The role of dysfunctional expectation persistence in psychopathology

Dissertation

zur Erlangung des Grades einer
Doktorin der Naturwissenschaften
(Dr. rer. nat.)
des Fachbereichs Psychologie der Philipps-Universität Marburg

Vorgelegt von
Anne-Catherine I. Ewen
Aus Luxemburg

Marburg (Lahn), September, 2022

Vom Fachbereich Psychologie der Philipps-Universität Marburg (Hochschulkennziffer 1180)
als Dissertation angenommen am ___.___._____

Erstgutachter: Dr. Marcel Wilhelm
Zweitgutachter: Prof. Dr. Winfried Rief

Tag der Disputation: ___.___._____

Acknowledgements

I would like to use this page to thank all those people who supported me during my time as a doctoral student and stood by me to realize this work.

First and foremost, I would like to thank my doctoral supervisor Dr. Marcel Wilhelm. Your relaxed manner has always helped me not to take the work too seriously and to always approach things with fun. I have always felt supported by you in my ideas and projects, thank you very much for having my back.

Next, I would like to thank Prof. Dr. Winfried Rief, as my second supervisor, who was available for any professional advice. I was able to learn from your experience and expertise, not only in the scientific field but also as the head of a huge working group.

Furthermore, I would also like to thank Dr. Gaby Bleichhardt, Dr. Kerstin Kühl, Dr. Katrin Wambach and all my supervisors at this point. It was through you that I really came to understand and love therapeutic work. Through your professional comments and discussions in supervision sessions, I was able to form my concept of psychotherapy, which in turn brought me a great deal forward not only in my practical work but also regarding my scientific questions.

At this point I would also like to say a big thank you to all the study participants, clients, and patients. Without the openness to share about one's inner self, science as we do it would not be possible.

I would also like to take this opportunity to thank my wonderful colleagues who, despite their own workload, always had time for conceptual and professional discussions and we were able to share our ideas and inspire each other.

I would also like to thank my family and friends for their emotional support and motivating words. Thank you for being there for me!

Table of contents

Table of figures

1. Abstract & Zusammenfassung

1.1. Abstract

In the literature, expectations are seen as core elements influencing and directing human behavior. There are many different models underlying this, such as the well-known expectancy–value theories. The past few decades have seen increased interest in analyzing the role of these theories in psychotherapy. On one hand, scholars have found increasingly convincing evidence of the impact of expectations on treatment success (i.e., placebo-effect research). On the other hand, the question has arisen whether people with mental disorders differ in the content of their expectations as well as in their processing mechanisms. The ViolEx model is one of the first expectation models that has been applied to the mechanisms of psychopathology and psychotherapy. It appears that people with mental disorders not only show a greater amount of dysfunctional expectations but also that those expectations are more persistent than in people without a mental disorder. In addition to other mechanisms, the concept of "cognitive immunization" has been suggested as responsible for the maintenance of dysfunctional expectations. First, researchers have found evidence for the link between cognitive immunization (i.e., expectation persistence after an expectation-disconfirming experience) and psychopathology. For this dissertation, the process of cognitive immunization, as a relatively new concept, was analyzed in detail, with the goal of developing interventions and reducing cognitive immunization processes.

In the first study, the concept of cognitive immunization was analyzed in an experimental design (N = 102). Social expectations were induced and violated, and the expectation adaptation was hypothesized to differ between micro-interventions, including an expectation-focused psychological intervention (EFPI). The EFPI group showed significantly greater variability in their expectations and, thus, lower rates of cognitive immunization compared to the other groups.

Second, the complexity of the implicit operationalization of cognitive immunization through experimental designs showed the need for efficient (self-rating) instruments. Therefore, a self-rating questionnaire, the Immunization Scale (IMS), has been developed. The IMS was validated through exploratory (N = 230) and confirmatory (N = 299) factor analyses, resulting in a 23-item questionnaire.

In the third study, the EFPI was tested for its effectiveness in reducing cognitive immunization, measured with the IMS. Therefore, an online longitudinal randomized controlled design was developed for people with mild depressive and/or anxiety symptoms (N = 128). Cognitive immunization was correlated with psychopathology, and the EFPI group showed a significant reduction in the cognitive immunization level.

Lastly, and based on the third study, a protocol paper was written for a large-scale psychotherapeutic study that analyzes the effectiveness of cognitive behavioral therapy (CBT) with the integration of EFPIs in people with diagnosed depression compared to standard CBT without special focus on expectations.

This dissertation provides a validated questionnaire to analyze cognitive immunization processes and their link to psychopathology. It offers initial evidence of EFPIs' effectiveness in reducing cognitive immunization in people with psychopathological symptoms. Practical and research implications are discussed.

1.2. Zusammenfassung

In der Literatur erwiesen sich Erwartungen als wichtige Einflussfaktoren auf das menschliche Verhalten. Diese Verbindung wird durch verschiedenste Modelle deutlich gemacht, wobei die Erwartungs-Mal-Werttheorien wohl die bekanntesten Modelle in den verschiedensten Bereichen der Psychologie darstellen. Im Bereich der klinischen Psychologie-Forschung, gewann einerseits der Einfluss von Erwartungen auf den Behandlungserfolg immer mehr an Interesse (siehe Placebo-Forschung). Andererseits wurde die Frage aufgeworfen, ob sich Menschen mit psychischen Störungen im Inhalt ihrer Erwartungen und deren Verarbeitungsprozesse unterscheiden. Das ViolEx-Modell ist eines der ersten Erwartungsmodelle, das auf die Mechanismen von Psychopathologie und Psychotherapie angewendet wurde. Es scheint, dass Menschen mit psychischen Störungen nicht nur mehr dysfunktionalen Erwartungen aufweisen, sondern dass diese Erwartungen auch nach Erwartungsverletzung weniger angepasst werden als bei gesunden Menschen. Neben anderen möglichen Mechanismen wird das sogenannte Konzept der kognitiven Immunisierung herangezogen, welches als Ursache für die Aufrechterhaltung dysfunktionaler Erwartungen angesehen wird. Erste Belege für den Zusammenhang zwischen kognitiver Immunisierung, d.h. fehlende Erwartungsanpassung nach einer erwartungsverletzenden Erfahrung, und Psychopathologie wurden bereits gefunden. Für diese Dissertation sollte erstmals der Prozess der kognitiven Immunisierung genauer analysiert werden. Daneben war das Ziel, Interventionen zu entwickeln, die kognitive Immunisierungsprozesse reduzieren können.

In einer ersten Studie wurde das Konzept der kognitiven Immunisierung in einem experimentellen Design untersucht (N = 102). Dazu wurden erstmals soziale Erwartungen induziert, welche daraufhin wieder verletzt wurden. Es wurde angenommen, dass sich die Erwartungsanpassung zwischen verschiedenen Mikrointerventionen, u.a. einer erwartungsfokussierten psychologischen Intervention (EFPI), unterscheiden würde.

Tatsächlich zeigte die EFPI-Gruppe eine signifikant höhere Variabilität in ihren Erwartungen im Vergleich zu den anderen Gruppen.

Weiter schien die einzige implizite Operationalisierung der kognitiven Immunisierung durch experimentelle Designs zu komplex, um das Konstrukt weiter zu analysieren. Daher wurde ein Fragebogen, nämlich die Immunisierungsskala (IMS), zur Selbsteinschätzung entwickelt. Die IMS wurde durch exploratorische (N = 230) und konfirmatorische (N = 299) Faktorenanalysen validiert und endete in einem validierten und reliablen 23-Item Fragebogen.

In der dritten Studie wurde die Wirksamkeit von EFPI im Hinblick auf die Verringerung der mit dem IMS gemessenen kognitiven Immunisierung getestet. Dazu wurde ein randomisiert kontrolliertes Online-Längsschnittdesign für Personen mit leichten depressiven und/oder Angstsymptomen entwickelt (N = 128). Die kognitive Immunisierung korrelierte nicht nur mit der Psychopathologie, sondern verringerte sich auch signifikant in der EFPI-Gruppe.

Schließlich wurde ein Protokollpapier für eine psychotherapeutische Studie verfasst, die die Wirksamkeit der kognitiven Verhaltenstherapie (KVT) mit der Integration von EFPI bei Menschen mit diagnostizierter Depression im Vergleich zu einer Standard-KVT untersucht.

Zusammenfassend lässt sich sagen, dass diese Dissertation einen validierten Fragebogen zur Verfügung gestellt hat, mit dem kognitive Immunisierungsprozesse und dessen Verbindung zur Psychopathologie in der zukünftigen Forschung analysiert werden können. Darüber hinaus konnten erste Belege dafür erbracht werden, dass EFPI die kognitive Immunisierung bei Menschen mit psychopathologischen Symptomen wirksam reduzieren kann. Praktische und wissenschaftliche Implikationen werden diskutiert.

2. Introduction

2.1. Psychotherapy: the debate of the effect mechanisms

Since the beginning of psychotherapy, the core question of how the psyche works and how it can be changed has remained unsolved. From the effectiveness of strict, standardized symptom-based psychotherapy, recorded in manuals with concrete interventions designed for specific disorders (Barlow, 1996; Garfield, 1996; Goldfried, 2020), to the preoccupation with the influence of the "common factors" (Beitman et al., 1989; Frank, 1961; Grawe, 2000; Grawe et al., 1994; Lambert et al., 1994; Rosenzweig, 1936; Wampold & Imel, 2015), different psychotherapeutic working mechanisms have been thoroughly analyzed in the literature. The idea that the common factors (e.g., therapeutic alliance, [outcome] expectations, empathy, therapist qualities) represent the most powerful working mechanism in psychotherapy was - and still is - in doubt (Luborsky et al., 1999; Weinberger, 1995). Despite the apparent consensus on considering common factors in psychotherapy, evidence and understanding of the mechanisms remains rather weak (Cuijpers et al., 2019; Goldfried, 2020). The same applies to the oft-criticized gap between research (suggesting and testing strictly standardized therapy procedures) and the intentional, eclectic use of therapeutic interventions in practice (Goldfried, 2020; Hofmann et al., 2022). But is psychopathology itself, as well as its different forms (e.g., depression or anxiety), not also decisive for the expression of certain common factors? Can it not be that individuals with depression show higher negative outcome expectations than people with other mental disorders? And what would happen if we targeted certain common factors present in each unique psychotherapeutic interaction in a standardized way through specific interventions?

To further explore these questions, one relevant common factor, which is apparent in every different common factor model (Grencavage & Norcross, 1990; Wampold, 2015) is the concept of expectation. Expectation has been widely investigated in different research areas,

and it will be the main subject of this dissertation, which attempts to explain why it is important and how it relates to the therapeutic context. To that end, the concept of expectation will be outlined, different models will be presented and the link to psychopathology and psychotherapy will be drawn. In that context, a relatively new expectation model, the ViolEx model, is presented. Finally, proposed therapeutic interventions targeting patients' expectations are presented.

2.2. Expectation: definition and models

2.2.1. The concept of expectation

The American Psychological Association (APA) Dictionary of Psychology (APA, 2022) defines "expectation" as follows:

> Expectation is a state of tense, emotional anticipation and in probability and statistics, the long-term average of a random variable. For example, the expectation is that the mean for a specific random variable obtained with an extremely large sample will equal the mean of the population of interest (APA, 2022).

The word "expectancy" is listed as a synonym, which the APA Dictionary defines as:

> The internal state resulting from experience with predictable relationships between stimuli or between responses and stimuli. This basic meaning becomes slightly more specific in some fields. For example, in cognitive psychology, it refers to an attitude or mental set that determines the way in which a person approaches a situation, and in motivation theory, it refers to an individual's belief that his or her actions can produce a particular outcome (e.g., attainment of a goal; APA, 2022).

In recent literature, the following definition can be found: Expectations are a subset of future-directed cognitions (Rief & Joormann, 2019). Expectations and expectancies are almost synonyms; whereas expectations are more often used as a more specific, explicit construct, expectancies represent a more implicit construct (i.e., expectations without full awareness) (Rief et al., 2015). Expectancies or expectations are frequently associated in the literature with the concept of beliefs, such as toward one's ability to achieve something (Atkinson & Feather, 1966). In their conceptualization, Panitz and colleagues (2021) highlight the impact of expectations on perception, affect, cognition, and behavior in different contexts. Expectations can also relate to a wide variety of concepts and, thus, seem to influence different things, such as efficacy expectancy (Bandura, 1978), treatment outcome expectations (Laferton et al., 2017), and response expectancy (Rotter, 1954).

Although a clear, unanimous definition is still lacking (Laferton et al., 2017), the following points can nevertheless be noted:

- Expectations and expectancies are often used synonymously.
- Expectations (expectancies) can be conscious/explicit or unconscious/implicit.
- Expectations are future-directed cognitions.
- Expectations influence human beings at various levels (e.g., behavior, affect, thinking, and perception).

The conceptualization of "expectation" in this dissertation will be based on these points.

2.2.2. Different expectation models

Before examining the concept of expectation in the psychopathological and psychotherapeutic context, important expectation models highlighting the power of expectation in human beings should be noted. These models illustrate why expectations should be considered in psychopathology and psychotherapy. They strongly influence human behavior, leading not only to functional but also dysfunctional behavior, which is actively targeted in psychotherapeutic treatment. As an example, looking at negative treatment -

outcome expectations likely lead to certain behavior in the therapy itself that inhibits the psychotherapeutic process. The most prominent models addressing the concept of expectation guiding human behavior are the different action-planning and decision-making theories, subsumed under the term "expectancy–value theories" (Heckhausen & Heckhausen, 2006). These theories assume goal-directed behavior and attempt to explain human behavior through certain values (e.g., interest or relevance), and the expectation of certain consequences (e.g., accessibility). Atkinson's (1966) model, an extended version of Lewin and colleagues' (1944) aspiration model, tries to explain achievement motivation. It postulates the following two factors as being important for achievement: expectancies for success (i.e., toward proper abilities) and subjective task values (i.e., motivation that allows the individual to answer the question "Do I want to do this activity, and why?"). In turn, the expectancy- value theory (Vroom, 1964) tries to explain why individuals choose a certain behavior over another. The model includes the components of expectancy (the belief that an effort will result in a certain performance based on past experience), instrumentality (the belief of being rewarded if performance could be reached), and value (the individual value of the reward outcome based on, for example, needs, motivation, or goals) (Parijat & Bagga, 2014). The theory of reasoned action or planned behavior (Ajzen, 1985; Ajzen & Fishbein, 2000) highlights the link between beliefs or attitudes and behavior; this model characterizes expectation in the concepts of behavioral and normative beliefs. A behavior will be shown after the evaluation of certain behavioral consequences (e.g., acceptance by a referent group). In behavioral economy, Kahneman and Tversky (1979, 2013) have tried to explain human decision processes in economics with their prospect theory. Again, the expected utility plays a central role in decision-making and behavior choices.

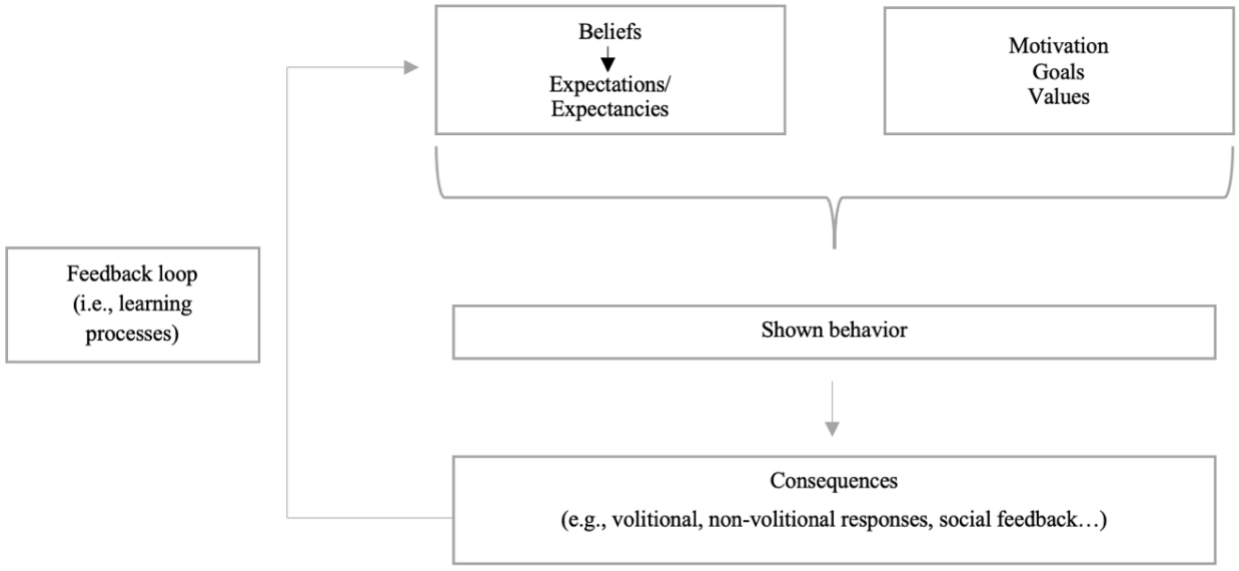
The Rubicon model is a prominent framework of human action that includes the concept of expectation (Heckhausen & Gollwitzer, 1987). It integrates the distinction between the choice and the realization of the action. Selecting the course of action encompasses weighing,

planning, implementing, and evaluating, whereby the expectations toward the implementation of a certain behavior play a central role in the volitional phase. An interesting aspect of this model is the post-action reflection phase, which influences the weighing process in subsequent situations (Heckhausen & Heckhausen, 2006). This feedback loop can be resumed under a learning process. Different (social) learning theories take this feedback loop into account, and their concepts are similar to the above models. The occurrence of a certain behavior is influenced by the expectancy of reinforcement and the value of this reinforcement (Bolles, 1972; Kirsch, 1985; Rotter, 1954). Interestingly, a distinction is made between a nonvolitional response (the consequences exhibit observable behavior, such as emotional responses like fear, conversions, pain, or sexual arousal) and a volitional response (the consequences occur with volitional effort) (Kirsch, 1985). Bandura (1977, 1978) analyzed the link between expectations of personal efficacy and self-efficacy. Interestingly, psychotherapy itself represents an environment of (social) learning, in which the importance of understanding and learning seems to be in focus (Bandura, 1961; Kanfer, 1961). Figure 1 presents a simplified schematic illustration of the most important statements of the different expectation models, established for a wide range of psychological research areas.

