score and subscale-level interpretation based on the Triflex model, aligning more directly with recent theoretical advances (Hayes et al., 2022). Importantly, our study is also the first to examine the bifactor structure of the CompACT, providing novel insights into whether the instrument can simultaneously reflect both general psychological flexibility and its core components—an approach not yet tested with the Psy-Flex or MPFI. Additionally, we followed the recommendations of a recent meta-analysis and systematic review (Macri & Rogge, 2024), which support the use of multidimensional instruments such as the CompACT for assessing process-level change in psychological flexibility.

Building on this rationale, it is important to consider how different instruments conceptualize the underlying structure of psychological flexibility. These measures differ substantially in their dimensionality: The PsyFlex fits a one-factor model (Gloster et al., 2021), while the MPFI

supports two major hierarchical factors encompassing twelve first-order factors (Grégoire et al., 2020; Rolffs et al., 2018). Research on Item Response Theory (IRT; Rogge et al., 2019) indicate that the CompACT (Francis et al., 2016) and the MPFI (Rolffs et al., 2018) underscore a more multifaceted interpretation of PF compared to the AAQ-II (Hernández-Lopez et al., 2021). Although it is advised to also compute a total score of the CompACT as a general assessment of psychological flexibility, originally only a three latent factor model—reflecting Openness to Experience, Behavioral Awareness, and Valued Action, in line with the Triflex model—has been successfully tested (Francis et al., 2016), leaving a gap yet to be explored. Additionally, the three-factor model has been further tested and adapted to different versions (Golijani-Moghaddam et al., 2023; Hsu et al., 2023; Morris, 2019), with English-speaking samples (Dawson & Golijani-Moghaddam, 2020; Kroska et al., 2020; Lavelle et al., 2022; Petersen et al., 2021; Shepherd et al., 2022; Stabbe et al., 2019), and in other cultural contexts (e.g. Romanian: Călinici & Călinici, 2021; Chinese: Chen et al., 2023; Zhao et al., 2024; Italian, German, Spanish: Giovannetti et al., 2022; Giovannetti et al., 2024; Korean: Jo et al., 2024; Malaysia: Musa et al., 2022; Czech: Ptáček & Jelinek, 2024; Indonesian: Suganda & Abidin, 2022; Portuguese: Trindade et al., 2021; Trindade et al., 2022).

In relation to transnational validations, however, there is a significant gap in Finnish contextual behavioral research: Despite an extensive array of intervention studies examining the effectiveness of ACT interventions and psychological flexibility in Finnish populations, no measures assessing psychological flexibility have been validated in Finnish samples. The CompACT has been extensively utilized to assess psychological flexibility and aligns with the emerging Triflex model. While it has been applied in Finnish contextual behavioral research for several years, no validated Finnish version exists. This study seeks to fill the gap by investigating the psychometric properties of the Finnish CompACT, contributing to both its cross-cultural validation and theoretical model refinement. Furthermore, we followed the recommendations of a recent meta-analysis and systematic review by Macri and Rogge (2024) which recommends that specific processes of psychological flexibility and inflexibility should be evaluated using multidimensional instruments, such as the CompACT. This type of exploration not only supports more nuanced theoretical understanding of psychological flexibility but also enhances the precision of intervention research by identifying which specific components (e.g., openness, awareness, or action) are most responsive to change and most predictive of outcomes.

1.1. Aims

This study pursued two main objectives. First, we aimed to examine the factor structure of the CompACT by testing four different models: Model 1: three latent factors (Openness to Experience [OE], Behavioral Awareness [BA], and Valued Action [VA]); Model 2: A single-factor structure, onto which all items loaded, representing psychological flexibility (PF); Model 3: A hierarchical three-factor model, where three latent factors were nested under a general overarching factor; and Model 4: A bifactor structure, where each item simultaneously loaded onto a general factor (representing overall psychological flexibility, PF) plus onto three orthogonal specific factors (OE, BA, and VA), corresponding to the theorized dimensions. The independent cross-validation sample of the aforementioned models consisted of a large sample of British individuals that had completed the original CompACT. Testing a bifactor model of the CompACT for the first time could provide valuable insights into whether the computation of the total score is warranted or whether only the three subscale scores should be reported (Reise et al., 2013).

Second, we aimed to examine the psychometric properties, including reliability, construct validity: Hypothesis testing based on theory, and sensitivity to change of the Finnish version of the CompACT. Regarding the first objective, we anticipated that the bifactor structure would show the best model fit within the pooled Finnish sample and the British cross-validation sample (Hypothesis 1). Furthermore, we predicted that these measures would show appropriate internal consistency (Hypothesis 2) and construct validity. In this regard, we expected that the CompACT scores would correlate in theoretically consistent directions: negatively with anxiety, stress, depression, burnout, cognitive fusion, and speech performance concerns, and positively with wellbeing, self-compassion, mindfulness, and adaptive self-perspective taking. We further hypothesized that these correlations would be of medium-to-large magnitude (Hypothesis 3), as indicative of adequate construct validity. Lastly, it was expected that the CompACT measure would be sensitive to change after ACT-based interventions (Hypothesis 4).

2. Method

2.1. Participants

The dataset for this psychometric study consisted of five distinct samples recruited through various channels, with detailed characteristics presented in Table 1.

2.1.1. Finnish samples

Sample 1 included caregivers of children with persistent medical conditions or developmental disabilities, recruited via local newspapers and caregiver organization Facebook pages, meeting criteria such as mild self-reported burnout and possessing sufficient Finnish language skills. Data from 110 eligible participants (93.6 % female; mean age = 40.1 years, SD = 6.68), were included in the present work. Detailed information about this study can be found elsewhere (Lappalainen et al., 2024).

Sample 2 comprised university students (n = 95; 53 % females; mean age = 24.61, SD = 4.77) from communication skills courses at the Language Center and Department of Education, recruited during course sessions. Additional details about this study can be found in Gallego et al. (2020), Gallego (2021), and Gallego et al. (2022).

Sample 3 included students from the University of Jyväskylä (n = 76; 70 % females; mean age = 24.95, SD = 6.50), recruited through newsletters and campus posters, with eligibility requiring no concurrent treatment for performance anxiety (Gorinelli, 2024; Gorinelli et al., 2022).

2.1.2. British samples

Sample 4 was compound of adults from a non-clinical population (n = 377; 74 % females; mean age = 31.34, SD = 11.12) recruited via social media networks (Facebook and Facebook) and university posters, with all participants completing the measures (Francis et al., 2016).

