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Ph.D. THESIS

PARANOID IDEATION ACROSS THE PSYCHOSIS SPECTRUM AND BEYOND: ASSESSMENT, PROCESS MECHANISMS, AND DIGITAL INTERVENTIONS

Summary

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Notes. _____

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CHAPTER I. THEORETICAL BACKGROUND

1.1 Psychotic Disorders: Clinical Burden and Treatment Gaps

Schizophrenia spectrum and related psychotic disorders constitute some of the most severe and disabling psychiatric conditions worldwide. Affecting approximately 0.4–1% of the global population, these disorders involve positive symptoms, negative symptoms, and cognitive impairments that contribute to persistent functional disability (Charlson et al., 2018; Jablensky, 2011). Onset typically occurs in late adolescence or early adulthood, disrupting educational, occupational, and interpersonal trajectories. Mortality is substantially elevated, with individuals losing approximately 13–15 years of life on average, while relapse, chronicity, and inadequate response to pharmacotherapy further intensify the clinical and economic burden (Hjorthøj et al., 2017; Leucht et al., 2025).

Despite clear guideline recommendations, access to evidence-based psychological interventions remains severely limited. Shortages of clinicians trained in Cognitive Behavioural Therapy for Psychosis (CBTp), together with inconsistent training and supervision, sustain a persistent gap between evidence, policy, and routine implementation (Haddock et al., 2014; Kopelovich et al., 2022; National Institute for Health and Care Excellence, 2014). This gap has driven growing interest in digital health technologies (DHTs) as scalable and flexible tools for extending psychological interventions beyond traditional clinical settings (Torous et al., 2021).

1.2. Technology Based Interventions in Psychosis

1.2.1. Integration of Psychological Interventions into Digital Delivery

DHTs represent an evolution in treatment delivery, extending established evidence-based interventions by improving accessibility, scalability, and continuity while preserving core therapeutic mechanisms and reducing barriers to care (Kopelovich & Turkington, 2021; Torous et al., 2021).

In the context of psychosis, both Cognitive Behavioural Therapy for Psychosis (CBTp) and Acceptance and Commitment Therapy (ACTp) are particularly suited to digital adaptation because both rely on structured, teachable therapeutic processes that can be delivered through modular and flexible formats. CBTp components such as psychoeducation, self-monitoring, cognitive restructuring, and relapse prevention can be translated into telehealth and app-based interventions while preserving key mechanisms of change (Kopelovich & Turkington, 2021). Similarly, ACTp's experiential exercises, mindfulness, defusion, and values-based practices are highly compatible with digital delivery and brief formats, enabling independent skill practice and asynchronous reinforcement (Morris et al., 2024). Emerging evidence supports the feasibility and acceptability of digital ACT interventions targeting psychological flexibility in psychosis (Bonnier et al., 2025).

Psychoeducation is among the most readily translated therapeutic components. Interactive and multimedia formats can support illness understanding, coping, self-management, and relapse prevention, while also providing a scalable foundation for CBT- and ACT-informed interventions (Sin et al., 2019).

1.2.2. Typology of Digital Health Technologies in Psychosis

DHTs in psychosis vary across three key dimensions: clinical integration (standalone vs. add-on to usual care), level of digitalization (fully digital vs. blended with face-to-face therapy), and human support (unguided vs. therapist-facilitated). These overlapping dimensions highlight that digital interventions represent diverse delivery models designed to extend, augment, or structure psychological care rather than a single therapeutic approach. These dimensions cut across technological formats and implementation strategies. The following subsections describe the principal technological modalities through which psychological interventions for psychosis have been delivered.

1.2.2.1 Web-Based Programs

Browser-based interventions for psychosis typically deliver modular CBT- or ACT-informed self-help content targeting symptoms such as paranoia, voices, and social difficulties, often with minimal therapist involvement. Programs such as *Coping With Voices* (Gottlieb et al., 2017), *EviBaS* (Westermann et al., 2020) and *HelpID* (Moritz et al., 2016) combine psychoeducation and structured exercises, offering scalable approaches designed to improve access to specialist psychological care.

1.2.2.2. Mobile Health (mHealth) Applications

Mobile health (mHealth) interventions provide real-time, context-sensitive support through smartphones, reinforcing therapeutic skills in daily life via symptom monitoring, coping prompts, and personalized feedback. Apps such as *Actissist* (Bucci et al., 2024), *SlowMo* (Garety et al., 2021) and PEAR-004 (Ghaemi et al., 2022) target symptoms, reasoning biases, and self-management, primarily as adjuncts to therapist-guided care. Related EMA/EMI and messaging-based approaches, including *Smartphone-Assisted coping-focused interVention for Voices - SAVVy* (Bell et al., 2020) and *Mobile Enhancement of Motivation in Schizophrenia - MEMS* (Luther et al., 2020) further personalize support through real-time monitoring and prompts, reflecting a shift toward adaptive, recovery-oriented digital care. Although technologically simple, messaging interventions have demonstrated feasibility and potential benefits for psychiatric symptoms and social functioning, while evidence for adherence improvement remains mixed (Välimäki et al., 2017; Watson et al., 2016).

1.2.2.3. Avatar Therapy (AT)

Avatar Therapy is a therapist-guided, computer-assisted intervention in which individuals with persistent auditory verbal hallucinations engage with a digital representation of their voice, showing reductions in hallucination severity and beliefs about voice omnipotence (Craig et al., 2018; Leff et al., 2013). Emerging evidence suggests benefits extending to anxiety, self-esteem, and quality of life (Liang et al., 2022).

1.2.2.4. Virtual Reality

VR interventions in psychosis include avatar-based therapy for voices, VR-CBT for paranoia and avoidance, and VR-assisted mindfulness or social cognition training. Evidence supports reductions in hallucinations, paranoia, distress, and social difficulties, although

findings are mixed across formats and comparators (Dellazizzo et al., 2021; du Sert et al., 2018; Freeman et al., 2022, 2023; Nijman et al., 2023; Pot-Kolder et al., 2018).

DHTs in psychosis span from low-intensity messaging to immersive virtual reality, yet their effectiveness depends on clearly understanding targeted clinical phenomena. Paranoid ideation represents a particularly important target for informing assessment strategies and developing targeted psychological and digital interventions.

1.3. Understanding Paranoid Ideation: Models and Psychological Mechanisms

1.3.1. Historical and Conceptual Foundations of Paranoia

Paranoia is typically described as excessive and unfounded mistrust of others, characterised by beliefs that other people intend to harm, ridicule, or deliberately provoke the individual, or that they are involved in conspiratorial actions directed against them (Freeman & Loe, 2023). The term originates from the Ancient Greek paranoia, initially denoting madness or mental disturbance, and was later refined by nineteenth-century psychiatry into a construct centred on persecutory and grandiose beliefs while recognising preserved intellectual functioning (Freeman & Freeman, 2008).

The idea that there is a continuum rather than a clear distinction between normal mental functioning and psychotic symptoms has been around for more than one hundred years, with notable references dating back to Bleuler in 1911 (Nasrallah & Smeltzer, 2011). This early recognition of gradation anticipated what has become a dominant contemporary framework: the dimensional conceptualization of paranoid ideation. Rather than assuming that paranoia emerges only within discrete psychiatric disorders, the dimensional perspective proposes that suspicious thoughts and persecutory beliefs are continuously distributed within the general population and vary quantitatively—rather than qualitatively—between clinical and non-clinical groups (Linscott & van Os, 2013; van Os et al., 2009).

1.3.2. The Continuum Model of Paranoid Ideation

Large-scale community surveys consistently demonstrate that suspicious thoughts, ideas of reference, and attenuated persecutory beliefs occur far more frequently than diagnosed psychotic disorders (Freeman & Loe, 2023; Linscott & van Os, 2013; van Os et al., 2009). Estimates from representative samples suggest that between 10% and 30% of individuals report at least occasional paranoid ideation (Freeman, 2007; Freeman et al., 2011).

Empirical research conceptualizes paranoia as a hierarchical continuum distributed exponentially across the population, with mild suspiciousness common and severe persecutory delusions comparatively rare (Bebbington et al., 2013). This hierarchy is typically structured into four escalating levels: (1) interpersonal sensitivity (heightened concerns about criticism, rejection, or social vulnerability), (2) general mistrust (suspicion regarding the intentions of others), (3) ideas of reference, and (4) ideas of persecution (Bebbington et al., 2013; Bell & O'Driscoll, 2018; Freeman et al., 2005; Freeman & Garety, 2014; Neidhart et al., 2024). Among these stages, ideas of reference represent an intermediate level within the paranoia continuum. They involve the belief that neutral events, comments, or environmental cues refer specifically to oneself. Although not all ideas of reference imply malicious intent, they often function as a cognitive bridge between general interpersonal sensitivity and persecutory

delusions (Green et al., 2008). At the most severe end of the spectrum are ideas of persecution, which involve the attribution of deliberate harmful intent by others (Freeman & Garety, 2014, 2000). While these beliefs are highly prevalent in schizophrenia-spectrum and first-episode psychosis samples (Paolini et al., 2016), milder persecutory thoughts are also reported in non-clinical populations (Freeman et al., 2005; Freeman & Loe, 2023). Longitudinal evidence further suggests that individuals may shift along this continuum over time in response to stress, affective states, and contextual influences (van Os et al., 2009).

Within the dimensional framework, clinical and non-clinical paranoia differ quantitatively rather than qualitatively, primarily in levels of conviction, distress, and functional impairment (Badcock & Paulik, 2020; van Os et al., 2009). While suspicious thoughts in the general population are often transient and less impairing, persecutory delusions are marked by rigidity, emotional distress, and behavioural consequences (Freeman & Garety, 2014).

Although the dimensional perspective clarifies how paranoid ideation varies across levels of severity, it leaves open the question of why suspicious thoughts escalate into persistent persecutory beliefs in some individuals but remain transient in others. To address this issue, contemporary research has focused on the cognitive and emotional mechanisms underlying paranoia.

1.3.3. Cognitive – Affective Models and Mechanisms Underlying Paranoia

Cognitive-affective models conceptualize paranoia as a multifactorial phenomenon arising from interacting cognitive, emotional, and social processes rather than a single causal factor (Alameda et al., 2020; Freeman & Garety, 2014). Within a biopsychosocial framework, paranoid beliefs are understood as emerging from how individuals interpret and respond to internal experiences and social environments (Freeman & Loe, 2023; Jolley & Garety, 2011).

1.3.3.1. Cognitive mechanisms

Early cognitive models emphasize the role of reasoning biases and attributional styles in the formation and maintenance of persecutory beliefs (Freeman et al., 2002). According to these models, individuals vulnerable to paranoia are more likely to interpret ambiguous experiences as personally threatening due to biases such as jumping to conclusions, external attributional tendencies, and deficits in social cognition. These interpretations are shaped by pre-existing negative schemas, including beliefs about the self as vulnerable or about others as potentially dangerous (Alameda et al., 2020; Freeman & Garety, 2014). Belief inflexibility—including limited consideration of alternatives and resistance to contradiction—further maintains persecutory beliefs and strengthens delusional conviction (Freeman & Garety, 2014).

Refined cognitive models further suggest that individuals prone to paranoia are not only characterized by reasoning biases but also by a lowered decision threshold for accepting explanatory hypotheses (Moritz et al., 2017; Murphy et al., 2018). This process facilitates the rapid consolidation of suspicious interpretations into stable persecutory beliefs (Murphy et al., 2018).

1.3.3.2. Affective processes

Emotional processes play a central role in the development and maintenance of paranoia, with anxiety and depression consistently associated with paranoid ideation (Alameda et al., 2020; Fowler et al., 2012; Freeman & Garety, 2014; Hartley et al., 2013). Longitudinal

evidence indicates that baseline anxiety and depression predict the persistence of paranoia over time, whereas paranoid beliefs do not similarly predict later negative affect, suggesting that affective states may contribute causally to paranoia (Fowler et al., 2012; Hartley et al., 2013). Negative affect can heighten perceptions of vulnerability, increase attention to threat, and shape the interpretation of ambiguous experiences toward persecutory meanings (Fowler et al., 2012; Jolley & Garety, 2011). One mechanism underlying this process may be the heightened emotional reactivity observed in psychosis. Individuals with psychosis often exhibit heightened stress sensitivity, threat anticipation, and reduced distress tolerance, further reinforcing suspicious interpretations (Reininghaus et al., 2016). Experience sampling and experimental studies identify anxiety as a proximal predictor of paranoia, while depression may contribute through negative self-schemas and broader psychosocial consequences such as social isolation (Bornheimer et al., 2022).

1.3.3.3. Social context and environmental stressors

Social and environmental factors may reinforce paranoia by limiting corrective interpersonal feedback and intensifying negative emotional responses (Fett et al., 2012; Freeman et al., 2002). Social isolation, exclusion, stressful life events, and daily stressors can amplify paranoid thinking, particularly in cognitively vulnerable individuals, with affective distress acting as a key mediator between adversity and persecutory beliefs (Alameda et al., 2020; Fett et al., 2012; Freeman & Garety, 2014).

1.3.3.4. Emotion regulation difficulties and dysregulation

Beyond cognitive and emotional processes, emotion regulation difficulties – including problems identifying, modulating, and accepting emotions (Gross, 2015) – constitute important vulnerabilities for paranoia (Opoka et al., 2021; Vines et al., 2022). Maladaptive regulation strategies, particularly rumination, suppression, and avoidance, are associated with higher levels of paranoid ideation, whereas acceptance and cognitive reappraisal may attenuate the negative affect–paranoia pathway, though reappraisal evidence remains mixed (Aldao et al., 2010; Moran et al., 2018). ESM findings suggest emotion regulation influences psychotic experiences primarily indirectly, with acceptance showing only small protective effects (Bortolon & Nardelli, 2025), and rumination and worry amplifying the daily-life negative affect–paranoia association (Bagrowska et al., 2025; Freeman, 2007; Freeman et al., 2015).

