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FACULTY OF PSYCHOLOGY AND EDUCATIONAL SCIENCES

"EVIDENCE-BASED PSYCHOLOGICAL ASSESSMENT AND INTERVENTIONS" DOCTORAL SCHOOL

Ph.D. THESIS SUMMARY

EXPLORING THE ROLE OF EARLY MALADAPTIVE SCHEMAS IN DEPRESSION: PROPOSED MECHANISMS AND TREATMENT DIRECTIONS

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Contents

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CHAPTER 1. THEORETICAL BACKGROUND[1]

1.1. Introduction to the research topic

Global estimates indicate that, currently, depression is the leading cause of disability worldwide, with more than 300 million individuals affected by this disorder (World Health Organization, 2017). A promising psychotherapeutic approach that has so far been only modestly investigated concerning depression is Schema Therapy (ST; Young, 1990; Young et al., 2003). This model may address some of the limitations of the standard cognitive-behavioral model, such as the lack of response of around a third of clients to standard treatment (Wojnarowski et al., 2019; Zhang et al., 2018), due to rigid beliefs or personality comorbidity (Gollan et al., 2006; Grilo et al., 2010; Mars et al., 2021; Reuter et al., 2016). We discuss the specifics of the model, its potential utility for depressed clients, as well as several gaps in knowledge related to its application to depression, in the following sections.

1.1.1. Schema Therapy for depression

The ST model is based on *early maladaptive schemas* (EMSs), rigid thought patterns formed in childhood and adolescence based on the invalidation of emotional needs by significant others or due to adverse life circumstances (Young et al., 2003). ST aims to restructure EMSs, to help individuals have more balanced expectations of their emotional needs being fulfilled in their current lives and thus achieve reductions in maladaptive personality traits or symptomatology. To do so, *modes* are typically targeted in ST and they represent momentary activation of EMSs and their adjacent coping repertoires (Young et al., 2003; Van Genderen et al., 2013). They include Parent (or more recently termed Critic) modes (the internalized "voices" of originally invalidating figures in clients' early lives), Child modes (emotional responses to present-day triggers, similar to those of the client's child self, who originally encountered the respective set of adverse situations) and coping modes (dysfunctional behavioral strategies meant to momentarily help the client with the activation of negative schema messages).

Besides its proven usefulness for a range of other disorders (see the review by Van Dijk et al., 2023, for an updated list of the empirical studies applying ST), ST has been proven to be effective in depression (Carter et al. 2013; Kopf-Beck et al., 2024; Malogiannis et al., 2011; Renner et al., 2016). However, more research is needed in terms of building and validating a comprehensive theoretical model of ST for depression.

In Renner et al.'s (2013) model of *chronic depression*, the EMSs that constitute vulnerability factors for this psychological problem are Abandonment/Instability, Emotional Deprivation and Failure. However, as it will be further discussed, less is known about the EMSs that constitute stable vulnerability factors for depression *in general*. Moreover, there is a need to identify the specific modes through which EMSs operate. Finally, considering the limited research in this area, the effectiveness and acceptability of ST interventions for depression needs additional study. We further discuss each of these directions for research in a distinct section.

1.1.2. EMSs as vulnerability factors for depression

A substantial number of studies look at cross-sectional associations between EMSs and depressive symptoms, with mixed results. A meta-analysis by Bishop and colleagues (2022) aggregated their findings and found all EMSs to be significantly and positively associated with depression, with Defectiveness/Shame and Social Isolation yielding large effects, Entitlement/Grandiosity, Self-Sacrifice and Unrelenting Standards displaying weak correlations and the remaining EMSs demonstrating moderate associations.

Due to some EMSs being highly intercorrelated (e.g., Camara & Calvete, 2012; Davoodi et al., 2018; Eberhart, Auerbachand, Bigda-Peyton, & Abela; 2011; Lewin et al., 2015; Petrocelli et al., 2001), it may be that the contribution of certain EMSs is overestimated based on the results of the respective meta-analysis. Young and colleagues talk about "linked schemas" (2003, p. 74), that is, EMSs that are acquired together, as they may relate to connected emotional needs. However, although a person may thus report several such linked EMSs to comparable degrees, it could be that the degree of their causal involvement in depression differs and only some of them might represent immediate priorities when targeting this psychological problem. As such, identifying individual EMS predictors of depression, across literature, represents a worthwhile direction for research.

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[1] Part of the theoretical background presented in this chapter has been published in the form of a narrative review. Stroian, P. I. (2021). Emotional needs and schematic functioning in depression: A narrative review. *Journal of Evidence-Based Psychotherapies*, *21*(1).

So far, studies looking at individual EMS predictors of depression have yielded mixed results. The Abandonment schema (Petrocelli et al., 2001; Renner et al., 2012; Stopa et al., 2001; Welburn et al., 2002) and the Failure schema (Calvete et al., 2006; Petrocelli et al., 2001; Renner et al., 2012), which were also proposed as proximal vulnerability factors for chronic depression in Renner et al.'s (2013) model, are among the EMSs that have been found to uniquely predict depression in some studies. Other EMSs, arguably related to the theme of helplessness, relevant in depression (Beck, 1967, 1995; Seligman, 1974, 1975) and which are uniquely associated with depression according to some results, are Dependence/Incompetence (Harris & Curtin, 2002; Petrocelli et al., 2001) and Vulnerability to Harm (Harris & Curtin, 2002, Schmidt et al., 1995). Furthermore, several studies identified the Defectiveness/Shame EMS as an individual predictor (Calvete et al., 2006; Harris & Curtin, 2002; Schmidt et al., 1995; Stopa et al., 2001). This, together with the fact that this EMS was found to have the highest association with depression in the meta-analysis by Bishop et al. (2022), highlights the potential role of Defectiveness/Shame as a distinct contributor to depression. The other EMS that was strongly correlated with depression in the respective meta-analysis (Social Isolation) was not found to be a unique predictor in any of the studies with this goal. However, more investigation of this EMS is warranted, considering the results of the meta-analysis and what Bishop and colleagues discuss as a potential evolutionary role of the Social Isolation schema in depression, in line with Social Rank Theory (Wetherall et al., 2019). Finally, another EMS worth considering as a potential individual factor of depression is the Negativity/Pessimism EMS. This EMS shares conceptual commonalities with hopelessness, an established vulnerability factor for depression (Alloy et al., 1988). Additionally, this EMS was one of the most strongly associated EMSs with depression in Bishop et al.'s study.

As such, aggregating the results of studies that explore the associations between EMSs (such as those presented above) and depression, while accounting for EMS intercorrelations could be a useful way to delineate which of the EMSs proposed above remain consistent predictors of depression across studies and make for potentially unique factors of depression. Furthermore, it is worth discussing the fact that schemas are knowledge structures that operate in a network-like fashion (e.g. Gilboa & Marlatte, 2017) and are interconnected, based on learned associations (Ghosh & Gilboa, 2014). Beck (1996) proposes that, in depression, schemas function as part of a network structure and mutually reinforce each other. Therefore, a network approach to EMSs could also be useful in understanding how EMSs are interlinked in depression and which of them are the most central in the cognitive systems of depressed individuals. This could also help distinguish the various contributions of each EMS, given their conceptual similarities and the relationships between the emotional needs underpinning them.

Additionally, the state-trait model of cognitive vulnerability to depression argues that, while cognitive vulnerability can remain stable, at least partly some of it only becomes accessible when in a depressed state (Just et al. 2001; Miranda et al., 1998; Persons et al., 1992). Investigating differences in the network structures of currently depressed versus previously depressed individuals could highlight potential differences in the activation of cognitive vulnerability. Furthermore, it could be worth examining whether the patterns of association between various maladaptive cognitions are strengthened during depressive episodes, in line with Beck's (1996) proposition that schema networks become more strongly interconnected as depression occurs. Last but not least, looking at potential differences between the schema network structure of previously depressed and never-depressed individuals could suggest whether certain EMSs act as stable vulnerability factors and influence the network differently in vulnerable individuals.

1.1.3. Schema modes in depression

Presently, research on the role of schema modes in depression is relatively scarce. Two studies found a broad set of maladaptive modes to be associated with depressive symptoms (Basile et al., 2018) or higher in individuals with depression, compared to healthy controls (Reinhard et al., 2022), respectively. To build a pragmatic ST model of depression, however, it would be important to pare down the number of modes to those that are directly and causally involved in the generation and maintenance of depressive symptoms. Identifying the specific content and function of the Critic and Child mode in depression could help nuance the goals of ST for this psychological problem.

A more recent development in ST, Contextual Schema Therapy (CST; Roediger et al., 2018) could aid in identifying the particular modes involved in depression. In this approach, modes are systematized based on their evolutionary function and their dynamics within schema activation – here, vulnerable feelings such as depressed affect can be understood as resulting from the activation of a self-directed Critic mode (as the carrier of internalized schema messages) and lead to coping behaviors such as freezing (e.g. numbing/dampening emotions) or surrendering (e.g. behavioral inactivity). The CST model has not been tested in depression so far. However, its propositions are in line with existing evidence on the role of self-criticism in depression (e.g. Werner et al., 2018) and the use of experiential avoidance (Akbari et al., 2022) and passive coping (Parker & Brown, 1982) by individuals with this psychological problem.

Considering Beck's (1996) proposition of depressive modes and the notion that cognitive, emotional and behavioral schemas operate in a network-like structure, testing the model above as part of a longitudinal network analysis framework could help clarify both the temporality of the proposed relationships and the centrality of each component in the model. A practical implication of the network model is that more central components (nodes) should be targeted first in treatment, as their deactivation would then lead to the most substantial impact in the network.

1.1.4. The use of Schema Therapy interventions in depression

One of the advantages of ST is that it can easily be integrated with other evidence-based approaches, due to the breadth of the conceptualization it offers. To help clients benefit the most from psychotherapy, it could be useful to bridge conceptualizations, across evidence-based approaches, so that a coherent rationale for treatment is provided, while also bringing together as many evidence-based techniques as possible, in line with the propositions for an Integrative and Multimodal CBT (David & Cristea, 2018).

Although not empirically tested for depression yet, Contextual Schema Therapy (CST) is a promising extension of the ST model that integrates the approach with contextual science elements. The six Acceptance and Commitment Therapy (ACT) processes of psychological flexibility (acceptance, cognitive defusion, mindfulness, self-as-context, values and committed action) (Hayes et al., 2011) are harnessed to help explain and tackle the processes of schema and mode activation (Roediger et al., 2018). CST aims to (1) bring about defusion from maladaptive thinking (the Critic mode), (2) improve acceptance of difficult (Child) emotions (replace experiential avoidance) (3) cultivate present-moment awareness (mindfulness), to better notice the activation of modes and the tendency to engage in maladaptive coping, (4) build a self-as-context perspective (Healthy Adult mode) instead of the Critic-prescribed conceptual self, (5) clarify personal values that help meet emotional needs and (6) engage in behaviors corresponding to those values (committed action) (Roediger et al., 2018). To our knowledge, there is no evidence published yet on the effectiveness of CST for depression, however, as a more established contextual behavior science approach, ACT is effective in reducing depressive symptoms (Bai et al., 2020; Bohlmeijer et al., 2011; Kohtala, Muotoka & Lappalainen, 2017; Ruiz et al., 2020). More research is thus needed to clarify whether CST can also be useful for individuals with depression. On the same note, a direction for research concerns the use and adaptation of ST for online delivery. As a structured form of treatment, ST is arguably amenable to application in a digital format. Evidence on whether individuals with depression can benefit from ST administered online is, however, lacking and therefore, more research is needed on these lines.

CHAPTER II. RESEARCH OBJECTIVES AND OVERALL METHODOLOGY

Considering the research directions proposed in the previous chapter, the main goal of the present thesis is to examine constructs from Schema Therapy and their potential relevance to depression, conceptualization- and intervention-wise. To address this goal, we structured the thesis around five main objectives. The **first objective** of the present work was to quantify, using meta-analytical procedures, the associations between EMSs and depression, both as bivariate and unique associations. To do so, we performed a correlational meta-analysis of 100 studies (**Study 1**) reporting associations between individual EMSs and depression. Furthermore, to address the limitations of relying on bivariate correlations when investigating potential vulnerability factors and help build a more parsimonious model of depression using EMSs, we carried out, within the same study, a structural equation modelling meta-analysis (MASEM) that tested seven theoretically and empirically relevant EMSs (Abandonment, Social Isolation, Defectiveness/Shame, Failure, Dependence/Incompetence, Vulnerability to Harm and Negativity/Pessimism) as unique predictors of depression.

The **second objective** of the thesis entailed comparing the network structures of the above-mentioned EMSs in currently depressed, previously depressed and never depressed individuals, in order to investigate whether EMSs with a conceptual relevance to depression occupy different positions in the cognitive networks of individuals and relate to one another differently, depending on clinical status (**Study 2**). We recruited 291 individuals who, based on a clinical assessment carried out within the study, met criteria for either current major depressive disorder, previous major depressive disorder or had never had a major depression episode. Using network analysis, we investigated the network centrality of the seven included EMSs within each group's network, as well as the strength of their associations.