Sample 5 consisted of community participants (n = 313; 81 % females; mean age = 33.3, SD = 11.9) sourced via online platforms such as Twitter, Facebook, LinkedIn, and Instagram) over six months (Bayliss, 2018).

2.2. Procedure

A team of native Finnish speakers, all proficient in English and experts in ACT therapy, translated the original CompACT into Finnish. Any discrepancies in the initial translation were reviewed and resolved before the items were back-translated into English. Further discussions were conducted to address inconsistencies with the original CompACT, ensuring that the Finnish adaptation maintained conceptual equivalence with the English version. The Finnish version of the CompACT is available in the supplemental appendix (Supplementary Appendix A).

The study was carried out with ethical approval from the Ethics Committee of the University of Jyväskylä. Participants across all samples provided written informed consent voluntarily, agreeing to both participate in their respective studies and allow their data to be analyzed. All studies adhered to the principles outlined in the Declaration of Helsinki, and no financial compensation was offered for participation. The datasets were collected from distinct studies presented

Table 1
Sociodemographic Characteristics of the Participants in each Study Sample.

Characteristics	Finnish samples			British samples	
	Sample 1 (n = 110)	Sample 2 (n = 95)	Sample 3 (n = 76)	Sample 4 (n = 377)	Sample 5 (n = 313)
Gender (women): n (%)	103 (93.6)	50 (52.63)	53 (69.7)	279 (74)	253 (80.8)
Age (in years): *M (SD)*	40.1 (6.69)*	24.61 (4.77)	24.95 (6.50)	31.34 (11.12)	33.3 (11.9)

Note: * missing data = 2.

below. The principal investigator of each study provided data that has not been previously analyzed or published in any scientific journal.

2.3. Measures

Psychological flexibility was assessed using the Comprehensive Assessment of ACT processes (CompACT; Francis et al., 2016), a 23-item questionnaire designed to evaluate three key dimensions: valued actions, behavioral awareness (CompACT-BA), and openness to experience (CompACT-OE). Participants responded to each item using a 7-point Likert scale, which options ranging from 0 (strongly disagree) to 6 (strongly agree). The overall CompACT score ranges from 0 to 138, with higher ratings representing greater levels of psychological flexibility (openness, awareness, action).

The Shirom-Melamed Burnout Questionnaire (SMBQ, Lundgren-Nilsson et al., 2012; Melamed et al., 1999) is a 22-item instrument utilized to measure symptoms of parental burnout. It consists of four dimensions: listlessness, physical fatigue, tension, and emotional exhaustion. Responses are collected using a Likert scale, ranging from 1 (almost never) to 7 (almost always). The total scores and subscale scores were calculated as the mean of the respective item responses, with higher scores indicating greater levels of burnout. Previous studies have reported strong reliability and validity for the SMBQ (Lundgren-Nilsson et al., 2012). In this study, the measure achieved a Cronbach's alpha of .92, reflecting excellent internal consistency.

The Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001) served as the instrument for evaluating depressive symptoms and determining the severity of depressive disorders. The scale includes 9 items rated on Likert scale from 0 (not at all) to 3 (almost every day), resulting in an overall score ranging from 0 to 27. Greater values represent higher depressive symptoms. The PHQ-9 has demonstrated good validity and reliability (Kroenke et al., 2001). In this study, the coefficient alpha was .78, indicating adequate reliability.

The Five Facet Mindfulness Questionnaire (FFMQ) was utilized to measure mindfulness abilities (Baer et al., 2006). It assesses five mindfulness dimensions: non-judging of inner experiences, describing, observing, acting with awareness, and non-reactivity to inner experiences. The questionnaire includes 39 statements scored on a Likert scale ranging from 1 (never or very rarely true) to 5 (very often or always true). Total values span from 39 to 195. Greater scores represent higher levels of mindfulness skills. The FFMQ has shown good reliability and validity indicators (Baer et al., 2006). In the present research, Cronbach's alpha demonstrated a value of .87 for the total score, with subscale reliability of .74 for observing, .79 for non-judging, .91 for describing, .79 for non-reacting, and .82 for acting with awareness.

Speech Performance Scale Self-Reported Version (SPS-SR; Rapee & Lim, 1992) was employed to evaluate self-perceived quality of speech performance. This instrument comprises 17 statements, each assess on a Likert scale ranging from 0 to 4, with 0 representing *'not at all'* and 4 representing *'very much'*. Total points span from 0 to 68. Higher points indicate greater speech-perceived performance. In relation of the reliability and validity of the scale, this has demonstrated good psychometric properties (Rapee & Lim, 1992; Tutino et al., 2020). In this current research, the Cronbach's alpha was .88.

The 3-Dimensional Reno Inventory of Self-Perspective (3D-RISP; Jeffcoat, 2015) was utilized to assess self-perspective skills of psychological flexibility and pathology. This self-reported scale comprises 13-item, rated on a Likert scale ranged from 0 (*never*) to 7 (*always*). It consists of three subdomains: transcendent (awareness of the self's transcendence), centered (grounded in self-awareness), entangled (identified with self-concept). Overall scores span from a minimum of 13 and a maximum of 91. Greater values reflecting higher self-perspective skills. Existing literature have demonstrated robust internal consistency observed in two sizable samples (Jeffcoat, 2015; $\alpha = .86$ and $\alpha = .79$). In this study, Cronbach's alpha for the overall score measured .88, with subscales reliabilities of .85, .83, and .73 for the entangled, centered, and transcendent, respectively.

The State Cognitive Fusion Questionnaire (SCFQ; Bolderston et al., 2018) was used to evaluate cognitive fusion in the here and now instead of as an overall trait Gillanders et al., 2014). It consists of 7-item assessed on a 7-point Likert scale spanning from 1 (*never true*) to 7 (*always true*). Greater results suggest stronger cognitive fusion. The SCFQ has demonstrated high internal consistency in a sizable sample (Bolderston et al., 2018; $\alpha = .95$). In this study, the reliability coefficient (Cronbach's alpha) was .78.

The Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) was employed in order to assess anxiety in societal interactions. There are 20 items in the scale, each item evaluated on a 5-point Likert scale spanning from 0 (*not at all characteristic or true of me*) to 4 (*extremely characteristic or true of me*). Overall points span from a minimum of 0 to a maximum of 80. Greater points showing higher levels of anxiety in social situations. The SIAS demonstrates strong reliability, with alpha values (Cronbach) reported between .88 and .93, and it exhibits good discriminant validity (Mattick & Clarke, 1998). In this current study, the reliability was excellent, with an alpha value (Cronbach) of .92.