1.3.3.5 Metacognition

Metacognition – the capacity to reflect upon one's own mental states and to recognize thoughts as subjective mental events rather than objective representations of reality (Lysaker et al., 2021; Lysaker & Dimaggio, 2014) – is impaired in schizophrenia spectrum disorders, predicting poorer psychosocial functioning and reduced quality of life (Hasson-Ohayon et al., 2015; Lysaker et al., 2011; Wiesepape et al., 2024). Dysfunctional metacognitive beliefs about thought uncontrollability and danger characterise persecutory delusions (Morrison et al., 2007; Morrison & Wells, 2003).

Together, cognitive, emotional, and metacognitive mechanisms form mutually reinforcing systems maintaining paranoia, supporting transdiagnostic models targeting shared psychological processes (Jolley & Garety, 2011).

1.4. Transdiagnostic Psychological Processes in Paranoid Ideation

Transdiagnostic approaches propose that shared psychological processes underlie diverse disorders, explaining comorbidity and supporting targeted interventions (Badcock & Paulik, 2020; Dalgleish et al., 2020). Psychotic experiences occur across diagnostic categories and the general population — being twice as common in depression and anxiety — supporting a broader psychosis phenotype (van Os & Reininghaus, 2016; Wigman et al., 2012). Psychological flexibility has emerged as an integrative transdiagnostic framework organising adaptive responses to distressing internal experiences (Doorley et al., 2020).

1.4.1. Psychological Flexibility as a Transdiagnostic Factor for Psychopathology

Psychological flexibility — the capacity to remain in contact with present-moment experiences while acting in accordance with personal values (Hayes et al., 2006; Kashdan & Rottenberg, 2010) — is considered central to psychological health, whereas psychological inflexibility, characterised by experiential avoidance, cognitive fusion, and rigid responding, underlies diverse psychopathology including depression, anxiety, and psychosis (Gloster et al., 2020; Hayes et al., 2012; Levin et al., 2012, 2014; Norouzi et al., 2024; Rutschmann et al., 2024; Stockton et al., 2019; Wakefield et al., 2018). Psychological flexibility and psychological inflexibility represent related yet distinct processes rather than polar ends of a single dimension (Macri & Rogge, 2024; Rolffs et al., 2018). The ACT model operationalises flexibility through six processes: acceptance, cognitive defusion, present-moment contact, self-as-context, values, and committed action (Hayes et al., 2012; Ong & Eustis, 2022). Conversely, psychological inflexibility arises from the dominance of opposing processes: experiential avoidance, cognitive fusion, fusion with self-concept, inflexible attention, remoteness from values, and unworkable patterns of action (Harris, 2019; Hayes et al., 2012). Empirical evidence identifies psychological inflexibility as a core transdiagnostic mechanism underlying diverse forms of psychopathology. ACT-based interventions effectively reduce psychological inflexibility across anxiety, depression, chronic pain, and addiction, with improvements in psychological flexibility acting as an active mechanism of therapeutic change (Gloster et al., 2020).

1.4.2. Psychological Inflexibility and Paranoia.

Psychological inflexibility is consistently elevated in psychosis-spectrum samples, with flexibility mediating the relationship between mindfulness and symptom severity (Hahne et al., 2025; Moran et al., 2021). Paranoia shows the strongest meta-analytic association with inflexibility ($r = .54$) among positive symptoms, substantially exceeding hallucinations ($r = .22$), likely reflecting paranoia's evaluative and interpersonal nature (Freeman, 2007; Pittman et al., 2024). Inflexibility also amplifies paranoia-generating effects of social adversity, moderating the ostracism–paranoid referencing relationship (Waldeck et al., 2023). Within the ACT framework, the openness pillar — acceptance and defusion — targets the two strongest repertoire-narrowing processes: experiential avoidance and cognitive fusion (Hayes et al., 2022). Although promising, fine-grained functional models specifying which inflexibility processes are most consequential for paranoia remain underdeveloped (Morris et al., 2024)

1.4.2. Cognitive Fusion and Experiential Avoidance

Experiential avoidance (EA) – the motivated attempt to escape unwanted internal experiences (Hayes et al., 2004, 2012) – is elevated in psychosis, predicting distress and maladaptive responses to auditory hallucinations (Varese et al., 2016). In paranoia, EA mediates relationships between low self-esteem, negative self-concept, insecure attachment, and paranoid ideation, maintaining persecutory beliefs by preventing disconfirmatory processing (Gil-Luciano et al., 2023; Udachina et al., 2009; Udachina & Bentall, 2014). Cognitive fusion (CF) – entanglement with thoughts as literal reality (Gillanders et al., 2014; Hayes et al., 2012) – operates differently, rendering paranoid beliefs non-revisable even when contradictory evidence is available, complementing rather than duplicating the jumping-to-conclusions bias. CF interacts with negative self-beliefs to sustain persecutory ideation (Sood et al., 2022) and associates with psychosis-like symptoms beyond general distress (Moran et al., 2021).

Although EA and CF frequently co-occur and are meaningfully correlated (Bardeen & Fergus, 2016), they operate through distinct mechanisms — suppression versus amplification of thought credibility — requiring complementary intervention strategies: acceptance-based and defusion-based techniques respectively. (Gaudiano & Ellenberg, 2023; Hayes et al., 2022).

1.5. Assessment of Paranoid Ideation and Related Processes

1.5.1. Assessment of Paranoid Ideation

Paranoid ideation can be assessed through a range of methods, including clinician-administered structured interviews (PANSS; Kay et al., 1987) and self-report instruments. The R-GPTS (Freeman et al., 2021), refined from the GPTS (Green et al., 2008) — recommended as the strongest available self-report measure (Statham et al., 2019) — captures ideas of reference and persecution across the full severity continuum. However, validation remains predominantly Western, with limited evidence for measurement invariance across clinical groups, criterion validity, and diagnostic utility (Freeman et al., 2021; Rek et al., 2025).

1.5.2. Assessment of Psychological Flexibility and Cognitive Fusion

The Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011), the dominant psychological flexibility measure, shows poor discriminant validity due to overlap with general distress, potentially inflating flexibility–psychopathology associations (Cherry et al., 2021). Multidimensional measures, such as the Multidimensional Psychological Flexibility Inventory (MPFI; Rolffs et al., 2018) and the Personal Psychological Flexibility Index (PPFI; Kashdan et al., 2020), provide a more precise operationalization and are better suited for examining mechanisms of change (Cherry et al., 2021). Within this multidimensional and process-oriented perspective, there is increasing emphasis on the assessment of specific components of psychological inflexibility that may play a distinct role in psychopathology. The Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014) widely applied across populations (Donati et al., 2021; Lucena-Santos et al., 2017; Rosales-Sarabia et al., 2025), measures cognitive entanglement with thoughts as literal truths. In psychosis, higher CFQ scores are associated with paranoid ideation, psychotic experiences, and positive and negative symptoms (Böge et al., 2023; Hahne et al., 2025).

1.6. Acceptance and Commitment Therapy for Paranoid Ideation and Psychosis

ACTp has emerged as a contextual behavioural approach within the broader family of cognitive behavioural therapies for psychosis, reflecting a shift toward process-based and psychological flexibility–focused interventions (Gil-Luciano et al., 2023; Morris & Simsion, 2025). Unlike traditional CBTp, which focuses primarly on the reappraisal or disputation of distressing beliefs, ACTp targets the functional processes through which individuals relate to their internal experiences. This approach is particularly well suited to paranoid ideation, where the goal is not to persuade the individual that their threat interpretations are mistaken but to reduce the degree to which those interpretations dominate experience and constrain behaviour (Gaudiano & Ellenberg, 2023).

Multiple systematic reviews indicate that ACTp is a safe and promising intervention associated with improvements across a range of outcomes, including positive symptoms, negative symptoms, depression, anxiety, rehospitalisation rates, help-seeking behaviour, mindfulness, patient satisfaction, and psychological flexibility, with brief formats effective even during acute episodes (Gloster et al., 2020; Tonarelli & Pasillas, 2016; Wakefield et al., 2018; Yıldız, 2020). Acceptance consistently mediates outcomes, though robust mediation evidence in psychosis remains limited (Pittman et al., 2024; Stockton et al., 2019).

1.7. Limitations of the State of Art

Several key conceptual, methodological, and empirical limitations characterise the current literature. First, the DHT evidence base for psychosis remains methodologically constrained: early reviews relied on narrative synthesis rather than pooled effects (Alvarez-Jimenez et al., 2014; Rus-Calafell & Schneider, 2020) and more recent meta-analyses are limited by non-randomised designs, heterogeneous interventions, and aggregated outcomes (Arnautovska et al., 2024; Clarke et al., 2020). Symptom-specific analyses are largely absent, safety and engagement are insufficiently reported (Bradstreet et al., 2019; Chivilgina et al., 2021; Wykes, 2019). Second, measurement limitations affect both the CFQ and R-GPTS: cross-group invariance evidence is limited and inconsistent across languages and clinical contexts (Donati et al., 2021; Rek et al., 2025; Zacharia et al., 2021), with Eastern European populations, including Romania, largely unrepresented. Thirdly, the mediating role of cognitive fusion in paranoia remains insufficiently examined. Although cognitive fusion has been consistently associated with paranoid ideation and related distress, existing evidence is primarily correlational. Notably, no study to date has examined whether cognitive fusion mediates the relationship between paranoid ideation and emotional distress, despite transdiagnostic and experimental evidence supporting such a mediating role (Böge et al., 2023; Cookson et al., 2020; Moran et al., 2021; Pittman et al., 2024). Finally, few brief, accessible interventions target the specific mechanisms maintaining paranoid ideation. Existing interventions have largely focused on broad symptom reduction rather than process-based approaches addressing underlying mechanisms such as cognitive fusion. Scalable, mechanism-focused interventions therefore remain underdeveloped.

CHAPTER II. RESEARCH OBJECTIVES AND OVERALL METHODOLOGY

In light of the limitations identified in the existing literature, the following four main objectives were set: (1) to examine the effectiveness of technology-based cognitive–behavioural interventions for psychotic disorders; (2) to examine the psychometric properties of the Romanian version of the Revised Green Paranoid Thoughts Scale (R-GPTS) and the Cognitive Fusion Questionnaire (CFQ) in a sample drawn from the community and clinical population; (3) to investigate the mediating role of cognitive fusion in the relationship between paranoid ideation and associated psychological distress; and (4) to assess the preliminary efficacy of a digital intervention targeting cognitive fusion in reducing paranoid ideation and related distress. To address these objectives, five interrelated studies were conducted, following the logical sequence illustrated in Figure 1.

In pursuit of **the first objective**, a systematic review and meta-analysis (Study 1) was conducted, evaluating DHT efficacy, moderators, safety, and acceptability in psychosis-spectrum disorders.

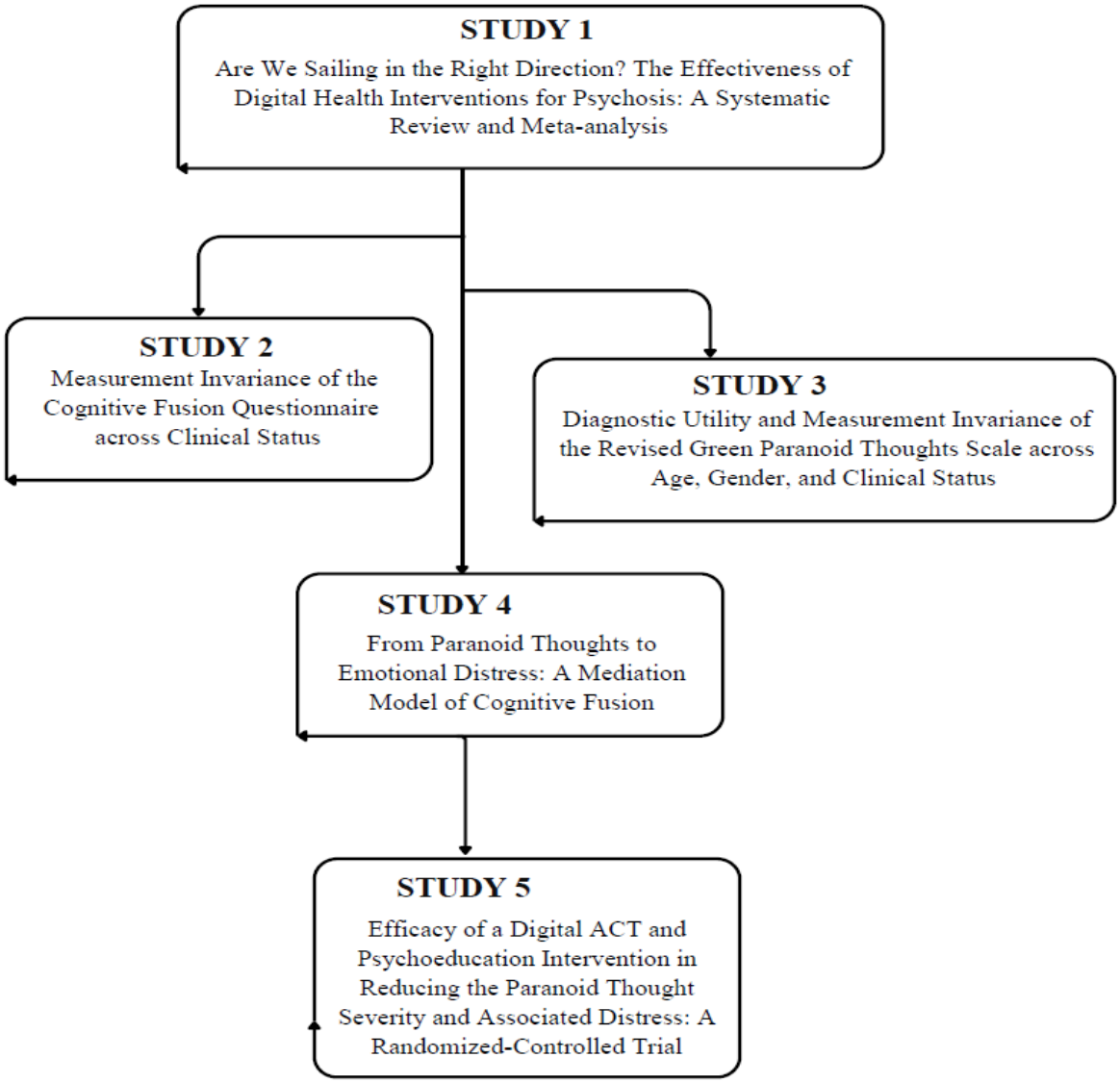
The second objective was addressed through two psychometric validation studies. Study 2 examined the dimensionality, internal consistency and measurement invariance across gender and clinical diagnosis. Study 3 examined the factorial structure, measurement invariance across gender, age, and clinical status, and diagnostic utility of the Romanian version of the R-GPTS.