Furthermore, to examine the role of schema modes in the activation of EMSs, our **third objective** was to also investigate their role within networks of conceptually relevant ST constructs. Based on a sample of 88 individuals recruited from the general population and using longitudinal network analysis, we examined the network structures of schema activation, self-criticism (the Critic mode), depressed mood (understood as the

Vulnerable Child mode), avoidant and surrender coping, as well as stress, to check how these depression-relevant constructs may relate on a moment-by-moment basis and which of them may potentially be the most central factor (**Study 4**). To address this objective, we tested the factor structure, construct validity and reliability of the Schema Coping Inventory beforehand, in a validation study (**Study 3**) performed on 501 individuals recruited from the general population.

Finally, our **fourth objective** was to examine whether an online intervention tackling proposed mechanisms from the previous study that displayed the highest centrality would be a feasible, acceptable and effective intervention in terms of treating depressive symptoms. As such, in **Study 5**, based on a sample of 94 participants with depressive symptoms, we carried out a randomized controlled trial comparing the effectiveness of a 15-day program (using Behavioral Activation and Contextual Schema Therapy principles and conceptualizing depression as the interplay between self-criticism, depressed mood and passive coping) to that of a psychoeducation control group. The feasibility and acceptability of the intervention were assessed within the study, as well as its effectiveness in terms of changes in depressive symptoms, self-criticism, surrender coping and psychological flexibility.

CHAPTER III. ORIGINAL RESEARCH

3.1. Study 1. A Meta-Analytic Review of the Relationship between Early Maladaptive Schemas and Depression in Adults[2]

3.1.1. Introduction

Given the high number of EMSs that can be theoretically and empirically linked to depression, it becomes important to clarify which EMSs, if any, are individual predictors and could act as distinct vulnerability factors for this psychological problem. Furthermore, as the previous meta-analysis (Bishop et al., 2022) displayed high heterogeneity, it could be useful to verify whether other potentially relevant moderators, not tested in the study, such as age, gender, the presence of stressors and time lag, could account for the heterogeneous results.

As such, the main goal of the present study is to estimate the effect size of the relation of each EMS to depression in adults, both in terms of bivariate and unique associations. We aim to extend the search performed by Bishop and colleagues and test the effect of several potential moderators, including participant age, gender, clinical status, percentage of students, country, the presence of stressors, time lag, instrument types and study quality. In what concerns the unique associations between EMSs and depression, the aim is to test the individual contribution of a selection of relevant EMSs using meta-analytic structural equation modeling (MASEM; Jak, 2015). The EMSs of Defectiveness, Abandonment, Failure, Social Isolation, Negativity/Pessimism, Vulnerability to Harm and Dependence/ Incompetence will be tested as unique predictors.

3.1.2. Method

We carried out a systematic review and meta-analysis on the relationship between EMSs and depression in adults, following PRISMA guidelines (Moher et al., 2009). The protocol has been registered in the International Prospective Register of Systematic Reviews (PROSPERO) under the registration number CRD42023403431.

3.1.2.1. Search strategy and study selection

We searched the databases PsycINFO, Scopus, Pubmed and ProQuest Central on July 20, 2022, and updated the search on March 29, 2024. We applied the following search string: *schema* AND *Young* AND (*depress** OR *dysthym** OR "*mood symptom**" OR "*mood disorder**" OR "*affective symptom**" OR "*affective disorder**" OR *dysphori**). Given the fact that depressive symptoms are often measured as covariates and may not be mentioned among the study variables in the title or abstract, we applied the search to full-text articles. We limited results to empirical studies on humans, published in peer-reviewed journals, either written or translated into English. No restrictions were applied in terms of publication time. We also conducted a hand search of the reference lists of the included articles, as well as of those of potentially relevant review articles. Furthermore, supplementary searches were carried out on Google Scholar and Web of Science, on October 19, 2022, and renewed on April 1, 2024. Using the Mendeley software (version 1.19.5), following the elimination of duplicates, the article titles and abstracts were scanned by the primary reviewer. Potentially eligible articles were then inspected in full text to confirm eligibility.

[2] This study has been submitted for publication at *Psychotherapy Research*.

3.1.2.2. Inclusion and exclusion criteria

To be included, studies had to (1) assess individual early maladaptive schemas using instruments pertaining to Jeffrey Young's model, (2) assess depression either in terms of symptom severity or diagnostic criteria, (3) report effect sizes of the uncorrected relationship between at least one EMS and depression, or sufficient numerical data for computing effect sizes, (4) include participants with a mean age of at least 18, (5) use a cross-sectional or a longitudinal design or, for experimental designs, report baseline association data between EMSs and depression, (6) be published in a peer-reviewed journal. We excluded (1) studies written in languages other than English or for which a translation was not available, (2) dissertations, book chapters, conference proceedings, qualitative studies and studies not reporting original data, (3) studies in which participants' mean age was below 18 and (4) studies which conceptualized schemas using a model other than Young's. In the case of otherwise eligible studies, but in which effect sizes of the associations between EMSs and depression were not provided, we contacted authors to request primary data.

3.1.2.3. Analysis

To estimate the bivariate relationships between each EMS and depression, we conducted separate meta-analyses for each of the 18 EMSs using the software Comprehensive Meta-Analysis, version 4.0 (Borenstein, 2022). We used the correlation coefficient *r* to estimate effect sizes based on a random-effects model, given the expected heterogeneity of the sample. The I^2 statistic was calculated to assess heterogeneity. Publication bias was assessed by visually inspecting funnel plots and by using Duval and Tweedie's trim-and-fill procedure (Duval & Tweedie, 2000) and Egger's test of the intercept (Egger et al, 1997).

We further conducted subgroup analyses in order to test for potential moderators. In terms of continuous moderators, we examined participant mean age, percentage of female participants, percentage of students, year of publication and study quality as potential moderators. As for categorical moderators, we looked for potential differences in terms of the clinical status of participants, study country (US versus other countries), presence of stressors (studies performed on samples undergoing stressful life situations versus studies carried out in the general population), depression report (interview versus self-report), depression instrument (BDI versus other) and YSQ version used (short versus long versions). As only two studies reported longitudinal bivariate associations (Camara & Calvete, 2012; Evraire & Dozois, 2014), we were not able to assess the effect of time on the relationship between EMSs and depression.

Furthermore, to assess the individual effects of EMSs on depression, while controlling for the other EMSs, we employed one-stage Meta-Analytic Structural Equation Modeling (MASEM) using webMASEM (Jak et al., 2021). The bivariate intercorrelations between the included EMSs (Defectiveness, Social Isolation, Abandonment, Failure, Dependence/Incompetence, Vulnerability to Harm and Negativity/Pessimism), where reported, and their correlations with depression were used in order to estimate a pooled correlation matrix. Based on this matrix, a path model of depression regressed on the seven EMSs was estimated.

3.1.3. Results

3.1.3.1. Selection and inclusion of studies

Seventy-two studies were initially included based on meeting inclusion criteria. We obtained data from authors from an additional 28 articles, resulting in a total of 100 included studies.

3.1.3.2. Study characteristics

The included studies were published between 2000 and 2024 and included a total of 29,794 participants. Samples ranged from 37 (Ak, 2011) to 1529 participants (Oettingen, 2018) and had mean ages between 18.5 (Tremblay, 2009) and 72.34 (Phillips, 2019). Eighteen studies included female participants only, one study only targeted male participants, 4 studies did not report gender distribution, whereas the remainder of the studies (k = 77) included mixed samples. Thirty-six studies employed clinical samples only, 22 studies used mixed samples (e.g. based on case-control designs), and 42 used non-clinical samples.

3.1.3.3. Bivariate associations between EMS and depression

The overall association of EMSs with depression, across the 100 included studies, was significant and positive, $r = 0.41$, 95% CI 0.38-0.44, $p < .0001$. Separate meta-analyses indicated that all EMSs were significantly and positively associated with depression (Table 1). Medium associations with depression were found for most EMSs, including Emotional Deprivation, Abandonment, Mistrust/Abuse, Social Isolation, Defectiveness/Shame, Failure, Dependence/Incompetence, Vulnerability to Harm, Enmeshment, Insufficient Self-Control, Subjugation, Emotional Inhibition, Punitiveness and Negativity/Pessimism. The EMSs of Entitlement, Self-Sacrifice,

Approval/Recognition Seeking and Unrelenting Standards showed small correlations with depression. No large correlations were identified.

The meta-analysis conducted across EMS demonstrated high heterogeneity, with the I^2 value indicating a heterogeneity of 83.59%. Furthermore, heterogeneity was high for all separate meta-analyses as well (Table 1 indicates I^2 values for each EMS).

Table 1
Meta-analytic results of associations of each EMS with depression

EMS	*k*	*N*	*R*	95%CI		*p*	I^2
				LL	UL		
Emotional Deprivation	89	26,517	.41	.38	.44	<.0001	89.11
Abandonment	92	26,960	.45	.42	.48	<.0001	87.11
Mistrust/Abuse	86	25,554	.44	.41	.48	<.0001	88.14
Social Isolation	85	24,036	.48	.45	.51	<.0001	89.12
Defectiveness/Shame	95	28,604	.49	.46	.51	<.0001	89.28
Failure	93	26,816	.45	.42	.48	<.0001	88.06
Dependence/Incompetence	88	25,149	.46	.44	.49	<.0001	87.56
Vulnerability to harm	90	26,548	.46	.43	.49	<.0001	85.89
Enmeshment	82	24,013	.34	.31	.38	<.0001	88.26
Entitlement	80	22,300	.22	.18	.27	<.0001	90.47
Insufficient Self-Control	82	24,394	.41	.38	.44	<.0001	85.16
Subjugation	81	22,984	.46	.43	.49	<.0001	86.52
Self-Sacrifice	86	24,250	.27	.23	.31	<.0001	90.58
Approval Seeking	45	16,658	.29	.24	.33	<.0001	86.86
Emotional Inhibition	83	23,742	.38	.35	.42	<.0001	88.48
Unrelenting Standards	85	23,988	.25	.21	.30	<.0001	92.27
Negativity/Pessimism	48	18,171	.48	.45	.53	<.0001	91.42
Punitiveness	44	16,540	.35	.29	.41	<.0001	94.70

Note: k = number of studies, N = number of participants across studies, r = mean unadjusted correlation, CI = confidence interval, LL = lower limit, UL = upper limit, p = correlation significance, I^2 = indicator of heterogeneity.

3.1.3.4. Meta-regression analyses

Given the high heterogeneity of the study sample, subgroup analyses were conducted, to check for potential moderators. In what concerns the global association of EMSs with depression, from amongst continuous moderators, we found gender to be significant, with the overall association between EMSs and depression becoming higher as the percentage of female participants increases, Q (1) = 7.54, b = .001, p = .006. As far as categorical moderators are concerned, we found an effect for the YSQ version used, Q (1) = 6.05, b = .116, p = .013, with studies using a long version of the instrument yielding higher overall associations (r = .49) than studies using a short version (r = .40).

We further tested for potential moderators in relation to each EMS. Study quality moderated the relationship between Defectiveness/Shame and depression, with studies with higher quality scores reporting lower associations, Q (1) = 7.53, b = -.004, p = .006. We found a significant negative effect for the year of publication, in relation to the Abandonment schema, Q (1) = 7.71, b = -.009, p = .006. Age, the percentage of female participants and the percentage of students did not moderate the associations between either EMS and depression.

As for categorical moderators, clinical status emerged as a significant moderator for three EMSs (Emotional Deprivation, Defectiveness and Emotional Inhibition), with higher associations between the respective EMSs and depression in non-clinical samples. The YSQ version significantly moderated the effect of Emotional Deprivation, Abandonment, Failure, Dependence/Incompetence, Insufficient Self-Control and Emotional Inhibition on depression, with studies using a long version of the YSQ yielding larger effects. Furthermore, studies using a version of the BDI yielded larger effects for Social Isolation, compared to studies using other depression instruments. No other effects were found for the type of depression instrument (BDI versus other) as a moderator. Additionally, the type of depression report (interview versus self-report) moderated the relationship between depression and Emotional Deprivation, Abandonment, Mistrust, Enmeshment and Insufficient Self-Control,

respectively, with studies using clinical interviews reporting larger effects. Additionally, four schemas (Self-Sacrifice, Approval/Recognition Seeking and Negativity/Pessimism) demonstrated larger effects in developer/validator studies relative to other studies.

3.1.3.5. Multivariate associations between EMSs and depression

The MASEM results are displayed in Table 2. As the tested model is a saturated one, the model fit cannot be tested, but parameter estimates are informative nevertheless. According to the results, the associations between all EMSs and depression remained significant when controlling for the other EMSs. However, all relationships were in the small effect range. The highest effect was found for Social Isolation, followed by Vulnerability to Harm, Defectiveness/Shame, Failure and Abandonment, Negativity/Pessimism and Dependence/Incompetence, respectively. Approximately 35.4% of the variance in depression was explained by the model.