A relatively new expectation model, the ViolEx model, concentrates mostly on the "feedback loop" and tries to explain expectation change or maintenance (Panitz et al., 2021; Rief et al., 2015). Pinquart and colleagues (2021) compared different expectation models and postulated three important mechanisms responsible for expectation change or maintenance: (1) expectations can be changed and adapted to a particular experience, (2) expectations can be maintained by minimizing the importance of expectation-disconfirming evidence, or (3) expectations can be affected by the search for, or production of, future expectation-confirming evidence. This model is complementary to the decision and action models, and it goes even further by examining the "feedback loop" leading to expectation modification or persistence. To date, this model has primarily been used in clinical psychology, but it can also be relevant

to, and applied across, different areas of psychology. Because this model builds the bridge to the relevance of expectations in psychopathology and psychotherapy in this dissertation, it will be presented in detail. The ViolEx model informs not only the influence of expectations on our behavior (see models presented above) but also the persistency or modification of these expectations. It provides a more holistic view of the influence of expectations and their mechanisms in psychopathology and psychotherapy. It is not only possible to explain the influence of negative expectations (for example, towards treatment success on the observed behavior of a patient) but it also acknowledges that these expectations sometimes persist and increase the likelihood of treatment resistance.

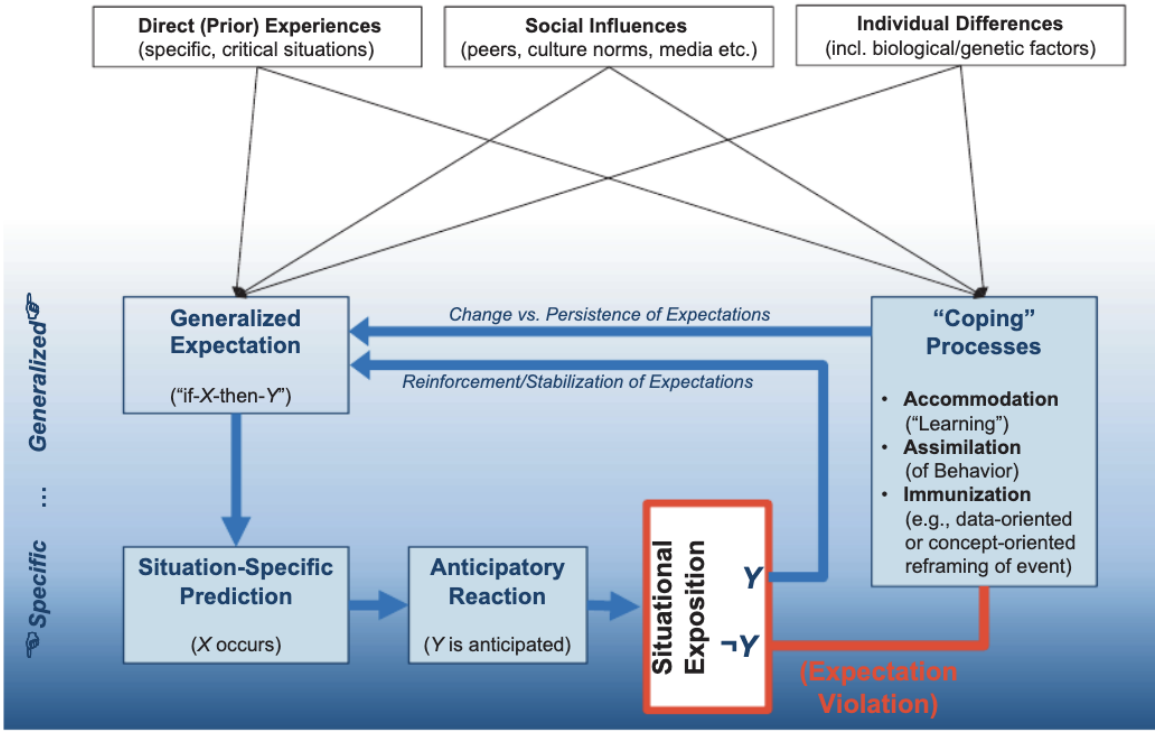
Figure 1. A simplified schematic illustration of the main statements of the different expectation models.



2.2.3. The ViolEx model

The ViolEx model is an innovative model that aims to analyze and explain the processes of generating, maintaining, or adapting certain expectations (Gollwitzer et al., 2018; Pinquart, Rothers, et al., 2021; Rief et al., 2015).

Figure 2. The ViolEx model by Rief and colleagues (2015).



Generalized expectations are formed by the social environment (e.g., peers, media, and cultural factors—especially social expectations), individual differences (e.g., personality traits and genetic and biological factors), and made prior experiences (e.g., situational expositions, experiences linking different stimuli). Looking at the different process mechanisms, the first differentiation should be made by the confirmation or disconfirmation of a certain situation-specific expectation. The expectation is retained and reinforced if it is confirmed by a certain experience. An expectation-disconfirming experience, however, can trigger different mechanisms and lead to expectation persistence or expectation change. The mechanism leading to expectation change is the *accommodation* process. Accommodation is described as a learning process in which the existing expectation is corrected based on the actual experience. In contrast, *assimilation* and *immunization* processes lead to the maintenance of the expectation despite contradicting experiences. *Assimilation* describes mechanisms that reduce discrepancies between expectation and experience by searching for - or producing - expectation-confirming information. Gollwitzer and colleagues (2018) first refer to avoidant

behavior, as it is well-known in anxiety disorders (i.e., fear avoidance). Next, the mechanisms that contribute to an expectation make it more likely to occur (i.e., the self-fulfilling prophecy). *Immunization* is consistently defined as the reappraisal of expectation-violating evidence in order to match the original expectation. Various forms of immunization have been presented by different authors, but a consistent differentiation of these concepts has yet to be articulated. In Rief and Joormann's (2019) article, immunization is defined not only as a cognitive process but also as a behavioral process that reduces or invalidates the impact of positive, expectation-violating experiences. Some examples of behavioral processes include avoiding expectation-violating situations, using selective attention, and ignoring contradictory stimuli. Furthermore, Gollwitzer et al. (2018) present two cognitive immunization strategies. Data-oriented immunization involves the devaluation of discrepant information. Concept-oriented immunization involves redefining or reframing the concept of an expectation (e.g., stereotypes), thereby creating a subtype (e.g., "This was only an exception.").

The ViolEx model has been verified in different experimental studies, focusing mainly on psychopathological expectations. Nevertheless, the promising experimental paradigm "No1LikesU!" was developed to verify the ViolEx model by analyzing the development, maintenance, and modification of social-rejection expectations based on social feedback (D'Astolfo et al., 2020). The paradigm induces negative social expectations (e.g., rejection) by providing social feedback through standardized, posed webcam conferences. In the second round, those expectations are violated or confirmed by rejection or appreciation feedback. The researchers observed differences in expectation maintenance resp. change between the subjects and the given feedback. Another research area that deals with the violation of expectations in a broad sense are the neurosciences, which examine prediction errors (D'Astolfo & Rief, 2017). This can also be found under the framework of predictive coding following the Bayesian brain hypothesis (Berg et al., 2021). The brain itself is seen as a

hypothesis-testing and probabilistic organ trying to reduce uncertainty by reducing prediction errors.

2.3. Expectations in the context of psychopathology and psychotherapy

Returning to the role of expectations and how they operate in the context of psychopathology and psychotherapy, evidence is portrayed below.

2.3.1. Expectations in clinical psychology research

The concept of expectations became particularly prominent in clinical psychology through placebo research (Colloca & Miller, 2011). A broad branch of literature emphasizes the power of treatment expectations regarding treatment success (Bingel, 2020; Enck & Zipfel, 2019; Evers et al., 2018; Kirsch, 1997, 2018; Kirsch et al., 2016; Wampold et al., 2005). The idea of focusing on common factors in psychotherapy was mainly shaped by this topic. As for (psycho-) pharmacology (Doering et al., 2014; Khan & Brown, 2015; Kirsch, 2014) and other treatments (Linde et al., 2007; Madsen et al., 2009), positive outcome expectations are leading to adaptive treatment outcomes in psychotherapy (Constantino et al., 2011; Constantino et al., 2018; Greenberg et al., 2006). Researchers even discovered that optimizing patients' expectations before a bypass surgery resulted in better improvement six months after the surgery, underlining the long-term effects of expectations (Rief et al., 2017). The literature is presenting increasingly more evidence of the influence of specific expectations on treatment success - in particular, the influence of certain expectations towards the therapeutic relationship (Al-Darmaki & Kivlighan, 1993; Finsrud et al., 2022; Wright & Davis, 1994). This context raises the issue of role expectations (i.e., expectations relating to the contribution of the therapist and the patient). Expectations toward personal commitment, facilitative conditions (expectations toward attributes and activities of the therapist, such as interpersonal warmth or problem identification), and expectations of the counselor's expertise influence the therapeutic alliance in a psychotherapeutic setting (Patterson et al., 2008; Patterson et al., 2014). We can conclude that different client expectations can affect the

therapeutic outcome. Considering the expectation models presented above, positive expectations likely lead to a certain behavior favoring the learning process and changes in the patient, while negative expectations toward therapy, the therapist, or even oneself can lead to stagnation and therapy resistance.

2.3.2. The ViolEx model and psychopathology: first evidence

The relevant literature can be differentiated into two focuses: one on dysfunctional expectations found in psychopathology and the other on information-processing deficits leading to (dysfunctional) expectation persistence.

Dysfunctional expectations in psychopathology: Rief and colleagues (2015) have defined expectations as "core features of mental disorders" and give certain examples of typical dysfunctional expectations in dependence of the disorder. For example, some authors believe that a higher degree of negative self-efficacy expectations is a core mechanism in depression (Davis & Yates, 1982; Kanfer & Zeiss, 1983; Kavanagh, 1992; Maddux & Meier, 1995). They propose negative relationships among self-efficacy, performance accomplishments, and emotional states. This concept of examining dysfunctional expectations as a sub-form of cognitions has recently generated empirical interest (Kube, D'Astolfo, et al., 2017; Rief & Joormann, 2019). Kube and colleagues (2017) have identified typical dysfunctional expectations in the following domains: social rejection, social support, mood regulation, and the ability to perform. In anxiety disorders, the specific dysfunctional expectations are explicitly identified as the main problem that is directly addressed in therapy through confrontative and exposure interventions. It is well established that anxiety disorders can result in situational avoidance of circumstances that are presumed to be dangerous, which leads to a non-experience of expectation violation and a lack of expectation adaptation (Aldao et al., 2010; Marks, 1979; Myers & Davis, 2007; Pittig et al., 2020). Of course, the concept of avoidance is not unique to anxiety disorders; it is mentioned in a wide range of literature (Aldao et al., 2010; Hofmann & Hay, 2018; Servatius, 2016). In the context of the ViolEx

model, we would place this under the concept of assimilation. Craske and colleagues (1988, 2014) underline the importance of emphasizing the expectation violation in exposure therapy to foster corrective learning and the adaptation of a functional expectation.

Dysfunctional expectation persistence: Another important mechanism leading to psychopathology is the problem of not updating these dysfunctional expectations, not only through avoidance of an expectation-disconfirming situation but also even after an expectation-violating situation. Experimental studies that have tried to analyze this information-processing deficit confirm a lack of expectation adjustment to disconfirming experiences (Kube, Glombiewski, Gall, et al., 2019; Kube, Rief, et al., 2017; Kube, Rief, et al., 2019). Therefore, the concept of cognitive immunization has been introduced. For example, researchers have discovered that people without a mental illness seem to adapt performance expectations much faster following expectation-disconfirming information than people with depressive symptoms (Kube, Rief, et al., 2019). Because a broad range of evidence is still lacking, overarching concepts can be consulted. Studies analyzing cognitive rigidity and inflexibility are informative of the concept of cognitive immunization (Kube, Rief, et al., 2019; Marazziti et al., 2010; Meiran et al., 2011; Stange et al., 2017). Liknaitzky and colleagues (2017, 2018) identify cognitive rigidity as a crucial problem in changing interpretations, beliefs, and expectations. Studies show that people with depression have difficulty switching paradigms due to deficits in executive functioning, poor working-memory updating, and less task preparation, leading to a certain lack of information updating in response to the environment (Meiran et al., 2011; Stordal et al., 2004).

Different aspects relevant to psychopathology must also be considered. People with mental disorders (primarily depression) not only show a higher amount of dysfunctional expectations, but they also show deficits in changing these (Kube, Kirchner, et al., 2019; Kube, Rief, et al., 2019). This can be caused by *assimilation* processes, meaning different mechanisms were used before an expectation violation occurred, leading to an avoidance of

disconfirming information. For *immunization* processes, disconfirming evidence has already been perceived, but the cognitive reappraisal leads again to the maintenance of the specific expectation. New experiences are not considered anymore, and an individual's flexible adaptation to the environment is disturbed. The therapeutic goal should be to change these dysfunctional expectations and foster adaptive information processing to instill more flexible expectations. In this way, the patient can select the most helpful expectation, ultimately leading to functional behavior and positive long-term effects (Korn et al., 2014).

2.3.3. Integrating expectation mechanisms into psychotherapy

Above, we found that different expectations toward different psychotherapeutic ingredients can influence therapeutic success (e.g., expectations toward treatment success, therapeutic alliance, and proper involvement). In addition, people with mental disorders show specific psychopathological expectations leading to dysfunctional behavior, such as avoidance. Lastly, people with mental disorders appear to have deficits in updating their expectations based on experiences. Incorporating these statements into practice, if people with (for example) depression show a higher amount of negative expectations, treatment expectations should be assessed. Further, even if the treatment or intervention shows improvement at first, people with mental disorders generally do not update their psychopathological dysfunctional expectations. Explicitly addressing each of these processes in psychotherapy is necessary.

In a practice review, Constantino, Ametrano, and Greenberg (2012) presented some ideas for fostering adaptive patient expectations toward psychotherapy and psychotherapeutic change. They underlined the necessity of making different expectations explicit by addressing them directly. Outcome expectations should be addressed as soon as possible. Some therapeutic management options for poor outcome expectations are proposed. Suggestions for integrating expectation-focused psychological interventions (EFPIs) have also been made by Doering, Glombiewski , and Rief (2018), who describe a first proposal for expectation-

focused psychotherapy. Treatment-related expectations and disease-specific expectations should be actively considered in psychotherapy. The establishment of positive outcome expectations is not only necessary but should function as the basis of every therapy (Doering et al., 2018). Psychoeducation about dysfunctional and persistent expectations should be introduced, such as by using a simplified ViolEx model (Kube, Glombiewski, & Rief, 2019). For some examples of disease-specific expectations (such as for depression or anxiety disorders), seeking out corrective experiences is highlighted—these expectations should be violated and, subsequently, corrected. How these dysfunctional expectations are confronted (e.g., through emotional experiences or through behavioral experiments) does not matter (Doering et al., 2018; Kube, Glombiewski, & Rief, 2019). A first implementation of EFPIs in a psychotherapeutic setting was already described by the proposition of a psychotherapeutic manual (Wilhelm et al., 2022).