For **the third objective**, a cross-sectional study (Study 4) was conducted on a mixed clinical and non-clinical sample, examining whether cognitive fusion mediates the relationship between the two dimensions of paranoid ideation — ideas of reference and persecution, as predictors — and depression, anxiety, and stress, as outcomes.

T**he fourth objective**, was addressed through a pilot parallel-group randomized controlled trial (Study 5) evaluating feasibility, acceptability, and preliminary efficacy of a brief digital ACT intervention targeting cognitive fusion and experiential avoidance in transdiagnostic clinical groups (anxiety, depression, psychosis spectrum) with elevated paranoid ideation, comparing intervention plus treatment-as-usual against waitlist control, with outcomes assessed at baseline, post-intervention, and four-week follow-up.

Figure 1

Schematic representation of the studies conducted



CHAPTER III. ORIGINAL RESEARCH

STUDY I. Are We Sailing in the Right Direction? The Effectiveness of Digital Health Interventions for Psychosis: A Systematic Review and Meta-analysis[1]

1.1. Introduction

Systematic reviews support the feasibility and acceptability of DHTs for psychosis, with promising effects on symptoms, depression, functioning, and medication adherence (Alvarez-Jimenez et al., 2014; Batra et al., 2017; Bonet et al., 2017; Fulford et al., 2025; Gire et al., 2017; Rus-Calafell & Schneider, 2020). However, existing meta-analyses remain methodologically constrained: However, existing meta-analyses provide only partial and difficult-to-interpret evidence regarding effectiveness: Clarke et al. (2020) drew on few trials; Arnautovska et al. (2024) included quasi-randomised designs; Morales-Pillado et al. (2023) conflated clinical and at-risk populations, obscuring conclusions regarding diagnosed individuals. Furthermore, guided interventions appear to outperform automated approaches (Lipschitz et al., 2023), yet the moderating role of human support remains underexamined. Critical gaps persist regarding symptom-specific effects (delusions vs. hallucinations), broader recovery outcomes (functioning, quality of life), and safety reporting, with high attrition raising concerns about tolerability and potential harms (Bradstreet et al., 2019; Wykes, 2019).

The present meta-analysis therefore evaluated RCTs of DHTs in adults with confirmed psychosis diagnoses, examining relative effectiveness across modalities, potential moderators, and the reporting of dropout and adverse events.

1.2. Method

1.2.1. Protocol and registration

The meta-analysis protocol was prospectively registered in the International Prospective Register of Systematic Reviews (PROSPERO), number CRD42021251108, and followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2009).

1.2.2. Identification and selection of studies

We searched Web of Science, PubMed, Embase, Scopus, PsycINFO, and the Cochrane Central Register of Controlled Trials (CENTRAL) from inception to January 2026.

Studies were considered for inclusion based on the following PICO criteria: Population: adults aged above 18 years old with a clinician-confirmed diagnosis of non-organic psychosis, mood disorder with psychotic features, schizophrenia, or related disorder from the schizophrenia spectrum, as described in clinical manuals such as DSM V and ICD 10

[1] This chapter is partially based on the following manuscript currently under review:
Mărginean, R. M., Georgescu, R. D., Pavăl, D., Mardan, R., Kopelovich, S. L., & Dobrean, A. (2026). Are we sailing in the right direction? The effectiveness of digital health interventions for psychosis: A systematic review and meta-analysis. Under review at *Journal of Medical Internet Research*

(American Psychiatric Association, 2022; World Health Organization, 1992). We excluded studies on populations with psychosis due to an identified medical condition or with other diagnostic categories without psychotic features, and the studies that included other age groups, general or high-risk populations, and caregivers in those cases where data for individuals with psychosis were not provided separately. With respect to the intervention we included any randomized non-face-to-face or blended intervention, based on digital technologies: mobile apps, avatars, web platforms, text messaging, and virtual reality (VR) which shared a cognitive behavioural approach or component, including third-wave CBT developments that emphasize the relevance of acceptance, mindfulness, psychological flexibility processes, and metacognition (Hayes & Hofmann, 2017). Both guided interventions (where minimal therapeutic support was provided electronically) and unguided, self-help interventions (where no human guidance/support was provided) were included. We exclude interventions focusing solely on cognitive remediation or relapse prevention, as well as those without a psychological or psychotherapeutic component (e.g., sending text reminders of scheduled sessions), as well as dissertations and conference abstracts. Concerning the comparator, we included both inactive controls [i.e., treatment-as-usual (TAU) or wait-list (WL)] and an active intervention (i.e., other psychotherapy delivery formats, another technology). The primary outcomes targeted were positive and negative symptoms, plus the overall symptomatology measured with validated clinician-rated or self-report scales. The secondary outcomes were depression and anxiety symptoms, quality of life, and general and social functioning.

Two reviewers in EndNote-19 reference software performed the screening and study selection independently. The final set of selected articles was reached through discussion, which was the consensus of all team members.

1.2.3. Data extraction

Two independent researchers conducted parallel data extraction. For each included study, we extracted: study location; control group type (active vs. inactive); intervention type (e.g., phone-based intervention/apps, VR intervention, web-based intervention); whether the protocol was manualized or evidence-based; diagnosis; therapist experience; type and level of support (e.g., only technical support or specialized support); technology type; level of digitalization (e.g., DHT only or blended); medication; intervention context and target; symptom status (active or in remission), session number, duration, frequency, and overall therapy length, sample size per arm; mean age and education; illness duration; dropout rate; and adverse events. When data were missing, the corresponding authors were contacted, and studies with no response were excluded from the analyses.

1.2.4. Quality assessment

Two independent researchers assessed risk of bias using the Revised Cochrane RoB 2 tool (Sterne et al., 2019). Five domains were evaluated: randomisation process, deviation from intended interventions, missing outcome data, assessor blinding, and selective reporting, each rated as low risk, some concerns, or high risk and an overall RoB score was computed for sensitivity analyses.

1.2.5. Data synthesis and analysis

Statistical analyses were conducted using Stata SE 18.0. Effect sizes were calculated as standardized mean differences (SMDs) and converted to adjusted Hedges' g (Hedges & Olkin, 2014). Independent meta-analyses were performed to evaluate DHTs compared to treatment-as-usual (TAU), sham (placebo) or waitlist controls, and separately, versus other active interventions. Sensitivity analyses were conducted by (1) leave-one-out analyses; (2) estimating only studies with low RoB; (3) excluding pilot and feasibility studies.

When multiple measures were available, clinician-rated instruments were prioritized. Statistical heterogeneity was assessed using the I^2 statistic and 95% prediction intervals (PIs). Potential sources of heterogeneity were explored through subgroup analyses based on intervention type, therapist involvement, and intervention target.

Small-study effects and publication bias were assessed via visual inspection of funnel plots, Egger's regression test, and contour-enhanced funnel plots to distinguish publication bias from other sources of asymmetry.

1.3. Results

1.3.1. Selection and inclusion of studies

The database search identified 25,444 articles. For nine RCTs, the data required to calculate effect sizes were requested from the authors and were obtained for five studies (Dabit et al., 2021; du Sert et al., 2018; Ghaemi et al., 2022; Moritz et al., 2016; Pot-Kolder et al., 2018). Ultimately, 41 randomized controlled trials met the eligibility criteria and were included in the quantitative synthesis (see Figure 1.1) .

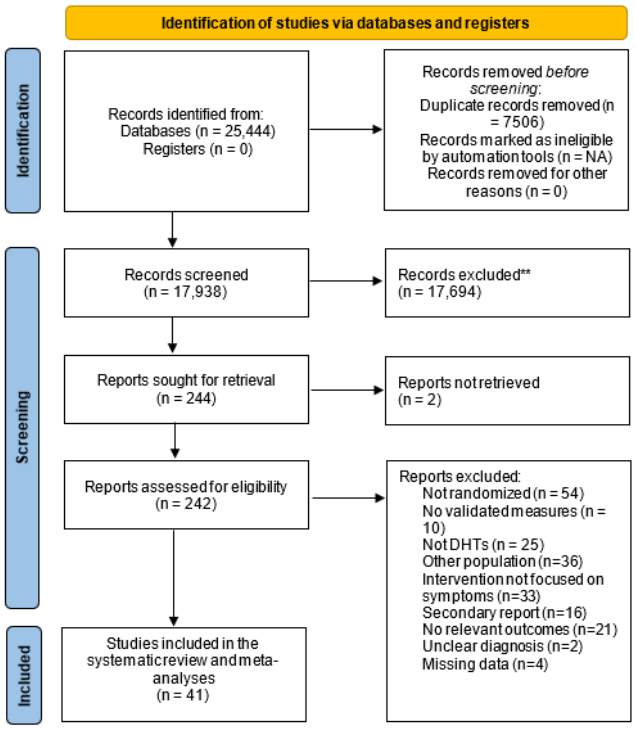
1.3.2. Study characteristics

Studies were published between 2012 and 2025, with the majority conducted in Western countries (k = 34). A total of 4,139 participants with psychosis were included, of whom 2,104 were allocated to experimental conditions and 2,035 to controls. Most studies focused on chronic schizophrenia spectrum disorders (k = 29), with 10 studies also including individuals with affective disorders with psychotic features. A subset focused specifically on first-episode psychosis (Bucci et al., 2018, 2024; Dudley et al., 2024; Steare et al., 2020). Two studies included inpatients (Freeman et al., 2022; Nijman et al., 2023), while the remaining included only outpatients receiving pharmacological treatment. Participants were predominantly male (56% experimental; 57% control), and the mean age was 37 years in both conditions.

Interventions were delivered either in a blended format (56%, k = 23) or as stand-alone interventions (44%, k = 18). Of those delivered as stand-alone, in 9 studies participants had access to only technical assistance, without any therapeutic support being provided. The types of technologies used included mHealth (k = 17), web-based interventions (k = 8), VR (k = 12), and avatar therapy (k = 4). Interventions ranged from a single 30-minute session to 26 weeks, comprising between 1 and 30 sessions of 30 to 90 minutes.

Figure 1.1

PRISMA Diagram



Note. PRISMA 2020 flow diagram illustrating the identification, screening, eligibility, and inclusion of studies. DHTs = digital health technologies; n = number of records.

1.3.3. Assessment of risk of bias (RoB) of included studies

Most of the included studies raised concerns about their quality. While 15 trials (38%) were rated low risk of bias across all five domains, 18 (43%) had some concerns, and 8 (20%) received high-risk ratings.

1.3.4. Main results (Tables 1.2)

1.3.4.1. Positive symptoms

Across 24 RCTs (N = 2,212), DHTs yielded a small but significant reduction in positive symptoms at post-treatment relative to passive controls (g = −0.18, 95% CI: −0.33 to −0.03; I^2 = 60%), maintained at 3–6-month follow-up (g = −0.21, 95% CI: −0.42 to −0.01; I^2 = 69%). Leave-one-out analyses confirmed that the pooled effects were robust, with no single study changing the statistical significance or direction of the findings. Subgroup analyses posttreatment stratified by symptom domain revealed no significant effect on auditory hallucinations (g = -0.16; 95% CI: -0.49 to 0.17; I^2=70%), yet a significant and homogeneous effect was observed for delusions (g= -0.16; 95% CI: -0.27 to -0.05; I^2=0%). Sensitivity analyses excluding pilot and feasibility studies yielded a slightly larger significant effect (g= -0.25; 95% CI: -0.41 to -0.10; I^2=65%; 95% CI: 40 to 79), while restriction to trials rated at low

ROB produced an attenuated estimate (g= -0.11; 95% CI: -0.25 to -0.11; I^2=18%; 95% CI: 0 to 59).

Across comparisons with active control the effect on positive symptoms was no statistically significant at posttreatment (g= -0.05; 95% CI, -0.24 to 0.13; I^2=38%; 95% CI: 0 to 59), with no evidence of effect at 3 to 6-month follow-up (g =0.00; 95% CI: -0.14 to 0.14; I^2=0%; 95% CI: 0 to 62). This pattern of null findings was consistent across sensitivity analyses excluding pilot and feasibility studies (g = -0.07; 95% CI, -0.38 to 0.24; I^2=66%; 95% CI: 11 to 87) and across symptom-specific subgroups, including auditory hallucinations at posttreatment (g = -0.03; 95% CI: -0.47 to 0.41; I^2=78%; 95% CI: 12 to 87) and follow-up (g = -0.12; 95% CI: -0.38 to 0.13; I^2=35%; 95% CI: 0 to 76), and delusions at posttreatment (g = -0.09; 95% CI: -0.23 to 0.05; I^2=0%; 95% CI: 0 to 59) and follow-up (g = -0.10; 95% CI: -0.24 to 0.05; I^2=0%; 95% CI: 0 to 79).