The Personal Report of Communication Apprehension (PRCA-24; McCroskey, 1982) was used to assess communication anxiety in four contexts: public speaking, small groups, meetings, and interpersonal encounters. The instrument comprises 24-statements, with responses rated on a Likert scale spanning from a minimum of 1 (*strongly disagree*) to a maximum of 5 (*strongly agree*). Greater results indicate higher levels of communication anxiety in societal situations. In each context, results vary from a minimum of 6 to a maximum of 30, contributing to an overall score between 24 and 120. PRCA-24 has shown to have a strong reliability, with Cronbach's alpha scores ranging from .93 to .95 (McCroskey, 1978, 1984; McCroskey et al., 1985). In this study, the total instrument yielded an alpha (Cronbach) of .92, with reliability coefficients of .77, .90, .89, and .74 for the public-speaking, small-group, meeting, and interpersonal-contexts subscales, respectively.

The Mental Health Continuum Short Form (MHC-SF; Keyes, 2009) was used with the objective of assessing wellbeing in psychological, emotional, and social domains. It is comprised of 14 statements assessed on a Likert scale, ranging from a minimum of 0 (*never*) to a maximum of 5 (*every day*). Overall results span from a minimum of 0 to a maximum of 70. Greater values reflect higher levels of well-being. The MHC-SF has previously shown excellent psychometrical properties (Keyes, 2009; $\alpha >$ .80). In our study, exhibited a Cronbach's alpha scores of .87.

The Perceived Stress Scale (PSS; Cohen et al., 1983) is an instrument utilized to assess stress levels. It comprises 10 statements assessed on a Likert scale ranging from 0 (*never*) to 4 (*very often*) to measure the levels of perceived stress in the previous month. Overall results span from a minimum of 0 to a maximum of 40. Greater results demonstrate higher levels of perceived stress. From previous research, PSS has demonstrated the internal consistency to range between .74 and .91 (Lee, 2012). In this

study, we found an alpha (Cronbach) of .82.

The Self Compassion Scale – Short Form (SCS-SF; Raes et al., 2011) is utilized for assessing self-compassion skills. The scale consists of 12 items rated on a Likert scale, spanning from a minimum of 1 (*almost never*) to a maximum of 5 (*almost always*). Greater marks indicate higher levels of self-compassion skills. The SCS-SF has demonstrated an internal consistency of .86 (Raes et al., 2011). In this current study, the psychometric properties were good, with an alpha (Cronbach) of .85 for the overall score.

The Fear of Negative Evaluation Scale- Brief Form (BFNE; Leary, 1983) is utilized to evaluate the subjective fear of being negatively evaluated by others in social contexts. The scale comprises 12-item rated on a Likert scale ranging from a minimum of 0 (n*ot at all characteristic of me*) to a maximum of 4 (*extremely characteristic of me*). Greater marks demonstrate greater fear of being negatively evaluated. The BFNE has shown an excellent internal consistency (Kampmann et al., 2016). In the current study, the Cronbach's alpha resulted on a .91.

Several of the measures included in the present study (e.g., SPS-SR, SIAS, PRCA, FNE) were selected in the context of prior or ongoing ACT-related research projects and reflect the original study designs in which the CompACT was administered.

2.4. Statistical analyses

Descriptive statistics, including mean (M), standard deviation (SD), skewness, and kurtosis, were calculated for all items of the CompACT. Additionally, corrected item-total correlations (r_{tot}) were analyzed in order to evaluate the contribution of each of the items to the overall scale. These correlations are useful for identifying items that may not align with the construct being measured. Specifically, a r_{tot} value below .30 suggests that an item may be capturing a construct different from the one intended by the scale (DeVellis, 1991).

To assess the dimensionality of the CompACT scale, we conducted confirmatory factor analyses (CFAs) using diagonally weighted least squares estimation (WLSMV), selected because of its robustness in dealing with ordinal data and smaller sample sizes. The sample size requirements were met, as a minimum of 100 participants is generally sufficient for analyzing relatively simple models (Kline, 2015). Based on the conceptual framework presented by the developers of the CompACT scale (Francis et al., 2016), we examined three first-order latent factors (Openness to Experience, Behavioral Awareness, and Valued Actions). Additionally, we examined the following three models: First, a one-factor model, were every item loaded onto one latent factor representing psychological flexibility; Second, a hierarchical three-factor model, where three latent factors were nested under a higher-order global factor; Third, a bifactor model, where each item is loaded onto a global factor as well as to three orthogonal specific factors corresponding to the theorized dimensions. The same factor models were also tested in the British samples to assess the replicability of the instrument's factor structure. Model fit was evaluated using the following indices and criteria for acceptable fit (Mokkink et al., 2024; Schermelleh-Engel et al., 2003): CFI and TLI $\geq$.95 (conservative) or $\geq$ .90 (liberal), RMSEA $\leq$.06 (conservative) or $\leq$ .10 (liberal), and SRMR $\leq$.05 (conservative) or $\leq$ .10 (liberal).

Cronbach alpha index, representing the average inter-item correlation, was evaluated for the total score of the CompACT as well as the subscales. The ω coefficient (unbiased alternative index of reliability) was also computed.

To evaluate construct validity, we calculated Pearson correlation coefficients for the following relationships: in relation to the CompACT, and the FFMQ, PHQ-9, SMBQ (Sample 1); between the CompACT and the SPS-SR, PRCA-PS, SCFQ, 3D-RISP (sample 2); and between the CompACT and the PRCA-24, MHC-SF, PSS, SIAS, SCS-SF, BFNE (Sample 3). For those variables that deviated from normal distribution, Spearman correlation analyses were performed instead. The magnitude of the correlation was understood according to the guidelines proposed by Cohen (Cohen, 1992): small (r = .10–.29), medium (r = .30–.49), and large (r = .50–1.00).

Paired-samples t-tests was utilized for evaluating the sensitivity to change. In Sample 1, the effect of a 10-week iACT intervention was evaluated on CompACT total scores and subscale scores (Valued Actions, Openness to Experience and Behavioral Awareness). In Sample 2, the effects of a 37-min ACT intervention on CompACT scores were also assessed. Finally, in Sample 3, the impact of three weekly 40-min VR-based ACT sessions was analyzed. These results are presented as mean score changes, significance levels, and effect sizes (Cohen's *d*). A value of .20 was interpreted as small, a value of .50 moderate, and a value above .80 large, for both the within- and between-group effect size (Cohen & Williamson, 1988). For the analysis involving descriptive statistics, correlation analyses, and paired-samples t-tests we used IBM SPSS Statistics, Version 28.0.1.1. For analyzing the CFA, we utilized the Mplus, Version 8.6.