3. Presentation of the dissertation project

3.1. Derivation of the hypotheses

Analyzing the influence that expectations have on human beings has been a popular topic for several decades across a wide range of psychology disciplines. Evidence that expectations influence psychotherapeutic processes is constantly being expanded. Several different expectation models underline the link between expectations and human behavior, which can easily be transferred to the field of clinical psychology, including research about psychopathology and its treatment. Numerous different studies identify the operation of psychopathological expectations in different mental disorders (e.g., anxiety disorders and depression), which result in specific behaviors that can lead to long-term harmful consequences. The interesting and additional aspect of the ViolEx model is that it tries to explain how people differently process experienced information influencing their future expectations and, consequently, their behavior. Projecting this model into the fields of psychopathology and psychotherapy enables us to approach information-processing mechanisms. In psychotherapy, the process not only involves correcting unrealistic cognitive content as a negative or threatening worldview, but it is also important to teach the patient how to question and correct those cognitive constructs or beliefs. Every human being has negative or dysfunctional cognitions and expectations, but the correction of these seems to occur more easily in people without mental disorders. People with mental illness appear to have deficits in this process of adapting their long-term harmful worldview to a more realistic and helpful worldview. As a possible cause of this rigidity, cognitive immunization is analyzed in a more detailed way in the context of this dissertation. The goal was to develop and test different interventions with the aim of reducing cognitive immunization processes.

3.2. Hypotheses

Study 1: Can the processes proposed by the ViolEx model (here cognitive immunization) be reproduced in an experimental design, focusing on social expectations as an example? Can immunization processes leading to expectation persistence be reflected in the experimental design? Can expectation maintenance be influenced by different interventions?

Study 2: Can immunization processes be directly captured by a self-rating questionnaire? Can immunization processes be measured reliably and validly with a newly developed questionnaire? How can immunization processes be clearly defined? To what extent do immunization processes represent independent constructs, and which can be overlapping constructs?

Study 3: Can EFPIs change and reduce the inhibiting impact of cognitive immunization? Are EFPIs effective in reducing immunization processes over time? How can EFPIs influence mild psychopathological symptoms (e.g., anxiety and depressive symptoms)?

Study 4: Can EFPIs be integrated into standard psychotherapy? Are EFPIs effective in reducing psychopathological (here, depressive) symptoms? Are EFPIs effective in reducing immunization processes in the psychotherapeutic context? Do EFPIs show an improvement of psychotherapy effectiveness, compared to recognized, standard CBT?

4. Summary of the studies

4.1. Study 1: An experimental study about social expectation adaptation

Citation: Ewen, A., Rief, W. & Wilhelm, M. (under review). Not so bad after all? – A randomized controlled micro-intervention study on the adjustment of social expectations in the prisoner's dilemma. *Journal of behavior therapy and experimental psychiatry.*

Theoretical background. Expectations have a strong influence on human behavior. The ViolEx model can explain expectation formation, maintenance, or change (Gollwitzer et al., 2018), and the relevance of expectations was transferred to psychopathology (Rief et al., 2015; Rief & Joormann, 2019). Current literature postulates an increase in dysfunctional expectations among people with mental disorders. In addition, these individuals seem to lack expectation adaptation after an expectation-violating experience. Based on the ViolEx model, this malfunction of information-processing mechanisms is explained by the assimilation and immunization processes. Assimilation, which comprises processes such as avoidance and self-fulfilling prophecies, has already been well-investigated, especially in anxiety disorders. The concept of cognitive immunization is newer, and it describes the cognitive process of devaluating relevant expectation-disconfirming experiences, in which the individual retains the original expectation. This seems particularly unfavorable, in the case of dysfunctional expectations, which are mainly found in psychopathology. Studies have revealed a higher level of immunization in social expectations in people with depression (D'Astolfo et al., 2020; Kube, D'Astolfo, et al., 2017). This study aims to establish a useful paradigm to investigate immunization processes. Next, it will explore whether immunization can be reduced with the help of an expectation-focused micro intervention in a randomized controlled trial.

Methods. To operationalize social interactions, the iterated prisoner's dilemma (iPD) with 12 trials was used. Healthy subjects played against a fictive co-player in a posed video giving

the impression of a live video call. In the first step, negative expectations were induced by a high amount of defection in the first game (75% defection in 12 trials). After a given intervention, the negative expectations toward the co-player were violated in a second step by the highly cooperative behavior of the co-player (75% cooperation in 12 trials). Participants were randomly assigned to one of three intervention groups. The first group received EFPI, targeting expectations, the mechanisms of change, and the relevance to adapt expectations toward made experiences. The second group received a psychological flexibility focused intervention addressing the relevance to act toward one's own (social) values. The third group received only an attentional control exercise. Immunization was operationalized with the mean square successive differences (MSSD), suggesting that the variability of specific expectations toward the opponent's behavior should be high with greater expectation-adjustment performance. Additionally, the shown behavior in expectation-violating trials (i.e., defection after three instances of cooperation in the second game) was analyzed. Moderator analyses were conducted, and mixed linear models and logistic regressions were calculated.

Results. To check the manipulation, significant differences were found in the mean of cooperating behavior of all the participants between the first and second games. No group differences resulted in the first trial. A significant interaction effect was found between timepoint and group in MSSD in the second game. Contrast analyses revealed significantly higher MSSD in the second iPD compared to the first iPD in the EFPI group. A significant group difference could be observed in shown behavior. Moderator analyses showed no significant results.

Discussion. The iPD seemed to be a reliable paradigm for assessing change and analyzing social expectation adaptation processes. Moreover, the EFPI influenced the variability of social expectations toward the co-player. The results indicate that the EFPI can foster expectation adjustment after an expectation violation. For practical implications, future research in clinical populations should consider whether EFPIs should be further developed to

counteract dysfunctional expectations and their lack of adaptation during psychotherapy. Further possibilities to reliably assess immunization processes should be proposed.

4.2. Study 2: Development of the Immunization Scale IMS

***Citation**:* Ewen, A., Rief, W. & Wilhelm, M. (in submission). Exploring the path of persisting dysfunctional expectations – Development of the Immunization Scale IMS. *Frontiers in Psychology – quantitative psychology and measurement.*

Theoretical background. The relevant literature includes investigations of patients' expectations that inhibit psychotherapeutic success. Research has suggested that some of the processes involved lead to the lack of expectation adaptation toward certain circumstances (e.g., "I will never be cured of my depression"). Even if patients have expectation-disconfirming experiences during psychotherapy, they do not adapt them, especially regarding the adaptation of these in real life (Rief et al., 2015). Some researchers have investigated the processes of assimilation and immunization (see ViolEx model), but only by using complex experiments. The aim of this study is to develop a basic questionnaire, the Immunization Scale (IMS), that assesses the mechanisms responsible for the persistence of dysfunctional expectations in a simpler way. Processes *before* (i.e., assimilation) and *after* (i.e., immunization) expectation-violating experiences have been considered.

Methods. To begin, an extensive literature review was performed that examined different concepts that are similar to the constructs of assimilation and immunization. This formed the basis for the formulation of different items corresponding to the hypothesized constructs. In the first study, the initially formulated 75 items were completed online by 230 participants from the general population. An item analysis (IA), as well as an exploratory factor analysis (EFA) followed by item reduction, was conducted. Next, a second study was conducted in which 299 participants from the general population completed the reduced scale at the first measurement point, and 75 participants completed it again one month later. A confirmatory factor analysis (CFA) was performed to validate the reduced scale. For validity and reliability analyses, participants in both studies answered demographic information and completed the

Beck Depression Inventory (BDI; Hautzinger et al., 2009), the Depressive Expectation Scale (DES; Kube, D'Astolfo, et al., 2017), the Beck Anxiety Inventory (BAI; Margraf & Ehlers, 2007), and the German version of the Acceptance and Action Questionnaire (FAH-II; Hoyer & Gloster, 2013).

Results. With the help of the IA and the EFA, the initial 75-item version was reduced to 23 items. The EFA revealed three main factors: negative expectations, assimilation, and cognitive immunization. The three subscales of the IMS were confirmed by CFA in the second study. Excellent internal consistency ($\alpha = .94$) was achieved in both studies for the overall IMS and its subscales. Regarding validity measurements, significant correlations between the IMS and the DES, BDI-II, BAI, and FAH-II were found. Very good test-retest reliability resulted in Study 2.

Discussion. The results of both studies revealed promising psychometric properties for the IMS. For practical implications, the IMS can be used in psychotherapy to assess the global level of immunization in patients. Practically speaking, high immunization levels indicate that the therapist should emphasize expectation-disconfirming experiences and intervene against possible immunization. In future studies, the IMS should be validated in other populations, particularly among different psychopathological samples. The IMS can also be used in expectation research (i.e., in the examination of expectation-focused therapy).

4.3. Study 3: A longitudinal online intervention study to counteract expectation persistence

Citation: Ewen, A., Rief, W. & Wilhelm, M. (in submission). A randomized-controlled online-intervention study for subclinical psychopathology promoting flexibility in expectations. *Frontiers in psychiatry – Mood disorders.*

Theoretical background. People with mental disorders show an increased amount of dysfunctional expectations and an increased lack of expectation adaptation even after expectation-disconfirming experiences. These mechanisms can lead to a lack of psychotherapeutic success. In particular, it is hypothesized that the transfer to real life is inhibited through mechanisms leading to expectation persistence (see ViolEx model). Expectation-focused psychological interventions (EFPIs) are proposed to directly address these mechanisms, which include assimilation and immunization (Kube, Glombiewski, & Rief, 2019; Rief & Glombiewski, 2016). The literature has already presented different experimental studies suggesting the potential efficacy of the EFPI in fostering expectation adaptation after expectation violation. This study will, for the first time, test the efficacy of online EFPIs in individuals with subclinical to mild depressive and/or anxious symptoms in reducing the immunization level, as measured with a self-rating questionnaire.

Methods. The online study was programmed with formr.org and lasted two months. Potential participants were automatically screened for inclusion criteria (PHQ-D: scores 5-9 and/or BAI: scores 8-25) after completing the baseline questionnaires. The program randomly assigned participants to one of three groups. A psychoeducation video thematizing expectation formation, maintenance, and change, as well as their influence on proper behavior, was presented to the first and second groups after the baseline questionnaires. The first group was introduced to behavioral experiments. For four weeks, they planned, performed, and evaluated two experiments testing proper expectations two times per week.

The second group, as an active control group, was asked to actively perceive stressful expectations and scrutinize them on a cognitive level. The third group, as a passive control group, received no task during the four-week study period. Afterwards, a post survey was completed by the three groups, as well as a follow-up survey again after four weeks without the implementation of interventions. Mixed models and contrast analyses were calculated using the IMS, the patient health questionnaire - depression section (PHQ-9; Gräfe et al., 2004), and the BAI (Margraf & Ehlers, 2007) as dependent, respectively moderator variables.

Results. The mixed model showed a trend in the interaction term of time point and group. Contrast analyses revealed a significant reduction in the sum score of the IMS over the three time points in the first experimental group. Moreover, the EFPI condition was significantly superior to the passive control group at the follow-up measurement time point. An influence of psychopathological symptoms (especially anxiety level) could be found, whereas the triple interaction integrating the BAI/ PHQ-9 as moderators remained insignificant.

Discussion. This study aimed to analyze the effectiveness of online EFPI for subclinical to mild depression and/or anxiety symptoms in reducing immunization. Results suggest a positive effect of the EFPI on immunization and support the integration of EFPI into psychotherapy or to use EFPI as prevention. The goal would be to make expectation-violating experiences in real life more salient and to reduce immunization processes, consequently making persistent expectations more flexible. Future research should investigate the effect of online and face-to-face EFPIs in a psychotherapeutic context with a clinical population.

4.4. Study 4: A protocol paper about the effectiveness of expectation-focused psychological interventions in cognitive behavioral psychotherapy

***Citation*:** Ewen, A., Bleichhardt, G., Rief, W., von Blanckenburg, P., Wambach, K. & Wilhelm, M. (under review). Expectation focused and frequency enhanced cognitive behavioral therapy for patients with major depression (EFFECT): A study protocol of a randomized active-control trial. *BMJ Open.*

Theoretical background. The identification of the working mechanisms of psychotherapy on depression remains an ongoing debate. Current research in clinical psychology appears to focus more on common factors across all of the different psychotherapy forms and away from school-specific theories. In this respect, the investigation of structural conditions seems obvious. The topic first arose with the study of the dose-response relationship. Initial studies have already provided evidence that increasing the frequency of psychotherapy sessions per week can heighten the effectiveness. Another general, promising concept is the notion of expectations as a general factor influencing the behavior of human beings. First research branches analyzing the information processing of human beings, in which expectations play a major role. In clinical psychology research, differences between healthy people and people with mental disorders such as depression were found, demonstrating an increase in dysfunctional expectations and a lack of expectation adaptation after a disconfirming experience. Scholars have suggested the integration of EFPIs into psychotherapy. Indeed, evidence has already shown positive effects on depressive symptoms. Based on this empirical background, this study aims to first compare cognitive behavioral therapy (CBT) performed once a week to an intensified, two-session-per-week CBT for depression. In a second step, this study aims to investigate the effect of the EFPI in the context of CBT on depressive symptom improvement.

Methods. The recruitment primarily takes place through individuals who were searching for psychotherapy in an outpatient clinic in Marburg, Germany. Before study inclusion, a current major depressive episode as the main diagnosis must have been diagnosed with the help of structured clinical interviews (structured clinical interview for the DSM-IV SKID-I (Wittchen et al., 1997) and the Montgomery Asperg Depression Rating Scale [MADRS; Schmidtke et al., 1988)). To qualify for the study, the patient must receive a sum score of at least 13 on the BDI-II (Hautzinger et al., 2009). Next, the participants are randomly assigned to one of three groups: normal CBT with one session per week; intensified CBT with two sessions per week; or intensified, expectation-focused CBT with two sessions per week. Every treatment arm conducts in all 24 psychotherapy sessions performed by trained psychotherapists in training. As effectiveness measure the depressive symptom severity is assessed with the BDI-II and the MADRS. A sample size of N = 150 is intended. The study was approved by the local ethics committee of the Department of Psychology, Philipps-University Marburg (reference number 2020-68v). For statistical evaluation, mixed models will be conducted, allowing a comparison between the three different groups over the time period of 24 sessions. Drop-out analyses will be performed.

Discussion. This study aims to analyze the influence of session frequency and different expectation mechanisms on the effectiveness of psychotherapy in a depressive population sample. As an expected benefit, suggestions regarding structural circumstances can be identified. This study is the first to deliver information about the effectiveness of EFPIs, focusing on the concept of expectations (defined as an essential influencing common factor in psychotherapy). Future research should investigate the influence of session frequency and expectations in other psychotherapy approaches.

5. Discussion

The first aim of this dissertation was to analyze the persistence of specific dysfunctional expectations in psychopathology even after disconfirming experiences (i.e., cognitive immunization). Interventions leading to the prevention or reduction of cognitive immunization were developed and tested for their effectiveness. In the context of this work, it was first possible to implicitly observe expectation persistence or expectation adaptation, after disconfirming experiences. This persistence can be influenced (i.e., reduced) by utilizing specific micro-interventions (Study 1). Regarding the "No1LikesU!" paradigm (D'Astolfo et al., 2020), the study offers a more developed paradigm to analyze the ViolEx model, with a focus on expectation modification. Accordingly, Study 1 supports the results of the "No1LikesU!" paradigm. One of the main results of Study 1 was that the micro EFPI was able to foster expectation change after an expectation violation, even in primary healthy participants without a diagnosed mental disorder. Not only were expectations more quickly adapted but this was also observed in the shown behavior. This underlines the above-illustrated expectation models linking expectations to shown behavior (Ajzen, 1985; Atkinson & Feather, 1966; Vroom, 1964).

In Study 2, a new self-rating questionnaire was constructed and validated. The IMS allows researchers to explicitly measure cognitive immunization. Through explanatory and confirmatory factor analyses, an independent factor playing a role in expectation persistency was found and indicates the existence of the concept of cognitive immunization (Study 2). It again supports the theoretical framework of the ViolEx model (Rief et al., 2015). High correlations between the IMS and psychopathological symptoms were also found. These results support the finding that people with mental disorders exhibit deficits in expectation adaptation after experiencing disconfirming information (Kube, Kirchner, et al., 2019; Kube, Rief, et al., 2019; Kube et al., 2020).