1.3.4.2. Negative symptoms

In the case of negative symptoms, the mean effect across twelve comparisons of DHT interventions with passive controls was small and statistically significant posttreatment (g = -0.32, 95% CI: -0.56 to -0.07; I^2 = 63%, 95% CI: 33 to 81). Leave-one-out analyses confirmed that the pooled effect was robust. However, the effect was not significant at the 3 to 6-month follow-up (g = -0.07, 95% CI: -0.42 to 0.28; I^2 = 50%, 95% CI: 0 to 69). When compared to active controls, DHT interventions also yielded a small and non-significant effect size g of -0.21 (95% CI: -0.65 to 0.23), with substantial heterogeneity (I^2 = 81%, 95% CI: 62 to 91) with a similar pattern at 3 to 6 months follow-up (g = -0.37; 95% CI: -1.02 to 0.27; I^2=90%; 95% CI: 82 to 95).

1.3.4.3. Overall symptomatology

Compared with passive controls, DHT interventions were associated with a small but statistically significant reduction in overall symptomatology at posttreatment (g = -0.41; 95% CI: -0.71 to -0.10), though accompanied by high between-study heterogeneity (I^2 = 78%; 95% CI: 66 to 82) (*see Table 1.2*). Leave-one-out analyses confirmed the stability of the pooled effect. The effect of those studies reporting at 3 to 6-month follow-up was not statistically significant (g = -0.24; 95% CI: -0.51 to 0.04; I^2 = 58%; 95% CI: 0 to 83).

When compared with active control conditions, DHT interventions demonstrated no significant effect on overall symptomatology either at posttreatment (g = 0.00; 95% CI: -0.21 to 0.21; I^2 = 0%; 95% CI: 0 to 79) or at 3 to 6-month follow-up (g = -0.01; 95% CI: -0.23 to 0.22; I^2 = 21%; 95% CI: 0 to 67).

1.3.5. Secondary outcomes

Compared with passive controls, DHT interventions demonstrated small but statistically significant posttreatment effects on anxiety (g = -0.21; 95% CI: -0.43 to -0.01; I^2=51%; 95% CI: 0 to 68), depression (g = -0.18; 95% CI: -0.35 to -0.01; I^2=54%; 95% CI: 21 to 74), and general functioning (g = 0.18; 95% CI: 0.01 to 0.36; I^2=42%; 95% CI: 0 to 75), while no significant effect was found for quality of life (g = -0.06; 95% CI: -0.17 to 0.06; I^2=0%; 95% CI: 0 to 63).

At 3 to 6-month follow-up, significant effects were maintained for anxiety (g = -0.28; 95% CI: -0.45 to -0.11; I^2=15%; 95% CI: 0 to 63), depression (g = -0.25; 95% CI: -0.47 to -0.03; I^2=57%; 95% CI: 5 to 75), and general functioning (g = 0.30; 95% CI: 0.12 to 0.49; I^2=4%; 95% CI: 0 to 80), with quality of life remaining nonsignificant (g = 0.02; 95% CI: -0.12 to 0.16; I^2=0%; 95% CI: 0 to 85).

In comparisons with active controls, effect estimates were uniformly nonsignificant across all secondary outcomes at both posttreatment and follow-up.

1.3.6. Sub-group analyses

For positive symptoms, no significant between-group differences emerged across modality (Q_b(2) = 0.23, p = .89), and only the AVATAR/VR-based interventions reached significance (g = -0.19; 95% CI: -0.36 to -0.02; I^2=20%). Therapist-delivered DTHs produced a significant effect (g = -0.24; 95% CI: -0.45 to -0.04; I^2=63%), whereas automated interventions did not (g = -0.09; 95% CI: -0.31 to 0.14; I^2=58%; Q_b(1) = 1.00, p = .02). DTHs specifically targeting specific symptoms yielded a significant effect (g = -0.18; 95% CI: -0.36 to -0.01; I^2=26%) compared to general interventions (g = -0.15; 95% CI: -0.36 to 0.07; I^2=70%; Q_b(1) = 0.06, p = .80). Neither sample size (β = -0.0001, p = .885) nor dropout rate (β = -0.007, p = .547) significantly moderated effects.

For negative symptoms, no modality subgroup reached significance (Q_b(2) = 0.59, p = .74), whereas therapist-delivered DTHs produced a significant effect (g = -0.55; 95% CI: -0.99 to -0.10; I^2=47%) compared to automated interventions (g = -0.22; 95% CI: -0.47 to 0.04; I^2=62%; Q_b(1) = 1.58, p = .21). Dropout rate significantly moderated negative symptom effects (β = 0.059, p < .001), while sample size did not (β = 0.002, p = .436).

1.3.7. Dropout rate

The mean dropout rate across studies in the experimental conditions ranged from 0% to 40% and in the control conditions ranged from 0% to 42%, indicating broadly similar attrition across groups. Most studies provided limited information on reasons for withdrawal, and where reasons were described, these were largely unrelated to the intervention.

1.3.8 Adverse events

Although most trials (31 out of 41) provided some information on adverse events (AEs), only 17 described systematic monitoring procedures, and only one study (Craig et al., 2018) reported predefined AE definitions. Most studies did not differentiate between serious and non-serious AEs. The most frequently described monitoring approach involved screening health records for serious AEs, such as hospitalizations, followed by regular interviews with therapists or participants to determine whether serious events occurred. No consistent pattern of excess harm was identified between the intervention and control groups. AEs attributed to the intervention were rarely reported and were generally not classified as serious.

Table 1.2.

DHT vs. passive control conditions – Post-test

Outcomes	k	N	Hedges'g^a	95% CI	I^2	95% CI
Positive symptoms	*24*	*2212*	*-0.18*	*-0.33 to -0.03*	*60*	*39 to 74*
Auditory hallucinations	8	551	-0.16	-0.49 to 0.17	70	37 to 85
Delusion	*11*	*1325*	*-0.16*	*-0.27 to -0.05*	*0*	*0 to 60*
Excluding pilot or feasibility studies	*16*	*1046*	*-0.25*	*-0.41 to -0.10*	*65*	*40 to 79*
Only those deemed to have low ROB	*10*	*1861*	*-0.11*	*-0.25 to -0.01*	*18*	*0 to 59*
Negative symptoms	*12*	*811*	*-0.32*	*-0.56 to -0.07*	*63*	*33 to 81*
Excluding pilot or feasibility studies	6	641	-0.23	-0.51 to 0.05	67	21 to 86
Only those rated with low ROB	6	530	-0.27	-0.63 to 0.08	73	38 to 88
Overall	*12*	*878*	*-0.41*	*-0.71 to -0.10*	*78*	*66 to 82*
Excluding pilot or feasibility studies	8	761	-0.29	-0.61 to 0.04	80	60 to 89
Only those rated with low ROB	4	273	-0.25	-0.91 to 0.41	85	63 to 94
Secondary outcomes						
Anxiety	*8*	*844*	*-0.21*	*-0.43 to -0.01*	*51*	*0 to 68*
Depression	*17*	*1345*	*-0.18*	*-0.35 to -0.01*	*54*	*21 to 74*
General functioning	*8*	*851*	*0.18*	*0.01 to 0.36*	*42*	*0 to 75*
Quality of life	10	1142	-0.06	-0.17 to 0.06	0	0 to 63

Note. k = number of studies; N = number of participants included in analysis. CI = Confidence Interval

[a] All results are reported with Hedges *g*, using a random effects model, except for general functioning and quality of life. Negative effects indicates superiority of the experimental DHT group over control group (s ignificant results are marked with italic).

1.3.9. Small study effect and publication bias

Funnel plots and Egger's test indicated no significant publication bias for positive (p = .183) or negative symptoms (p = .963). For overall symptoms, however, pronounced funnel plot asymmetry and a significant Egger's test (p = .013) suggested small-study effects, partly attributable to between-study heterogeneity.

1.4. Discussion

To the best of our knowledge, this is the first systematic review and meta-analysis examining the efficacy of DHT interventions designed to target symptoms in individuals with schizophrenia spectrum disorders. Across 41 RCTs, DHTs produced small but significant improvements in positive, negative, and overall symptoms, anxiety, depression, and general functioning relative to passive controls. Effects on positive symptoms, anxiety, depression, and functioning were maintained at 3–6-month follow-up, whereas effects on negative and overall symptoms did not persist and became non-significant in sensitivity analyses excluding pilot studies. Symptom-specific disaggregation revealed significant effects for delusions but not auditory hallucinations, likely reflecting the greater structural compatibility of CBT-based

delusion techniques with digital formats relative to the more heterogeneous interventions targeting hallucinations (Sitko et al., 2020).

Among DHT modalities, only VR- and avatar-based interventions demonstrated significant effects on positive symptoms, although differences between intervention types were not statistically significant. These findings suggest that immersive interventions may hold particular promise for psychosis. Consistent with this interpretation, therapist-delivered DHTs outperformed fully automated formats across both positive and negative symptoms, highlighting the importance of integrating human support into digital interventions for individuals with psychotic disorders and cautioning against the use of purely standalone digital tools (Fialho et al., 2025; Greenway et al., 2024; Linardon et al., 2019).

Notably, quality of life was not significantly improved at either time point, suggesting that symptom-level improvements are insufficient to produce gains in subjective well-being. It is relevant to acknowledge that a major determinant of QoL in psychosis is the social deficits. It would be interesting to compare the efficacy of standard protocols with that of those enhanced by techniques that address factors contributing to such deficits.

The safety profile of DHTs appeared reassuring, with no consistent evidence of excess harm. Serious intervention-related adverse events were rare, and VR-based interventions were mainly associated with transient mild side effects. However, inconsistent adverse event monitoring and reporting substantially limit confidence in the available safety evidence.

1. 5. Limitations and Implications for Future Research

Key limitations include high heterogeneity in some analyses, unstable estimates for negative and overall symptoms in sensitivity analyses, few trials comparing DHTs with active controls or examining follow-up, and predominantly Western high-income samples limiting generalisability. Future research should prioritise adequately powered, pre-registered RCTs with active comparators to establish effects beyond expectancy and engagement. Defining necessary components of human support in blended care models, identifying which DHT types are most effective as symptom-reduction versus adjunctive monitoring tools, and conducting individual patient data meta-analyses to identify moderators would substantially advance the field. Systematic adverse event monitoring and transparent attrition reporting are essential for meaningful safety evaluation.

Overall, DHTs are associated with small but significant improvements across symptoms, anxiety, depression, and functioning, appear safe and acceptable, and represent a promising scalable option where face-to-face alternatives are limited, though confirmatory evidence with active comparators remains needed.

STUDY II. Validation and Cultural Adaptation of the Cognitive Fusion Questionnaire in the Clinical and Nonclinical Romanian Population[2]

2.1. Introduction

Cognitive fusion (CF)—the tendency to become entangled with thoughts and treat them as literal truths, reducing perspective-taking and behavioural flexibility—is a core process within the psychological inflexibility framework (Gillanders et al., 2014; Hayes et al., 2012). According to the ACT model, CF contributes to the development and maintenance of psychological distress by leading individuals to respond to thoughts as objective realities rather than transient mental events (Ciarrochi & Bailey, 2008). In contrast, cognitive defusion promotes flexible, value-based behaviour by changing one's relationship with thoughts rather than attempting to eliminate them (Hayes et al., 2020; Stoddard & Afari, 2014).

CF has been identified as a transdiagnostic process associated with reduced well-being, impaired functioning, and a broad range of mental health disorders, including depression, anxiety, obsessive–compulsive disorder, posttraumatic stress disorder, and psychotic disorders (Berghoff et al., 2018; Cookson et al., 2020; Hellberg et al., 2020). In psychosis, CF is elevated in clinical populations and mediates the relationship between impaired present-moment awareness and negative symptoms (Popa et al., 2022).

The Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014) is one of the most widely used measures of cognitive fusion. It has been adapted across numerous cultural contexts and has demonstrated robust psychometric properties. However, evidence regarding its measurement invariance remains inconsistent across cultures and clinical populations (Lucena-Santos et al., 2017; Zacharia et al., 2021), highlighting the need for validation in underrepresented contexts such as Romania.

The main objectives of the present study are to: a) examine the dimensionality of the Romanian CFQ, b) investigate the internal consistency in both clinical and nonclinical adult samples, c) investigate measurement invariance across gender and clinical diagnosis, and d) evaluate its suitability for clinical assessment and general research use.

2.2. Methods

2.2.1. Procedure

The study received ethical approval, and the Romanian version of the CFQ was translated and culturally adapted. Nonclinical participants were recruited online, whereas clinical participants were recruited from psychiatric and specialised medical centres. The study combined newly collected data with two previously published datasets (Cojocaru et al., 2024; Popa et al., 2022).

[2]This chapter is based on the following article:
Mărginean, R., Popa, C. O., Sava, F. A., Marian, Ș., Predatu, R., Schenk, A., Cojocaru, C. M., Moldovan, T., Poetar, C., & Dobrean, A. (2026). Validation and cultural adaptation of the Cognitive Fusion Questionnaire in a clinical and non-clinical Romanian population. *Current Psychology* (accepted for publication).

2.2.2. Participants

Inclusion criteria required participants to be adults (≥18 years), Romanian-speaking, able to provide informed consent, and to complete the CFQ. Clinical participants had a psychiatrist-confirmed diagnosis of an anxiety/depressive disorder, psychotic disorder, or neurological condition. The final sample comprised 1,053 adults, including a nonclinical sample (N = 683) and a clinical sample (N = 370) with anxiety/depressive disorders (n = 144), psychotic disorders (n = 161), and neurological conditions (n = 65).

2.2.3. Measures

Demographic data included gender, age, and educational attainment.

Cognitive fusion was assessed using the 7-item Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014), which demonstrated excellent internal consistency across all samples (α = .93–.95; ω = .94–.95).

2.2.4. Statistical analysis

Data were analysed in R using the lavaan package (Rosseel, 2012). The factorial structure of the CFQ was examined using confirmatory factor analysis (CFA), and measurement invariance was tested sequentially across gender and clinical diagnosis (configural, metric, scalar, and strict). Invariance was evaluated based on changes in model fit indices, following Chen's (2007) recommendations.