Table 2

Estimates of the multivariate relationships between EMSs and depression

EMS	*b*	*SE*	*p*
Abandonment	0.099	0.023	<.001
Social Isolation	0.159	0.026	<.001
Defectiveness/Shame	0.112	0.028	<.001
Failure	0.100	0.023	<.001
Dependence/Incompetence	0.081	0.025	<.001
Vulnerability to Harm	0.124	0.028	<.001
Negativity/Pessimism	0.092	0.040	<.001

Note. EMS = early maladaptive schema; *b* = path coefficient; *SE* = standard error; *p* = significance of *b.*

3.1.4. Discussion

When analyzing bivariate relationships, we found a moderate positive overall relationship between EMSs and depression. Furthermore, consistent with the results of an earlier meta-analysis carried out by Bishop et al. (2022) all individual EMSs yielded positive associations with depression, and Defectiveness/Shame and Social Isolation displayed some of the highest correlations. In contrast with the previous study, which found the respective EMSs to be strongly related to depression, the effects of both EMSs were in the moderate size range according to our results, although they neared a strong effect size. We found no EMSs that demonstrated a strong relationship with depression. Most EMSs were moderately associated with depression as well, including Emotional Deprivation, Abandonment, Mistrust/Abuse, Failure, Dependence/Incompetence, Vulnerability to Harm, Enmeshment, Insufficient Self-Control, Subjugation, Emotional Inhibition Negativity/Pessimism and Punitiveness. Entitlement, Self-Sacrifice, Approval Seeking and Unrelenting Standards showed low associations with depression in our study. In the previous meta-analysis, all of the respective EMSs but Approval-Seeking were weakly associated with depression. This EMS was found to be moderate in Bishop et al.'s study, albeit only slightly higher than in our results. The fact that all EMSs were significantly correlated with depression supports Young et al.'s (2003) theory that EMSs represent vulnerability factors for psychopathology. The fact that our results indicate no EMSs as strongly associated with depression may be due to methodological variations between the studies included in the two meta-analyses. In our study, the highest associations were found, overall, for a number of EMSs that are part of the domains of Disconnection and Rejection and Impaired Autonomy and Performance, respectively. This is in line with Beck's theory of depression, according to which schemas related to the themes of *unlovability* and *helplessness* represent vulnerability factors for depression (Beck, 1996).

Another aim of the present meta-analysis was to estimate the magnitude of the unique associations between EMSs and depression. Several EMSs that have been theorized and/or empirically found to be related to depression were included, namely Abandonment, Social Isolation, Defectiveness, Failure, Dependence/Incompetence, Vulnerability to Harm and Negativity/Pessimism, and a meta-analytic structural equation model of these EMSs as predictors of depression was tested. All the EMSs included in the model were significant predictors and displayed small effects, with Social Isolation demonstrating the largest effect size. This could point to the fact that depression is based on a number of separate appraisals, all of which may contribute to the experience of this psychological problem: perceived inadequacy (i.e. the Defectiveness/Shame schema), lack of affiliation to a social group (Social Isolation), perceived instability (Abandonment), decreased expectations for

performing autonomously (i.e. Failure, Dependence/Incompetence), increased sense of danger (Vulnerability to Harm), and increased pessimism (the Negativity/Pessimism EMSs).

Our review has a number of strengths, including adherence to PRISMA guidelines and pre-registration. Of note, we expanded the search strategy used in the previous meta-analysis; more databases have been included, additional terms have been added to the search string and data was obtained from a number of authors where it was not immediately available. This has led to a high number of included studies (100, compared to 51 in the previous review), which we believe has improved the robustness of findings. Furthermore, we included additional moderators, including age, gender, the presence of stressors and study quality. Lastly, to the best of our knowledge, this is the first meta-analysis to estimate the unique associations between EMSs and depression using a MASEM procedure.

Our meta-analysis is, however, not without limitations. First and foremost, similarly to the previous meta-analysis, high heterogeneity among studies was found for all analyses. To address this issue, we performed moderation analyses and found several significant variables affecting the strength of the relationship between EMSs and depression. Another limitation consists of the fact that we could not assess the effect of longitudinal versus cross-sectional relationships on the relationship between EMSs and depression, as only two studies provided longitudinal data. More research is needed in order to be able to quantify any differences in effect sizes based on time lag, given that cross-sectional results can be biased by reverse causality. Our results are also limited by the fact that we only included a selection of EMSs in the meta-analytical structural model. We chose to do so because including all EMSs would have required a much larger number of studies. Additionally, the goal was to provide a model encompassing only the most theoretically and empirically relevant EMSs, in order to examine which of these could act as individual predictors. However, this does not exclude the possibility for other EMSs to act as unique predictors of depression or to cancel the effect of EMSs that were included in our study. Future studies should extend the scope of our research to other EMSs, in order to explore whether a more refined and comprehensive model of the relationship between EMSs and depression can be formulated.

3.2. Study 2: Comparing the Early Maladaptive Schema Network Structures of Currently Depressed, Previously Depressed and Never Depressed Individuals

3.2.1. Introduction

The goal of the present exploratory study was to compare the network structures of several theoretically and empirically relevant EMSs (Abandonment, Social Isolation, Defectiveness/Shame, Failure, Dependence/Incompetence, Vulnerability to Harm and Negativity/Pessimism) in individuals with current major depression, past major depression and never depressed individuals, respectively. Namely, we aim to identify potential differences in centrality and strengths of associations among the respective EMSs based on clinical status. Furthermore, we aim to check whether current depressive symptoms are placed and connect to the rest of the network differently based on clinical status (current depression vs. previously depressed vs. never depressed).

3.2.2. Method

3.2.2.1. Participants

We recruited participants based on announcements shared on Facebook, either through paid advertisements or posts in Romanian community groups. The inclusion criterion was an age between 18 and 65 years old. Exclusion criteria were (1) a self-reported diagnosis of bipolar disorder or psychotic disorder, or participants meeting criteria for such a disorder based on a subsequent clinical interview, carried out via telephone, (2) current suicidal risk, as indicated by a score of 2 (“I would like to kill myself”) or 3 (“I would kill myself if I had the chance”) on the Beck Depression Inventory – Second Version or identified through the clinical interview.

Out of a total of 337 individuals who signed up, 291 were declared eligible following assessment and included. 97 participants had current major depression, 80 participants had had at least one previous episode of major depression, and 114 had never experienced MDD. The participants ranged in age from 18 to 64, with a mean of 32.27 (SD = 10.97). Regarding gender, 79.72% of participants identified as females.

3.2.2.2. Instruments

Participant background. Participant information was requested based on several items within the data collection form and included demographic information (age, gender, professional status and education level) and

psychiatric history (whether and when participants had been formally diagnosed with a psychiatric disorder and the name/s of the disorder/s).

Depressive symptoms. To assess the current level of depressive symptoms, participants filled in the Beck Depression Inventory – Second Version (BDI-II; Beck, Steer & Brown, 1996).

Early maladaptive schemas. We measured participants' levels of the seven EMSs we included (Abandonment, Social Isolation, Defectiveness/Shame, Failure, Dependence/Incompetence, Vulnerability to Harm and Negativity/Pessimism) based on the corresponding subscales of the Young Schema Questionnaire – Short Version 3 (YSQ-S3; ; Young & Brown, 2005).

Clinical assessment. To assess the presence or absence of criteria for major depression, either current or past, as well as to rule out bipolar and psychotic disorders, we employed the corresponding modules of the Structured Clinical Interview for the Diagnostic and Statistical Manual 5 (SCID-5; First et al., 2016). The team of assessors were clinical psychologists under supervision and were in their final year of training within the Clinical Psychology and Psychotherapy master program at Babes-Bolyai University in Cluj-Napoca.

3.2.2.3. Procedure

Participants could sign up using a Qualtrics™ form that included an information letter and a consent form on the first page. Only participants who agreed to the study terms were able to enrol in the study, and, using survey logic, they were directed to subsequent study questionnaires if their responses matched the inclusion criteria. Eligible participants were contacted, following the questionnaire completion, by the research team, to schedule a telephone-based clinical interview with a member of the team.

3.2.2.4. Data analysis

To estimate the three networks (i.e., never depressed - ND, previously depressed - PD, currently depressed - CD) we employed the Gaussian Graphical Model (GGM; Epskamp et al., 2018; Lauritzen, 1996), with variables being represented as nodes, and the relationships between the variables being represented as edges. The GGM was computed using the Graphical Least Absolute Shrinkage and Selection Operator based on the Extended Bayesian Information Criterion (EBICglasso; (Chen & Chen, 2008; Foygel & Drton, 2010; Friedman & Tibshirani, 2019. For directly comparing the three networks, the Network Comparison Test was employed (van Borkulo, 2019; van Borkulo et al., 2022).

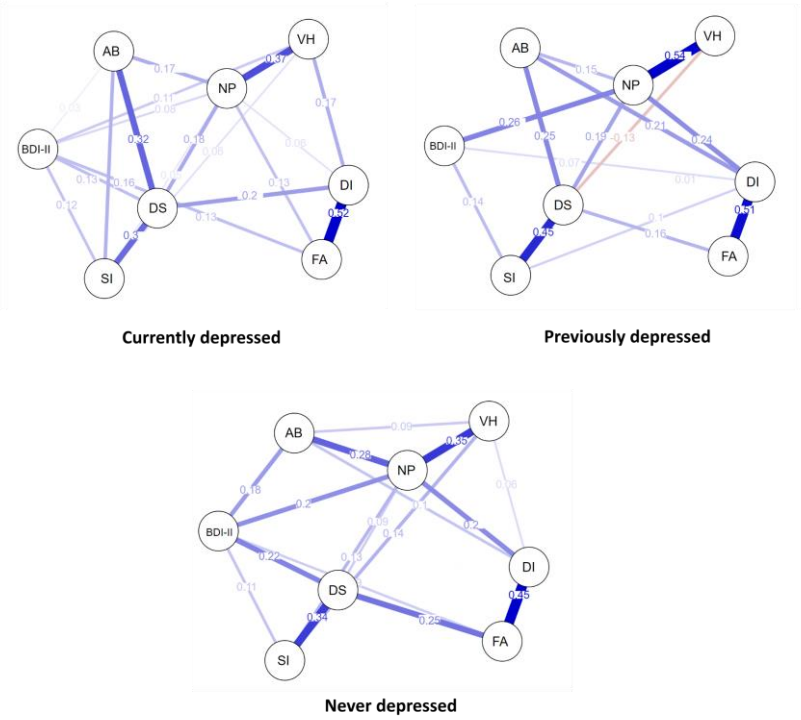
3.2.3. Results

3.2.3.1. Network analyses

The three networks are graphically depicted in Figure 1, while the centrality indices are plotted in Figure 2. The network stability analysis indicated that, except for the expected influence and edge weights, the stability indices were low across the three networks. Given the fact that expected influence and edge weights were the only indicators that consistently displayed higher values than 0.25 and approached the recommended threshold of 0.50 (Epskamp et al., 2018), we chose to focus on these centrality indices in subsequent interpretations of the results from the main network analysis and the results from the network comparisons analyses.

Figure 1

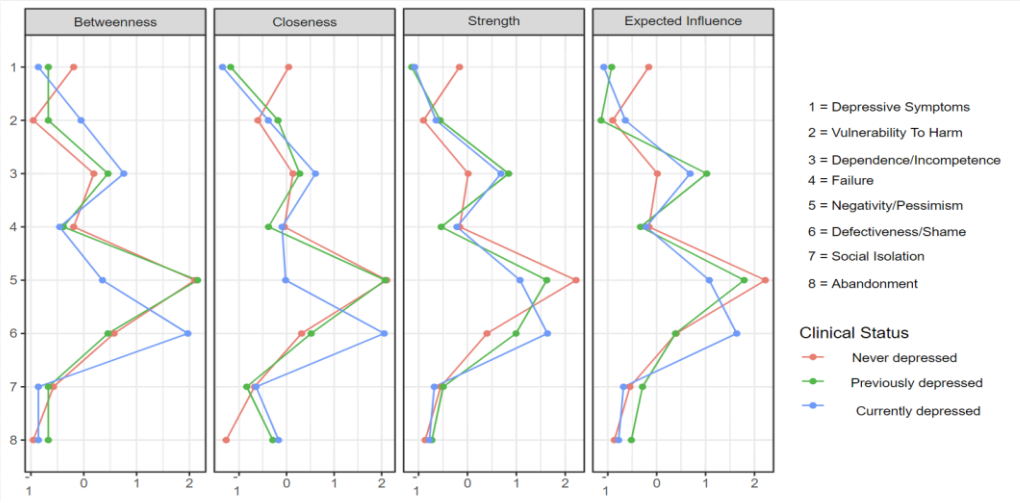
Network plots



Note. AB = Abandonment, SI = Social Isolation, DS = Defectiveness/Shame, NP = Negativity/Pessimism, FA = Failure, DI = Dependence/Incompetence, VH = Vulnerability to Harm, BDI-II = Beck Depression Inventory - Second Version.

Figure 2

Centrality plot



3.2.3.2. Network comparisons

For the comparison between the ND versus the PD networks, there was no statistically significant difference in terms of global difference in edge weights ($p = 0.454$). There was a statistically significant individual edge difference, namely Defectiveness/Shame - depressive symptoms (ND partial correlation: 0.22 vs. PD partial correlation: 0.00, $p = 0.043$). With regard to the comparison of individual node expected influence across networks, the Dependence/Incompetence node had a significantly higher expected influence in the PD network than in the ND network ($p = 0.038$). Moreover, the depressive symptoms node had a significantly higher expected influence in the ND network than in the PD network ($p = 0.036$).

For the comparison between the ND versus the CD networks, there was no statistically significant difference in terms of global difference in edge weights ($p = 0.150$). There was however a statistically significant individual edge difference, namely Abandonment - Defectiveness/Shame (ND partial correlation: 0.00 vs. CD partial correlation: 0.32, $p = 0.017$). There were no statistically significant differences in terms of individual node expected influence across networks.