The third study demonstrated that EFPIs can influence the immunization level. For the first time, established therapeutical interventions were tested via an online study in a subclinical to mild depressive and/or anxious population. These interventions reduced the immunization level measured by the IMS over two months (Study 3). This supports the initial findings in the literature, showing that EFPIs influence expectation modification (Kube, Glombiewski, Gall, et al., 2019; Kube, Glombiewski, & Rief, 2019). This study also addresses the influence of EFPIs on psychopathological symptoms, underlining the link between expectation persistency and psychopathology, which should be considered and addressed in psychotherapy to foster a more flexible pattern of thinking. As a final step, these interventions were integrated and expanded into standard psychotherapeutic care (Study 4). It remains to be seen if these interventions can add value to standard psychotherapeutic treatment.

5.1. Strengths and limitations

This dissertation is based on a new, still-unexplored topic in clinical psychology and can present initial evidence on the subject. The four studies within the dissertation show different strengths. A main feature is the methodologically clean design of all four studies, which used a variety of methodological designs (experimental design, longitudinal study, and online format). In all studies, the participants were randomly assigned to their intervention group (Studies 1, 3, and 4), the questionnaire was validated through exploratory and confirmatory factor analyses with two recruitment waves, and all of the designs were kept as naturalistic as possible (Studies 3, 4) while still being economical. The studies were neatly sequenced. Starting with an experimental design, the existence of the cognitive immunization construct was verified. Next, the construction of a questionnaire helped measure the construct in a more efficient way, and the third study reviewed the existence of interventions, immunization reduction, and expectation persistence. The last study is planned to investigate the added value of these interventions for mental health treatments in a realistic psychotherapeutic

setting. The researchers began with a healthy population, analyzed people with subclinical or mild psychopathological symptoms, and in the last study, focused on people with diagnosed depression. A significant strength of Studies 3 and 4 was the additional support offered to people experiencing mental distress during the COVID-19 pandemic.

The studies are not, however, without limitations. For all studies, the representativeness of the population sample should be considered. In all four studies, the proportion of German (psychology) students was overrepresented due to the remuneration given after participation (Studies 1–3). Studies 1 and 2 considered healthy participants, whereas Study 3 focused on mild depressive and anxious participants; Study 4 included only people with diagnosed depression. Any generalization to other psychopathologies should be made with caution. In addition, in Study 3, symptom severity was only measured online using a self-rating questionnaire, and an external rating by clinical professionals (as in Study 4) could be more reliable, albeit less efficient. The resulting distortions should be taken into account. Moreover, the COVID-19 pandemic surely influenced the questionnaire responses. In Study 1, recruitment had to be discontinued due to the lockdown. For Studies 2 and 3, the psychopathological symptoms could also be attributed to the uncertain situation of the pandemic (Brakemeier et al., 2020), even if Study 3 undoubtedly offered great emotional support for the population. A specific criticism of Study 3 concerns the sample's high number of dropouts. Due to the lack of a monitoring body, several participants did not complete the second - and especially the third - survey wave (i.e., too much time passed between measurement time points). To counteract this limitation, the data for measurement points two and three were estimated via the multiple imputation method.

In terms of content, Study 1 focused on social expectations toward the behavior of an opponent. The study did not address other potential (psychopathological) expectations (e.g., expectations toward oneself or self-efficacy). For the IMS (Study 2), the conception of the questionnaire was based on existing literature, but further clarification of the concept of

immunization should be made by incorporating or investigating conceptually similar constructs, such as the idea of experiential avoidance (Hayes et al., 2012). In Study 3, EFPIs were formulated based on propositions from the literature, but other interpretations of the results should be considered. It appears that the EFPIs reduced immunization processes, but it is possible that, instead, they reduced avoidant behavior through the behavioral experiments, which in turn could have reduced the symptoms (especially the anxiety symptoms). That, in turn, could have reduced immunization mechanisms through the reduction of symptoms. Due to a somewhat restricted sample size, clear analyses of possible moderations and mediations were limited, especially in Studies 1 and 3. In Study 4, the most obvious criticism concerning the content is the clear delimitation or the added value of the EFPI from standard CBT in practice. It is well-known that, in practice, psychotherapists do not follow a specific CBT manual or psychotherapeutic direction, but instead use psychotherapeutic techniques and instruments in an eclectic way (Lazarus et al., 1992).

5.2. Future research

5.2.1. Implications for the theoretical models

The immunization process appears to be a key element of persistent dysfunctional expectations, but research on the ViolEx model is still in its infancy. Future studies could include existing literature analyzing other expectation processing models as expectancy-value theories. Looking at the ViolEx model, the "value" component is not explicitly present. We know from the expectancy-value theories that the value of showing or not showing a certain behavior plays a crucial role in the execution of the behavior. In that context, non-volitional reactions, motivational elements, and volitional aspects could be taken into account (Heckhausen & Gollwitzer, 1987), including the influence of emotions and affects shaping human behavior and their impact on the emergence of certain expectations. Humans do not operate as rational, predictive machines whereby feelings, emotions, and affects should be contemplated (Seth et al., 2012). The concept of cognitive immunization is, to date, defined as

a mainly cognitive process. It might be that emotional processes lead to the same avoidant mechanisms through, for example, the experience of secondary emotional states, thereby avoiding primary emotions (Braniecka et al., 2014).

A further avenue would be to attain a clearer derivation of these dysfunctional expectations. In the literature review, dysfunctional expectations are treated as dysfunctional, future-directed cognitions, relying on the well-known theory of Aaron Beck (Beck, 1970). It is possible that dysfunctional expectations could be found at the levels of automatic thoughts (e.g., "The presentation will be terrible"), conditional assumptions (e.g., "I have to be a good presenter; otherwise, people will think badly about me"), and fundamental beliefs (e.g., "I am a loser"). Predicting the emergence of the different dysfunctional expectations, possibly on different levels, may help to target them through formulating clearer EFPIs.

An improved differentiation of the various processes leading to expectation persistence should also be conducted, and a clearer definition of (cognitive) immunization processes is needed. This dissertation primarily includes propositions for the conceptualization of cognitive immunization (Study 2). In the literature, several very similar concepts are presented (Craske et al., 1988; Hayes et al., 2012; Meiran et al., 2011) that could also be considered. In this dissertation, cognitive immunization is seen as a component of experiential avoidance, which represents every avoidance of internal experiences as thoughts or feelings (Hayes et al., 2012). Cognitive immunization leads to the avoidance of certain expectation-disconfirming information by reappraisal. It is possible that the acknowledgment of certain expectation-disconfirming experiences can question our worldview, which is typically perceived as uncomfortable and exhausting. For example, if a person believes that they are a loser and holds the expectation of "I will probably fail again on this exam," internal consistency is experienced. If that person starts to believe "I will pass this exam," they have to question their basic assumptions, and internal discrepancies will be experienced.

5.2.2. Implications for future research

Expectancy–value theories primarily describe a goal-directed and rather conscious process of making decisions and choosing a certain behavior. The distinction with unconscious processes should be made. Future research could target, for example, the Bayesian theories postulating the predictive functioning of the brain (Kube et al., 2020). Neuroscientific studies should be implemented to clarify updating processes in the brain (Collette et al., 2006). Another interesting avenue for research is the influence of the valence of experienced violation (Kube et al., 2021). How strong must the violation be until an update of the expectation is carried out, and is there a difference between people with mental disorders and those without? Another essential research topic would be the investigation of the influence of expectations and cognitive immunization processes on the part of the therapist. The literature shows promising evidence of the influence of therapists' characteristics in psychotherapy (Ackerman & Hilsenroth, 2001, 2003).

In psychotherapeutic practice, it remains to be seen if EFPIs bring added value to the existing toolbox of psychotherapeutic interventions. Through randomized controlled trials, comparisons with established psychotherapeutic treatments should be undertaken (see Study 4). Also, as EFPIs target information-processing mechanisms, and do not represent symptom-based interventions, they should be tested for their effectiveness with other mental disorders, as they have been, so far, tested primarily with depression. Lastly, long-term effects should be analyzed through longitudinal studies (Studies 3 and 4).

5.3. Clinical and practical implications

This work demonstrates that immunization processes can be reduced with the help of EFPIs, and they should be integrated into the psychotherapeutic toolbox. The most important clinical implication would be to integrate EFPIs not only for psychopathological expectations but also to monitor the patients' expectations toward certain interventions and also toward the treatment itself. Presumably, immunization processes can also lead to therapy resistance

because the generalization of psychotherapeutic interventions to a real-life setting is not ensured (Rief & Glombiewski, 2017). Specific expectations, such as “This therapy can’t help me either” or “This intervention helped me solely because my therapist accompanied me,” can now be considered and counteracted by actively assessing them in psychotherapy and intervening against immunization processes.

Moreover, if the therapist can observe a certain persistence of specific dysfunctional expectations, the IMS can give an orientation of the immunization level of the patient. The goal would then be to make these specific expectations that the client is presenting more flexible. By making the expectations more conscious, an adaptive behavior can be chosen in a functional way by considering its consequences. An EFPI can foster information-processing mechanisms (i.e., learning mechanisms), which is much more flexible than simply replacing negative expectations with positive ones (Grawe, 2000). This allows the patient to adapt more easily to changing circumstances, which can be more efficient in the long term. This idea of focusing on information processes and not only offering symptom-based treatment is in line with the different branches of the third wave of CBT, such as with acceptance and commitment therapy (Hayes & Hofmann, 2018; Hayes et al., 2012).

5.4. Conclusion

This dissertation dealt with the concept of cognitive immunization, underlining its relevance in psychopathology. Through the use of an experimental design, the immunization mechanisms leading to more persistent expectations could be implicitly observed. In the next step, the explicit measurement - and a clearer definition - of cognitive immunization was made with the construction of the IMS. With this more efficient instrument, the immunization processes can be better approached in the psychotherapeutic context. Through the formulation of EFPIs, the level of cognitive immunization can be reduced in a sample with mild depressive and/or anxious symptoms. In a further stage, these EFPIs are used in standard

psychotherapy, showing that not only can EFPIs reduce immunization processes but also bring added value to standard CBT.

6. Literature

Ackerman, S. J., & Hilsenroth, M. J. (2001). A review of therapist characteristics and techniques negatively impacting the therapeutic alliance. *Psychotherapy: Theory, Research, Practice, Training*, *38*(2), 171.

Ackerman, S. J., & Hilsenroth, M. J. (2003). A review of therapist characteristics and techniques positively impacting the therapeutic alliance. *Clinical psychology review*, *23*(1), 1-33.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In *Action control* (pp. 11-39). Springer.

Ajzen, I., & Fishbein, M. (2000). Attitudes and the attitude-behavior relation: Reasoned and automatic processes. *European review of social psychology*, *11*(1), 1-33.

Al-Darmaki, F., & Kivlighan, D. M. (1993). Congruence in client-counselor expectations for relationship and the working alliance. *Journal of Counseling Psychology*, *40*(4), 379.

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review [Review]. *Clinical Psychology Review*, *30*(2), 217-237. https://doi.org/10.1016/j.cpr.2009.11.004

APA, A. P. A. (2022). APA Dictionary of Psychology. In https://dictionary.apa.org

Atkinson, J. W., & Feather, N. T. (1966). *A theory of achievement motivation* (Vol. 66). Wiley New York.

Bandura, A. (1961). Psychotherapy as a learning process. *Psychological Bulletin*, *58*(2), 143.

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological review*, *84*(2), 191.

Bandura, A. (1978). Self-efficacy: Toward a unifying theory of behavioral change. *Advances in behaviour research and therapy*, *1*(4), 139-161.

Barlow, D. H. (1996). The effectiveness of psychotherapy: science and policy.

Beck, A. T. (1970). Cognitive therapy: Nature and relation to behavior therapy. *Behavior therapy*, *1*(2), 184-200.

Beitman, B. D., Goldfried, M. R., & Norcross, J. C. (1989). The movement toward integrating the psychotherapies: An overview. *American Journal of Psychiatry*, *146*(2), 138-147.

Berg, M., Feldmann, M., & Kube, T. (2021). Oversampled and undersolved: Depressive rumination from a predictive coding perspective.

Bingel, U. (2020). Placebo 2.0: the impact of expectations on analgesic treatment outcome. *Pain*, *161*, S48-S56.

Bolles, R. C. (1972). Reinforcement, expectancy, and learning. *Psychological review*, *79*(5), 394.

Brakemeier, E.-L., Wirkner, J., Knaevelsrud, C., Wurm, S., Christiansen, H., Lueken, U., & Schneider, S. (2020). Die COVID-19-Pandemie als Herausforderung für die psychische Gesundheit. *Zeitschrift für Klinische Psychologie und Psychotherapie*.

Braniecka, A., Trzebińska, E., Dowgiert, A., & Wytykowska, A. (2014). Mixed emotions and coping: The benefits of secondary emotions. *PloS one*, *9*(8), e103940.

Collette, F., Hogge, M., Salmon, E., & Van der Linden, M. (2006). Exploration of the neural substrates of executive functioning by functional neuroimaging. *Neuroscience*, *139*(1), 209-221.

Colloca, L., & Miller, F. G. (2011). Role of expectations in health. *Current opinion in psychiatry*, *24*(2), 149-155.

Constantino, M. J., Ametrano, R. M., & Greenberg, R. P. (2012). Clinician interventions and participant characteristics that foster adaptive patient expectations for psychotherapy and psychotherapeutic change. *Psychotherapy*, *49*(4), 557.

Constantino, M. J., Arnkoff, D. B., Glass, C. R., Ametrano, R. M., & Smith, J. Z. (2011). Expectations. *Journal of clinical psychology*, *67*(2), 184-192.

Constantino, M. J., Vîslă, A., Coyne, A. E., & Boswell, J. F. (2018). A meta-analysis of the association between patients' early treatment outcome expectation and their posttreatment outcomes. *Psychotherapy*, *55*(4), 473.

Craske, M. G., Rapee, R. M., & Barlow, D. H. (1988). THE SIGNIFICANCE OF PANIC-EXPECTANCY FOR INDIVIDUAL PATTERNS OF AVOIDANCE [Article]. *Behavior Therapy*, *19*(4), 577-592. https://doi.org/10.1016/s0005-7894(88)80025-x

Craske, M. G., Treanor, M., Conway, C. C., Zbozinek, T., & Vervliet, B. (2014). Maximizing exposure therapy: An inhibitory learning approach [Article]. *Behaviour Research and Therapy*, *58*, 10-23. https://doi.org/10.1016/j.brat.2014.04.006

Cuijpers, P., Reijnders, M., & Huibers, M. J. (2019). The role of common factors in psychotherapy outcomes. *Annual review of clinical psychology*, *15*(1), 207-231.

D'Astolfo, L., Kirchner, L., & Rief, W. (2020). No1LikesU!–A Pilot Study on an Ecologically Valid and Highly Standardised Experimental Paradigm to Investigate Social Rejection Expectations and Their Modification. *Clinical Psychology in Europe*, *2*(2).

Davis, F. W., & Yates, B. T. (1982). Self-efficacy expectancies versus outcome expectancies as determinants of performance deficits and depressive affect. *Cognitive Therapy and Research*, *6*(1), 23-35.

Doering, B. K., Glombiewski, J. A., & Rief, W. (2018). Expectation-focused psychotherapy to improve clinical outcomes. *International review of neurobiology*, *138*, 257-270.

Doering, B. K., Rief, W., & Petrie, K. J. (2014). Lessons to be learned from placebo arms in psychopharmacology trials. In *Placebo* (pp. 273-290). Springer.

D'Astolfo, L., & Rief, W. (2017). Learning about expectation violation from prediction error paradigms–A meta-analysis on brain processes following a prediction error. *Frontiers in psychology*, *8*, 1253.

Ellis, A. (1957). Rational psychotherapy and individual psychology. *Journal of individual psychology*, *13*(1), 38.

Enck, P., & Zipfel, S. (2019). Placebo effects in psychotherapy: a framework. *Frontiers in psychiatry*, *10*, 456.

Evers, A. W., Colloca, L., Blease, C., Annoni, M., Atlas, L. Y., Benedetti, F., . . . Colagiuri, B. (2018). Implications of placebo and nocebo effects for clinical practice: expert consensus. *Psychotherapy and psychosomatics*, *87*(4), 204-210.

Finsrud, I., Nissen-Lie, H. A., Vrabel, K., Høstmælingen, A., Wampold, B. E., & Ulvenes, P. G. (2022). It's the therapist and the treatment: The structure of common therapeutic relationship factors. *Psychotherapy Research*, *32*(2), 139-150.

Frank, J. D. (1961). *Persuasion and healing: A comparative study of psychotherapy.* Johns Hopkins University Press.

Freud, S. (2018). *The collected works of Sigmund Freud* (Vol. 1). Library of Alexandria.

Garfield, S. L. (1996). Some problems associated with" validated" forms of psychotherapy. *Clinical Psychology: Science and Practice*, *3*(3), 218.

Goldfried, M. R. (2020). The field of psychotherapy: over 100 years old and still an infant science. *Clinical Psychology in Europe*, *2*(1), 1-3.