2.3. Results

2.1. Descriptive characteristics

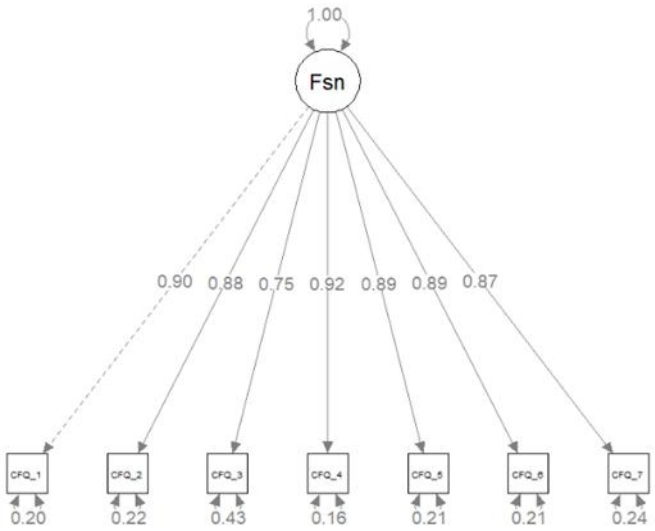
The total sample (N = 1,053) had a mean age of 41.09 years (SD = 13.19), was predominantly female (75%) and highly educated (66%), with CFQ scores highest in emotional (M = 29.58, SD = 11.38) and psychotic disorder groups (M = 29.01, SD = 12.69) relative to nonclinical (M = 18.35, SD = 10.03) and organic samples (M = 20.26, SD = 9.40). The data did not contain any missing values.

2.2. Confirmatory factor analysis

CFQ items showed normal distributions (skewness: 0.45–0.91; kurtosis: −0.99 to 0.14). CFA confirmed the unidimensional structure with good overall fit (CFI = .99, TLI = .98, SRMR = .014), with the exception of RMSEA = .084, which slightly exceeded the recommended cutoff but remains acceptable.

Measurement invariance testing supported configural, metric, and scalar invariance across gender and clinical diagnosis, indicating equivalent factor structure, factor loadings, and item intercepts across groups (Table 2.2). Although strict invariance was not established, this finding does not preclude valid comparisons between groups.

Figure 2.1. *One-factor model with standardized factor loadings*



Note. Standardized factor loadings are presented on arrows. Residual variances are shown below observed variables.

Table 2.2

Measurement Invariance across Genders and Diagnostics

Tested Model	X^2	df	CFI	TLI	RMSEA (90%CI)	SRMR	Δχ2 (Δdf)	ΔCFI	ΔTLI	ΔRMSEA	ΔSRMR	Compared model	Decision
One-factor model	115.83***	14	0.99	0.98	0.084	0.014							
Gender invariance													
M1: Configural	144.83***	28	0.98	0.98	0.09 (0.076-0.104)	0.014							
M2: Metric	146.50***	34	0.98	0.98	0.08 (0.067-0.093)	0.016	1.67 (6)	0.001	0.00	0.005	0.01	M1	Accept
M3: Scalar	157.57***	40	0.98	0.98	0.07 (0.063-0.088)	0.018	11.07 (6)	0.009	0.00	0.002	0.005	M2	Accept
M4: Strict	248.54***	47	0.97	0.98	0.09 (0.08-0.102)	0.026	90.97*** (7)	0.056	0.012	0.008	0.016	M3	Reject
Diagnostic invariance													
M1: Configural	148.13***	56	0.99	0.98	0.08 (0.064-0.095)	0.016							
M2: Metric	167.11***	74	0.99	0.98	0.07 (0.056-0.084)	0.03	18.99 (18)	0.001	0.005	0.01	0.014	M1	Accept
M3: Scalar	248.26***	92	0.98	0.98	0.08 (0.069-0.093)	0.036	81.16*** (18)	0.009	0.006	0.011	0.006	M2	Accept
M4: Strict	660.18***	113	0.92	0.94	0.14 (0.127-0.147)	0.05	411.91*** (21)	0.056	0.038	0.056	0.014	M3	Reject

Note. χ^2 = chi-square; df = degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker–Lewis Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual. Values in parentheses represent 90% confidence intervals for RMSEA. Δ indicates changes in fit indices between nested models. Invariance decisions were based on changes in fit indices (ΔCFI, ΔTLI, ΔRMSEA, ΔSRMR) and chi-square difference tests. ***p < .001.

2.4. Discussion

The Romanian CFQ demonstrated good psychometric properties, with a confirmed unidimensional structure, strong factor loadings, and excellent internal consistency, consistent with international validations (Gillanders et al., 2014; Kim & Cho, 2015; Rosales-Sarabia et al., 2025; Zacharia et al., 2021). The slightly elevated RMSEA is common in low-degrees-of-freedom models and consistent with other CFQ validations (Rosales-Sarabia et al., 2025).

The establishment of scalar invariance across gender and diagnostically heterogeneous groups, including individuals with psychotic disorders, strengthens evidence for the robustness of the CFQ and supports the conceptualisation of cognitive fusion as a transdiagnostic process (Kim & Cho, 2015). Demonstrating measurement equivalence in individuals with psychotic disorders specifically addresses a gap in validated process-based assessment tools for this population, reinforcing the transdiagnostic applicability of the Romanian CFQ across clinically heterogeneous samples.

Limitations include the absence of test-retest analyses, convergent and divergent validity evaluation, and standardised diagnostic interviews. Convenience sampling and overrepresentation of women limit generalisability. Mixed online and paper-based recruitment may have introduced response variability. Future studies should examine temporal stability and equivalence across administration modalities, while incorporating external clinical scales to establish convergent and divergent validity.

In conclusion, the Romanian CFQ constitutes a psychometrically robust, transdiagnostically applicable measure of cognitive fusion, suitable for both research and routine clinical use across a broad spectrum of psychopathologies.

Study III. Diagnostic Utility and Measurement Invariance of the Revised Green Paranoid Thoughts Scale across Age, Gender, and Clinical Status[3]

3.1. Introduction

Paranoid ideation is dimensionally distributed along a continuum in the general population, ranging from interpersonal anxieties and ideas of reference to persecutory beliefs (Freeman, 2006, 2007). The Revised Green et al. Paranoid Thoughts Scale (R-GPTS; Freeman et al., 2021) captures this variability through two subscales and has consistently demonstrated high reliability across validation studies conducted in different cultural contexts (Freeman et al., 2021; Latteur et al., 2022; Rek et al., 2025). Despite its increasing use, measurement invariance across clinician-verified clinical and nonclinical groups remains insufficiently examined, and the proposed cut-offs have rarely been validated against continuous clinician-rated measures, such as the Positive and Negative Syndrome Scale (PANSS; Kay et al., 1987).

Existing research is predominantly based on samples from Western countries, although the Ideas of Reference subscale may be particularly sensitive to sociocultural influences. The Romanian context is especially relevant, as historical experiences of institutional surveillance and persistent interpersonal mistrust may influence how suspicious thoughts are interpreted and reported (Mitruț et al., 2013). Against this background, the present study aimed to evaluate the structural validity of the Romanian version of the R-GPTS, examine measurement invariance across age, gender, and clinical status, and investigate its diagnostic utility.

3.2. Methods

3.2.1 Translation of R-GPTS

With the author's permission, the R-GPTS was translated and culturally adapted into Romanian prior to validation..

3.2.2. Participants

Participants were aged 16 years or older, Romanian-speaking, and able to provide informed consent. Clinical participants had psychiatrist-confirmed diagnoses of schizophrenia-spectrum disorders or other mental health conditions, whereas the control group comprised individuals without a history of mental illness. Following the exclusion of participants with unverifiable diagnoses or ambiguous clinical status, the final sample included 629 participants: non-clinical controls (N = 395), individuals with psychotic disorders (N = 116), and individuals with other mental health conditions (N = 118). The mean age was 42.06 years (SD = 12.64), and 76.47% of participants were women.

3.2.3. Instruments

Demographic information included age, gender, education, employment, marital status, place of residence, psychiatric history, and treatment characteristics. Paranoid ideation was

[3] This chapter is based on the following article:
Mărginean, R. M., Florean, I. S., & Dobrean, A. (2026). Diagnostic utility and measurement invariance of the Revised Green Paranoid Thoughts Scale across age, gender, and clinical status. *European Journal of Psychological Assessment* (accepted for publication).

assessed using the Revised Green et al. Paranoid Thoughts Scale (R-GPTS; Freeman et al., 2021). Cognitive fusion was measured with the Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014), negative emotional states with the Depression, Anxiety, and Stress Scale (DASS-21R; Lovibond & Lovibond, 1995), psychological flexibility with the Personalized Psychological Flexibility Index (PPFI; Kashdan et al., 2020), and psychological inflexibility/experiential avoidance with the Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011). In the psychosis group, symptom severity was assessed using the Positive and Negative Syndrome Scale (PANSS; Kay et al., 1987). Three PANSS indicators were used: the Positive Symptoms subscale (P1–P7), the Paranoia/Belligerence composite (P6, P7, G8), and the Suspiciousness item (P6), used as a specific indicator of paranoid ideation. All measures demonstrated good to excellent internal consistency in the present sample.

3.2.4 Procedure

The study received ethical approval. Nonclinical participants were recruited online, whereas clinical participants were recruited from psychiatric services. ROC analyses used PANSS T-scores to distinguish minimal-to-mild from moderate-to-severe symptom severity (T = 65; Ștefan et al., 2012).

3.2.5. Data analyses

Analyses were conducted in R. Missing data were evaluated using Little's MCAR test; univariate normality was assessed via skewness and kurtosis, and multivariate normality via the Henze-Zirkler test. Reliability was evaluated using Cronbach's alpha and McDonald's omega. CFA was conducted using the DWLS method, with good fit defined as RMSEA ≤ .06, CFI ≥ .95, TLI ≥ .95, and SRMR ≤ .08. Measurement invariance was tested via multigroup CFA across gender, four age groups (< 28, 29–39, 40–50, ≥ 51 years), and clinical status (schizophrenia-spectrum, other diagnoses, no diagnosis), with ΔRMSEA ≤ .015, ΔSRMR ≤ .01, and ΔCFI ≤ .01 indicating invariance support (Chen, 2007). Convergent validity was examined via Pearson correlations between R-GPTS subscales and theoretically related constructs. Diagnostic utility was evaluated through ROC analysis, with AUC quantifying discriminatory power (0.70–0.90 = moderate; ≥ 0.90 = high), optimal cutoffs determined via the Youden Index, and stability enhanced through 10,000 bootstrap resamples.

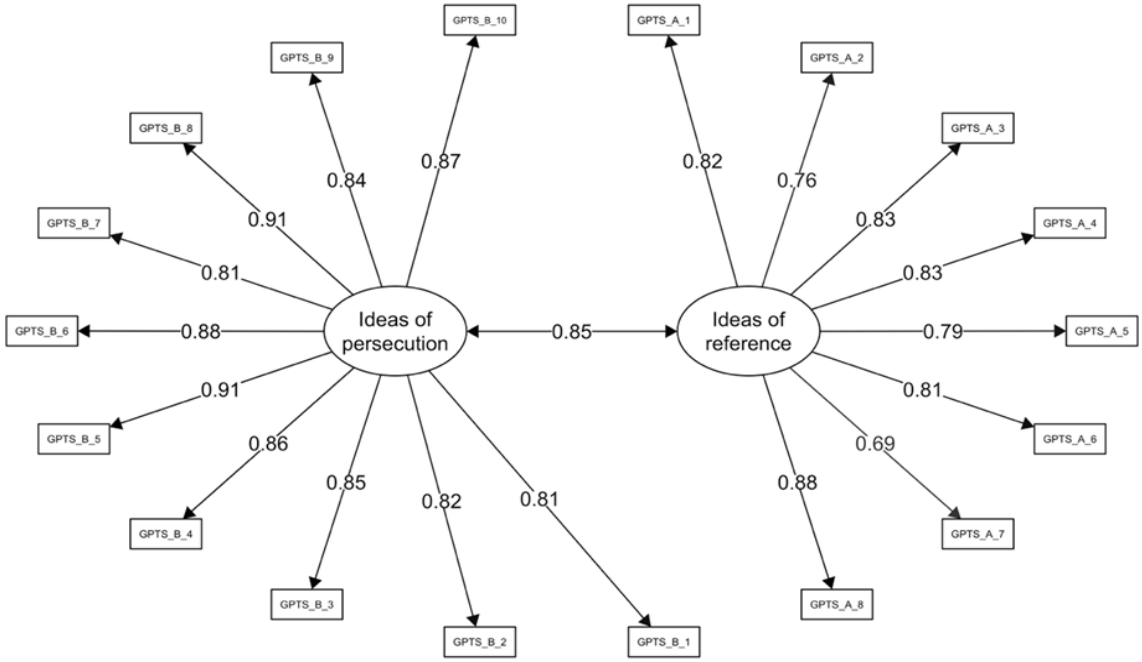
3.3. Results

3.3.1. Preliminary Analyses and Confirmatory Factor Analysis

Univariate normality was supported. Henze-Zirkler's test revealed a significant violation of multivariate normality (HZ = 5.16, $p < .001$). Confirmatory factor analysis yielded excellent fit for the hypothesised two-factor model (RMSEA = 0.039, CFI = 0.999, TLI = 0.998, SRMR = 0.035) (Figure 3.1).

Figure 3.1

The Two-Factor Model with Reference and Persecution as Latent Variables



Note: All manifest variables are depicted by rectangles. Factor loadings are indicated by single-head arrows. The correlation between the latent variables is illustrated with a double-headed arrow.

3.3.2. Internal Consistency

The R-GPTS demonstrated excellent internal consistency across its subscales, with McDonald's omega (ω) values of 0.94 for Part A and 0.95 for Part B and Cronbach's alpha scores of 0.91 for Part A and 0.94 for Part B.