3. Results

3.1. Item analysis

Exploratory analyses demonstrated that the item values of the Finnish CompACT followed a normal distribution, based on skewness and kurtosis (see Table 2). Specifically, all items exhibited skewness and kurtosis within acceptable ranges for psychological measures. The majority of items displayed corrected item-total correlations (r_{tot}) above the recommended .30 level, indicating adequate homogeneity. Notably, Item 2 ("One of my big goals is to be free from painful emotions") showed a r_{tot} value of .25, falling slightly below the cutoff.

3.2. Dimensionality

Fit indices for all the tested CFA models are reported in Table 3**.** The one-factor solution showed poor fit across both samples. The correlated and hierarchical three-factor models reached only marginal fit, with acceptable indices observed in the British but not in the Finnish sample. By contrast, the bifactor model provided the best fit in both samples, achieving acceptable values under liberal criteria in the Finnish (CFI = .92, TLI = .91, SRMR = .05, RMSEA = .08, 90 % CI [.07, .09]) and British (CFI = .93, TLI = .92, SRMR = .04, RMSEA = .09, 90 % CI [.08, .09]) data.

In contrast, the bifactor model exhibited the best fit in both the Finnish (CFI = .92, TLI = .91, SRMR = .05, RMSEA = .08 with 90 % CI [.07, .09]) and British (CFI = .93, TLI = .92, SRMR = .04, RMSEA = .09 with 90 % CI [.08, .09]) samples. In the Finnish sample, the general factor demonstrated significant factor loadings (ranging from .27 to .68), Behavioral Awareness (ranging from .19 to .81), and Valued Action (ranging from .38 to .62). Item 6 (from the Openness to Experience subfactor) showed a non-significant factor loading (.12). Fig. 1 and Fig. 2 display the bifactor model with standardized factor loadings for the Finnish and British samples, respectively.

3.3. Reliability

The Finnish CompACT total scale showed good internal consistency with Cronbach's α (α = .88) and McDonald's ω (ω = .87) both exceeding the commonly accepted threshold of .60. The subscales of Behavioral Awareness, Openness to Experience and Valued Actions also exhibited good internal consistency, based on both Cronbach's α and McDonald's ω. Specifically, the Openness to Experience subscale showed α = .82 and ω = .82. The Behavioral Awareness subscale had α = .81 and ω = .80, while the Valued Actions subscale showed α = .84 and ω = .85. Overall, the results indicate that both Cronbach's α and McDonald's ω provide reliable estimates of internal consistency for the CompACT total and its subscales, with values generally exceeding .80 for all scales and subscales.

Table 2
Mean (M), Standard Deviation (SD), Skewness, Kurtosis, and Corrected Item-Total Correlations (r_{tot}) for the CompACT items (Finnish Pooled samples).

CompACT items	M (SD)	S	K	r_{tot}
1. I can identify the things that really matter to me in life and pursue them	4.69 (1.18)	−1.49	2.28	.42
2. One of my big goals is to be free from painful emotions	2.34 (1.70)	.48	−.88	.25
3. I rush through meaningful activities without being really attentive to them	2.72 (1.46)	.51	−.62	.33
4. I try to stay busy to keep thoughts or feelings from coming	3.47 (1.86)	−.15	−1.28	.45
5. I act in ways that are consistent with how I wish to live my life	3.49 (1.61)	−.41	−1.15	.55
6. I get so caught up in my thoughts that I am unable to do the things that I most want to do	3.29 (1.74)	.01	−1.29	.51
7. I make choices based on what is important to me, even if it is stressful	4.21 (1.33)	−.77	−.18	.42
8. I tell myself that I shouldn't have certain thoughts	3.66 (1.92)	−.28	−1.37	.46
9. I find it difficult to stay focused on what's happening in the present moment	3.28 (1.75)	.02	−1.26	.50
10. I behave in line with my personal values	4.62 (1.11)	−1.26	1.82	.49
11. I go out of my way to avoid situations that might bring difficult thoughts, feelings, or sensations	3.22 (1.68)	−.02	−1.22	.49
12. Even when doing the things that matter to me, I find myself doing them without paying attention	3.12 (1.50)	.28	−1.02	.37
13. I am willing to fully experience whatever thoughts, feelings and sensations come up to me, without trying to change or defend against them	3.49 (1.64)	−.27	−.98	.53
14. I undertake things that are meaningful to me, even when I find it hard to do so	3.77 (1.38)	−.48	−.64	.50
15. I work hard to keep out upsetting feelings	3.30 (1.60)	−.10	−1.07	.53
16. I do jobs or tasks automatically, without being aware of what I'm doing	3.26 (1.64)	.00	−1.07	.40
17. I am able to follow my long terms plans including times when progress is slow	3.81 (1.59)	−.57	−.78	.44
18. Even when something is important to me, I'll rarely do it if there is a chance it will upset me	3.58 (1.51)	−.02	−.99	.51
19. It seems I am "running on automatic" without much awareness of what I'm doing	3.52 (1.78)	−.18	−1.19	.55
20. Thoughts are just thoughts -they don't control what I do	3.26 (1.59)	−.18	−1.07	.31
21. My values are really reflected in my behavior	4.15 (1.25)	−.76	.39	.40
22. I can take thoughts and feelings as they come, without attempting to control or avoid them	3.30 (1.57)	−.03	−1.07	.57
23. I can keep going with something when it's important to me	4.64 (1.20)	−1.09	.84	.48

Note. Missing information from study 1 (n = 3).

3.4. Construct validity

Tables 4 and 5 shows scores correlations of the Finnish CompACT with SMBQ, PHQ-9, FFMQ, SPS-SR, SCFQ, 3D-RISP, PRCA-PS, PRCA-24, MHC-SF, PSS, SIAS, SCS-SF, and BFNE. Focusing on total scores, correlations ranged from −.22 to .81, were statistically significant ($p < .05$), and aligned with theoretical expectations, supporting the scale's construct validity.

3.5. Sensitivity to change

The paired-samples t-tests results, as shown in Table 6, evaluate the impact of different ACT-based interventions on participants; CompACT scores. The participants who underwent the 10-week iACT and the 37-min ACT interventions showed a statistically significant increase in their CompACT total scores as well as in the Valued Action and Openness to Experience scores, but not in Behavioral Awareness scores. Overall, the effect sizes ranged from moderate to large. Those who participated in the VR-based ACT sessions showed a statistically significant increase of all CompACT scores, with large effect sizes.