Gollwitzer, M., Thorwart, A., & Meissner, K. (2018). Editorial: Psychological Responses to Violations of Expectations [Editorial Material]. *Frontiers in Psychology*, *8*, 3, Article 2357. https://doi.org/10.3389/fpsyg.2017.02357

Grawe, K. (2000). *Psychologische Therapie* (k. Auflage, Ed.). Hogrefe.

Grawe, K., Donati, R., & Bernauer, F. (1994). *Psychotherapie im Wandel: von der Konfession zur Profession*. Hogrefe, Verlag für Psychologie Göttingen.

Greenberg, R. P., Constantino, M. J., & Bruce, N. (2006). Are patient expectations still relevant for psychotherapy process and outcome? *Clinical psychology review*, *26*(6), 657-678.

Grencavage, L. M., & Norcross, J. C. (1990). Where are the commonalities among the therapeutic common factors? *Professional psychology: Research and practice*, *21*(5), 372.

Gräfe, K., Zipfel, S., Herzog, W., & Löwe, B. (2004). Screening psychischer Störungen mit dem "Gesundheitsfragebogen für Patienten (PHQ-D)". *Diagnostica*, *50*(4), 171-181.

Hautzinger, M., Keller, F., & Kühner, C. (2009). *BDI II. Beck-Depressions-Inventar* (Vol. 2. Auflage). Pearson.

Hayes, S. C., & Hofmann, S. G. (2018). *Process-based CBT: The science and core clinical competencies of cognitive behavioral therapy*. New Harbinger Publications.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2012). *Acceptance and Commitment Therapy. The Process and Practice of Mindful Change.* (2 ed.). Guilford.

Heckhausen, H., & Gollwitzer, P. M. (1987). Thought contents and cognitive functioning in motivational versus volitional states of mind. *Motivation and emotion*, *11*(2), 101-120.

Heckhausen, J., & Heckhausen, H. (2006). *Motivation und handeln*. Springer-Verlag.

Hofmann, S. G., Barber, J. P., Salkovskis, P., Wampold, B. E., Rief, W., Ewen, A.-C. I., & Schäfer, L. N. (2022). What Is the Common Ground for Modern Psychotherapy? A Discussion Paper Based on EACLIPT's 1st Webinar. *Clinical Psychology in Europe*, *4*(1), 1-8.

Hofmann, S. G., & Hay, A. C. (2018). Rethinking avoidance: Toward a balanced approach to avoidance in treating anxiety disorders. *Journal of anxiety disorders*, *55*, 14-21.

Hoyer, J., & Gloster, A. T. (2013). Psychologische Flexibilität messen= Measuring psychological flexibility: Der Fragebogen zu Akzeptanz und Handeln–II (FAH-II): The Acceptance and Action Questionnaire–II (AAQ-II). *Verhaltenstherapie*, *23*(1), 42-44.

Kahneman, D., & Tversky, A. (1979). Prospect Theory of Decisions Under Risk. *Econometrica*, *47*(2), 1156-1167.

Kahneman, D., & Tversky, A. (2013). Prospect theory: An analysis of decision under risk. In *Handbook of the fundamentals of financial decision making: Part I* (pp. 99-127). World Scientific.

Kanfer, F. H. (1961). Comments on learning in psychotherapy. *Psychological Reports*, *9*(3), 681-699.

Kanfer, R., & Zeiss, A. M. (1983). Depression, interpersonal standard setting, and judgments of self-efficacy. *Journal of abnormal psychology*, *92*(3), 319.

Kavanagh, D. J. (1992). Self-efficacy and depression. *Self-efficacy: Thought control of action*, 177-193.

Khan, A., & Brown, W. A. (2015). Antidepressants versus placebo in major depression: an overview. *World Psychiatry*, *14*(3), 294-300.

Kirsch, I. (1985). Response expectancy as a determinant of experience and behavior. *American Psychologist*, *40*(11), 1189.

Kirsch, I. (1997). Response expectancy theory and application: A decennial review. *Applied and preventive Psychology*, *6*(2), 69-79.

Kirsch, I. (2014). Antidepressants and the placebo effect. *Zeitschrift für Psychologie*, *222*(3), 128.

Kirsch, I. (2018). Response expectancy and the placebo effect. *International review of neurobiology*, *138*, 81-93.

Kirsch, I., Wampold, B., & Kelley, J. M. (2016). Controlling for the placebo effect in psychotherapy: Noble quest or tilting at windmills? *Psychology of Consciousness: Theory, Research, and Practice*, *3*(2), 121.

Korn, C. W., Sharot, T., Walter, H., Heekeren, H. R., & Dolan, R. J. (2014). Depression is related to an absence of optimistically biased belief updating about future life events. *Psychological medicine*, *44*(3), 579-592.

Kube, T., D'Astolfo, L., Glombiewski, J. A., Doering, B. K., & Rief, W. (2017). Focusing on situation-specific expectations in major depression as basis for behavioural experiments - Development of the Depressive Expectations Scale. *Psychology and Psychotherapy-Theory Research and Practice*, *90*(3), 336-352. https://doi.org/10.1111/papt.12114

Kube, T., Glombiewski, J. A., Gall, J., Touissant, L., Gartner, T., & Rief, W. (2019). How to modify persisting negative expectations in major depression? An experimental study comparing three strategies to inhibit cognitive immunization against novel positive experiences. *Journal of Affective Disorders*, *250*, 231-240. https://doi.org/10.1016/j.jad.2019.03.027

Kube, T., Glombiewski, J. A., & Rief, W. (2019). Expectation-Focused Psychotherapeutic Interventions for People with Depressive Symptoms. *Verhaltenstherapie*, *29*(4), 281-291. https://doi.org/10.1159/000496944

Kube, T., Kirchner, L., Lemmer, G., & Glombiewski, J. A. (2021). How the Discrepancy Between Prior Expectations and New Information Influences Expectation Updating in Depression—The Greater, the Better? *Clinical Psychological Science*, 21677026211024644.

Kube, T., Kirchner, L., Rief, W., Gartner, T., & Glombiewski, J. A. (2019). Belief updating in depression is not related to increased sensitivity to unexpectedly negative information. *Behaviour Research and Therapy*, *123*, Article 103509. https://doi.org/10.1016/j.brat.2019.103509

Kube, T., Rief, W., & Glombiewski, J. A. (2017). On the Maintenance of Expectations in Major Depression - Investigating a Neglected Phenomenon. *Frontiers in Psychology*, *8*, Article 9. https://doi.org/10.3389/fpsyg.2017.00009

Kube, T., Rief, W., Gollwitzer, M., Gartner, T., & Glombiewski, J. A. (2019). Why dysfunctional expectations in depression persist - Results from two experimental

studies investigating cognitive immunization. *Psychological Medicine*, *49*(9), 1532-1544. https://doi.org/10.1017/s0033291718002106

Kube, T., Schwarting, R., Rozenkrantz, L., Glombiewski, J. A., & Rief, W. (2020). Distorted cognitive processes in major depression: a predictive processing perspective. *Biological psychiatry*, *87*(5), 388-398.

Laferton, J. A., Kube, T., Salzmann, S., Auer, C. J., & Shedden-Mora, M. C. (2017). Patients' expectations regarding medical treatment: a critical review of concepts and their assessment. *Frontiers in psychology*, *8*, 233.

Lambert, M. J., Bergin, A. E., & Garfield, S. (1994). The effectiveness of psychotherapy. *Encyclopedia of psychotherapy*, *1*, 709-714.

Lazarus, A. A., Beutler, L. E., & Norcross, J. C. (1992). The future of technical eclecticism. *Psychotherapy: Theory, Research, Practice, Training*, *29*(1), 11.

Lewin, K., Dembo, T., Festinger, L., & Sears, P. S. (1944). Level of aspiration.

Liknaitzky, P., Smillie, L. D., & Allen, N. B. (2017). Out-of-the-Blue: Depressive Symptoms are Associated with Deficits in Processing Inferential Expectancy-Violations Using a Novel Cognitive Rigidity Task [Article]. *Cognitive Therapy and Research*, *41*(5), 757-776. https://doi.org/10.1007/s10608-017-9853-x

Liknaitzky, P., Smillie, L. D., & Allen, N. B. (2018). The low and narrow: A preliminary test of the association between depressive symptoms and deficits in producing divergent inferences. *Creativity Research Journal*, *30*(1), 67-77.

Linde, K., Witt, C. M., Streng, A., Weidenhammer, W., Wagenpfeil, S., Brinkhaus, B., . . . Melchart, D. (2007). The impact of patient expectations on outcomes in four randomized controlled trials of acupuncture in patients with chronic pain. *Pain*, *128*(3), 264-271.

Luborsky, L., Diguer, L., Seligman, D. A., Rosenthal, R., Krause, E. D., Johnson, S., . . . Schweizer, E. (1999). The researcher's own therapy allegiances: A "wild card" in

comparisons of treatment efficacy. *Clinical psychology: Science and practice*, *6*(1), 95-106.

Maddux, J. E., & Meier, L. J. (1995). Self-efficacy and depression. In *Self-Efficacy, adaptation, and adjustment* (pp. 143-169). Springer.

Madsen, M. V., Gøtzsche, P. C., & Hróbjartsson, A. (2009). Acupuncture treatment for pain: systematic review of randomised clinical trials with acupuncture, placebo acupuncture, and no acupuncture groups. *Bmj*, *338*.

Marazziti, D., Consoli, G., Picchetti, M., Carlini, M., & Faravelli, L. (2010). Cognitive impairment in major depression. *European journal of pharmacology*, *626*(1), 83-86.

Margraf, J., & Ehlers, A. (2007). *Beck Angst-Inventar (BAI) – Deutsche Ausgabe*. Harcourt.

Marks, I. (1979). Exposure therapy for phobias and obsessive-compulsive disorders. *Hospital Practice*, *14*(2), 101-108.

Meiran, N., Diamond, G. M., Toder, D., & Nemets, B. (2011). Cognitive rigidity in unipolar depression and obsessive compulsive disorder: Examination of task switching, Stroop, working memory updating and post-conflict adaptation. *Psychiatry research*, *185*(1-2), 149-156.

Myers, K. M., & Davis, M. (2007). Mechanisms of fear extinction. *Molecular psychiatry*, *12*(2), 120-150.

Panitz, C., Endres, D. M., Buchholz, M., Khosrowtaj, Z., Sperl, M. F., Mueller, E. M., . . . Pinquart, M. (2021). A revised framework for the investigation of expectation update versus maintenance in the context of expectation violations: the ViolEx 2.0 model. *Frontiers in Psychology*, 5237.

Parijat, P., & Bagga, S. (2014). Victor Vroom's expectancy theory of motivation–An evaluation. *International Research Journal of Business and Management*, *7*(9), 1-8.

Patterson, C. L., Anderson, T., & Wei, C. (2014). Clients' pretreatment role expectations, the therapeutic alliance, and clinical outcomes in outpatient therapy. *Journal of Clinical Psychology*, *70*(7), 673-680.

Patterson, C. L., Uhlin, B., & Anderson, T. (2008). Clients' pretreatment counseling expectations as predictors of the working alliance. *Journal of Counseling Psychology*, *55*(4), 528.

Pinquart, M., Endres, D., Teige-Mocigemba, S., Panitz, C., & Schütz, A. C. (2021). Why expectations do or do not change after expectation violation: A comparison of seven models. *Consciousness and Cognition*, *89*, 103086.

Pinquart, M., Rothers, A., Gollwitzer, M., Khosrowtaj, Z., Pietzsch, M., & Panitz, C. (2021). Predictors of coping with expectation violation: an integrative review. *Review of General Psychology*, *25*(3), 321-333.

Pittig, A., Wong, A. H., Glück, V. M., & Boschet, J. M. (2020). Avoidance and its bi-directional relationship with conditioned fear: Mechanisms, moderators, and clinical implications. *Behaviour research and therapy*, *126*, 103550.

Rief, W., & Glombiewski, J. A. (2016). Expectation-Focused Psychological Interventions (EFPI). *Verhaltenstherapie*, *26*(1), 47-54. https://doi.org/10.1159/000442374

Rief, W., & Glombiewski, J. A. (2017). The role of expectations in mental disorders and their treatment. *World Psychiatry*, *16*(2), 210.

Rief, W., Glombiewski, J. A., Gollwitzer, M., Schubö, A., Schwarting, R., & Thorwart, A. (2015). Expectancies as core features of mental disorders. *Current opinion in psychiatry*, *28*(5), 378-385.

Rief, W., & Joormann, J. (2019). Revisiting the cognitive model of depression: The role of expectations. *Clinical Psychology in Europe*, *1*, 1-19.

Rief, W., Shedden-Mora, M. C., Laferton, J. A., Auer, C., Petrie, K. J., Salzmann, S., . . . Moosdorf, R. (2017). Preoperative optimization of patient expectations improves long-

term outcome in heart surgery patients: results of the randomized controlled PSY-HEART trial. *BMC medicine*, *15*(1), 1-13.

Rosenzweig, S. (1936). Some implicit common factors in diverse methods of psychotherapy. *American journal of Orthopsychiatry*, *6*(3), 412.

Rotter, J. B. (1954). Social learning and clinical psychology.

Schmidtke, A., Fleckenstein, P., Moises, W., & Beckmann, H. (1988). Studies of the reliability and validity of the German version of the Montgomery-Asberg Depression Rating Scale (MADRS). *Schweizer Archiv fur Neurologie und Psychiatrie (Zurich, Switzerland: 1985)*, *139*(2), 51-65.

Servatius, R. J. (2016). Avoidance: From basic science to psychopathology. In (Vol. 10, pp. 15): Frontiers Media SA.

Seth, A. K., Suzuki, K., & Critchley, H. D. (2012). An interoceptive predictive coding model of conscious presence. *Frontiers in psychology*, *2*, 395.

Stange, J. P., Alloy, L. B., & Fresco, D. M. (2017). Inflexibility as a vulnerability to depression: A systematic qualitative review. *Clinical Psychology: Science and Practice*, *24*(3), 245.

Stordal, K. I., Lundervold, A. J., Egeland, J., Mykletun, A., Asbjørnsen, A., Landrø, N. I., . . . Oedegaard, K. J. (2004). Impairment across executive functions in recurrent major depression. *Nordic journal of psychiatry*, *58*(1), 41-47.

Vroom, V. H. (1964). Work and motivation.

Wampold, B. E. (2015). How important are the common factors in psychotherapy? An update. *World Psychiatry*, *14*(3), 270-277.

Wampold, B. E., & Imel, Z. E. (2015). *The Great Psychotherapy Debate: The Evidence for What Makes Psychotherapy Work* (sec. edition ed.). Routledge.

Wampold, B. E., Minami, T., Tierney, S. C., Baskin, T. W., & Bhati, K. S. (2005). The placebo is powerful: estimating placebo effects in medicine and psychotherapy from randomized clinical trials. *Journal of clinical psychology*, *61*(7), 835-854.

Weinberger, J. (1995). Common factors aren't so common: The common factors dilemma. *Clinical psychology: Science and practice*, *2*(1), 45.

Wilhelm, M., Bleichhardt, G., Ewen, A.-C., & Rief, W. (2022). Erwartungsfokussierte psychotherapeutische Interventionen bei Depression: ein Behandlungsmanual. *Psychotherapeut*, *67*(3), 204-212.

Wittchen, H. U., Schramm, E., Zaudig, M., & Un-land, H. (1997). *SKID. Strukturiertes klinisches Inter-view für DSM-IV, Achse I, deutsche Version* Hogrefe.

Wright, J. H., & Davis, D. (1994). The therapeutic relationship in cognitive-behavioral therapy: Patient perceptions and therapist responses. *Cognitive and behavioral practice*, *1*(1), 25-45.

7. Appendix

7.1. Study 1

Title: Not so bad after all? – A randomized controlled micro-intervention study on the adjustment of social expectations in the prisoner's dilemma

Ewen, A.[a], Rief, W.[a] & Wilhelm, M.[a]

[a] Philipps-University of Marburg, Germany, Department clinical psychology and psychotherapy

Author information:

Corresponding author: Anne-Catherine Ewen, M. Sc.

Philipps-University of Marburg, department clinical psychology and psychotherapy,

Gutenbergstraße 18, 35032 Marburg, Germany

E-Mail: ewen@staff.uni-marburg.de

Dr. Marcel Wilhelm

Philipps-University of Marburg, department clinical psychology and psychotherapy,

Gutenbergstraße 18, 35032 Marburg, Germany

E-Mail: marcel.wilhem@staff.uni-marburg.de

Prof. Dr. Winfried Rief

Philipps-University of Marburg, department clinical psychology and psychotherapy,

Gutenbergstraße 18, 35032 Marburg, Germany

E-Mail: rief@staff.uni-marburg.de

Abstract

Background and objectives

People with mental disorders show an increased number of dysfunctional expectations and do not reliably adjust them despite expectation disconfirming experiences. Cognitive immunization describes information processing devaluing information violating existing expectations (cf. ViolEx model). This study aims to investigate the effectiveness of an expectation-focused micro intervention in reducing immunization processes in a randomized controlled trial.