Finally, for the comparison between the PD and CD networks, there was no statistically significant difference in terms of global difference in edge weights ($p = 0.820$). There was however a statistically significant individual edge difference, namely Abandonment - Dependence/Incompetence (PD partial correlation: 0.21 vs. CD partial correlation: 0.00, $p = 0.040$) The Defectiveness/Shame - Dependence/Incompetence edge only approached statistical significance (PD partial correlation: 0.00 vs. CD partial correlation: 0.20, $p = 0.052$).

3.2.4. Discussion

First, in terms of centrality, we found the Dependence/Incompetence schema to display more expected influence on the network of previously depressed individuals, compared to that of their never-depressed counterparts. This suggests that the appraisal of the self as helpless may have a key role in the cognitive system of vulnerable individuals, in line with the proposition of the helplessness schema as a vulnerability factor in depression (Beck, 2002; Miller & Seligman, 1975). The fact that Dependence/Incompetence is distinctively involved in depression is also suggested by a trend for an association of this EMS with depressive symptoms in the past depressed, but not in the never-depressed group, although the difference between groups did not reach statistical significance.

Second, the Negativity/Pessimism EMS was more central in the previously depressed group, compared to the currently depressed counterpart, in terms of expected influence. This result is somewhat surprising, as one could expect this EMS to become more influential and/or triggered by other EMS content when experiencing a depressive episode. On the other hand, this EMS taps into cognitive content that is arguably related to future threats (e.g. “You can’t be too careful; something will almost always go wrong”, “If something good happens, I worry that something bad is likely to follow”), which might be more salient when individuals are not depressed. In this case, they may have more cognitive resources available to engage with and process future-oriented thoughts and concerns, whereas, during depressive episodes, they could be impaired.

The Defectiveness/Shame EMS was the most central in the currently depressed group, which supports the role of cognitive processes related to unlovability in depression (Beck, 1967, 1995) and is also in line with findings by Marian and Sava (2023), who found that the thought “There’s something wrong with me” was the most central in a network including automatic thoughts and depressive and social anxiety symptoms. Furthermore, this finding highlights the potentially broader role of this pattern in depressed individuals’ negative appraisal of themselves regarding various life areas (e.g. connecting with others and functioning autonomously).

Interestingly, from the three groups, depressive symptoms were the most central in the networks of the never-depressed group; furthermore, there was a significant difference in the centrality of depressive symptoms between never-depressed and previously depressed individuals. This could indicate that, in non-vulnerable individuals, the pattern of association with EMSs may be more consistent (e.g. lower reported EMSs – lower depression), whereas vulnerable individuals may underreport EMS levels despite some degree of depressive symptoms being present, perhaps due to avoidance, or report higher levels of EMSs even when depressive symptoms are lower in intensity. Future studies should further investigate potential moderators of the relationship between EMSs and depression in clinical individuals, such as avoidant coping strategies.

However, it is important to stress that our interpretations are merely speculative and network associations are not necessarily indicative of causal relationships (Bringmann et al., 2019), so our results ought to be interpreted with caution. On the same note, since our findings are based on cross-sectional data, they cannot indicate whether EMS networks in currently depressed or past depressed individuals might get modified *due to* depression or *lead to* depression. Longitudinal network studies are needed to assess the temporality of network changes. Furthermore,

the fact that we conceptualized vulnerability to depression in terms of having a history of MDD episodes also constitutes a limitation that is worth mentioning, as never-depressed individuals may still be cognitively vulnerable to depression.

Another limitation consists of the fact that we did not account for a potential mood state bias in participants. As many YSQ items are phrased in terms of "feeling" (e.g. item 58: "I feel alienated or cut off from other people"), respondents, and, in particular, currently depressed ones, might overreport the endorsement of certain EMSs. Future studies could assess how EMS networks might differ based on mood changes. Furthermore, the fact that we gathered data using an online survey and offered participants reports of their YSQ answers also poses a risk of bias and could potentially explain the low stability coefficients we obtained for some of the indices. Last but not least, the fact that most of our participants were young, highly educated females makes for a potential source of bias in our results; future studies should use a more demographically representative sample, to address this limitation.

3.3. Study 3: Reliability and Validity of the Romanian Version of the Schema Coping Inventory[3]

3.3.1. Introduction

According to the ST model, clients can develop specific coping strategies, in order to adapt to the messages of EMSs, as they form and become triggered in clients' early environments. If used consistently, these coping strategies may become part of the clients' repertoires, called schema coping styles. Although they can be immediately useful throughout the client's formative years, coping styles may become dysfunctional later on, as they lead to maladaptive behaviors and prevent corrective emotional experiences. Schema theory proposes three primary coping styles, which are underpinned by evolutionary theory: overcompensation, avoidance, and surrender. Overcompensation relates to any behavioral strategies that involve the client acting in opposition to EMS messages. For instance, an individual who endorses the Emotional Deprivation schema, according to which they will not get the emotional support they need from others, may be prone to act entitled and demanding in relationships, based on this style, in an attempt to counteract the painful emotions that result from the respective EMS. Avoidance involves the suppression of thoughts and painful emotions and/or behavioral escape from any situations that may trigger specific EMSs. A client whose preferred coping style is avoidance may tend, for instance, to avoid social situations that would otherwise trigger their Defectiveness/Shame schema (according to which they are socially inept). Finally, Surrender as a coping style relates to the tendency to act passive and compliant in the face of negative schema messages (van Genderen et al., 2012; Young et al., 2003). For instance, someone with a Surrender coping style towards their Mistrust/Abuse EMS may expect others to treat them unfairly and not defend themselves when mistreated.

However, schema coping instruments benefit from a small amount of evidence in terms of their psychometric properties. For the Schema Coping Inventory (SCI; Rijkeboer et al., 2010; Rijkeboer & Lobbestael, 2016), which measures the three coping styles, the only published validation study that we are aware of has been performed on adolescents (van Wijk-Herbrink et al., 2018b). In this study, support was found for the three-factor structure of the SCI (composed of the Overcompensation, Avoidance and Surrender subscales). Furthermore, the concurrent validity of the instrument was indicated by correlations of the subscales to internalizing and externalizing behaviors, as measured by Youth Self Report (YSR; Achenbach & Rescorla, 2001), and to schema modes, based on subscales of the Schema Mode Inventory (SMI; Young et al., 2007). In the unpublished original validation study, performed on adults, the internal consistency values for the three SCI subscales were acceptable to good (Rijkeboer & Lobbestael, 2016, cited in van Wijk-Herbrink et al., 2018b). Furthermore, the factor structure of three factors corresponding to the three subscales was confirmed in this study, as was concurrent validity, tested using dimensions on the Assessment of DSM-IV Personality Disorders Questionnaire (ADP-IV; Schotte et al., 2004).

Given the scarce data on the validity of the SCI, more research is warranted in this area. As such, the present study aims to validate the SCI in the Romanian adult population, in terms of factor structure, reliability and construct validity. As far as construct validity is concerned, we predict that the Overcompensation subscale will correlate positively with Leadership, Arrogance and Dominance as personality traits. Furthermore, we expect the opposite for the Surrender subscale – to be negatively associated with Leadership, Arrogance and Dominance. Finally, we predict that Avoidance will be positively associated with Reclusiveness as a personality dimension.

[3] This study has been submitted for publication at *Journal of Rational-Emotive and Cognitive-Behavior Therapy.*

3.3.2. Method

3.3.2.1. Participants and procedure

Participants were recruited online, using online advertisements posted in Facebook community groups. Respondents who agreed with the study terms, presented in the informed consent on the first page of the study form, and indicated that they were at least 18 years old were able to access the subsequent questionnaires.

The sample included 501 participants, aged between 18 and 72, with a mean age of 30.81 (*SD* = 10.12). 335 (66.87%) participants identified as female, 160 (32.14%) as male and 5 (0.99%) indicated another gender. The majority of participants (94.81%) identified their ethnicity as Romanian, with the rest indicating either Hungarian (3.39%), Romani (1%), German (0.4%) or mixed ethnicity (0.4%). Most participants had university-level education (75.45%), resided in an urban area (87.63%) and were in a relationship (38.72%).

3.3.2.2. Instruments

Schema Coping Inventory (SCI; Rijkeboer et al., 2010). A Romanian translation of the SCI was created by P.S. and A.F., both fluent in Romanian and English, using a back-translation procedure (Brislin, 1980). The Romanian SCI includes, just as the original version, 12 items, with each subscale comprising four items. The items, measuring Overcompensation (example item: "If I get criticized, I jump to my defense"), Avoidance (e.g., "I prefer to avoid confrontation") and Surrender (e.g., "If others treat me bad, I let that happen"), are each rated on a Likert scale ranging from 1 = completely untrue of me, to 7 = completely true of me. As presented in the introduction, the original SCI has been shown to have adequate reliability, as well as factorial and concurrent validity (Rijkeboer & Lobbestael, 2016).

The International Personality Item Pool (IPIP; Goldberg, 1999; Goldberg et al., 2006). A selection of subscales from the IPIP was used in order to measure personality dimensions that were deemed to be conceptually similar to the coping styles measured by the SCI. From the IPIP Personality Circumplex, we used the *Arrogant-Calculating* subscale, comprising four items (e.g., "I cut others to pieces"). From the 16 Personality Factors Questionnaire, the *Dominance - Assertiveness* subscale was used, which numbers ten items (e.g., "I can take strong measures"). Finally, from the Six Factor Personality Questionnaire, we used the *Leadership – Dominance* subscale (ten items, e.g., "I have a strong need for power") and the *Autonomy – Reclusiveness* subscale (ten items, e.g., "I prefer to do things by myself"). For all of these items, a Likert scale ranging from 1 = strongly disagree to 5 = strongly agree was used. Items were presented in scrambled order to participants. The Romanian version of these subscales generally displayed acceptable and good internal consistency, with the exception of the Reclusiveness subscale (α = .62) (Iliescu et al., 2015). However, its internal consistency in the present study was acceptable (α = .70).

3.3.2.3. Data analysis plan

Confirmatory factor analysis was employed to assess the structure of the SCI, using Diagonally Weighted Least Squares (DWLS; DiStefano & Morgan, 2014). We employed several indices of fit: the Cumulative Fit Index (CFI), the Tucker–Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMS) and the Goodness of Fit Index (GFI). For CFI and TLI, values of 0.95 or higher are indicative of a well-fitting model, whereas values of 0.90 suggest an acceptable fit (Bentler, 1990). For RMSEA, a value below 0.05 is considered very good, while values between 0.05 and 0.08 reflect a reasonable fit (Hu & Bentler, 1999). SRMR values lower than 0.08 indicate good model fit (Hu & Bentler, 1999). In the case of GFI, the closer to 1 the value, the better the fit, and values above 0.90 are considered acceptable (Kelloway, 1998).

To test construct validity, we used bivariate correlations, examining the associations of each subscale of the SCI with conceptually similar scales from the IPIP. Furthermore, internal consistency for each subscale was calculated using Cronbach's α. All analyses were performed with the R *lavaan* package (Rosseel, 2012), implemented on the JASP software platform (Han & Dawson, 2020).

3.3.3. Results

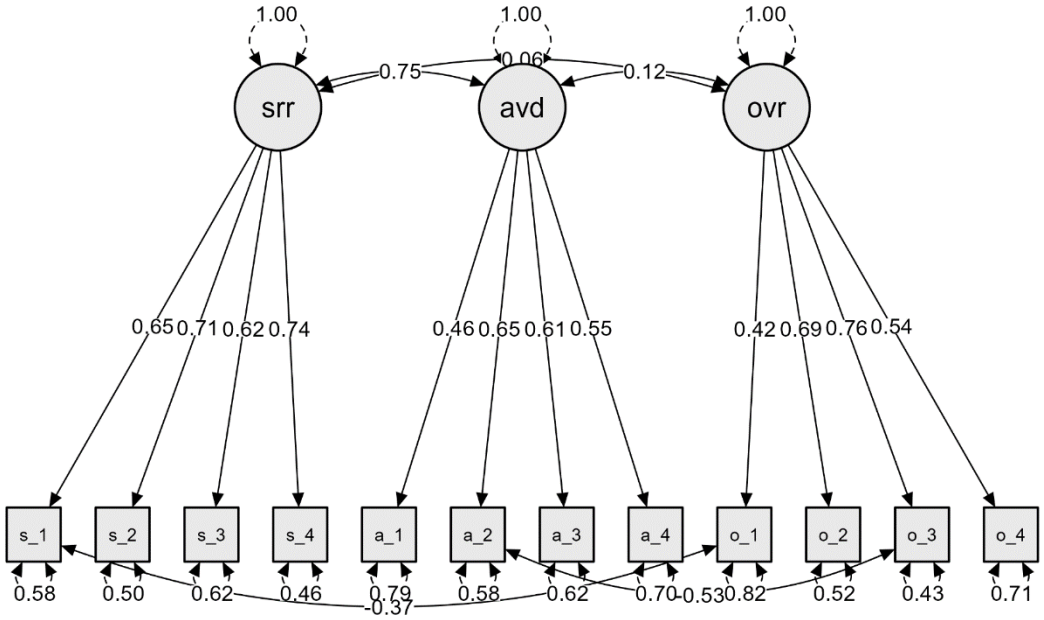
3.3.3.1. Factor structure

The results of the CFA showed that most fit indices were above the commonly accepted threshold (CFI = 0.93, TLI = 0.90, SRMR = 0.08, GFI = 0.98), with the exception of RMSEA, whose value suggested a mediocre fit [RMSEA = 0.10 (90% CI 0.09 – 0.11)]. Substantial modification indices for some item pairs (Surrender item 1 and Overcompensation item 1, and Avoidance item 2 and Overcompensation item 3, respectively) suggested the need for including residual covariances in the model. Accounting for these variances, all fit indices were

acceptable or good [RMSEA = 0.08 (%90 CI 0.07 – 0.09), CFI = 0.95, TLI = 0.94, SRMR = 0.07, GFI = 0.99]. All items had factor loadings higher than 0.4 (the model and factor loadings are presented in Figure 3).