Table 3
Goodness-of-fit indices of potential models for the CompACT (23 items) for the Finnish and British sample.

Factor structure	χ^2			CFI	TLI	SRMR	RMSEA [90 % CI]
	Est.	*df*	*p*				
One factor model							
Finnish sample	1863.152	230	<.001	.639	.603	.105	.160 [.154, .167]
British sample	5414.914	230	<.001	.658	.624	.126	.184 [.180, .188]
Three-correlated factor model							
Finnish sample	736.807	227	<.001	.887	.874	.065	.090 [.083, .098]
British sample	1729.068	227	<.001	.901	.890	.059	.100 [.095, .104]
Hierarchical three factor model							
Finnish sample	736.808	227	<.001	.887	.874	.065	.090 [.083, .098]
British sample	1729.068	227	<.001	.901	.890	.059	.100 [.095, .104]
Bifactor model							
Finnish sample	555.951	207	<.001	.923	.906	.051	.078 [.070, .086]
British sample	1237.135	207	<.001	.932	.917	.043	.087 [.082, .091]

Note. The chosen estimator was weighted least square mean and variance adjusted (WLSMV). Abbreviations: 90 % CI, 90 % confidence interval of the RMSEA; CFI, Comparative Fit Index; RMSEA, root mean square error approximation; TLI, Tucker–Lewis Index; SRMR, Standardized Root Mean Square Residual.

4. Discussion

This study is the first to examine a bifactor model of the CompACT, providing new insights into its dimensional structure and score computation. We analyzed the factor structure of the CompACT in pooled samples from the Finnish and British general populations, while also validating the Finnish version of the instrument. The study followed the future research suggestions from Francis et al. (2016) by exploring the best model structure for the CompACT using CFA, examining the performance of the measure across different populations, monitoring if it reflects the construct it is supposed to measure, and observing the sensitivity to change of the measure after an intervention. The aim of this study was therefore to identify the best fitting model of the CompACT across the Finnish and British cultural contexts, while addressing the need for a transnational validation of a psychological flexibility self-report measure within Finnish CBS research.

Data in the study was normally distributed, and item correlation exceeded the threshold in most of the cases, suggesting that items are consistent and cohesive measuring similar aspects of the same construct. Ensuring precision in measuring a construct is important, yet it is often challenging. Several measures of psychological flexibility have been developed and tested in an effort to accurately measure this construct (Bond et al., 2011; Gloster et al., 2021; Grégoire et al., 2020; Hayes, 2004; Rolffs et al., 2018).

This study tested four different models of the CompACT's structure. For the first time, the bifactor model has been tested in the CompACT, and it resulted in the best fitting model across both the Finnish and British samples (Hypothesis 1), highlighting the importance of psychological flexibility as a global construct while also distinguishing its three

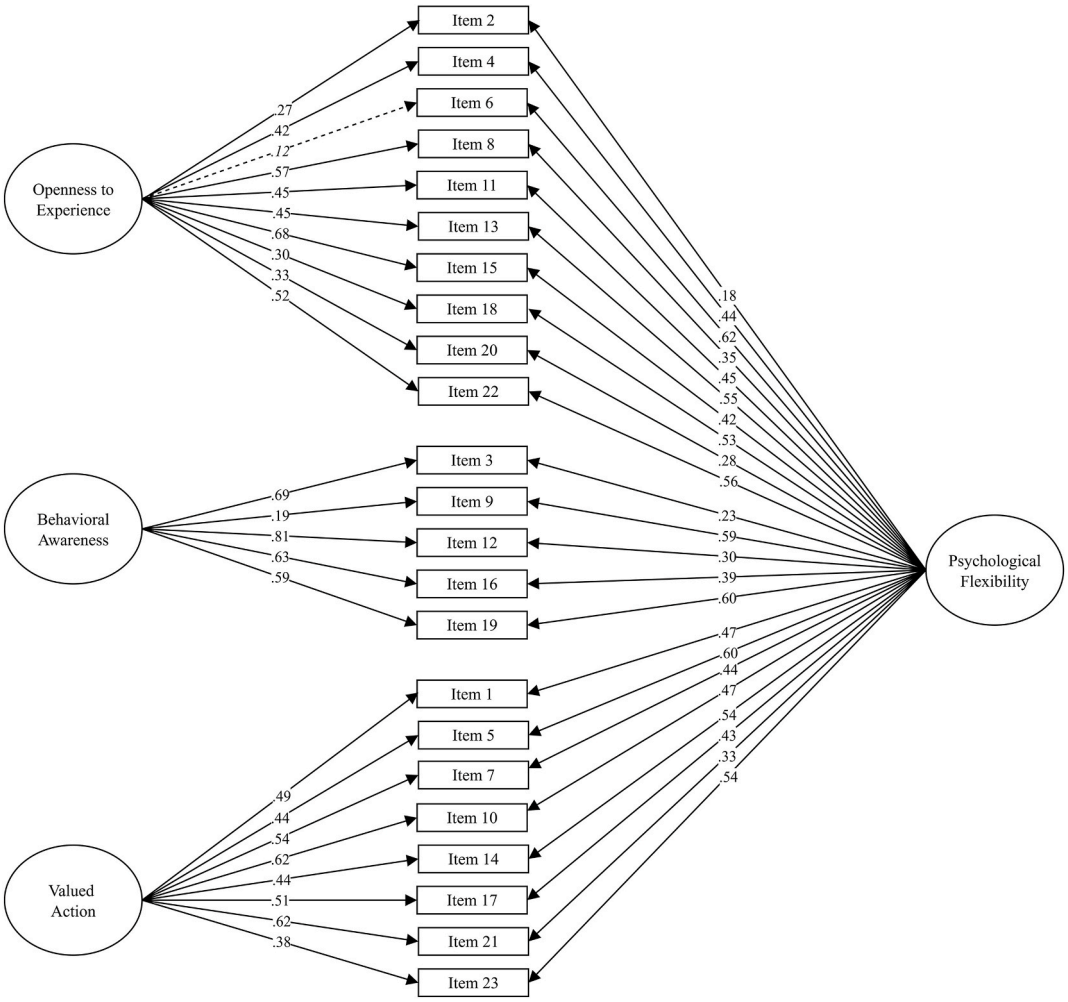

Fig. 1. The CompACT bifactor structure in the Finnish Sample. Note: Non-significant factor loadings are given in Italics and indicated by dashed lines.

subcomponents (openness to experience, behavioral awareness, and valued actions). Difficulty in measuring psychological flexibility as a single construct has been reported in the literature (Kashdan et al., 2020; Ong et al., 2020) and recent research suggests how mechanisms of psychological flexibility should be evaluated using multidimensional scales (Macri & Rogge, 2024). This study is novel in demonstrating that the CompACT can be used to conceptualize psychological flexibility as both a unidimensional construct of general flexibility and a multidimensional construct addressing multiple psychological processes. Consequently, the bifactor model supports the calculation of a total psychological flexibility score while also allowing for individual subscale scores. This increases the utility of the CompACT in both research and practice, enhancing the interpretability of the measure for various purposes and in different contexts. Additionally, this study represents the first attempt to validate the measure within the Finnish context.