Methods

Using operationalized social interactions and the iterated prisoner's dilemma (iPD), negative expectations were induced and, after an intervention, violated again in healthy subjects towards a fictive co-player. Participants were randomized to either an expectation focused psychological intervention (EFPI), a psychological flexibility focused intervention (PFFI), or an attentional control exercise. The variability of specific expectations towards the behavior of the opponent was operationalized as mean square successive differences (MSSD).

Results

MSSD were significantly higher for the EFPI group in the second iPD. A significant group difference could partially be observed in shown behavior.

Limitations

Due to a limited representation of the sample (i.e., psychology students), results should be generalized with caution.

Conclusion

EFPI seems to be able to accelerate the process of the expectation adjustment after an expectation violation. Further research should investigate this in clinical populations.

Key words: expectation violation, immunization, ViolEx-model, expectation focused psychological intervention EFPI, psychological rigidity

Theoretical background

The role of expectations in human behavior seems to be present in psychological research since ever. Different expectations have an influence on our shown behavior as it is explicitly approached by the different expectancy-value theories as by specific decision-making and action models (Ajzen, 1985; Atkinson & Feather, 1966; Kahneman & Tversky, 2013). Human behavior can be explained through, first, the perceived own value of a possible consequence followed by a certain behavior and, second, through the expectation this consequence actually occurs (Quick, 1988).

Not far from these theories, clinical psychology research recently started to focus on expectations, becoming prominent as an impact factor on treatment outcome (Craske et al., 1988; Craske et al., 2014). In placebo research, specific expectations were identified as the main mechanism of the placebo effect (Kirsch, 2018; Price et al., 2008; Schwarz et al., 2016; Wampold & Imel, 2015). As different types of expectations have a different effect on treatment outcome in clinical contexts, different psychological expectation models have been suggested to be adapted (Rief & Petrie, 2016). The ViolEx-model establishes a theoretical framework explaining the process of generating, maintaining, or adapting certain expectations (Gollwitzer et al., 2018; Rief et al., 2015). Expectations are predictive cognitions formed by the social environment, personality, and experiences. Expectations are remained if they are confirmed. However, if an expectation is violated, different information processing mechanisms lead either to an expectation change or expectation maintenance: an *accommodation* process leads to an expectation adaptation to the made experience by representing a normal learning process. *Assimilation* and *immunization* processes facilitate the maintenance of the expectation despite contradicting facts, and can be based on behavioral

and experiential avoidance and cognitive reevaluation of disconfirming information (Gollwitzer et al., 2018). To verify this model, a first promising experimental paradigm called No1LikesU!, was developed to analyze the development, maintenance and modification of social rejection expectations based on social feedback (D'Astolfo et al., 2020).

Based on the ViolEx model, Rief and Joormann (2019) established a new cognitive model of depression including dysfunctional expectations as a core part. It focuses on the violation of negative expectations to entail expectation modification. Adaptations of this model go even further proposing distortion in learning mechanisms based on predictive processing in depression (Kube et al., 2020). First evidence revealed that these negative expectations seem to persist, even after an expectation violation occurred (Kube et al., 2017; Kube et al., 2019). Healthy participants adapt their performance expectations faster after expectation disconfirming feedback compared to people with depression (Kube et al., 2019). This lack of adjustment might be due to cognitive immunization, through the post-hoc reappraisal of positive experiences (Rief & Glombiewski, 2016). These immunization mechanisms can be compared to studies analyzing cognitive rigidity or inflexibility (Kube et al., 2019; Marazziti et al., 2010; Meiran et al., 2011; Stange et al., 2017). In different task switching paradigms, persons with depression seem to show deficits in executive functioning, poor working memory updating and less task preparation (Meiran et al., 2011; Stordal et al., 2004). It has therefore been suggested that cognitive behavioral therapy (CBT) should include direct work on dysfunctional expectations (expectation focused psychological interventions, EFPI) and immunization processes to stimulate the flexible and functional adaptation of expectations to experienced situations (Doering et al., 2018; Rief & Glombiewski, 2016).

At first glance, an overlapping concept with immunization in psychotherapeutic practice seems to be psychological inflexibility, which is linked to mental health and well-being (Kashdan & Rottenberg, 2010). As a part of the third wave of CBT, acceptance and

commitment therapy (ACT) tries to enhance the psychological flexibility by stimulating the salience and acceptance of the present moment, take distance to own thoughts with the aim of reducing experiential avoidance and promoting committed action towards proper values in life (Hayes et al., 2011). EFPI themselves are defined as typical CBT interventions with the aim to change dysfunctional expectations by fostering their adaptation to a more functional worldview. ACT makes a step back and tries to include a more holistic view on psychopathology. Nevertheless, some careful overlapping ideas can be for example the concept of the present moment in the hexaflex of psychological flexibility, whereby EFPI tries to enhance the salience of expectation confirming or disconfirming information in the present moment. The more, both approaches try to take distance to automated behavioral procedures. Believing in a negative expectation for 100% may influence human behavior fostering experiential and behavioral avoidance, possibly coherent with immunization processes. In contrast to EFPI, ACT is already well established in practice, even if further methodologically high quality randomized clinical trials are needed to state it as an evidence-based treatment (Öst, 2014).

By consequence, the question arises: Do short interventions of EFPI enhance behavioral and expectation modification, reduce immunization processes, and foster expectation change after expectation-disconfirming experience? Further, may it be helpful to adapt this process to psychotherapeutic settings? To test these questions, negative social expectations were induced, interventions were presented, and afterwards social rejection expectations were violated. Processes of expectation development and adaptation processes present the focus of this study. The aim is to analyze the influence of EFPI on expectation modification and shown behavior after a positive expectation violation. EFPI is expected to decrease cognitive immunization by making expectations and their violations conscious, giving the opportunity

to flexibly adapt expectations and their consequent behavior to shown behavior of the opponent.

Main hypotheses

To standardize the expectation induction and violation, mock video conferences and the iterated prisoner's dilemma (iPD) with twelve trials respectively will be used. The expectation induction was done via rejecting behavior in the following mock video conference and defective behavior in the iPD, whereas friendly behavior in the video conference and cooperative behavior in the iPD in the second round represented the expectation violation.

1. (a) EFPI will lead to a faster adaptation of the specific cooperation expectations towards the coplayer during the second iterated prisoner´s dilemma (iPD) compared to the psychological flexibility focused intervention (leads to less variability in behavior caused by committed action towards own values, independently of the behavior of the other person) and the active control group.

(b) The EFPI group will differ significantly to the other groups in shown behavior (cooperation vs. defection) during the second iPD, primary in those trials, after expectation violation. Significant differences in shown behavior should be found between the second and third trial, the sixth and seventh and the tenth and eleventh trial.

2. Psychological flexibility, the specific values of teamwork and assertiveness, as well as the specific value of importance to win can be potential moderators and lead to more variance clarification.

Methods

Participants

Participants were mainly recruited through mailing lists and the research participation system of the *[removed for masked review]* University. Inclusion criteria were age of majority, sufficient *[removed for masked review]* language skills and no severe visual

impairment. The recruitment took place between March 2020 and April 2021. Due to the COVID-19 pandemic, the study was discontinued between April and August 2020. Participants received 10 Euros or one hour in student credit points. A power analysis for an ANOVA with repeated measures, within-between factors with a moderate effect (f = 0.25) was calculated before the recruitment to estimate the sample size suggesting at least 30 participants per group (see preregistration [*link removed for masked review]*).

Study design

Registered subjects were assigned to one of the three groups using block randomization (see figure 1). After going through the study information and informed consent, subjects were asked to complete baseline questionnaires using the platform SoSci Survey (Leiner, 2019). Then, the investigator explained the rules of the prisoner´s dilemma with the help of a winning table indicating the number of points gained depending on proper behavior decision and the behavior chosen by the other person (see Appendix A.1). In all, the participants should decide twelve times if they wanted to cooperate or to defect. Afterwards, participants were called from another computer by video-call using google Hangouts to make the social interaction more realistic (D'Astolfo et al., 2019). A video of a person showing unfriendly and distant nonverbal behavior was presented in a way that the subject was thinking it is another subject sitting in a different room. The participant was told to explain the rules of the iterated prisoner´s dilemma to the "other person" in one minute. Thereafter, the iterated prisoner's dilemma was started. Before every trial (in all 12 trials) the specific expectation of cooperation of the "other person" was asked. To enhance the negative social expectations, the algorithm of the prisoner`s dilemma defected 75% and only cooperated in the first, fourth and ninth trial (Sorgi & Van 't Wout, 2016). The gained points in each trial were resumed and feedbacked in a table summing up the earned points for the participant and the supposed other person. Subsequently, participants received an intervention, depending on their assigned

group. In the next part, social negative expectations were violated. Again, participants met the other person per mock video-call and this time the nonverbal behavior of the person was attentive, friendly, and interested. Participants should then explain the interventions they received within one minute. The prisoner´s dilemma was repeated with an iteration of 75% cooperation in order to induce an expectation violation. Again, the expectation of cooperation or defection of the "other person" was asked before every trial. A follow-up questionnaire was filled to check the validity of the study and the emotional state of the participants to ensure no enduring negative impact of the negative expectation induction. Finally debriefing included the deception of talking and playing against a real person.

Materials

Participants were sitting in an experimental room in front of a laptop with an internal microphone and webcam and could use a mouse or the track pad to interact with the computer.

Mock video conference. Videos were recorded according to the No1LikesU!-paradigm (D'Astolfo et al., 2019). Besides the evidence for dysfunctional performance expectations in depression, this paradigm invests into social rejection expectations with the help of manipulated and standardized social feedback through mock video conferences. Therefore, a script for two volunteers (one female and one male with approximately the same age in their twenties) was written. In the first video, they were supposed to show distant, assertive nonverbal behavior by looking away, looking on the wristwatch and being leaned backwards. In the second video, the volunteers were instructed to show friendly, empathetic nonverbal behavior by smiling slightly, wave at the beginning, nodding the head and being leaned forward. The video material was shown without sound, which was communicated as the other person's microphone being muted to ensure a standardized experimental procedure.

Iterated prisoner's dilemma. The iterated prisoner's dilemma as a social interaction game allows to analyze the course and variability of expectation and behavior change after a certain expectation violation over different trials. The iterated prisoner's dilemma was newly programmed (can be requested from corresponding author), so that the specific expectation of cooperation of the supposed other person could be asked before every trial. On the desktop, two grey circles were shown including a *1* for defection and *2* for cooperation. Moreover, participants were handed out an instruction table with the rules and inscriptions of the game (see Appendix A.1). If one participant cooperated and the other defected, the person who defected received 5 points, whereas the cooperative person got 0 points. If both participants cooperated, both received 3 points and if both defected, both received 2 points. Over the 12 trials, the gained points were summed up. After every trial, the participant was presented with a summary table of their own points as well as the points of the opponent. The programmed algorithm in the first block at baseline was CDDDCDDDCDDD (D=defection; C=cooperation) and in the second DCCCDCCCDCCC. To make the game seem more realistic, a random pause between 1 and 7 seconds was programmed between pushing the button "cooperation" or "defection" and showing the summary table to the participant.

Interventions. The interventions for the different groups were set up in a way to be similar in procedure, complexity, and structure. In every group, it started with a more educational content (i.e., viol-Ex model, importance of values and attention-models) and went over to more practical exercises with the link to personal examples in life (i.e., expectations and experience of violation, metaphors and look-point-name exercise). The interventions were not directed at the prisoner's dilemma task. All interventions took around 20 minutes.

The expectation focused psychological intervention (EFPI) group focused on making the participant more attentive for expectation violations with the aim to reduce cognitive immunization. At first, a definition of expectations was discussed with the participant.

Dysfunctional (i.e., producing experiential or behavioral avoidance as a consequence of negative affect) and functional (i.e., planning own behavior to avoid negative consequences) negative expectations were distinguished, as well as positive and neutral expectations. The link between expectations and reactive behavior was drawn as well as the consequences of it. Different reactions on expectations were explained with a focus on immunization. At the end, the whole theoretical background was elaborated regarding a personal example of the participant (e.g., being afraid of presenting in front of people, being sure to fail in the next exams, expecting my partner to reject me when I say what I want, expecting my partner to reject me, when I am cooperating …). The active and flexible decision of an adaptation of the expectations due to made experiences were singled out as a taking home message.

In the psychological flexibility focused intervention (PFFI) group, different tasks and metaphors (Wengenroth, 2017) of the acceptance and commitment therapy were used to promote valued-based behavior and the distance-taking process from stressful cognitions. Firstly, important values of the participant were collected with the gravestone metaphor. Values were compared to a compass, giving a direction in life. Secondly, the Bus-driver metaphor was used to emphasize the influence of daily cognitions due to stress, routine etc. getting the bus off track. This exercise included personal examples of difficult cognitions of the participant. The image of the monster on the road-side metaphor summarized the discussion. Fusion, Evaluation, Avoidance and reason-giving is opposed to accept, choose and take action (Wengenroth, 2017).

The active control group consisted in finding a definition of attention with the participant. Attention was compared to a spotlight, attention selectivity (selective and shared attention) and attention intensity (Alertness, Vigilance) were distinguished. Information procession and attention theories were presented and explained (filter theory of attention (Broadbent, 2013); Attenuation theory (Treisman, 1964); late selection model of selective attention; (Deutsch &

Deutsch, 1963). Further on, an interactive distraction task was done by the participant, who had to look, point and name different objects in the room (look-point-name game; (Riggs, 2015).

Measures

Socio-demographics. Participant information included age, sex, native language, nationality, place of residence, education, and actual employment.

Main variables. The specific expectation of cooperation in the next trial of the iterated prisoner's dilemma was assessed twelve times (probability to cooperate: 0-100%). Shown behavior in the play was coded by 0 (cooperation) or 1 (defection).

Immunization. The aspect of immunization in the sense of slower adaptation of proper expectations was operationalized by the computation of mean square successive differences (Jahng et al., 2008). The advantage of MSSD is that, besides the variability, temporal dependency in time series is considered. High values are indicating a higher instability in the responses of cooperation expectations of the other during the iPD. A high MSSD score indicates that the participant has a higher variability in their cognitive responses, revealing a faster expectation change following expectation violation.

Moderators. To measure psychological flexibility, the *[removed for masked review]* version of the Acceptance and Action Questionnaire II (Hoyer & Gloster, 2013) was used. The questionnaire is a validated and reliable self-reported 7-item scale measuring psychological flexibility, respectively experiential avoidance. A higher sum-score represents higher inflexibility. To survey the social values, self-constructed items were used. The values assertiveness and teamwork were rated as *not important, rather important, very important* (Harris, 2014). The importance to win (scale 0-10, 0 = not at all, 10 = extremely) was asked after the second play of the iterated prisoner´s dilemma.

Randomization

At the beginning of the recruitment, a block randomization was performed for 102 future participants using the package *blockrand* (Snow & Snow, 2013) from RStudio version 1.2.5042 (RStudio, 2009-2020). By registering for the study, the participant automatically received the intervention assigned to the participant number.

Ethics

The local ethics committee of the Department of Psychology, [*removed for masked review]* approved the study (reference number [*removed for masked review]*). The study has been preregistered at the open science framework OSF ([*link removed for masked review]).*

Statistical analyses

All analyses are conducted using RStudio version 1.2.5042 (RStudio, 2009-2020).

To test the validity of the standardized experiment, a single t-test for dependent samples between the means of the specific cooperation expectations towards the opponent between the first and second game of the iterated prisoner´s dilemma was calculated. The same was done with the amount of cooperation behavior by taking the sum score of cooperation in the first compared to the sum score of cooperation in the second game. Levene-tests have been calculated to check homoscedasticity revealing highly non-significant results.

The aspect of immunization in the sense of fast adaptation of proper expectations was operationalized by the computation of mean square successive differences (Jahng et al., 2008). High values are indicating a higher instability in the responses of cooperation expectations of the other during a game. Participants with a high MSSD score means, that they had a higher variability in their responses.

Before the analyses were conducted, the data was checked for outliers to exclude influential data. Therefore, the Mahalanobis distance was calculated checking against a χ^2-cut-off of $\alpha = .001$. One case influencing the models including the MSSD as the dependent variable was excluded. To conduct the mixed effects analyses, the package *lme4* (Bates et al.,

2018) and *lmerTest* (Kuznetsova et al., 2015) were used. As predictors, the interaction term *timepoint*group variable* was included, as random effect the intercepts of the participants were implemented, whereby the timepoint represents the first or the second iPD. Further on, the homoscedasticity and normality were checked by residual plots, which showed the expected pattern. Contrasts were calculated using the package *emmeans* (Lenth et al., 2018). For moderator analyses the moderator variables were inserted as a triple interaction into the model as a fixed effect.