Figure 3

Confirmatory factor analysis of the three-factor structure of the SCI, including residual covariances



Note. srr = Surrender subscale; avd = Avoidance subscale; ovr = Overcompensation subscale.

3.3.3.2. Internal reliability and construct validity

The Surrender subscale had an acceptable internal consistency (α = .72), while Overcompensation and Avoidance yielded values indicating questionable internal consistency (.66 and .60, respectively).

As for construct validity, most tested associations were significant and in the expected direction (see Table 3). The only exception occurred for the relationship between Surrender and Arrogant-Calculating traits, where a small positive correlation was identified. Overcompensation was positively associated with all corresponding personality traits as expected – a moderate association was found for Leadership and Arrogant-Calculating traits and a small association was identified in the case of Dominance. Surrender was negatively correlated with Leadership (moderate association) and Dominance (strong association). Avoidance had a positive and moderate correlation with Reclusiveness. Moreover, while we had not aimed to test these specific relationships, it is noteworthy that Avoidance was also negatively correlated with Leadership and Dominance, while Surrender was positively associated with Reclusiveness.

Table 3

Descriptive statistics and bivariate correlations between SCI subscales and IPIP personality dimensions

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. SCI Overcompensation	17.68	4.92	—						
2. SCI Avoidance	13.98	4.82	.09*	—					
3. SCI Surrender	12.11	5.19	.08	.51***	—				
4. IPIP Leadership-Dominance	29.50	7.05	.41***	-.24***	-.33***	—			
5. IPIP Arrogant-Calculating	10.61	3.00	.37***	-.01	.09***	.19***	—		
6. IPIP Dominance	29.90	5.45	.27***	-.37***	-.53***	.66***	.25***	—	
7. IPIP Reclusiveness	31.17	5.48	.05	-.38***	.32***	-.21***	.14***	-.18***	—

Note. $^{*}p < .05$, $^{**}p < .01$, $p < .001$.

3.3.4. Discussion

Our results lend support to the proposed factor structure of the instrument, with fit indices confirming that the instrument measures surrender, avoidant and overcompensatory coping styles as intended.

In terms of reliability, only the Surrender scale was found to have acceptable internal consistency ($\alpha = .72$), whereas values for Overcompensation ($\alpha = .66$) and Avoidance ($\alpha = .60$) were below the commonly recommended threshold. The results for Avoidance and Overcompensation match those obtained by van Wijk-Herbrink and colleagues (2017), who found questionable internal consistency for all SCI subscales in a non-clinical sample. This may be because the different behavioral strategies encompassed in each coping style may not necessarily correlate with one another. For instance, the Avoidance subscale includes items related to behavioral avoidance (e.g. “I prefer to avoid confrontation”), but also experiential avoidance (e.g. “It is best to switch off your feelings as much as possible”), which may act as separate sets of strategies (Gamez et al., 2011). In clinical samples, these strategies may be more tightly linked because they are likely driven by the specific mechanisms of psychopathology; however, in non-clinical samples, more variability in coping strategies can arguably be expected, which could explain why we obtained lower internal consistency for some of the SCI subscales.

As for construct validity, most associations with theoretically similar constructs were confirmed in our study, with one exception. The association between Surrender coping and Dominance was positive, contrary to our expectations, albeit the effect was small. The fact that Surrender was positively associated with Dominance is in line with the results obtained by van Wijk-Herbrink et al. (2018b), who found Surrender to be positively associated with externalizing behaviors in adolescents. This can be explained by the tendency for submissive behavior to result in increased anger (Allan & Gilbert, 1997, 2002; Gilbert, 2000), which could then be further translated into aggressive or defiant behaviors. Overall, however, the three SCI dimensions appear to reflect constructs related to overcompensation, avoidance and surrender as coping styles – Overcompensation was positively related to Leadership, Dominance and Arrogant-Calculating personality traits, Surrender was negatively related to Leadership and Arrogant-Calculating traits, and Avoidance was positively related to the trait of Reclusiveness.

Our study has several important limitations. First, we relied on a convenience sample, which limits the generalizability of our findings. Second, the study questionnaires were filled in online, with little control over participants’ degree of involvement in filling in the instruments. Third, the fact that participants were incentivized to participate by the option to receive reports of their results could have led them to provide more socially desirable answers. Last but not least, an important limitation lies in the fact that we did not include a clinical sample for comparison. Use of the SCI is arguably the most informative for clinical populations, due to higher levels of maladaptive coping. Future studies ought to validate the instrument on a Romanian clinical sample as well, in order to verify whether the psychometric characteristics observed in our study generalize to clinical populations in this specific cultural context.

3.4. Study 4: Network Dynamics of Schema Activation, Depressed Mood, and Schema Modes: An Ecological Momentary Assessment Study

3.4.1. Introduction

Given the need for a ST model that explains how schema modes operate in depression, the use of research designs that capture their momentary activation would arguably be the most informative. So far, several studies have investigated state constructs that are conceptually similar to schema modes proposed for depression (Critic, Vulnerable Child, Detached/Avoidant Protector and Compliant Surrenderer), as well as their relationships. For instance, there is evidence to indicate that self-criticism is not only a trait, but also has a state-like functioning pattern, with diary studies indicating fluctuations in the degrees to which individuals are critical of themselves on a moment-by-moment basis (Dunkley et al., 2006; Veilleux et al., 2024; Zuroff et al., 2016). In terms of the relationship between self-criticism and maladaptive schemas, an ecological momentary assessment (EMA) study by Dunkley and colleagues (2003) found that self-blame mediated the relationship between perfectionism and avoidant coping. Individuals with a high endorsement of perfectionistic beliefs blamed themselves more in their day-to-day lives, and this was then associated with a higher use of avoidant coping. Furthermore, Gilbert and colleagues (2006) found that, in an imagery task, the strength (vividness) of state self-criticism was related to higher feelings of discouragement when confronted with the respective image of a critical self and more perceived difficulties dismissing self-critical thoughts. This is in line with the above-mentioned proposition that Critic modes lead to vulnerable states, which may prompt maladaptive coping such as freezing or surrendering. On these lines, another EMA study found that depressed affect predicted less use of social support coping (Gunthert et al., 2002), which could point to the activation of a surrender coping state.

Considering the theoretical propositions and the evidence outlined above, we propose the following mechanisms of EMS activation in depression: stronger schema activation could result in more self-criticism later on (e.g. the Critic mode), which could then predict higher depressed affect (which, in ST, would correspond to a Vulnerable Child mode). Furthermore, higher depressed affect could result in a greater likelihood of avoidant and passive (surrender) coping later on. As proposed by Renner et al. (2013), maladaptive coping acts as a maintenance factor for this psychological problem; based on past evidence (e.g. Holahan et al., 2005), we suggest that this may be due to the accumulation of stressors, as more passive and avoidant coping could cause further problems in individuals' daily lives. We thus expect stress levels to be predicted by the previous use of avoidant and surrender coping, respectively.

We aim to test the above-mentioned relationships in an EMA design, to delineate the temporal sequence of modes that are potentially relevant for the generation and maintenance of depression. Furthermore, using a network analysis approach, we aim to identify the most central mechanism from among the ones proposed. Given the previously identified relationships of self-criticism with schema activation, depressed mood and maladaptive coping and the central tenet of the cognitive model of depression, according to which negative thinking triggered in specific situations is a proximal mechanism of depressed mood and dysfunctional behavior (Clark et al., 1999) and by previous results indicating the centrality of automatic negative thoughts in depression (e.g. Marchetti et al., 2021; Marian & Sava, 2023), we expect self-criticism (the Critic mode) to be the most central component of the network.

3.4.2. Method

3.4.2.1. Participants and procedure

Participants were invited to participate using advertisements shared in Facebook community groups, which included a link to an online Qualtrics™ sign-up form. To be included, participants had to (1) be at least 18 years of age, (2) own an Android or iOS-operated smartphone with internet access and (3) agree with the study terms. Using survey logic, only participants who met the criteria for participation were directed, following completion of the sign-up process, to a page that included information on how to access the Expiwell™ experience sampling app.

Upon signing up in the app, participants received instructions and details of the structure of the intervention. They were reminded that, for 14 days, they would receive 4 sets of questionnaires every day between 10:00 am and 10:00 pm. Beeps were scheduled to occur randomly within 4 equal time intervals (10:00 am – 1:00 pm; 1:00 pm – 4:00 pm; 4:00 pm – 7:00 pm; 7:00 pm – 10:00 pm). The questionnaires remained available for 20 minutes and an additional reminder was sent to participants after 10 minutes if they had not provided answers in the meantime. Using a contact feature in the app, participants could send messages to the research team and were

assisted via email in case of technical difficulties. Participants who had a completion rate of the EMA measures of 80% or higher were rewarded with shopping vouchers worth approximately $20 each.

3.4.2.2. Instruments

Schema activation. For brevity purposes, we used a selection of 3 items from the Young Schema Questionnaire – Long Form 3 (YSQ-L3; Young & Brown, 2003) to measure momentary schema activation. For the 3 most correlated EMSs with depression, based on the meta-analysis by Bishop et al. (2022) (Social Isolation, Defectiveness, Pessimism), we selected the items with the highest loadings on the respective factor based on a study by Yalcin et al. (2020). The items were adapted to reflect momentary schema activation (e.g. for Defectiveness: "I felt that if others found out about my basic defects, I could not face them") and participants were instructed to refer to how much the statements had applied to them in the hour before questionnaire completion, using a six-point Likert scale from 0 ("not at all") to 5 ("extremely").

Self-criticism. To measure state self-criticism, we used the Self-Critical mode subscale of the Momentary Schema Modes Questionnaire (MSMQ; Lazarus et al., 2020). A 6-point Likert scale from 0 ("not at all") to 5 ("extremely") was used for participants to indicate how much they had engaged in self-criticism in the past hour, based on the 3 items ("I put myself down", "I punished myself/ denied myself pleasure because I didn't deserve it", "I was self-critical").

Depressed mood. A selection of 3 items from the Profile of Mood States (McNair et al., 1992) ("sad", "hopeless" and "discouraged") were used to measure depressed mood. The three items were shown to reliably measure momentary depressed mood in a diary study by Cranford and colleagues (2006). In our study, participants were asked to indicate the degree to which the items reflected their state during the previous hour, on a six-point Likert scale from 0 ("not at all") to 5 ("extremely").

Surrender and avoidant coping. We used adaptations of the Surrender and Avoidance subscale from the Schema Coping Inventory (SCI; Rijkeboer et al., 2010) to measure state coping behaviors. Each subscale encompasses four items. Our versions of the items referred to the degree to which participants had experienced the respective surrender and avoidance behaviors in the past hour (e.g. item 6: "I preferred to avoid confrontation") and were based on a six-point Likert scale from 0 ("not at all") to 5 ("extremely").

Stress. The degree of stress experienced in the past hour was assessed based on a measure used in a study by Fuller-Tyszkiewicz et al. (2017). The first item we used inquires about the most relevant stressful situation, if any, that the respondent has experienced or that has been on the respondent's mind in the past hour, by prompting participants to select the type of stressor (either social, professional, health-related, financial, administrative, other or no stressful situation). Participants who stated that they had encountered any kind of stressful situation were prompted to specify the degree of stress associated with that situation, from 0 = not stressful at all to 5 = extremely stressful (item 2), and their perceived ability to cope with the situation, from 0 = not at all to 5 = extremely well (item 3). Responses to items 2 (direct scored) and 3 (reverse scored) were summed to indicate the degree of momentary stress experienced by participants. Item 1 was only used to anchor the participants' answers to the following questions.

3.4.2.3. Data analysis

We employed the *mlvar* R statistical library (version 0.5.2; Epskamp et al., 2021) for the estimation of a t-1 (i.e., lagged) multi-level vector autoregressive dynamic network model, a model in which all variables at a given time point (i.e., time t) are predicted, in a regression model, by variables from the prior assessment time point (i.e., time t-1). This approach leads to the estimation of three types of networks: a temporal network, a contemporaneous network, and a between-persons network (Epskamp, van Borkulo et al., 2018). The "qgraph" (Epskamp et al., 2012) R statistical library was employed for estimating and plotting the centrality indices, representative of the relative influence that each variable has in the network (betweenness, closeness, in- and out-strength, and in- and out-expected influence. All statistical analyses pertaining to network analysis were carried out using the R version 4.2.2 statistical environment (R Core Team, 2022).

3.4.3. Results

3.4.3.1. Sample characteristics

Out of 117 participants who signed up for the study, 109 (93.16%) downloaded and signed up in the Expiwell™ app. Eighty-eight of them (80.73%) provided EMA responses and were thus included in the final sample. The mean age of participants was 30.58 (*SD* = 9.52), with an age range of 20 to 55. Seventy participants (79.55%) declared that they were female, whereas the rest (20.45%) indicated their gender as male. Most participants were employed (57.95%) and had completed a form of higher education (69.31%).