An additional finding of interest was that several factor loadings for the Finnish version were lower than those reported in the original English validation, with one item (Item 6) from the Openness to Experience subscale showing a non-significant loading. Although we applied a rigorous forward–backward translation procedure to ensure conceptual equivalence, it is possible that certain ACT-related terms or idiomatic expressions have no fully equivalent counterpart in Finnish. Cultural norms regarding emotional expression and acceptance may also influence how some items are endorsed. For example, Finnish cultural tendencies toward emotional restraint might partially explain the weaker association of Item 6 with its intended latent factor. Similar patterns have been observed in other cross-cultural validations of the CompACT (Giovannetti et al., 2022; Musa et al., 2022; Trindade et al., 2021; Zhao et al., 2024). Moreover, it is also important to highlight that in bifactor models, item variance is partitioned between a general and one specific factor, which naturally leads to lower factor loadings in the specific dimensions compared to traditional correlated factor models, such as the original three-factor solution. Thus, the reduced loadings observed here are consistent with both methodological expectations (Reise et al., 2010) and potential cultural-linguistic influences. While the overall reliability and validity of the Finnish version remain strong, these results suggest that minor item refinements could further improve construct alignment in future adaptations.

In terms of reliability, the CompACT demonstrated excellent reliability indices (Hypothesis 2), exceeding the established threshold values for both the general total score and the individual subscales. Similarly, Francis et al. (2016) reported high levels of internal consistencies, which aligns with the findings of our study. In line with recent methodological recommendations (Hayes & Coutts, 2020), this study calculated both Cronbach's α and McDonald's ω values. The results of our study, partly based on samples from the Finnish population, also align well with findings from studies in other cultural populations, which similarly reported good reliability levels (e.g. Chen et al., 2023; Musa et al., 2022; Ptáček & Jelinek, 2024; Trindade et al., 2022; Zhao et al., 2024), supporting the robustness of the CompACT's internal consistency.

Regarding construct validity, the CompACT demonstrated expected relationships with external constructs (Hypothesis 3), showing strong negative correlations with measures of distress (e.g., anxiety, stress, and

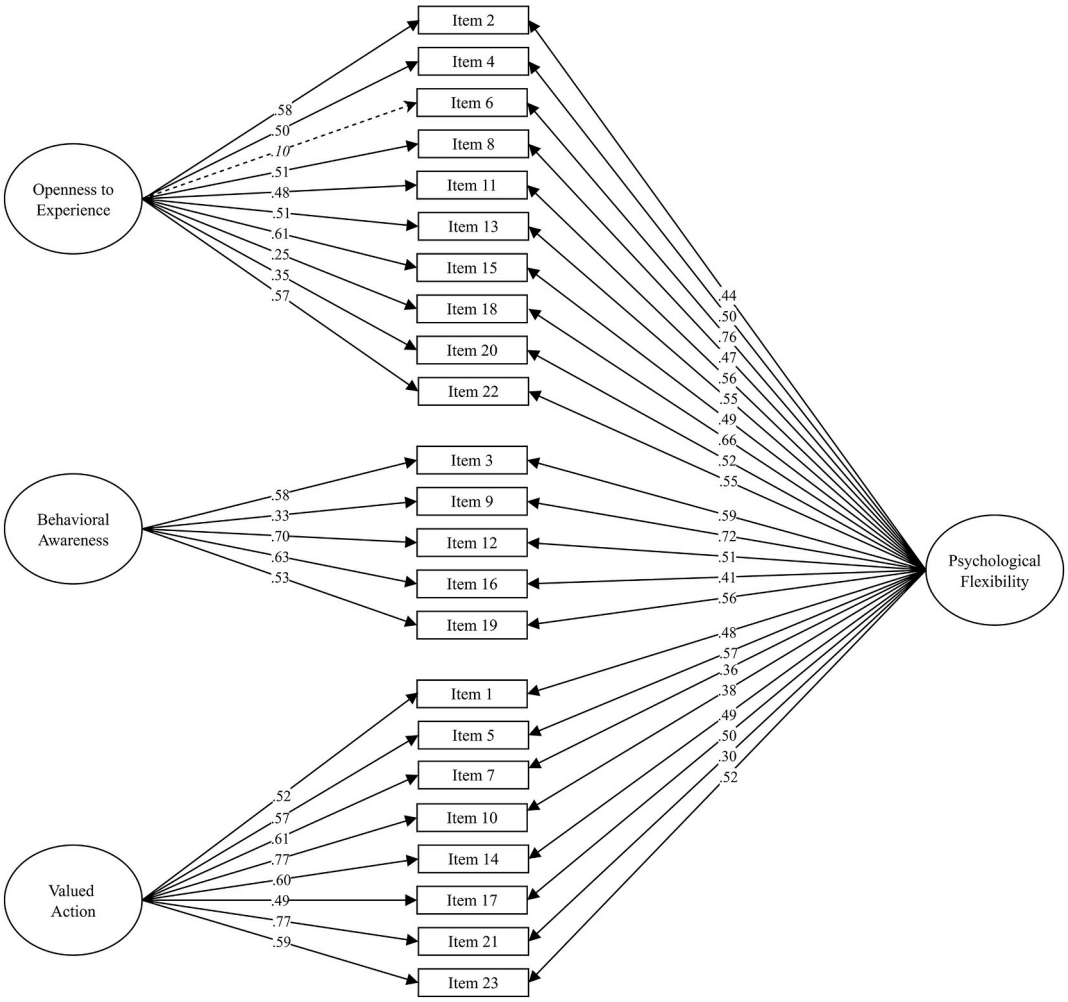

Fig. 2. The CompACT bifactor structure in the British Sample. Note: Non-significant factor loadings are given in Italics and indicated by dashed lines.