To analyze group differences in shown behavior in the second game of the iterated prisoner´s dilemma, three logistic regressions with different reference trials over the second iterated prisoner's dilemma were calculated with the *glmer*-function from the same *lme4*-package (Bates et al., 2018). The reference trials were chosen by means of an expectation violation in shown behavior of the algorithm. The first logistic regression included, besides the random effect, the fixed effects group variable with the three levels EFPI, PFFI and control group and the variable timepoint with the levels trial 2 and trial 3 of the second game, as well as their interaction. The second analysis included the same variables as fixed effects, with the levels of the timepoint variable trial 6 and trial 7. The last analysis included the levels trial 10 and 11. As for the other mixed effect analysis, contrasts were calculated, and the residual distributions were plotted.

Results

Sample characteristics

A total of 102 individuals participated. Two persons were excluded due a lack of credibility of the cover story. The data of 100 participants were included in our analyses (see table 1). The mean age of the sample is 23.33 years (*SD* = 4.65, Range [18-41]), 68% of the subjects were female. 81% had *[removed for masked review]* nationality and 96% were university students.

Manipulation check for the experimental induction and change of social expectations

There was no significant difference between the groups ($M_{EFPI} = 5.71$, $SD_{EFPI} = 2.91$; $M_{PFFI} = 4.92$, $SD_{PFFI} = 2.89$; $M_{CG} = 5.21$, $SD_{CG} = 2.50$) over the different trials in the first iterated prisoner's dilemma ($F(2,97) = 1.65$, $p = 0.197$). Further on, the t-test revealed a significant difference in the overall mean of cooperation expectations over the different trials between the first and the second iterated prisoner's dilemma ($t(99) = -9.05$, $p < 0.001$). Figure 2 shows the participants' overall expectations of cooperation towards the opponent over the two games of the iterated prisoner's dilemma separated by the three groups.

No significant difference between the groups ($M_{EFPI} = 30.57$, $SD_{EFPI} = 13.70$; $M_{PFFI} = 37.44$, $SD_{PFFI} = 20.23$; $M_{CG} = 31.26$, $SD_{CG} = 16.56$) over the different trials of the first game in shown cooperation behavior ($F(2,97) = 1.65$, $p = 0.526$) was found. A significant difference in cooperation behavior over the 12 trials between the first and the second iterated prisoner's dilemma has been found ($t(99) = -13.43$, $p < 0.001$). Figure 3 shows the participants' overall expectation of cooperation of the opponent over the two played iterated prisoner's dilemmas separated by the three groups.

Main analyses

While the main effects of timepoint ($F(1, 96) = 0.002$, $p = 0.959$) and group ($F(2,96) = 0.78$, $p = 0.462$) were not significant, the interaction between the timepoint and group showed a significant effect ($F(2, 96) = 3.91$, $p = 0.023$; see table 4). Contrast analyses revealed a significant difference ($t(96) = -2.42$, $p = 0.027$; see Appendix A.3) in the EFPI-group between the MSSD-scores of the first and second prisoner's dilemma (PFFI group: $t(96) = 0.76$, $p = 0.449$; control group: $t(96) = 1.50$, $p = 0.137$; see figure 4).

Results of the logistic models showed different results (see Appendix A.2). The first analysis, including the levels trial 2 and trial 3 for the timepoint variable, showed a trend in

the main effect group between the EFPI and PFFI group (Odds ratio of 0.21, $p = 0.06$). Further on, shown behavior in trial 2 was significantly different then in trial 3 (Odds ratio of 0.04, $p < 0.001$). The interaction terms showed a significant interactions PFFI group x trial 3 (Odds ratio of 41.00, $p < 0.001$) and control group x trial 3 (Odds ratio of 10.88, $p = 0.03$). Contrast analyses showed a highly significant difference of the shown behavior between the trial 2 and trial 3 in the EFPI group ($p < 0.001$), whereas the behavior in the other two groups between the two timepoints remained insignificant. For the second and the third analysis no significant interactions have been found ($p > 0.05$). Significant differences were found in the main effect timepoint between trial 5 and trial 6 (Odds ratio of 16.65, $p < 0.001$), as well as for trial 10 and trial 11 (Odds ratio of 0.23, $p = 0.03$). Main results for the logistic regressions can be seen in table 2.

Moderator analyses

To analyze the influence of possible moderators, the moderator in question was included into the mixed-effects model as a further predictor (see Appendix A.4 and A.5). All hypnotized moderators as psychological flexibility, global value of teamwork, global value of assertiveness and the importance to win included as a triple interaction with the timepoint and group variable remained insignificant ($p > 0.1$, see table 4). Comparing the moderator models with the basic model, only the model including the value assertiveness explained significantly more variance then the basic model (($\chi^2(6) = 15.67$, $p = 0.02$; see table 5).

Discussion

Social expectations play an important role in emotional well-being, but also in shown behavior. Therefore, this study experimentally modulated expectation adaptation through psychotherapeutic micro interventions, while using a standardized paradigm of expectation violation. The results of the manipulation check support the standardized procedure. The paradigm successfully induced negative social expectations about the cooperation behavior of

the opponent in the iterated prisoner's dilemma. These specific expectations could significantly be changed through the manipulations resulting in higher expectations of cooperation of the opponent during a second period of the game. The same could be observed for the shown cooperation behavior suggesting a link between the expectations and behavior in the game. These results are consistent with the findings of the No1LikesU!-Paradigm (D'Astolfo et al., 2020). As the ViolEx-model suggests, expectations are supposed to be modified after expectation-disconfirming experiences (Craske et al., 2014; Rief et al., 2015). After the shown behavior differed significantly between the first and the second play, the results can be interpreted as consistent with the literature about action models suggesting expectations as a leading factor of chosen action in form of behavior (Ajzen, 1985; Atkinson & Feather, 1966).

The main analyses confirmed the first hypothesis (1a) suggesting a higher expectation adaptation in the EFPI-group compared to the PFFI or the control group. The MSSD score, indicating the variability over the different trials, was significantly higher in the second compared to the first game in the EFPI-group, whereas no difference could be observed for the other two groups. EFPI effected the expectation processing resulting in a higher expectation adaptation after a given expectation-violating information (in this experiment, the manipulated behavior of the opponent). These findings indicate the effectiveness of expectation-focused interventions, that can be promising by including them into CBT treatments (Rief & Glombiewski, 2016). EFPI enhanced the flexible change of own (social) expectations, supposedly by increasing the salience of individual expectations and the conscious decision-making process of behavior. Looking at the shown behavior, the significant interaction between timepoint and group between the second and third trial supports this assumption. The significant difference in the EFPI group in shown behavior in trial 2 and trial 3 (see figure 5) shows that the EFPI intervention not only led to a faster

expectation change but also to a behavioral change. This significant effect got smaller over the 12 trials, as can be observed for the trial 5 and 6 as well as for trial 10 and 11. A cautious interpretation can be that the other two groups may have perceived the behavior change in a slower manner, whereas the group differences were leveled out over the play.

Moderator analyses did not show significant results. The value assertiveness seems to play some role as the model including assertiveness explained significantly more variance. However, the clear interrelationships cannot be drawn by our analyses, although assertiveness has been shown to influence and enhance competitive behavior (Fong et al., 2021; Malesza, 2020).

Practical and clinical implication

First, this article presents a highly standardized paradigm, inspired by the No1LikesU!-paradigm, that can be used to induce specific expectations and their violation in a proper manner. The paradigm can be used for further research in order to elucidate the mechanisms of expectations, their modification and adaptation, as well as immunization processes as a lack of expectation adaptation (Gollwitzer et al., 2018).

Second, the results indicate a higher expectation adaptation and behavioral change after an EFPI. It seems promising including these interventions into psychotherapeutic settings. Psychopathology is associated with a high level of rigidity in behavior and cognitions (Kashdan & Rottenberg, 2010), while EFPI targets expectation change directly. As this also affected shown behavior, EFPI seems to be a suitable focus or addition to CBT. This could be utilized by addressing any situation-specific expectation, for example expectations towards psychotherapy. If psychotherapists can address specific expectations, e.g., towards a certain intervention, immunization processes as “This intervention will not help me either” or “This is a nice intervention, but I will never be able to translate it into my daily life” could be taken up. Next, these immunization thoughts and their paralyzing consequences can be discussed

and changed in psychotherapy in a more structured way. Including the psychoeducation about expectations and its influence on our behavior can help patients to find an explanation of their persistent thoughts and behavior, giving them the opportunity to regain the internal control over themselves and reducing the feeling of not being able to change.

Thinking in a broader way, this study and its results portray the interplay of social expectations and shown social behavior. Interpersonal expectations in clinical settings have an influence on treatment outcome. Different relationship or role expectations towards the clinician seem to influence the working alliance (Al-Darmaki & Kivlighan, 1993; Sharf et al., 2010; Tokar et al., 1996), whereas other findings indicate that especially expectations in personal commitment are influencing the alliance in first place (Patterson et al., 2008). Further research must be done to properly conclude, how the role or relationship expectations are influencing the working alliance or treatment outcome.

Limitations and future research

One limitation represents our rather restricted sample. Even if it was tried to recruit a representative sample with money remuneration, the participants were mainly university students with a high education degree. Further on, the interventions were rather short, whereas the rest of the study was rather time consuming and elaborated. Through open questions, noticed anomalies (e.g., deception) were asked, whereby none of the included participants reported detected deception. Further, the prisoner's dilemma as a well-established experimental paradigm, may itself influence the investigated processes. Further participant or environmental characteristics can influence the chosen behavior, even if expectations may be one of these factors. Different studies identified for example a link between depression and the gaming behavior in sense of showing a more inconsistent play behavior compared to healthy people (Clark et al., 2013; Sorgi & Van 't Wout, 2016). At last, in can be questioned if MSSD is suitable to assess immunization processes. MSSD informs about the variability

under consideration of the temporal dependency in time series (Jahng et al., 2008). The advantage was to assess immunization processes over a certain time and not only at one timepoint directly after an expectation violation occurred.

In further research, the difference between healthy and clinical samples should be considered. It should be tested if people with mental disorders really show higher levels of immunization, whereas expectation focused psychological interventions can faster promote expectation adaptation and enhance cognitive flexibility. Moreover, the influence of other potential moderators should be analyzed. As already addressed above, different expectations towards oneself (e.g., “I expect myself to act in a prosocial way”, “I expect to lose, no matter what behavior I show”) can influence the shown behavior. In a next step, different expectations towards oneself can be included as further possible predictors.

Conclusion

It could be shown how a small intervention of 20 minutes can change not only expectations, and their adaptation but also the shown behavior. This study is the first to test EFPI in a standardized experimental design including the iterated prisoner’s dilemma that allows to investigate effects on behavior. The results show a promising effect of EFPI in raising the variability of specific expectations, easing expectation change. As a conclusion EFPIs are leading to a higher grade of flexibility, reduce persistence and rigidity. Further research is needed to underpin these results.

Literature

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In *Action control* (pp. 11-39). Springer.

Al-Darmaki, F., & Kivlighan, D. M. (1993). Congruence in client-counselor expectations for relationship and the working alliance. *Journal of Counseling Psychology*, *40*(4), 379.

Atkinson, J. W., & Feather, N. T. (1966). *A theory of achievement motivation* (Vol. 66). Wiley New York.

Bates, D., Maechler, M., Bolker, B., Walker, S., Christensen, R. H. B., Singmann, H., . . . Green, P. (2018). Package 'lme4'. *Version*, *1*(17), 437.

Broadbent, D. E. (2013). *Perception and communication*. Elsevier.

Clark, C. B., Thorne, C. B., Hardy, S., & Cropsey, K. L. (2013). Cooperation and depressive symptoms [Article]. *Journal of Affective Disorders*, *150*(3), 1184-1187. https://doi.org/10.1016/j.jad.2013.05.011

Craske, M. G., Rapee, R. M., & Barlow, D. H. (1988). THE SIGNIFICANCE OF PANIC-EXPECTANCY FOR INDIVIDUAL PATTERNS OF AVOIDANCE [Article]. *Behavior Therapy*, *19*(4), 577-592. https://doi.org/10.1016/s0005-7894(88)80025-x

Craske, M. G., Treanor, M., Conway, C. C., Zbozinek, T., & Vervliet, B. (2014). Maximizing exposure therapy: An inhibitory learning approach [Article]. *Behaviour Research and Therapy*, *58*, 10-23. https://doi.org/10.1016/j.brat.2014.04.006

D'Astolfo, L., Kirchner, L., & Rief, W. (2019). *No1likesU – An Internally and Ecologically Valid Paradigm to Investigate Social Rejection Expectations and Their Adjustment in Human Samples* World Conference of behavioral and cognitive Therapies, Berlin.

D'Astolfo, L., Kirchner, L., & Rief, W. (2020). No1LikesU!–A Pilot Study on an Ecologically Valid and Highly Standardised Experimental Paradigm to Investigate Social Rejection Expectations and Their Modification. *Clinical Psychology in Europe*, *2*(2).

Deutsch, J. A., & Deutsch, D. (1963). Attention: Some theoretical considerations. *Psychological review*, *70*(1), 80.

Doering, B. K., Glombiewski, J. A., & Rief, W. (2018). Expectation-focused psychotherapy to improve clinical outcomes. *International review of neurobiology*, *138*, 257-270.

Fong, M., Zhao, K., & Smillie, L. D. (2021). Personality and competitiveness: Extraversion, agreeableness, and their aspects, predict self-reported competitiveness and competitive bidding in experimental auctions. *Personality and Individual Differences*, *169*, 109907.

Gollwitzer, M., Thorwart, A., & Meissner, K. (2018). Editorial: Psychological Responses to Violations of Expectations [Editorial Material]. *Frontiers in Psychology*, *8*, 3, Article 2357. https://doi.org/10.3389/fpsyg.2017.02357

Harris, R. (2014). *ACT leicht gemacht*.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2011). *Acceptance and commitment therapy: The process and practice of mindful change*. Guilford Press.

Hoyer, J., & Gloster, A. T. (2013). Psychologische Flexibilität messen= Measuring psychological flexibility: Der Fragebogen zu Akzeptanz und Handeln–II (FAH-II): The Acceptance and Action Questionnaire–II (AAQ-II). *Verhaltenstherapie*, *23*(1), 42-44.

Jahng, S., Wood, P. K., & Trull, T. J. (2008). Analysis of Affective Instability in Ecological Momentary Assessment: Indices Using Successive Difference and Group Comparison via Multilevel Modeling [Article]. *Psychological Methods*, *13*(4), 354-375. https://doi.org/10.1037/a0014173

Kahneman, D., & Tversky, A. (2013). Prospect theory: An analysis of decision under risk. In *Handbook of the fundamentals of financial decision making: Part I* (pp. 99-127). World Scientific.

Kashdan, T. B., & Rottenberg, J. (2010). Psychological flexibility as a fundamental aspect of health [Article]. *Clinical Psychology Review*, *30*(7), 865-878. https://doi.org/10.1016/j.cpr.2010.03.001

Kirsch, I. (2018). Response expectancy and the placebo effect. *International review of neurobiology*, *138*, 81-93.

Kube, T., Rief, W., & Glombiewski, J. A. (2017). On the Maintenance of Expectations in Major Depression - Investigating a Neglected Phenomenon. *Frontiers in Psychology*, *8*, Article 9. https://doi.org/10.3389/fpsyg.2017.00009

Kube, T., Rief, W., Gollwitzer, M., Gartner, T., & Glombiewski, J. A. (2019). Why dysfunctional expectations in depression persist - Results from two experimental studies investigating cognitive immunization. *Psychological Medicine*, *49*(9), 1532-1544. https://doi.org/10.1017/s0033291718002106

Kube, T., Schwarting, R., Rozenkrantz, L., Glombiewski, J. A., & Rief, W. (2020). Distorted cognitive processes in major depression: a predictive processing perspective. *Biological psychiatry*, *87*(5), 388-398.

Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2015). Package 'lmertest'. *R package version*, *2*(0), 734.

Leiner, D. J. (2019). *SoSci Survey (Version 3.1.06) [Computer software]*. In https://www.soscisurvey.de

Lenth, R., Singmann, H., Love, J., Buerkner, P., & Herve, M. (2018). Emmeans: Estimated marginal means, aka least-squares means. *R package version*, *1*(1), 3.

Malesza, M. (2020). Grandiose narcissism and vulnerable narcissism in prisoner's dilemma game. *Personality and Individual Differences*, *158*, 109841.