3.3.3. Measurement invariance

Full scalar invariance was supported across gender ($\Delta\chi^2(68) = 61.54$, $p = .69$; $\Delta CFI = .00$; $\Delta RMSEA = .005$), age ($\Delta\chi^2(192) = 196.59$, $p = .395$; $\Delta RMSEA = .003$; $\Delta SRMR = -.001$), and clinical status ($\Delta\chi^2(100) = 31.11$, $p = 1.00$; $\Delta RMSEA = .014$; $\Delta CFI = -.001$; $\Delta SRMR = .005$).

3.3.4 Group Differences

No significant gender difference emerged for Ideas of Reference ($d = -0.02$, $p > .05$), though men showed slightly higher Ideas of Persecution ($d = 0.155$, $p < .001$). The youngest cohort (< 28 years) scored significantly higher on Ideas of Reference than all older groups ($d = -0.36$ to -0.45, $p < .001$), with smaller, less consistent differences for Ideas of Persecution relative to the 29–39 ($d = -0.15$, $p < .05$) and 40–50 ($d = -0.19$, $p < .05$) groups but not the 51+ group ($d = -0.09$, $p > .05$).

The psychosis group scored significantly higher than controls on both Ideas of Reference ($d = 0.29$, $p < .001$) and Ideas of Persecution ($d = 0.42$, $p < .001$), with the other

clinical group also elevated relative to controls, and no significant between-clinical-group difference for Ideas of Reference ($d = -0.02$, $p > .05$).

3.3.5 Convergent and Discriminant Validity

R-GPTS subscales correlated significantly with experiential avoidance ($r = .61–.63$), cognitive fusion ($r = .63$), depression ($r = .57–.60$), anxiety ($r = .59–.64$), and stress ($r = .65$; all $p < .01$), with all values below the redundancy threshold ($r < .70$), supporting discriminant validity (Cheung et al., 2024).

3.3.6 ROC Analysis and R-GPTS Diagnostic utility.

ROC analyses indicated fair diagnostic utility for Ideas of Reference (AUC = 0.75–0.81) and good-to-excellent discriminative validity for Ideas of Persecution (AUC = 0.84–0.88), with the Persecution subscale consistently producing the highest AUC values across all three PANSS reference standards (P6, PANSS-P, PANSS-PB).

3.4. Discussion

The findings support the structural validity and reliability of the Romanian version of the R-GPTS, confirming its two-factor structure and measurement invariance across gender, age, and clinical status. Demonstrating scalar invariance across clinician-verified clinical groups extends the existing evidence and supports the use of the scale for meaningful comparisons across groups. Higher Ideas of Reference scores among younger participants are consistent with developmental models of paranoid ideation, whereas elevated Ideas of Persecution scores in the psychosis group support the distinction between referential thinking and persecutory beliefs. ROC analyses demonstrated good diagnostic utility for the Ideas of Persecution subscale and identified optimal cut-offs specific to the Romanian sample.

Study limitations include mixed recruitment (online and paper-based), the overrepresentation of women and urban participants, and the absence of test–retest reliability and predictive validity assessments. Future research should examine the longitudinal stability, sensitivity to change, and diagnostic accuracy of the R-GPTS in more diverse clinical and community samples.

Study IV. From Paranoid Thoughts to Emotional Distress: A Mediation Model of Cognitive Fusion

4.1. Introduction

The understanding of psychosis has shifted from a dichotomous biological view to a continuum of human experience, with paranoid ideation ranging from everyday interpersonal mistrust and ideas of reference to persecutory beliefs (Freeman & Garety, 2014). Since these experiences share risk factors across clinical and subclinical populations, researchers are increasingly adopting transdiagnostic, process-based approaches to understand how they translate into emotional distress and functional impairment (Hayes et al., 2020). Contextual behavioural models, such as Acceptance and Commitment Therapy (ACT), suggest that the clinical impact of paranoia depends less on the content of suspicious thoughts than on how individuals respond to them (Wakefield et al., 2018). Accordingly, explanatory models have shifted from first-order cognitive processes to higher-order processes, particularly cognitive fusion—the tendency to become entangled with thoughts and experience them as literal reality (Ciarrochi & Bailey, 2008; Hayes et al., 2020). Cognitive fusion amplifies emotional distress by reducing behavioural flexibility and maintaining maladaptive patterns, whereas cognitive defusion promotes a more flexible relationship with thoughts (Gillanders et al., 2014). Consistent with this view, cognitive fusion has been associated with depression, anxiety, stress, and, more recently, persecutory ideation (Pittman et al., 2024). Despite this evidence, a significant gap remains: no study has directly examined whether cognitive fusion mediates the relationship between paranoid ideation and emotional distress. To address this gap, the present study tested a process-based mediation model to determine whether cognitive fusion accounts for the associations between ideas of reference, ideas of persecution, and symptoms of depression, anxiety, and stress in a combined clinical and community sample.

4.2. Methods

4.2.1. Design and participants

The study included 909 participants aged 16 years or older: a non-clinical sample (N = 623), a psychosis sample (N = 116) with psychiatrist-confirmed schizophrenia-spectrum diagnoses, and a clinical comparison sample (N = 170) with other mental health conditions, including 118 clinician-confirmed and 52 self-reported diagnoses. Participants had a mean age of 39.8 years and were predominantly women (78.21%).

4.2.2. Procedure

Data were collected between July and August 2022. Clinical participants were recruited from psychiatric hospitals and outpatient clinics, whereas non-clinical participants were recruited via social media and completed the questionnaires online. Participation was voluntary, and all participants provided informed consent.

4.2.3. Measurements

Paranoid ideation was assessed using the R-GPTS (Freeman et al., 2021; $\alpha = .91–.95$), cognitive fusion with the CFQ (Gillanders et al., 2014; $\alpha = .97$), and emotional distress with

the DASS-21R (Lovibond & Lovibond, 1995; depression α = .91, anxiety α = .90, stress α = .91). All measures demonstrated excellent internal consistency.

4.2.4. Statistical analysis

Analyses were conducted in R using structural equation modelling (SEM). Missing data were handled using FIML, and model parameters were estimated with robust maximum likelihood (MLR). Convergent and discriminant validity were assessed using AVE, CR, the Fornell-Larcker criterion, and HTMT. A latent mediation model included the two R-GPTS dimensions as predictors, cognitive fusion as the mediator, and depression, anxiety, and stress as outcomes. Model fit was evaluated using CFI, TLI, RMSEA, and SRMR, with indirect effects tested via bias-corrected bootstrap confidence intervals (5,000 resamples).

4.3. Results

Data were not missing completely at random ($\chi^2(737) = 2532.52$, $p < .001$) and were therefore handled using FIML. Univariate and multivariate normality assumptions were violated, and 128 multivariate outliers (14.1%) were excluded. All bivariate correlations were positive and significant ($r = .58–.86$, $p < .001$).

4.3.1. Measurement model evaluation

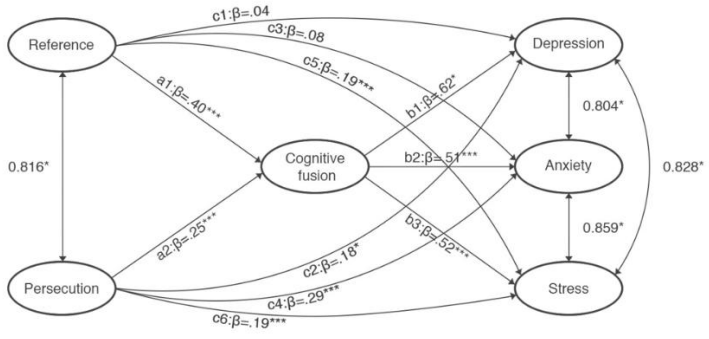
All factor loadings were significant ($\lambda = .62–.94$, $p < .001$), with adequate convergent validity (AVE = .55–.80) and excellent composite reliability (CR = .90–.97). Discriminant validity was supported according to both the HTMT and Fornell-Larcker criteria.

4.3.2. Structural model

The structural model demonstrated acceptable fit ($\chi^2(974) = 3089.27$, $p < .001$; CFI = .915; TLI = .910; RMSEA = .058; SRMR = .042). Both R-GPTS dimensions significantly predicted cognitive fusion: ideas of reference ($\beta = .40$, $p < .001$) and ideas of persecution ($\beta = .25$, $p < .001$). Cognitive fusion significantly predicted depression ($\beta = .62$), anxiety ($\beta = .51$), and stress ($\beta = .52$; all $p < .001$). Ideas of persecution retained significant direct effects on all distress outcomes ($\beta = .18–.30$, $p < .05$), whereas ideas of reference showed no significant direct effects on depression or anxiety. Indirect effects through cognitive fusion were significant for both paranoia dimensions (all $p < .001$). The model explained 40% of the variance in cognitive fusion and 61–65% of the variance in depression, anxiety, and stress.

Figure 4.3

Estimated Mediation Model of Cognitive Fusion Linking Paranoid Ideation to Psychological Distress (Standardized Coefficients)



Note. Standardized regression coefficients (β) are presented for all paths. a-paths represent effects of paranoid ideation on cognitive fusion; b-paths represent effects of cognitive fusion on psychological distress outcomes; c-paths represent direct effects of paranoid ideation on distress outcomes. Double-headed arrows indicate correlations between variables. *p < .05, **p < .01, ***p < .001.

4.4. Discussion

Findings indicate that cognitive fusion is a key process linking paranoid ideation to emotional distress across clinical and community populations, supporting the ACT perspective that distress depends more on individuals' relationship with their thoughts than on thought content alone (Ruiz et al., 2023). Persecutory ideation retained direct effects on depression, anxiety, and stress, whereas the effects of referential thinking were primarily indirect through cognitive fusion, suggesting distinct mechanisms underlying the two dimensions of paranoia. Extending previous transdiagnostic research, this study provides the first evidence that cognitive fusion mediates the relationship between paranoid ideation and emotional distress in a heterogeneous clinical and community sample. Clinically, the findings support ACT interventions targeting cognitive fusion, particularly for referential thinking, while suggesting that persecutory ideation may additionally require interventions addressing threat appraisals and reasoning biases. Limitations include the cross-sectional design, reliance on self-report measures, and the predominantly female, highly educated sample.

Study V. Efficacy of a Digital ACT and Psychoeducation Intervention in Reducing Severity and Distress Associated with Paranoid Thoughts in Adults

5.1. Introduction

Paranoid ideation extends beyond schizophrenia-spectrum disorders and frequently co-occurs with anxiety and depression, where it is associated with poorer outcomes and functional impairment (Wigman et al., 2012). Increasing evidence suggests that distress is determined not only by the intensity of paranoid thoughts but also by the psychological processes through which individuals relate to them (Gaudiano et al., 2010; Pittman et al., 2024). Cognitive fusion increases the credibility and behavioural influence of thoughts, whereas experiential avoidance restricts contact with experiences that might disconfirm threat interpretations. Although these processes frequently co-occur, they make distinguishable contributions to paranoia maintenance (Gaudiano & Ellenberg, 2023; Morris & Simsion, 2025).

Acceptance and Commitment Therapy for psychosis directly targets fusion and avoidance through defusion, acceptance, present-moment awareness, and values-based action. Existing evidence indicates small but meaningful benefits for distress and functioning, while digital delivery may reduce cost, geographical barriers, and interpersonal demands that are particularly relevant for individuals with elevated suspiciousness (Morris et al., 2024; Torous et al., 2021). However, trials have generally emphasised broad symptom reduction rather than experimentally testing process mechanisms in brief, self-directed, transdiagnostic formats.

The present study therefore developed and piloted a brief, three-week self-directed digital ACT intervention targeting CF and EA as maintaining mechanisms of paranoid ideation in a transdiagnostic sample across anxiety, depressive, and psychotic disorders, with primary objectives of evaluating feasibility, acceptability, and safety, and secondary objectives of obtaining preliminary efficacy estimates and examining engagement patterns. It was hypothesised that the intervention group would show greater reductions in paranoid ideation, depression, anxiety, stress, cognitive fusion, and experiential avoidance, alongside greater increases in acceptance and psychological flexibility, relative to the control group.

5.2. Methods

5.2.1. Design

This pilot two-arm RCT compared digital ACT plus treatment-as-usual with waitlist control over a 3-week intervention and 4-week follow-up, with assessments at baseline (T1), post-intervention (T2, Week 4), and follow-up (T3, Week 8); waitlist participants received the intervention after T2.

5.2.2. Participants

Eligible participants were adults aged 18–65 years with elevated paranoid ideation (R-GPTS Part A $\geq$ 16; Part B $\geq$ 11), schizophrenia-spectrum, anxiety, or depressive disorders, stable treatment, adequate digital literacy, and Romanian proficiency. Exclusion criteria included acute psychosis, high suicide risk, severe cognitive impairment, substance use disorders, and concurrent participation in psychological studies. Eligibility was confirmed through clinician-led screening and medical history.

5.2.3. Procedure

Participants were recruited in February 2026 through clinician referral from outpatient and private mental health services in Suceava County, Romania. Following electronic informed consent, participants were allocated (1:1) using a computer-generated minimisation procedure. Blinding was not feasible, and all outcomes were self-reported.

5.2.4. Intervention

5.2.4.1. Digital ACT Intervention

The intervention comprised three weekly self-directed ACT modules (60–90 minutes), adapted for psychosis from established ACT manuals (Gaudiano & Ellenberg, 2023; Harris, 2019; Morris et al., 2013; O'Donoghue et al., 2018; Ruiz et al., 2023). Modules targeted cognitive fusion, cognitive defusion, experiential avoidance, and emotional distress through psychoeducation and experiential exercises. Materials were delivered via Google Drive with asynchronous messaging support.

5.2.4.2 Waitlist Control and Treatment as Usual

All participants continued treatment as usual throughout the study. Twice-monthly non-therapeutic check-in calls monitored safety and supported retention. Waitlist participants received intervention access following T2 assessment.