depression) and positive correlations with well-being, self-compassion, and mindfulness. Notably, the Behavioral Awareness (BA) subscale exhibited a distinct pattern, aligning less consistently with distress-related measures (e.g., PHQ-9, r = −.12) compared to Openness to Experiences (OE) and Valued Actions (VA). However, BA demonstrated strong internal consistency (.80–.81) and meaningful correlations with theoretically related constructs such as "acting with awareness" (r = .63), supporting its content validity within the psychological flexibility framework. This pattern suggests that BA may not function as a direct buffer against distress-related outcomes such as depression. Instead, BA could serve as a foundational process that enables other psychological flexibility components—being attuned to present-moment experiences may facilitate acceptance (OE) and value-based action (VA) but may not independently enhance well-being. Additionally, BA's moderate correlation with non-judging (r = .25) indicates that, without openness, heightened awareness alone might increase discomfort rather than promote PF. While many of the observed correlations aligned with theoretical expectations in terms of direction and significance, not all met the hypothesized medium-to-large magnitude threshold. This was particularly the case for the Behavioral Awareness subscale but also affected a subset of correlations across other subscales. These results may reflect contextual influences on how psychological flexibility is expressed and measured, or variability in the conceptual overlap between ACT processes and some of the comparator constructs. Future studies should investigate these discrepancies further, ideally using larger samples and culturally specific models of PF.

When used in an intervention study, the Finnish version of the CompACT detected meaningful variation of the construct (Hypothesis 4), highlighting the measure sensitivity to change. This is an important aspect when trying to assess the efficacy of an intervention protocol and participant's changes over time. In particular, we reported a large effect size in a VR-based ACT intervention for social and public speaking anxiety of university students (Gorinelli et al., 2023), possibly suggesting innovative approaches for enhancing psychological flexibility. Although significant in two out of three intervention studies, the Behavioral Awareness subscale appeared to perform less effectively in the Finnish sample compared to the remaining two subscales, which showed much greater changes over time. This may be due to the intervention's focus on processes more directly related to other aspects than behavioral awareness. Future research should explore the CompACT sensitivity to change on different samples and interventions.

Finally, this study confirms that the CompACT is a good choice when choosing a measure for psychological flexibility. It is a multidimensional measure that is not bound to a specific time frame, allowing for the collection of both a general psychological flexibility score and scores for specific subprocesses when needed. This makes it a versatile and valuable tool for both research and clinical practice.

This study has several limitations. A first limitation may concern the sample that was predominantly a female, non-clinical convenience sample, not recruited specifically for the purposes of this study. This indicates that the CompACT was administered either online or in person, alongside different questionnaires, and at varying time points. Second, the sample size of the Finnish group (n = 281), while adequate for the confirmatory factor analyses conducted, may limit the stability of

Table 4
Construct validity of the CompACT (Sample 1: n = 110; Sample 2: n = 95).

Measures	M (SD)	CompACT	OE	BA	VA
SMBQ (sample 1) [1–7]	4.63 (.85)	−.22*	−.14	−.22*	−.15
Physical fatigue [1–7]	4.78 (.92)	−.17	−.09	−.16	−.14
Cognitive weariness [1–7]	4.86 (.92)	−.23*	−.12	−.17	−.24*
Tension [1–7]	4.42 (1.12)	−.38**	−.28**	−.23*	−.31**
Listlessness [1–7]	4.43 (1.18)	−.05	−.04	−.17	.07
PHQ-9 (sample 1) [0–27]	9.44 (4.79)	−.39**	−.32**	−.12	−.37**
FFMQ (sample 1) [39–195]	126.04 (15.50)	.63**	.54**	.45**	.35**
Observing [8–40]	26.10 (5.19)	.13	.02	.23*	.10
Describing [8–40]	28.71 (5.75)	.24*	.25**	.05	.17
Acting with awareness [8–40]	22.18 (4.70)	.43**	.29**	.63**	.09
Non-judging [8–40]	28.16 (7.00)	.59**	.60**	.25**	.33**
Non-reacting [7–35]	20.89 (4.04)	.37**	.31**	.19	.29**
SPS-SR (study 2) [0–68]	38.58 (9.56)	.34**	.38**	.13	.26*
SCFQ (Study 2) [7–49]	26.92 (12.01)	−.69**	−.71**	−.52**	−.40**
3D-RISP (Study 2) [13–91]	63.31 (10.82)	.81**	.81**	.50**	.61**
Entangled [7–49]	33.02 (6.88)	−.77**	−.78**	−.48**	−.56**
Centered [4–28]	19.58 (3.55)	.69**	.75**	.38**	.48**
Transcendent [2–14]	10.71 (2.44)	.40**	.31**	.31**	.39**
PRCA-PS (Study 2) [6–30]	20.5 (4.75)	−.41**	−.45**	−.23*	−.26*

Note. The numbers in brackets beside the scale and subscale names represent the range of possible scores. For the SMBQ and its subscales (Physical Fatigue, Cognitive Weariness, Tension, and Listlessness), the numbers in brackets represent mean item values, rather than total scores. CompACT, Comprehensive Assessment of Acceptance and Commitment Therapy Processes, with subscales OE for Openness to Experiences, BA for Behavioral Awareness, and VA for Valued Actions; SMBQ, Shirom-Melamed Burnout Questionnaire with subscales with subscales Physical Fatigue, Cognitive Weariness, Tension, and Listlessness; PHQ-9, Patient Health Questionnaire-9 items; FFMQ, Five Facet Mindfulness Questionnaire with subscales Observing, Describing, Acting with awareness, Non-judging and Non-reacting; SPS-SR, Speech Performance Scale Self-Reported; SCFQ, State Cognitive Fusion Questionnaire; 3D-RISP, Three Dimensional Reno Inventory of Self-Perspective; PRCA-PS, Personal Report of Communication Apprehension-Public Speaking subscale. *p < .05; **p < .01.

parameter estimates in the bifactor model. Hence, larger sample sizes are recommended in future studies to confirm and extend these findings. At the same time, this validation study includes data not only from the Finnish population but also from a British sample, broadening the observation to a large sample and across multiple populations and cultural contexts. Third, while this approach provided the advantage of including a broad variety of measures for comparison, it also resulted in the collection of different amounts of constructs across different samples. Fourth, the study did not assess test–retest reliability, which limits conclusions about the stability of the Finnish CompACT scores over time. Evaluating the test-retest reliability is essential to determine whether the measure yields consistent results under stable conditions. Future studies should use longitudinal designs and evaluate reliability over time by means of the intraclass correlation coefficient. Fifth, although this study examined theoretically grounded correlations with related constructs to support construct validity, no other psychological flexibility measures (e.g., the MPFI or Psy-Flex) were included. As a result, convergent validity in the strict psychometric sense could not be evaluated. Future studies should include such comparator instruments to assess convergent validity more directly and comprehensively. Finally, all data were collected using the measure itself, a self-report measure, which may introduce biases affecting its validity. Future research using the Finnish population could expand sampling to include more diverse populations in terms of gender, age, and educational background, and consider longitudinal designs to assess the stability of CompACT scores over time. Replication studies should consider exploring both general total score and subscales of the CompACT using large samples available. Although the measure has been tested in different cultural contexts, it is important to observe the measure psychometric properties with specific populations, cultures, and clinical/non-clinical samples.