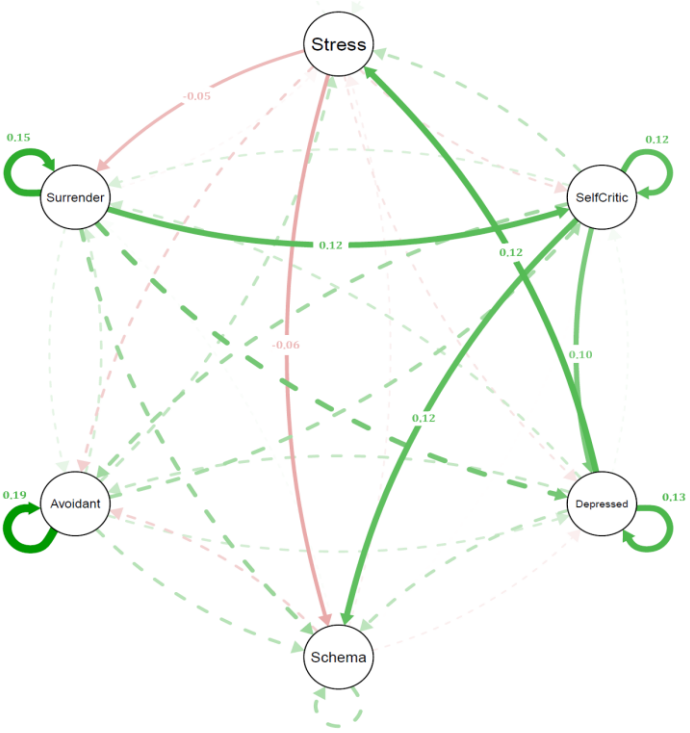
Participants filled in a total number of 2,427 assessments (*M*=27.58, *SD*=17.83) for an average number of 8.90 days (*SD*=4.62). On average, participants filled in 2.84 assessments every day (*SD*=0.80).

3.4.3.4. Network analysis

For the purposes of the present summary, we present the results the within-person temporal network only (i.e., indicative of predictive relations between variables over time). the results indicated several statistically significant temporal connections between variables (Figure 4). Stress at moment t-1 predicted Schema activation (β = -0.06, p = 0.027) and Surrender coping (β = -0.05, p = 0.027) at moment t, Self-criticism at moment t-1 predicted itself (β = 0.12, p = 0.019), Depressed mood (β = 0.10, p = 0.020) and Schema activation (β = 0.12, p = 0.003) at moment t, Depressed mood at moment t-1 predicted itself (β = 0.13, p = 0.021), and Stress (β = 0.21, p = 0.041) at moment t, Avoidant coping at moment t-1 predicted itself (β = 0.19, p < 0.001) at moment t, and finally, Surrender coping at moment t-1 predicted itself (β = 0.15, p = 0.002) and Self-criticism (β = 0.12, p = 0.017) at moment t. The statistically significant autoregressions for Self-criticism, Depressed mood, Avoidant coping and Surrender coping indicate that, for the prototypical participant, these factors tend to persist over time.

Figure 4

Within-person temporal network



3.4.3.5. Network centrality

Firstly, with regard to the strength centrality indices, Self-criticism had the highest Out-Strength (i.e., the sum of absolute values of all edges' weights pointing from a node towards all other nodes), meaning that this node was responsible for predicting the highest number of other nodes. Schema activation had the highest In-Strength (i.e., the sum of absolute values of all edges' weights pointing towards a node from other nodes), meaning that this node was the most strongly predicted by other nodes in the network.

Secondly, in terms of expected influence centrality indices (i.e., which takes into account negative associations among nodes), Self-criticism had the highest Out-Expected Influence, meaning that this node was responsible for predicting the highest number of other nodes. Stress and Self-criticism had the highest In-Expected Influence, meaning that these nodes were the most strongly predicted by other nodes in the network.

Finally, Surrender coping and Self-criticism had the highest Closeness, meaning that these nodes were more central in the network or closer to other nodes, while Stress and Self-criticism had the highest Betweenness, meaning that these nodes were situated on the shortest paths between other nodes in the network.

3.4.4. Discussion

The lagged relationship we identified between self-criticism and depression is in line with previous findings indicating that self-criticism is predictive of depression, both as a trait (e.g. Werner et al., 2019) and a state (Dunkley et al., 2003). Individuals who were more critical of themselves displayed higher depressed affect hours later, which highlights the utility of addressing self-criticism to tackle depressive symptoms and supports its role as a core cognitive mechanism of depression, as previously established (Beck, 1967, 1976; Beck & Emery, 1985; Blatt et al., 1982; Ellis, 1962, 1971, 1973. Second, self-criticism was also found to be the most important node in the temporal network, being consistently rated above the other nodes, regardless of the specific centrality index. Self-criticism predicted other nodes the most strongly and also predicted the highest number of other variables, was situated the closest to the other nodes and was also predicted by the highest number of nodes. This also points to the importance of addressing cognitive factors when looking at depressive symptoms and matches other network analysis results indicating that cognitive aspects are central in depression (e.g. Marchetti et al., 2021; Marian & Sava, 2023).

We further discuss the unconfirmed relationships and suggest potential explanations for the counterpointing results. First, schema activation did not predict self-criticism, but the other way around. However, the fact that schema activation and self-criticism were correlated when measured contemporaneously might suggest a more immediate effect of schema activation on self-criticism, which may then dissipate, especially given the fact that self-criticism predicted depressed mood, which has been associated with a tendency to engage in thought suppression (Purdon, 1999). Indeed, when measured concurrently, schema activation and avoidant coping were connected, which suggests the possibility for the latter to have been activated and act as a temporary buffer.

Depressed mood did not predict surrender and avoidant coping at the following assessment, which may be indicative of maladaptive coping only occurring momentarily and/or being replaced by healthier coping strategies. We used three-hour windows, during which it may have been likely for other modes to occur as well. Considering the fact that modes are considered to be moment-by-moment states, a shorter timeframe may have better captured the ulterior activation of surrender and avoidant coping. Indeed, depressed mood was contemporaneously associated with both surrender and avoidant coping, which might indicate that depressed mood led to these types of coping in the short run. From a mode theory perspective, healthy individuals differ from clinical populations in terms of their ability to shift modes and access alternative ways of coping, especially in challenging situations (Dweck, 2017; Flanagan, 2010).

As for the relationship between maladaptive coping and stress, the two types of coping did not predict more stress at the following assessment. The same pattern proposed above – maladaptive coping only occurring momentarily – may have meant that stress did not significantly accumulate from one assessment to the next due to maladaptive coping. Given the fact that the stressful situations we assessed are broadly related to more general life situations (e.g. interpersonal, financial), momentarily passive or avoidant coping may not have immediately influenced them significantly, and longer periods of maladaptive behavior may have been needed to produce a more consistent impact. However, despite not predicting stress, surrender coping did predict self-criticism. This suggests that individuals adopting passive behaviors may have later criticized themselves for it, highlighting a potential vicious circle of depression: self-criticism might immediately lead to depressed affect and surrender coping (as suggested by contemporaneous associations), the latter of which could then generate self-criticism even several hours later. This finding also matches results obtained by Veilleux et al. (2024), who, in an ecological momentary assessment study, found self-criticism to be higher when individuals perceived themselves as less able to tolerate distress and exercise willpower.

When looking at the limitations of the present study, one of them is the fact that we only relied on a non-clinical sample. Average scores for depressed mood were relatively low, with some participants reporting little variation on this level. It is likely that, in depressed individuals, the associations between our variables would have been stronger, in line with the core propositions of the network model (Bringmann et al., 2013). Future studies ought to compare the networks of a clinical versus a non-clinical sample and investigate whether lagged effects of, for instance, depressed mood on coping occur more consistently in depressed individuals or whether, in this population, schema activation is associated with more persistent self-criticism several hours later, compared to a non-clinical sample.Another limitation consists of the timeframe we used to examine the lagged relationships between variables. As previously mentioned, multiple mode shifts could have occurred within the several hours between measurements, perhaps leading respondents to adopt more adaptive behaviors and buffer the effects of the maladaptive mechanisms we measured. Future studies ought to use more fine-grained measurements of

schema activation, mood, coping and stress (e.g. within an hour), to better capture mode shifts and their dynamics. As research related to state activation of schema therapy constructs is still in its infancy and there is little to no research on the measurement of these constructs, the way we chose to operationalize and measure them may not have been the most reflective of the underlying constructs. More specifically, additional research is thus needed on identifying the most immediately salient schema content in terms of generating depressive symptomatology and on defining what aspects of passive and avoidant coping are triggered, considering the fact that the instruments we used are not specifically meant to capture aspects related to depression. Finally, causation cannot be inferred from our results and thus, they ought to be interpreted with caution. Factors beyond those we have included may have been responsible for the associations highlighted in this study (or for the lack thereof).

Nevertheless, the present study has several important implications. To our knowledge, this is the first study to test schema therapy constructs related to depression in an experience sampling and network analysis paradigm and to illustrate how they interact longitudinally, in day-to-day situations. The scope of our study is thus in line with one of the goals identified by a panel of ST experts as research priorities for the field, namely to identify the connections between EMSs, modes and coping styles (Pilkington et al., 2022). The fact that self-criticism predicted depressed mood and was also the most central component of the longitudinal network suggests the need for including the Critic mode in the ST model of depression and, on a practical level, for targeting it as part of ST-based interventions for this psychological problem. This mode also appears to be prompted by surrender coping and to trigger further schema activation, suggesting a potential vicious circle in depression that may arguably be best addressed by teaching clients to counteract and disengage from self-criticism, particularly when behavioral passivity triggers it.

3.5. Study 5: Feasibility, Acceptability and Outcomes of a Contextual Schema Therapy-Based Mobile Program for Depressive Symptoms[4]

3.5.1. Introduction

Given the potential utility of enhancing standard psychological interventions with Contextual Schema Therapy principles, as well as the need for accessible interventions for depression, the present study is a pilot test of a short online self-administered intervention for depressive symptoms (*nCompass*), based on CST principles and Behavioral Activation. The *nCompass* intervention is a 15-day mobile program targeting behavioral inactivity, self-criticism and depressed mood, conceptualized as maladaptive modes, aiming to (1) help participants recognize, monitor and change behavioral inactivity/avoidance (defined as the Protector mode), (2) defuse from and replace self-criticism/negative schema messages (the Critic mode) with healthier cognitive alternatives and (3) support users in understanding and meeting emotional needs (address the Vulnerable Child mode) by engaging in meaningful activities. Although behavioral inactivity could theoretically be conceptualized as a set of modes (e.g. Compliant Surrender, Detached Protector, Avoidant Protector), to simplify conceptualization, all the respective facets of inactivity are represented, in the app, through a single mode called the Protector mode. This mode is described, within the program as fostering behavioral passivity (disengagement from meaningful activities) and diminished positive affect, so as to keep the Critic mode at bay.

We aim to investigate whether the program could make for a feasible, acceptable, and effective intervention in terms of reducing depressive symptoms. Furthermore, as the program focuses on reducing self-criticism (the Critic mode) and maladaptive coping and improving psychological flexibility, we aim to assess changes in these proposed mechanisms and to check whether they can explain changes in depressive symptoms that are due to engaging in the program.

3.5.2. Method

3.5.2.1. Participants

Participants were recruited using advertisements posted in Facebook community groups. To be included, participants had to: (i) be at least 18 years of age and (ii) experience symptoms of depression (defined as a total score of 14 or higher on the Beck Depression Inventory-II (BDI-II). We excluded participants with (1) a self-reported diagnosis of bipolar or psychotic disorder, (2) current suicidal risk, as indicated by a score of 2 ("I would like to kill myself.") or 3 ("I would kill myself if I had the chance.") on the *Suicidal Thoughts or Wishes* item on the BDI-II. Participants were randomly allocated to the nCompass group (n=51) or the psychoeducation group (n=51). The mean age of participants was 27.06 (*SD*=7.13) in nCompass group and 26.78 (*SD*=6.25) in the control group.

[4] This study has been submitted for publication at *Journal of Contextual Behavioral Science*.

3.5.2.2. Instruments

Demographic information. In the sign-up form, participants were requested to fill in information regarding their age, gender, ethnicity, highest form of education completed, as well as employment status.

*Depressive symptoms***.** The Romanian version of the Beck Depression Inventory – Second Version (BDI-II; Beck, Steer & Brown, 1996) was used to assess depressive symptoms at intake, post-test and follow-up.

Self-criticism. Due to the fact that changes in trait self-criticism were deemed unlikely following a brief intervention such as ours, we chose an instrument measuring state self-criticism. The Self-Judgement Subscale of the State Self-Compassion Scale – Long Form (SSCS-L; Neff et al., 2021) asks respondents to rate the degree to which they are critical of themselves while imagining that they are faced with a current difficult situation in their lives. This is done using three items (e.g., "I'm being pretty tough on myself") rated on a Likert scale from 1 ("Not at all true for me") to 5 ("Very true for me").