5.2.5. Outcomes and Measures

5.2.5.1. Assessment Schedule

Assessments were completed at baseline (T1), post-intervention (T2, Week 4), and follow-up (T3, Week 8) via Google Forms distributed through WhatsApp or email.

5.2.5.2. Feasibility and Acceptability Outcomes

Feasibility and acceptability were evaluated against pre-specified progression criteria: recruitment ≥ 60%, retention ≥ 90% at T2, and mean satisfaction ≥ 4.0/5.0. Acceptability was assessed using a study-specific satisfaction questionnaire (1–9 scale) and the System Usability Scale (SUS; Brooke, 1996).

5.2.5.3. Clinical and Process Outcomes

The primary outcome was paranoid ideation. Secondary outcomes included depression, anxiety, stress, cognitive fusion, experiential avoidance, and psychological flexibility (including acceptance).

5.2.5.4. Instruments and Measures

Demographic characteristics were collected using a brief sociodemographic questionnaire. Paranoid ideation was assessed with the R-GPTS (Freeman et al., 2021; Part A: $\alpha = .81$, $\omega = .81$; Part B: $\alpha = .90$, $\omega = .90$), applying the Romanian cut-offs established in Study 3. Emotional distress was measured with the DASS-21R (Depression: $\alpha = .87$; Anxiety: $\alpha = .82$; Stress: $\alpha = .88$). Cognitive fusion was assessed with the CFQ ($\alpha = .90$, $\omega = .91$), experiential

avoidance with the AAQ-II (α = .89, ω = .90), and psychological flexibility with the PPFI (Avoidance: α = .89; Harnessing: α = .78; Acceptance: α = .62). Usability was evaluated using the SUS (Brooke, 1996).

5.2.5. Data Analysis

A priori power analysis indicated a required sample of 54 participants (27/group), with a target of 60 allowing for 10% attrition. Analyses were performed in R using an intention-to-treat approach, with missing data handled by full information maximum likelihood. Intervention effects were examined using linear mixed-effects models, supplemented by ANCOVA for post-treatment comparisons. Effect sizes were estimated using Hedges' g, and follow-up stability was evaluated using TOST equivalence testing. Mediation was examined using latent change score models with bias-corrected bootstrap confidence intervals (5,000 resamples). An exploratory partial correlation network analysis examined relationships among study variables. Feasibility outcomes were summarised descriptively against pre-specified progression criteria.

5.2.6. Safety Monitoring and Risk Management

Adverse events were monitored through structured self-report, interim contacts, and spontaneous reports, under ongoing clinician oversight to ensure participant safety and clinical stability. Participants received information on accessing support services in the event of distress.

5.3. Results

5.3.1. Sample characteristics

Of 130 individuals approached, 62 met the inclusion criteria and were randomised to the intervention (n = 32) or waitlist control group (n = 30). Participants had a mean age of 36.84 years (SD = 10.38) and were predominantly female (75.81%), urban-dwelling (72.58%), and university educated (53.23%). The sample included participants with anxiety (35.48%), psychotic (29.03%), depressive or mixed disorders (27.42%), and obsessive-compulsive disorder (8.06%).

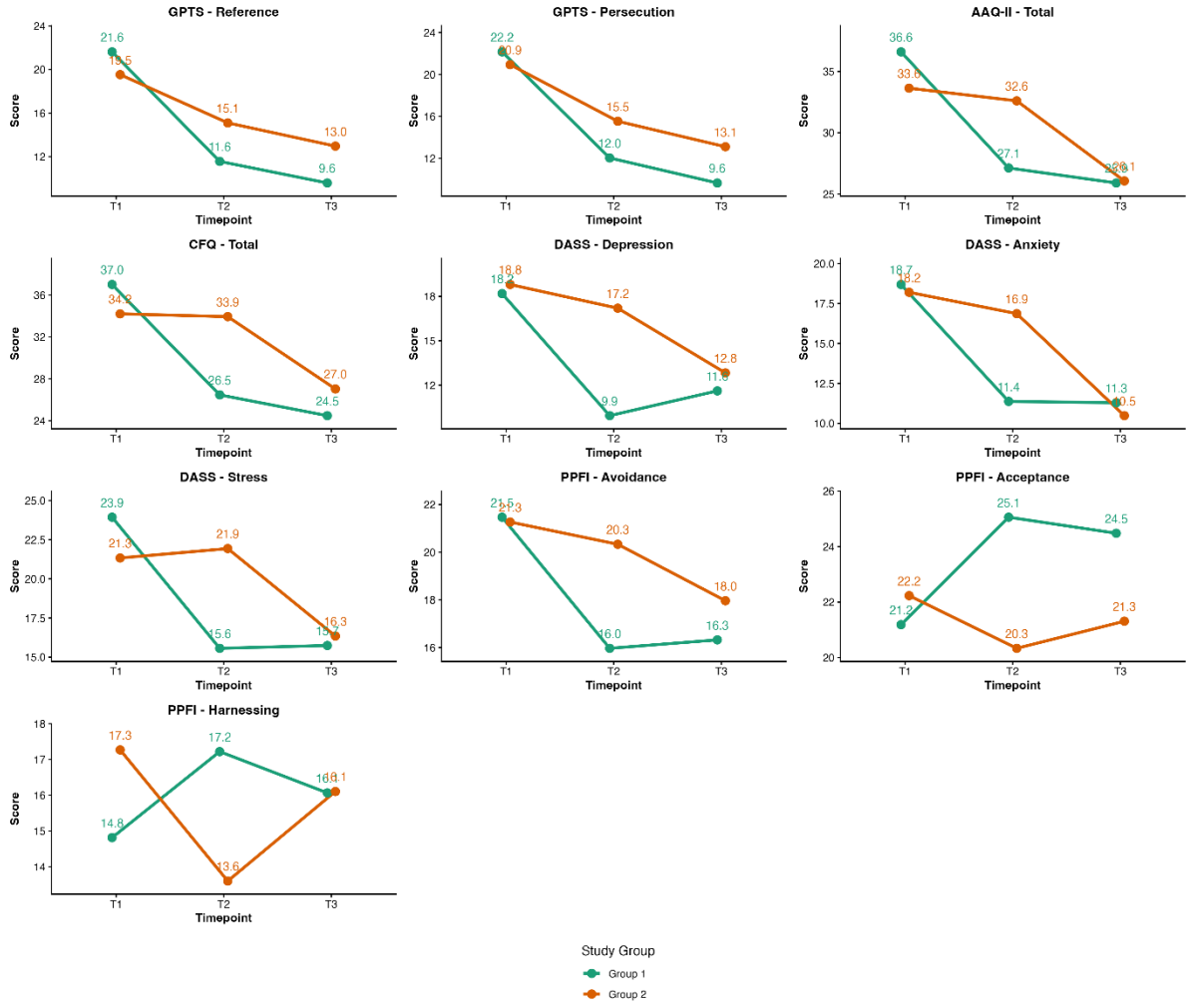
5.3.2. Feasibility and Acceptability

All pre-specified feasibility criteria were met. Recruitment was high (90.77%), with excellent retention at T2 (100%) and T3 (96.77%). Module completion and exercise adherence were high, usability exceeded the recommended benchmark (SUS: M = 88.28 in the intervention group; M = 77.76 following waitlist crossover), and satisfaction was very high in both groups (M = 8.58 and 8.43, respectively). No serious adverse events or intervention-related harms were reported.

5.3.3. Efficacy outcomes

Figure 5.2

Trajectories of Primary and Secondary Outcomes across Timepoints by Study Group



Note. T1 = baseline; T2 = post-intervention; T3 = follow-up (intervention group) / post-intervention following crossover (waitlist group). Higher scores indicate greater severity for R-GPTS, DASS-21, CFQ, AAQ-II, and PPFI Avoidance, and greater psychological flexibility for PPFI Acceptance and Harnessing. Green – experimental group; Red – waitlist control group.

5.3.3.1. Primary Clinical Outcomes

Linear mixed-effects models revealed significant main effects of Time for both R-GPTS subscales (Ideas of Reference: $F = 51.049$, $p < .001$; Ideas of Persecution: $F = 35.896$, $p < .001$). A significant Time × Group interaction favoured the intervention for Ideas of Reference ($F = 5.806$, $p = .004$; $g = 0.71$, 95% CI [0.21, 1.26]), but not Ideas of Persecution ($F = 2.637$, $p = .076$; $g = 0.47$, 95% CI [−0.03, 1.01]). Within the intervention group, substantial reductions were observed from T1 to T2 for both subscales (Reference: 21.62 to 11.56; Persecution: 22.16 to 12.03), maintained at follow-up with no significant T2–T3 change. Between-group differences at T2 and T3 were significant for Ideas of Reference ($p = .039$; $p = .035$) but not Ideas of Persecution.

5.3.3.2 Secondary Outcomes

Significant Time × Group interactions were observed for all distress outcomes — depression ($F = 3.961$, $p = .022$; $g = 0.71$), anxiety ($F = 3.728$, $p = .027$; $g = 0.62$), and stress ($F = 6.768$, $p = .002$; $g = 0.90$) — and for process variables: cognitive fusion ($F = 10.427$, $p < .001$; $g = 1.24$), experiential avoidance ($F = 8.551$, $p < .001$; $g = 1.17$), PPFI acceptance ($F = 7.124$, $p = .001$; $g = −0.98$), and harnessing ($F = 6.614$, $p = .002$; $g = −1.01$). Within-group reductions in the intervention group were large and maintained at follow-up, with no significant T2–T3 changes. Between-group differences did not persist to follow-up for most outcomes, with PPFI acceptance remaining significantly higher in the intervention group at T3 ($b = 3.19$, $t = 2.18$, $p = .031$).

5.3.3.4 Sensitivity Analysis

ANCOVA sensitivity analyses largely replicated primary LMM findings, with significant group differences favouring the intervention for Ideas of Reference ($F = 5.662$, $p = .021$), cognitive fusion ($F = 22.016$, $p < .001$), experiential avoidance ($F = 19.045$, $p < .001$), all DASS-21R subscales (ps = .001–.009), and all PPFI subscales (ps = .001–.018). Ideas of Persecution remained non-significant ($F = 3.267$, $p = .076$).

5.3.5. Durability of Effects (TOST)

Equivalence testing (TOST) demonstrated statistical stability of gains from T2 to T3 for all DASS-21R subscales and all PPFI subscales (all both-sided ps < .05), indicating durable distress and flexibility improvements. Equivalence was not demonstrated for Ideas of Reference, Ideas of Persecution, CFQ, or AAQ-II (all ps > .05), suggesting continued variability in paranoid ideation and fusion processes at follow-up.

5.3.6. Mediation Analyses

Latent change score mediation analyses demonstrated that reductions in cognitive fusion fully mediated intervention effects on both Ideas of Reference (indirect effect = 4.28, 95% CI [2.06, 6.82]; direct effect non-significant) and all three distress outcomes: depression (6.30, 95% CI [3.06, 9.50]), anxiety (7.48, 95% CI [4.45, 10.47]), and stress (8.52, 95% CI [4.89, 12.23]). Reductions in experiential avoidance similarly fully mediated distress improvements (depression: 4.67; anxiety: 4.33; stress: 5.50; all CIs excluding zero; direct

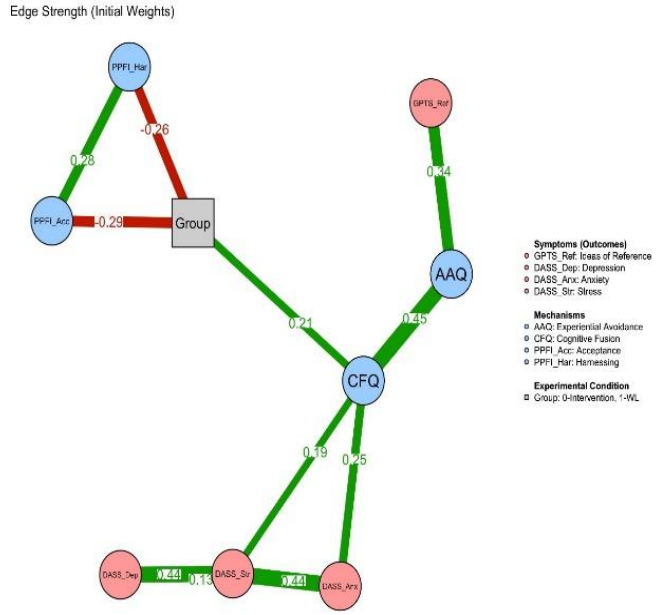
effects non-significant). Increases in PPFI acceptance also fully mediated distress reductions across all three outcomes (depression: 2.66; anxiety: 2.58; stress: 2.84; all CIs excluding zero), with all direct effects non-significant.

5.3.7. Exploratory Network Analysis

The exploratory network analysis revealed a core mechanistic pathway from Ideas of Reference through experiential avoidance (AAQ-II; w = 0.34) to cognitive fusion (CFQ; w = 0.35), with CFQ connecting strongly to all three distress dimensions. Edge stability analysis (10,000 bootstrap iterations) confirmed the robustness of key connections: AAQ-II–CFQ (100%), DASS subscale inter-connections (99–100%), and R-GPTS Reference–AAQ-II (95%). Group condition showed lower direct edge stability to CFQ (30%) and AAQ-II (46%), consistent with full mediation findings. The network corroborates cognitive fusion and experiential avoidance as central bridging processes between paranoid ideation and emotional distress through which intervention effects operated.

Figure 5.3.