5. Conclusion

This study highlights the advantages of the bifactor model, demonstrating that psychological flexibility can be conceptualized both as a general construct and through its specific subdomains. Additionally, the study highlights that the Finnish version of the CompACT can be used to effectively measure psychological flexibility in intervention research and practice among the Finnish population. Future research should further examine the distinct contributions of each subscale to psychological outcomes and intervention responsiveness.

CRediT authorship contribution statement

Ana Gallego: Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Jaime Navarrete:** Writing – original draft, Formal analysis, Conceptualization. **Simone Gorinelli:** Writing – original draft, Resources, Project administration, Methodology, Investigation, Funding acquisition. **Francesca Brandolin:** Writing – original draft. **Päivi Lappalainen:** Writing – original draft, Supervision, Resources, Project administration, Methodology, Funding acquisition. **Nima Golijani-Moghaddam:** Writing – review & editing, Project administration, Data curation. **David L. Dawson:** Writing – review & editing, Project administration, Data curation. **Raimo Lappalainen:** Writing – review & editing, Supervision, Methodology, Investigation, Funding acquisition. **Juan V. Luciano:** Writing – review & editing, Supervision, Methodology, Conceptualization.

Statement of ethics

This study was approved by the Ethics Committee of the University of Jyväskylä. None of the participants received any financial incentive for participating in this study. All participants provided written informed consent.

Data availability statement

The data supporting this study's findings are available from the corresponding author upon reasonable request.

Declaration of AI-assisted technologies in the writing process

During the preparation of this manuscript, the authors utilized ChatGPT in order to refine certain sentences, focusing on grammar and style enhancements. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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Table 5
Construct validity of the Comprehensive Assessment of Acceptance and Commitment Therapy Processes (sample 3; $n = 76$).

Measures	M (SD)	CompACT	OE	BA	VA
PRCA-24 [24–120]	89.28 (14.23)	−.36*	−.38**	−.13	−.26
General discussion [6–30]	22.23 (5.28)	−.41**	−.41**	−.21	−.29
Meetings [6–30]	23.03 (4.84)	−.16	−.26	−.00	−.29
Interpersonal communication [6–30]	18.98 (4.39)	−.43**	−.37*	−.20	−.42**
Public speaking anxiety [6–30]	25.06 (3.93)	−.13	−.15	−.00	−.13
MHC-SF [0–70]	49.80 (10.30)	.56**	.52**	.16	.57**
PSS [0–40]	17.39 (5.84)	−.53**	−.51**	−.16	−.50**
SIAS [0–80]	39.00 (15.00)	−.47**	−.52**	−.15	−.36*
SCS-SF [12–60]	3.09 (.65)	.55**	.53**	.24	.46**
Self-kindness [2–10]	3.65 (.86)	.34*	.31*	.14	.32*
Self-judgement [2–10]	3.19 (1.10)	−.54**	−.56**	−.30*	−.36*
Common humanity [2–10]	3.66 (.99)	.35*	.34*	−.09	.46**
Isolation [2–10]	3.51 (1.14)	−.49**	−.43**	−.24	−.45**
Mindfulness [2–10]	4.04 (.81)	.23	.17	.26	.15
Over-identification [2–10]	4.11 (.82)	−.32*	−.39**	−.14	−.14
BFNE [0–48]	41.13 (10.39)	−52**	−56**	−.23	−.34*

Note. The numbers in brackets beside the scale and subscale names represent the range of possible scores. PRCA, Personal Report of Communication Apprehension, with subscales for General Discussion, Meetings, Interpersonal Communication, and Public Speaking Anxiety; MHC-SF, Mental Health Continuum-Short Form; PSS, Perceived Stress Scale; SIAS, Social Interaction Anxiety Scale; SCS-SF, Self-Compassion Scale–Short Form, with subscales Self-kindness, Self-judgment, Common Humanity, Isolation, Mindfulness, and Over-identification; BFNE, Brief Fear of Negative Evaluation. The numbers in brackets beside subscale names is the range of possible scores. *p < .05; **p < .01.

Table 6
Means, standard deviations, and paired-samples *t*-test in CompACT and its subscales.

Measure	Pre-test		Post-test		*t*	*p*	Cohen's d (95 % interval)
	M	SD	M	SD			
Study 1. 10-week iACT (n = 28)							
CompACT	79.86	18.45	91.61	18.49	−2.56	.02	.48 (.09, .87)
OE	34.50	11.70	40.18	10.39	−2.44	.02	.46 (.07, .85)
BA	13.04	6.14	15.43	6.08	−1.62	.12	.31 (.08, .68)
VA	32.32	7.44	36.00	5.86	−2.49	.02	.47 (.08, .86)
Study 2. 37-minute ACT (n = 65)							
CompACT	86.22	21.13	89.03	21.02	−3.31	.002	.41 (.16, .66)
OE	33.63	11.34	34.91	11.39	−2.91	.005	.36 (.11, .61)
BA	17.29	6.37	17.52	6.72	−.75	.454	.09 (−.15, .33)
VA	35.29	7.30	36.60	6.81	−3.23	.002	.40 (.15, .65)
Study 3. Three weekly 40-min VR-based ACT sessions (n = 35)							
CompACT	85.54	16.39	95.60	16.84	−5.35	<.001	.90 (.51, 1.29)
OE	31.83	10.14	36.77	10.74	−4.54	<.001	.77 (.39, 1.14)
BA	18.31	4.64	20.57	7.16	−2.68	.011	.45 (.10, .80)
VA	35.40	7.19	38.26	5.91	−4.08	<.001	.69 (.32, 1.06)

The number in brackets beside subsacale names is the range of possible scores. CompACT, Comprehensive Acceptance and Commitment Therapy Process Scale; OE, Openness to experiences; BA, Behavioral awareness; and VA, Valued actions.

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Conflict of interest statement

All authors declare no conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jcbs.2025.100952.

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