Surrender coping. The Surrender subscale from the Schema Coping Inventory (SCI; Rijkeboer et al., 2010) was used to measure surrender coping, based on schema theory. In the SCI, Surrender, Avoidance and Overcompensation as coping styles are each measured using 4-item subscales, rated on a Likert scale from 1 = Completely untrue of me to 7 = Completely true of me (example item: "If others treat me bad, I let that happen"). Higher scores reflect higher maladaptive coping. Instructions and items were adapted so as to reflect coping from the past two weeks (e.g. "If others treated me bad, I let that happen").

Psychological inflexibility. The Romanian version of the 7-item Acceptance and Action Questionnaire – version 2 (AAQ-II; Bond et al., 2011) was used to measure psychological inflexibility in participants. The AAQ-II uses a 7-point Likert scale, from 1 = never true to 7 = always true, and higher total scores are reflective of higher psychological inflexibility.

*Acceptability and usability***.**A selection of items from the System Usability Scale (SUS; Bangor et al., 2008) and the USE Scale (Lund, 2001), deemed relevant to the content and goals of the program, were employed to assess acceptability and usability. From the SUS, we used four items (e.g. "The nCompass program was easy to use"), whereas, from the USE, ten items were employed (e.g. "The nCompass program was useful". All items were rated on a Likert scale from 1 = strongly disagree to 5 = strongly agree. Furthermore, custom items were built to measure the acceptability of the various features of the program.

3.5.2.3. Procedure

Participants were recruited using advertisements posted in Facebook community groups. Respondents who agreed to the terms in the informed consent, presented in the introduction of the form, were able to access the screening instruments on the following pages. Based on survey logic, only participants who met inclusion criteria were able to access baseline measures. Eligible participants were randomized, using the Qualtrics™ randomization feature, into either the nCompass group or a self-administered online psychoeducation group. The content of the two interventions is presented in the respective sections below.

Following the 15 days of intervention, participants were emailed with a link to an online form containing post-test measures. After an additional two weeks, participants were contacted again via email to fill in the follow-up assessment.

This study was preregistered on OSF.

3.4.2.3.1. Intervention protocols

nCompass intervention. The *nCompass* intervention was structured as a 15-day mobile self-help program based on the principles of Contextual Schema Therapy and Behavioral Activation for depression. The nCompass program targets behavioral inactivity, self-criticism and depressed mood, conceptualized as maladaptive modes, and aims to (1) help participants recognize, monitor and change behavioral inactivity/avoidance (defined as the Protector mode), (2) defuse from and replace self-criticism/negative schema messages (the Critic mode) with healthier cognitive alternatives and (3) support users in understanding and meeting emotional needs (address the Vulnerable Child mode) by engaging in meaningful activities. Similar to Lejuez et al.'s protocol (2011), participants were invited to schedule activities pertaining to important life areas, which were associated to one of the five sets of needs proposed in ST: (1) **connection** (life area: relationships); (2) **autonomy/performance** (life area: education/career); (3) **healthy limits/structure** (life area: daily responsibilities); (4) **self-care** (life area: mind, body and spirituality); (5) **play** (life area: recreation and interests). In ***the first stage*** of the program (the first five days), participants were prompted to focus on monitoring and counteracting their Protector mode by purposely engaging in one meaningful activity each day and/or noticing their tendency to avoid it. In the ***second***

stage (the next five days), the same process was repeated, this time with activities of moderate difficulty. Techniques tackling the Critic mode were introduced, with users being prompted to choose the most credible negative thought they had in relation to their chosen activity (either "I don't deserve to do this activity", "I'll fail", "It's pointless", "It's silly/stupid", "I will feel lonely while doing it", or a custom thought). Then, using audio recordings of defusion exercises, participants were instructed to practice a different strategy every day. In the ***third stage*** (the last five days), within the same process, but for activities of higher difficulty, participants were presented with a list of alternative thoughts (corrective messages) to one problematic thought from the aforementioned list. Participants were invited to remember the alternative thought as they attempted to do their daily activity.

Self-administered psychoeducational intervention. The self-administered psychoeducational intervention was based on a set of reading materials, in PDF format, that participants received daily for 15 days via email. Emails were automatically sent to participants every day at 10 a.m. and participants were instructed to read the respective material within the day. Each material comprised one written page presenting a theme related to depression and its factors. To match the content of the nCompass intervention, the themes of avoidance, behavioral activation, self-criticism, cognitive defusion and self-compassion were presented at length within the materials

3.5.2.4. Data analysis

All analyses were performed using the *lavaan* package (Rosseel, 2012), as implemented on the JASP software platform, version 0.16.4 (Han & Dawson, 2020). Acceptability and usability responses were analyzed on a descriptive level, by considering the average scores for each item, as well as the percentage of participants who agreed/strongly agreed, were neutral, or disagreed/strongly disagreed with each statement describing the program.

The feasibility of the program was assessed by examining the percentages of participants who (1) installed the app, (2) engaged with the app at least once, (3) completed each of the three levels of the program. Furthermore, we examined the number of days in which participants used the app and the percentages of completed daily activities suggested as part of the program. High engagement and completion rates were considered indicators of feasibility.

To analyze changes in depressive symptoms, self-criticism, surrender coping and psychological inflexibility, we first performed independent sample t-tests to check for baseline differences between groups. We used two-factor repeated-measures ANOVA with time (pre-test, post-test and follow-up) as a within-subjects factor and group (nCompass or psychoeducation) as a between-subjects factor. In the case of significant baseline differences, we also performed univariate analyses of covariance (ANCOVA) to check for post-test and follow-up differences in groups, with pre-test scores as covariates.

To assess the effects of changes in self-criticism, surrender coping and psychological inflexibility as mediators of the effect of group on changes in depression symptoms, a series of mediation analyses were planned using the SEM mediation package in JASP.

3.5.3. Results

3.5.3.1. Feasibility

Out of 51 participants allocated to the nCompass condition, 48 (94.12%) installed the app. 43 participants (84.31%) were active users (completed at least one interaction) and were thus included in the analysis. Forty-two of them (97.67%) filled in the post-test questionnaires and thirty-two (74.42%) participants responded at follow-up. In the psychoeducation group, out of the 51 allocated participants, 50 (94.33%) filled in the post-test measurements and 40 (75.47%) responded at follow-up.

In the nCompass condition, 41 of the 48 total users (85.41%) completed the first level of the program, 38 (79.16%) finished the second level and 35 (72.92%) completed the third level. However, when only considering participants who actively used the program (i.e. engaged with the application at least once), 40 out of the 43 active users (93.02%) completed the first level, 36 (83.72%) finished the second level and 32 (74.41%) completed the third. On average, nCompass participants used the app for 10.34 out of the 15 days of the program. In their active days in the app, participants indicated that they completed 68.15% of the proposed activities.

3.5.3.2. Acceptability and usability

Most participants agreed or strongly agreed with statements related to the program's usefulness and ease of use. The majority of participants also indicated that they were satisfied with the app. Furthermore, most

participants agreed or strongly agreed with statements regarding the usefulness of specific features, including psychoeducation and conceptualization, daily activities, behavioral experiments, Critic-related exercises and corrective messages.

3.5.3.3. Between-group analyses

Descriptive statistics for all study variables at each time point are displayed in Table 4. For BDI-II, repeated measures ANOVA showed a significant group by time interaction $F(2,200) = 5.80$, $p = .004$, $\eta^2p = 0.06$. According to post-hoc analyses, this effect was explained by changes from pre- to post-test, $t(50) = 5.86$, $p < .001$, $d = 0.66$, and from pre-test to follow-up, $t(50) = 6.55$, $p < .001$, $d = 0.74$, in the nCompass group, by changes from pre- to post-test in the psychoeducation group, $t(50) = 3.09$, $p = .035$, $d = 0.35$, and by a difference at follow-up between the groups, $t(100) = 3.07$, $p = .04$, $d = 0.61$.

Table 4

Descriptive statistics of groups at each phase of the study

Variable and phase	nCompass		Psychoeducation		Baseline differences	
	M	*SD*	*M*	*SD*	*t(100)*	*p*
BDI-II						
Pre-test	25.43	9.50	26.19	9.52	0.37	.72
Post-test	18.43	9.60	22.43	11.03		
Follow-up	17.61	12.19	24.02	11.10		
Self-criticism						
Pre-test	10.35	3.01	9.88	2.78	0.37	.72
Post-test	9.45	3.13	9.26	3.21		
Follow-up	9.16	3.17	8.98	2.99		
SCI Surrender						
Pre-test	14.12	4.84	11.53	4.66	-2.75	.007
Post-test	11.92	4.84	11.75	4.94		
Follow-up	11.75	4.81	12.43	4.18		
AAQ-II						
Pre-test	35.33	10.81	31.96	9.30	-1.69	.094
Post-test	32.02	12.80	32.33	8.80		
Follow-up	33.00	13.91	31.77	9.32		

For Surrender, we also found a significant group by time interaction, $F(2,200) = 8.42$, $p < .001$, $\eta^2p = 0.08$, which was explained by decreases from pre- to post-test $t(50) = 3.76$, $p = .003$, $d = 0.47$, and from pre-test to follow-up in the nCompass group, $t(50) = 4.06$, $p = .001$, $d = 0.50$. The groups did not differ at post-test, $t(100) = -0.86$, $p = 1.000$, nor at follow-up, $t(100) = 0.74$, $p = 1.000$. However, as we found that groups were different at pre-test in terms of surrender coping scores (see Table 4), we also ran ANCOVAS of the post-test and follow-up differences between groups using pre-test scores as covariates. We found that, controlling for pre-test scores, groups were different at post-test, $F(1,99) = 7.54$, $p = .007$, $\eta^2p = 0.07$, with estimated marginal means indicating that the experimental group had lower scores ($M = 10.92$, $SE = 0.46$) than the control group ($M = 12.75$, $SE = 0.46$). At follow-up, there was also a significant difference between groups, $F(1,99) = 4.41$, $p = .038$, $\eta^2p = 0.04$, with the experimental group recording lower levels of surrender coping ($M = 11.21$, $SE = 0.58$) than the control group ($M = 12.97$, $SE = 0.58$).

For self-criticism, no group-by-time interaction was found, $F(2,200) = 0.23$, $p = .79$. We also found a significant group-by-time interaction for AAQ-II, $F(2,200) = 3.75$, $p = .025$, $\eta^2p = 0.008$. This effect was explained by changes from pre- to post-test in the nCompass group, $t(50) = 3.47$, $p = .010$, $d = 0.30$. The pre- to follow-up change in the nCompass group was, however, not significant, $t(50) = 2.44$, $p = .233$, and the groups did not differ at post-test, $t(100) = 0.14$, $p = 1.000$, nor at follow-up, $t(100) = -0.57$, $p = 1.000$.

3.5.3.4. Mediation analysis

As differences in self-criticism and psychological inflexibility between groups were not significant at post-test and follow-up, we only tested the models of changes in Surrender coping as a mediator of the relationship between group and changes in BDI-II scores. The indirect effect of Surrender coping from pre-test to post-test was significant, $b = 1.90$, 95% CI [0.62, 4.16]. The direct effect was not significant, $b = 1.42$, 95% CI [-1.23, 4.11], indicating that changes in Surrender coping fully explained changes in BDI-II scores, based on group. As

for pre-test to follow-up changes, we also found a significant indirect effect, $b = 2.81$, 95% *CI* [1.27, 4.95], while the direct effect was insignificant, $b = 2.92$, 95% CI [-0.20, 6.08].

3.5.4. Discussion

In a sample of individuals with depressive symptoms, we found the 15-day nCompass program to be feasible and acceptable and effective in terms of depressive symptoms and Surrender coping. Retention rates were comparable to those obtained in studies testing similar BA mobile programs for depression (Dahne et al., 2019a, Dahne et al., 2019b, Schlosser et al., 2017). Most participants rated the program as easy to use and useful and rated their satisfaction as high, with acceptability scores being also similar to those of other mobile applications for depression (Deady et al., 2018; Schlosser et al., 2017; Rohani et al., 2019). Furthermore, the majority of users stated that the features included in the program (psychoeducation, behavioral activation and experiments, defusion exercises and corrective messages) were useful in terms of helping them approach meaningful daily activities. This points to the fact that a brief Contextual Schema Therapy-based self-help intervention is a viable treatment in terms of user preferences.

As far as the intervention outcomes are concerned, we found significant decreases in depressive symptoms at a two-week follow-up, compared to an active (self-administered psychoeducation) control group. From among the proposed mechanisms, only Surrender coping displayed significant changes in the nCompass group, compared to the control group, both at post-test and follow-up. Changes in Surrender coping explained the decreases in depressive symptoms in the nCompass users, relative to the control group.

The fact that our intervention was effective in reducing depressive symptoms is in line with previous studies pointing to ST's usefulness for treating depression (Carter et al., 2013; Malogiannis et al., 2014; Renner et al., 2016). Furthermore, our study confirms the usefulness of mobile interventions based on contextual behavioral principles (Levin et al., 2017; Lu et al., 2023; Ly et al., 2012) and BA for depression (Dahne et al., 2019; Hefner et al., 2019, Van Genugten et al., 2021), similar to previous results. More generally, our findings support the effectiveness of internet-based contextual psychotherapies (Han & Kim, 2022a) and BA (Han & Kim, 2022b).