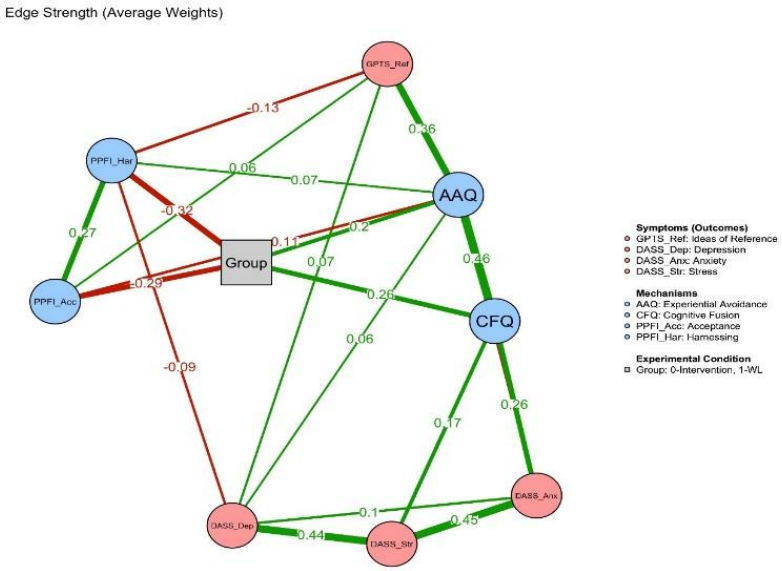
Network Edge Weights Linking Study Group, Psychological Processes, and Clinical Outcomes



Note. Edges represent partial correlation coefficients (regularized) between variables in the network model. Positive edge weights indicate direct associations, whereas negative weights indicate inverse relationships. Stronger connections are reflected by thicker edges. The "Group" node represents treatment allocation (0 = waitlist, 1 = intervention), and edges linking Group to process and outcome variables reflect direct intervention effects within the network structure.

Figure 5.4.

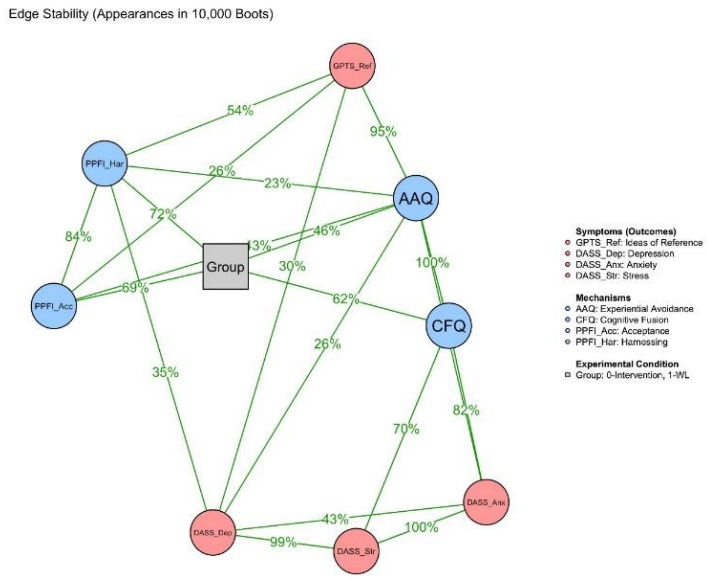
Average Edge Weights Across Nodes in the Network Model



Note. Valorile reprezintă intensitatea medie a conexiunilor (ponderile muchiilor) pentru fiecare nod, reflectând gradul general de conectivitate în cadrul modelului de rețea. Valorile mai ridicate indică asocieri medii mai puternice cu celelalte variabile din model. Nodul „Grup” reprezintă alocarea participanților la tratament (0 = lista de așteptare; 1 = intervenție).

Figure 5.5.

Stabilitatea conexiunilor pe baza frecvenței de apariție în 10.000 de eșantioane bootstrap



*Note***.** Values represent the percentage of bootstrap samples (10,000 resamples) in which each edge was retained in the network, reflecting the stability of edge selection. Higher percentages indicate more robust and consistently identified associations. Nodes represent clinical outcomes, psychological processes, and experimental condition (Group: 0 = waitlist, 1 = intervention).

5.4. Discussion

The present pilot RCT demonstrated that a brief, self-directed digital ACT intervention targeting cognitive fusion and experiential avoidance is feasible, acceptable, and safe in a transdiagnostic clinical sample with elevated paranoid ideation. All pre-specified progression criteria were met, with strong recruitment, zero attrition at post-intervention, high retention, and excellent usability ratings exceeding standard benchmarks (Brooke, 1996), consistent with prior digital and brief ACT-based evidence (Morris et al., 2024).

Primary efficacy findings partially supported the hypotheses. The intervention significantly reduced Ideas of Reference and produced moderate-to-large improvements in depression, anxiety, and stress, consistent with the ACT model of changing individuals' relationship with internal experiences rather than eliminating symptoms (Gloster et al., 2020). In contrast, no significant effect was observed for Ideas of Persecution, suggesting that this dimension may require more intensive or longer interventions (Gaudiano & Ellenberg, 2023).

The largest effects were observed for the primary process targets — cognitive fusion ($g = 1.24$) and experiential avoidance ($g = 1.17$) — exceeding meta-analytic benchmarks (Macri & Rogge, 2024). Critically, latent change score mediation analyses demonstrated full mediation of intervention effects on Ideas of Reference and all distress outcomes through cognitive fusion reduction, providing the first longitudinal experimental support for cognitive fusion as a mechanism of change in paranoid distress. PPFI acceptance remained the only outcome maintaining a significant between-group advantage at follow-up, suggesting willingness during valued goal pursuit as a comparatively durable therapeutic gain (Stockton et al., 2019).

Limitations include the pilot design and modest sample size, limiting the precision of efficacy estimates, exclusive reliance on self-report measures with potential for response bias, imbalance across diagnostic groups that may have influenced outcomes, construct validity concerns regarding the AAQ-II in psychosis populations (Cherry et al., 2021; Moran et al., 2021), the brief intervention duration and limited follow-up, recruitment from a single region limiting generalisability, and clinician referral potentially increasing participant engagement and expectancy effects.

Chapter IV. General conclusions and implications

Despite substantial advances, important gaps remain in the literature on paranoid ideation, including limited evidence on digital interventions, insufficient validation of key measures across cultures and clinical populations, the unexamined mediating role of cognitive fusion in the paranoia–distress relationship, and the lack of brief mechanism-focused interventions targeting cognitive fusion and experiential avoidance. To address these gaps, the present thesis aimed to: (1) evaluate the efficacy of digital health technologies for psychosis through a systematic review and meta-analysis; (2) validate the Romanian versions of the CFQ and R-GPTS; (3) examine cognitive fusion as a mediator of the relationship between paranoid ideation and emotional distress; and (4) pilot a digital ACT intervention targeting these mechanisms.

4.1. Overview of the Main Findings

The systematic review and meta-analysis (Study I; 41 RCTs, N = 4,139) found that digital health technologies (DHTs) produced small but significant improvements in positive ($g = -0.18$), negative ($g = -0.32$), and overall symptoms ($g = -0.41$) compared with passive controls, with positive symptom effects maintained at follow-up ($g = -0.21$). No significant effects were observed against active comparators. DHTs were effective for delusions but not hallucinations, therapist-supported interventions outperformed automated formats, and VR/avatar interventions showed the strongest effects on positive symptoms. Anxiety, depression, and functioning also improved, whereas quality of life did not.

Studies II and III validated the Romanian versions of the CFQ and R-GPTS. The CFQ showed a unidimensional structure, excellent reliability, and scalar invariance across gender and diagnostic groups. The R-GPTS confirmed its two-factor structure, demonstrated scalar invariance across gender, age, and diagnostic groups, strong convergent validity, and acceptable diagnostic utility with ROC-derived cut-offs.

Study IV tested a structural equation mediation model in a combined clinical and community sample (N = 909), showing that cognitive fusion fully mediated the relationship between both paranoia dimensions and depression, anxiety, and stress. These findings identify cognitive fusion as a central transdiagnostic mechanism linking paranoid ideation to emotional distress.

Study V, a pilot parallel-group RCT (N = 62), evaluated a brief digital ACT intervention targeting cognitive fusion and experiential avoidance. All feasibility criteria were met, with high recruitment, retention, usability, and satisfaction, and no serious adverse events. The intervention significantly improved Ideas of Reference, depression, anxiety, stress, cognitive fusion, and experiential avoidance, whereas effects on Ideas of Persecution were non-significant. Mediation analyses showed that reductions in cognitive fusion fully mediated improvements in Ideas of Reference and emotional distress, with gains in distress and psychological flexibility maintained at follow-up.

4.2. Implications of the Thesis

4.2.1. Theoretical Implication

The present thesis advances theoretical understanding in three key ways. First, Studies II–IV support a dimensional, transdiagnostic conceptualisation of paranoid ideation, demonstrating that both paranoid ideation and cognitive fusion show robust psychometric properties and measurement invariance across clinical and community samples, age, gender, and diagnostic groups. These findings support meaningful cross-diagnostic comparisons and identify cognitive fusion as a transdiagnostic process rather than a disorder-specific vulnerability. Second, Studies IV and V identify cognitive fusion as a central mechanism linking paranoid ideation to emotional distress. Cross-sectional and longitudinal mediation analyses consistently showed that cognitive fusion explained the relationship between paranoid ideation and distress, with intervention-induced reductions in fusion fully mediating improvements in Ideas of Reference and emotional distress. Together, these findings provide strong evidence that cognitive fusion represents a plausible mechanism of therapeutic change. Third, Study I supports digital delivery as an effective modality for psychosis, while highlighting the superiority of therapist-supported over fully automated interventions. Together with the feasibility and efficacy findings of Study V, these results support blended digital care as a theoretically and clinically preferable approach to fully automated interventions.

4.2.2. Methodological Implications

The thesis makes several methodological contributions. Studies II and III provide rigorously validated Romanian versions of the CFQ and R-GPTS, establishing the psychometric infrastructure for research on cognitive fusion and paranoid ideation in an underrepresented Eastern European context. The CFQ showed full scalar invariance across clinical groups, including schizophrenia-spectrum disorders, exceeding the invariance reported in several Western validations, including the original English version. The R-GPTS demonstrated full measurement invariance across gender, age, and clinician-verified diagnostic groups, together with strong convergent validity and adequate diagnostic utility. A further contribution of Study III is the derivation of Romanian ROC-based cut-offs, subsequently used as screening criteria in Study V, improving on reliance on Western-derived thresholds. Study I advances methodological standards for DHT meta-analyses by restricting inclusion to RCTs with clinician-confirmed diagnoses, stratifying analyses by comparator type, therapist involvement, and intervention focus, and disaggregating positive symptoms into delusions ($g = -0.16$; $I^2 = 0\%$) and auditory hallucinations ($g = -0.16$; $I^2 = 70\%$), revealing distinct effect profiles obscured by aggregate analyses. The use of Hedges' g, leave-one-out sensitivity analyses, prediction intervals, contour-enhanced funnel plots, and symptom-specific publication bias analyses further strengthens the methodological rigour of the review.

4.2.3.Practical Implications

The findings of this thesis have important implications for clinical practice and the development of accessible digital mental health services. The meta-analytic findings support digital health technologies as a scalable approach to improving access to psychological care for psychosis, while highlighting the added value of therapist-supported over fully automated

interventions. Studies IV and V identify cognitive fusion as a clinically relevant transdiagnostic treatment target, supporting ACT-based defusion strategies across anxiety, depressive, and psychotic presentations. The validated Romanian versions of the CFQ and R-GPTS provide reliable tools for routine clinical assessment, with the CFQ demonstrating measurement invariance across gender and diagnostic groups and the R-GPTS across age, gender, and diagnostic groups, supporting valid transdiagnostic assessment and case formulation.

4.3. Limitations and Future Directions

The findings of this thesis should be interpreted in light of several limitations. Study I was characterised by moderate-to-high heterogeneity, limited active-comparator evidence, and predominantly Western samples. Studies II and III relied on convenience samples, lacked test–retest and additional validity evidence, and did not use standardised diagnostic procedures. Study IV employed a cross-sectional design, precluding causal inference, and did not examine other relevant mechanisms, such as cognitive reappraisal, decentering, and reasoning biases. Study V was limited by its pilot design, modest sample size, exclusive reliance on self-report measures, brief intervention and follow-up, diagnostic group imbalance, and recruitment from a single geographical region. Across studies, the overrepresentation of female, urban, and highly educated participants further limits generalisability. Future research should prioritise larger, pre-registered longitudinal and experimental studies with active comparators, broader and more representative samples, multi-method assessment, longer follow-up, and systematic evaluation of safety and therapeutic mechanisms.

4.5. Main Conclusions of the Present Thesis

1. Digital health technologies are associated with small but clinically meaningful improvements in psychosis-related outcomes, though effects are contingent on comparison condition, symptom domain, and level of human support.
2. Disaggregating positive symptoms reveals clinically distinct effects: DHTs demonstrate reliable efficacy for delusions but not auditory hallucinations.
3. The Romanian CFQ demonstrates robust psychometric properties and full measurement invariance across clinical and non-clinical groups, supporting its use as a transdiagnostic process measure.
4. The Romanian R-GPTS demonstrates valid psychometric properties, full measurement invariance across age, gender, and clinical status, and adequate diagnostic utility for identifying elevated paranoid ideation..
5. Cognitive fusion appears to be a central process linking paranoid ideation to emotional distress, and represents a plausible mechanism through which suspicious thoughts acquire clinical significance.
6. A brief, self-directed digital ACT intervention targeting cognitive fusion and experiential avoidance is feasible, acceptable, and associated with promising preliminary efficacy in a transdiagnostic clinical sample with elevated paranoid ideation.
7. The intervention demonstrates its clearest effects for ideas of reference, suggesting that less elaborated forms of paranoid ideation may be particularly responsive to brief

process-based intervention, whereas persecutory beliefs may require greater intensity or duration of treatment.

8. Intervention effects appear to be driven by changes in targeted mechanisms, with strong effects on cognitive fusion and experiential avoidance and evidence that reductions in cognitive fusion account for improvements in paranoid ideation and emotional distress.

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