Contrary to our expectations, no significant effects were found for self-criticism. This could be due to the brevity of the intervention, with the Critic mode only being targeted for 10 days within the program. Furthermore, contrary to previous research examining the effect of mobile contextual therapies in depression (Lu et al., 2023), we could not find changes in psychological flexibility over those in the control group. At post-test and follow-up, AAQ-II scores remained over the clinical cut-off of 26 established in literature (Bond et al., 2011). This may be related to the content and scope of our intervention, which addresses one behavior a day and only targets some of the processes of psychological flexibility in relation to the respective behavior. This, together with the length of the intervention, could arguably be insufficient to achieve consistent changes in psychological flexibility as a whole. Future studies should test whether modified versions of the program, including an extended duration, and a more intensive focus on the processes of self-criticism and psychological flexibility (e.g. more exercises, a more flexible and personalized training of processes), could lead to higher increases.

Another limitation consists of the fact that we did not rely on a clinical sample, which limits the generalizability of our findings to clinical populations. Future studies should test whether the present findings hold for clinical individuals as well. On these lines, as ST was originally proposed for individuals with chronic emotional and personality disorders, future studies should investigate whether our intervention leads to different degrees of improvement in chronic versus non-chronic depression and in the case of comorbid personality disorders relative to users without. Moreover, the relatively high rates of attrition by follow-up make for an additional limitation of the present study. Future research in this area should employ more extensive strategies for incentivizing participant adherence to study measures. Furthermore, the short follow-up period we used poses a limitation in terms of understanding how the benefits of the intervention are maintained over time. Future studies should therefore use a longer follow-up period. Some of the demographic characteristics of the sample also make for a noteworthy limitation of this study. The fact that most participants were highly educated young adult females can represent a source of bias in terms of assessing the intervention's overall feasibility, acceptability and effects. Future studies should therefore aim to recruit a more demographically diverse sample to more reliably check whether our results hold across sociodemographic categories. Additionally, we examined the relationship between concurrent changes in depressive symptoms and Surrender coping, which does not help explain the temporality of changes and their relationships; it may be that improvements in depressive symptoms were responsible for decreases in Surrender coping or that both were affected by third variables. Future studies should employ more robust statistical methods that account for reversed effects and help discern the temporal effects of proposed mechanisms.

Finally, it must be noted that given that the present study is the first to empirically test the nCompass intervention, more research is needed before definitive conclusions can be drawn. Future studies should aim to replicate these findings to confirm the effectiveness and of the intervention. The present research, however, preliminarily highlights the usefulness of the nCompass program for depressive symptoms and provides evidence of its feasibility, acceptability and effectiveness in terms of reducing depressive symptoms and maladaptive coping. On a practical level, the nCompass intervention makes for an accessible and flexible treatment option for depression that appears to work as an acceptable alternative to other intervention approaches.

CHAPTER IV. CONCLUSIONS

4.1. Theoretical and Conceptual Implications

From a theoretical standpoint, the present thesis helps fill in several gaps in the conceptual understanding of EMSs in depression. Up until now, there has been no consensus on which EMSs and schema modes are relevant for this psychological problem. As all 18 EMSs had been shown to correlate with depression in a past meta-analysis (Bishop et al., 2022), but not all of them may be directly involved in this psychological problem, we narrowed down, based on a review of the extant literature on the topic, the list of EMSs to a selection of conceptually and empirically relevant ones. Based on meta-analytical structural equation modeling, we found that depression involves multiple schematic components, including a perceived sense of defectiveness, instability, social isolation, failure to achieve and a perceived inability to function independently, negative expectations about the future and perceived uncontrollability of negative events.

Secondly, we identified several potentially more influential EMSs from the above-mentioned ones, using network analysis, which has helped highlight potential dynamics in the cognitive vulnerability of (previously) depressed individuals and highlight which cognitive vulnerabilities could exert the most influence in the cognitive systems of vulnerable individuals. As previously discussed, the fact that Defectiveness, Dependence/Incompetence and Negativity/Pessimism were the most influential in the networks of currently depressed individuals is in line with the body of knowledge highlighting the role of unlovability, helplessness and hopelessness beliefs in depression. However, the fact that there were differences in the centrality of these EMSs based on clinical status suggests that the appraisals made by vulnerable individuals may be influenced differently, depending on whether they are currently depressed – in past depression, the endorsement of maladaptive EMSs appears to be dominated by negative expectations from the future (i.e. the Negativity/Pessimism EMSs), while currently depressed individuals might have a more consistent focus on perceived unlovability (Defectiveness/Shame). The degree to which individuals appraise their emotional needs negatively might then be impacted by different points of reference (e.g. future threats in previously depressed versus present rejection from others in currently depressed individuals), which suggests that schema activation is dynamic, based on the salience of different emotional needs. However, these propositions need to be confirmed by longitudinal studies, in which the proposed shifts in schema activation can be adequately captured.

Thirdly, the present thesis also contributes to the integration of schema modes into a theoretical model of depression and highlights the role of self-criticism for depression and schema activation. The centrality of self-criticism and its connections to multiple components in the network, including depressive symptoms, suggest that this component might be the most proximally relevant in depression among those we investigated. This can also be true if we look at the fact that self-criticism was predicted by surrender coping. Given the fact that depressive symptoms were concurrently associated with Surrender coping, we suggest an interplay between the Critic mode, depression and the Surrender coping mode, which could explain, in schema mode terms, how depression occurs and is maintained – when individuals are critical of themselves, they could be more likely to have a depressed mood even several hours later and thus resort to surrender coping. This, in turn, could result in more self-criticism in the following hours, leading to a vicious cycle.

The relevance of the Surrender mode in depression is also suggested by the findings of our randomized controlled trial showing concurrent changes in depressive symptoms and Surrender coping, explained by participation in the self-administered ST-based program for depressive symptoms.

4.2. Practical Implications

The present thesis also has several important practical implications. First, our research highlights several potentially relevant EMSs to be assessed and targeted in the treatment of depression. This can lead to a more fine-

tuned treatment approach to this psychological problem; based on this, specific treatment strategies can be applied and further developed to address the specifics of each EMS, as it operates in individuals with this disorder. Up until now, to the best of our knowledge, there are no protocols or clinical guides offering strategies for targeting the specific EMSs we have identified as relevant in depression specifically. Further research that tests the utility of specifically tailored ST-based techniques, addressing the EMSs we identified, is warranted.

Secondly, the fact that we identified self-criticism as the most central component of depression and also a relationship between self-criticism and depression, based on temporal network analysis, suggests the fact that prioritizing this mode as part of the ST-based treatment of depression might be an effective way to address this psychological problem. Furthermore, the interplay we propose, based on our results, between the Critic mode, depressed mood (Vulnerable Child) and Surrender coping could make for a useful and intuitive conceptualization of depression and help clients become aware and counteract this vicious cycle.

Thirdly, to our knowledge, our intervention study is the first to integrate a ST-based conceptualization of depression with behavioral activation and contextual principles. Based on the acceptability results and outcomes of our intervention study, we argue that our brief self-administered program for depressive symptoms that uses the above conceptualization and incorporates behavioral activation with ST-based and contextual elements could be used on a large scale to address depressive symptoms and successfully integrate the three approaches into a coherent intervention framework. The large effect we identified for our brief intervention highlights its potential to address depressive symptoms cost-effectively.

Finally, albeit a secondary goal of this research, instrumental to assessing schema coping within some of the other studies, the validation of the Schema Coping Inventory in the Romanian population can, needless to say, support research and clinical practice within this particular context. The SCI appears, based on our results, to be a psychometrically sound instrument in most respects, although more research is needed to examine the reliability of some of the subscales and their conceptual underpinnings.

4.3. Methodological Innovations

Throughout the thesis, we relied on several innovative methods that add to the value of the present work and are thus worth mentioning. To begin with, using meta-analytical structural equation modeling in Study 1, we were able to synthesize correlational data from multiple studies into a model that breaks down the contributions to depression of seven relevant EMSs, and we found all of the included EMSs (Abandonment, Social Isolation, Defectiveness/Shame, Failure, Dependence/Incompetence, Vulnerability to Harm and Negativity/Pessimism) to uniquely contribute to the prediction of depression. This has not only helped delineate the separate effect sizes of the included EMSs but also more generally suggested the relevance of a variety of cognitive appraisals in depression.

Moreover, Study 2 is, to our knowledge, the first to investigate EMS network structures based on clinical status. Using network analysis, we were able to capture differences in EMS endorsement and potential dynamics of their activation and connection, highlighting different patterns in currently, previously and never depressed individuals. Considering the conceptual commonalities of EMSs, this design has helped delineate which EMSs might be the most influential in depression and highlight potential mechanisms of connection between EMSs in this disorder. Additionally, the fact that we relied on clinical versus nonclinical samples adds robustness to our findings.

Furthermore, the state measurement of modes in Study 4, using ecological momentary assessment is an important contribution of the present thesis, as, to the best of our knowledge, no other studies had tested mode dynamics in depression based on intensive longitudinal data. As modes are understood as state constructs, characterized by momentary shifts (based on environmental demands and momentary psychological resources) (Flanagan, 2014), measuring their activation in real-time is arguably the most precise approach to capturing their dynamic nature. Based on the experience sampling method, we collected a large number of measurements of the constructs of interest and were able to investigate temporal relationships between them, highlighting potential mechanisms of depression and their evolution over time. Additionally, a novel methodological approach we used in the respective study was longitudinal network analysis, which also allowed for the identification of the most central aspect of schema and mode functioning. Identifying the most central node can suggest which component of the structure is potentially the most influential and could be targeted first (Borsboom & Cramer, 2013; McNally, 2016).

Finally, in Study 5, we proposed a novel intervention protocol for depression, combining ST, BA and contextual principles within a brief self-administered program delivered on a mobile application. This approach is innovative and potentially useful on a broad scale for multiple reasons. First, the integration of several different

conceptualizations of depression and the diversity of techniques (behavioral, experiential, cognitive, and acceptance-based) means that the intervention will potentially suit the treatment preferences of a greater number of individuals, as also indicated by the high acceptability scores recorded in Study 5. Second, the self-administered, mobile format is, needless to say, advantageous in terms of accessibility and convenience. Most participants rated the intervention as easy to use and stated that they could successfully use the program without any external support. Third, the brief, but intensive format of the intervention (daily exercises, structured on three levels of difficulty) makes for a more focused and structured approach to depressive symptoms that can enhance learning and motivation. Although the intervention regime is intensive, the exercises are built to be in the zone of proximal development of participants, which might prevent discouragement and motivate users. The fact that large decreases in depressive symptoms were obtained in a short timeframe suggests that such a format can be immediately effective, although more research is needed to verify whether such gains can be maintained in the longer term.

4.4. Limitations and Future Directions

There are several limitations to the present research that ought to be mentioned and addressed in future studies. First, most of our results cannot be interpreted causally, due to their correlational nature. More experimental research is needed to be able to more thoroughly investigate EMS and mode activation, for instance through laboratory experiments looking at the effects of mood induction. So far, only one study that we are aware of has used this design to examine EMS (Stopa & Waters, 2005). To build a robust ST model of depression, correlational research needs to be supplemented with experimental evidence of the role in depression of the EMSs and modes we identified.

Second, in most of our primary research studies, we relied on non-clinical and subclinical samples only, so no assertions can be made in terms of how these results extend to clinical populations. Future studies ought to replicate our results in clinically depressed individuals or, where applicable, examine how they might differ based on clinical status. For instance, as discussed in Study 4, clinically depressed individuals may display stronger lagged associations between the components we included in network analysis, arguably due to less reliance on healthy modes which could counteract their effects.

Third, given that ST was originally proposed for personality disorders and chronic emotional disorders, future studies ought to also examine how the mechanisms and intervention strategies we proposed apply to chronic depression and personality comorbidity. As we aimed to offer preliminary evidence on the utility of ST constructs in depression, which could then be tested in particular cases, the inclusion of chronic depression and personality disorders was beyond the scope of our research. Comparing non-chronic with chronic depression and individuals with or without personality comorbidity in terms of the processes we explored could provide additional insights into the ST mechanisms of depression.

Fourth, our research was entirely based on convenience samples, recruited online. As such, most of our participants were young, highly educated females. Future studies should thus address this limitation by using demographically representative samples, to check whether our results hold across various demographic characteristics. Furthermore, the fact that all data was collected online, with little control over the process of instrument completion, can raise questions about the reliability of responses. However, as much as possible, we tried to mitigate this concern by implementing measures such as checking for outliers and examining reliability.

Fifth, to keep our models parsimonious and due to concerns related to statistical power, we only included a subset of EMSs in the models and analyses. We aimed to rely on EMSs whose role in depression has been consistently suggested by meta-analytical and primary data or by theoretical propositions. However, definite claims about the exhaustiveness of our model cannot be made and, very likely, other EMSs can also contribute to the generation or maintenance of depression, more or less directly. Future studies should aim to include other EMSs and check which of them could also be involved in depression.

Finally, there is a need for building tailored instruments for the measurement of ST constructs applying to depression. In studies 4 and 5, we relied on several more generic instruments that may or may not adequately capture the essence of the constructs as proposed for this psychological problem. Particularly in the case of instruments used for momentary assessment (Scollon et al., 2003) and network analysis (Robinaugh et al., 2020) it becomes important to ensure psychometric soundness, as such measures are often borrowed from traditional studies without previous examination of their compatibility with the goals of such methods. Future studies should thus examine, in more depth, whether the constructs we used are properly reflected by the respective measures and whether they are amenable to the ecological momentary assessment and the network analysis of ST constructs. Alternatively, specifically tailored instruments for these purposes can be built and tested.

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