Marazziti, D., Consoli, G., Picchetti, M., Carlini, M., & Faravelli, L. (2010). Cognitive impairment in major depression. *European journal of pharmacology*, *626*(1), 83-86.

Meiran, N., Diamond, G. M., Toder, D., & Nemets, B. (2011). Cognitive rigidity in unipolar depression and obsessive compulsive disorder: Examination of task switching, Stroop, working memory updating and post-conflict adaptation. *Psychiatry research*, *185*(1-2), 149-156.

Patterson, C. L., Uhlin, B., & Anderson, T. (2008). Clients' pretreatment counseling expectations as predictors of the working alliance. *Journal of Counseling Psychology*, *55*(4), 528.

Price, D. D., Finniss, D. G., & Benedetti, F. (2008). A comprehensive review of the placebo effect: recent advances and current thought. *Annu. Rev. Psychol.*, *59*, 565-590.

Quick, T. L. (1988). Expectancy theory in five simple steps. *Training & Development Journal*, *42*(7), 30-33.

Rief, W., & Glombiewski, J. A. (2016). Expectation-Focused Psychological Interventions (EFPI). *Verhaltenstherapie*, *26*(1), 47-54. https://doi.org/10.1159/000442374

Rief, W., Glombiewski, J. A., Gollwitzer, M., Schubö, A., Schwarting, R., & Thorwart, A. (2015). Expectancies as core features of mental disorders. *Current opinion in psychiatry*, *28*(5), 378-385.

Rief, W., & Joormann, J. (2019). Revisiting the cognitive model of depression: The role of expectations. *Clinical Psychology in Europe*, *1*, 1-19.

Rief, W., & Petrie, K. J. (2016). Can psychological expectation models be adapted for placebo research? *Frontiers in psychology*, *7*, 1876.

Riggs, S. E. (2015). Brief cognitive therapy for schizophrenia interventions for the therapeutic milieu. *The Behavior Therapist*, *38*(4), 97-100.

RStudio, I. (2009-2020). *RStudio*. In (Version 1.2.5042) www.rstudio.com

Schwarz, K. A., Pfister, R., & Büchel, C. (2016). Rethinking explicit expectations: connecting placebos, social cognition, and contextual perception. *Trends in Cognitive Sciences*, *20*(6), 469-480.

Sharf, J., Primavera, L. H., & Diener, M. J. (2010). Dropout and therapeutic alliance: a meta-analysis of adult individual psychotherapy. *Psychotherapy: theory, research, practice, training*, *47*(4), 637.

Snow, G., & Snow, M. G. (2013). Package 'blockrand'. *The Comprehensive R Archive Network*.

Sorgi, K. M., & Van 't Wout, M. (2016). The influence of cooperation and defection on social decision making in depression: A study of the iterated Prisoner's Dilemma Game. *Psychiatry Research*, *246*, 512-519. https://doi.org/10.1016/j.psychres.2016.10.025

Stange, J. P., Alloy, L. B., & Fresco, D. M. (2017). Inflexibility as a vulnerability to depression: A systematic qualitative review. *Clinical Psychology: Science and Practice*, *24*(3), 245.

Stordal, K. I., Lundervold, A. J., Egeland, J., Mykletun, A., Asbjørnsen, A., Landrø, N. I., . . . Oedegaard, K. J. (2004). Impairment across executive functions in recurrent major depression. *Nordic journal of psychiatry*, *58*(1), 41-47.

Tokar, D. M., Hardin, S. I., Adams, E. M., & Brandel, I. W. (1996). Clients' expectations about counseling and perceptions of the working alliance. *Journal of College student psychotherapy*, *11*(2), 9-26.

Treisman, A. M. (1964). Selective attention in man. *British medical bulletin*, *20*(1), 12-16.

Wampold, B. E., & Imel, Z. E. (2015). *The Great Psychotherapy Debate: The Evidence for What Makes Psychotherapy Work* (sec. edition ed.). Routledge.

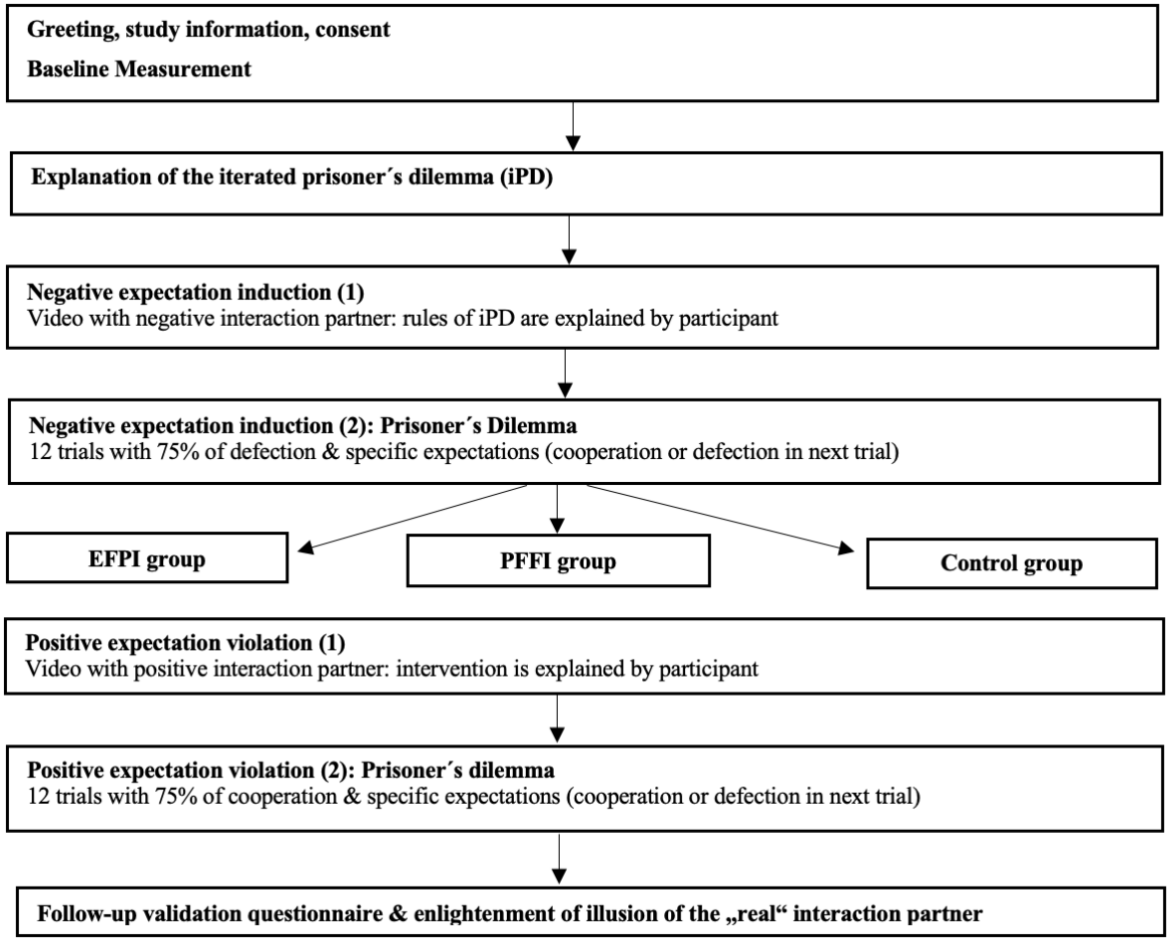
Wengenroth, M. (2017). *Therapie-Tools Akzeptanz- und Commitmenttherapie (ACT)* (2 ed. ed.). Beltz.

Öst, L.-G. (2014). The efficacy of acceptance and commitment therapy: an updated systematic review and meta-analysis. *Behaviour research and therapy*, *61*, 105-121.

Tables and Figures

Figure 1.

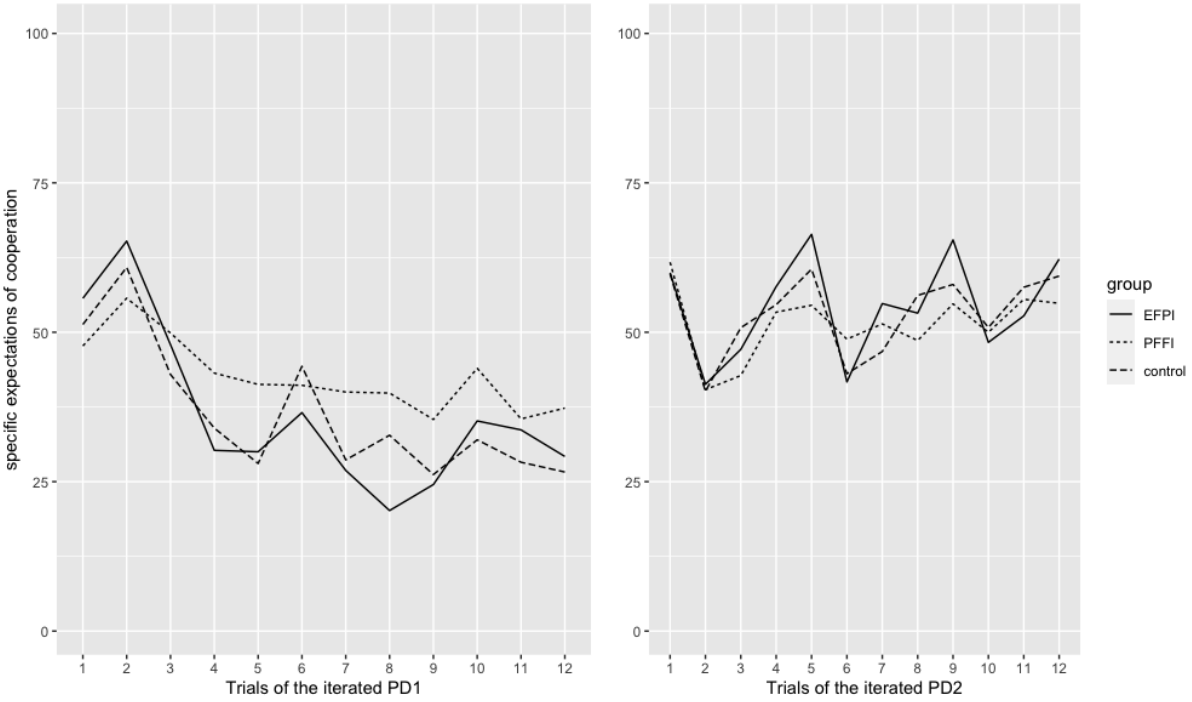
Procedure of the experiment.



Note. Abbreviations: BDI-II Beck depression Inventory, AAQ-II acceptance and action questionnaire, SWLS satisfaction with life scale, BFI Big Five Inventory , IIP-D inventory of interpersonal problems, IE-4 Assessment of locus of control, SVO social value orientation, DES depressive expectations scale, PANAS positive and negative affect schedule, PsyFlex instrument measuring state psychological flexibility, PFFI psychological flexibility focused interventions, EFPI expectation-focused psychological interventions

Figure 2.

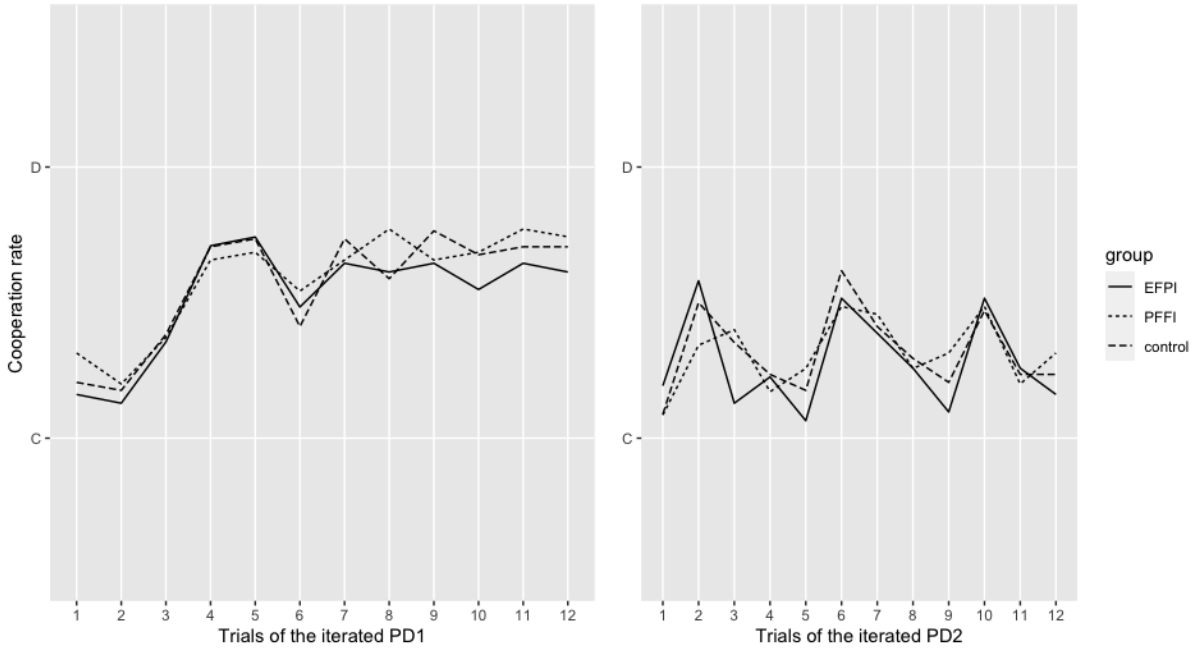
Specific expectations about the cooperation of the opponent for every trial in the first and second iterated prisoner's dilemma



Note. Abbreviations: PD1 prisoner's dilemma 1 representing the first play, PD2 prisoner's dilemma 2 representing the second play, group EFPI got the expectation focused psychological intervention, group PFFI got the psychological flexibility focused intervention and group control is the control group.

Figure 3.

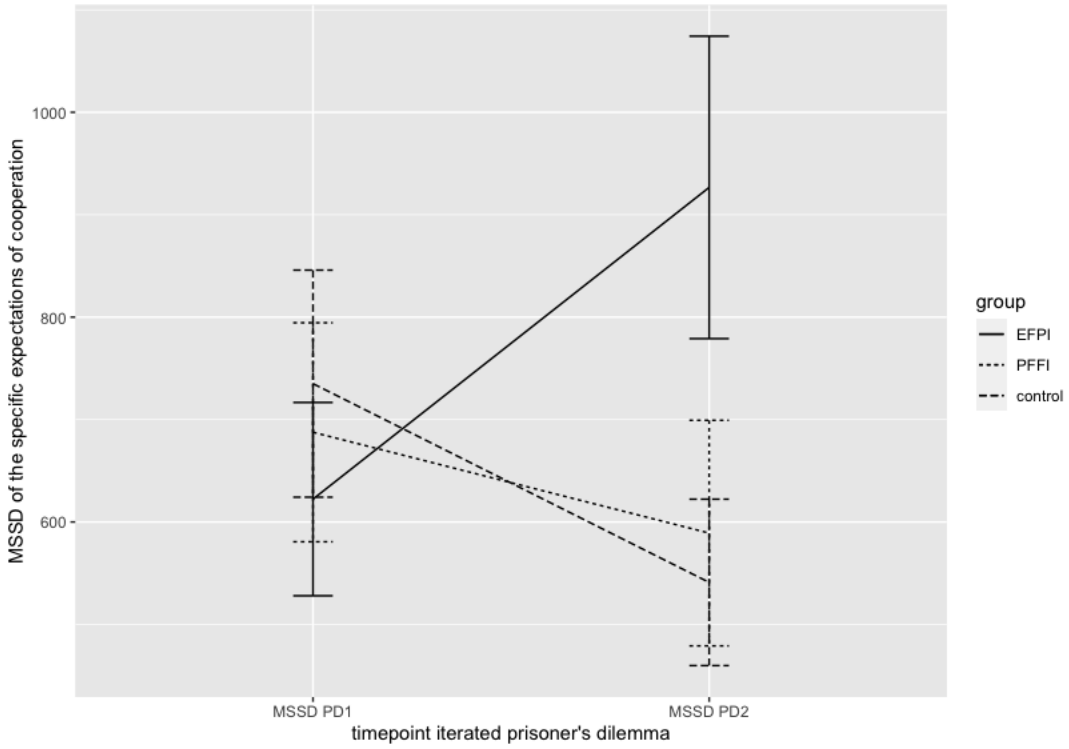
Shown cooperative behavior (percentage) during the first and second iterated prisoner's dilemma



Note Abbreviations: PD1 prisoner's dilemma 1 representing the first play, PD2 prisoner's dilemma 2 representing the second play, group EFPI got the expectation focused psychological intervention, group PFFI got the psychological flexibility focused intervention and group control represents the control group.

Figure 4.

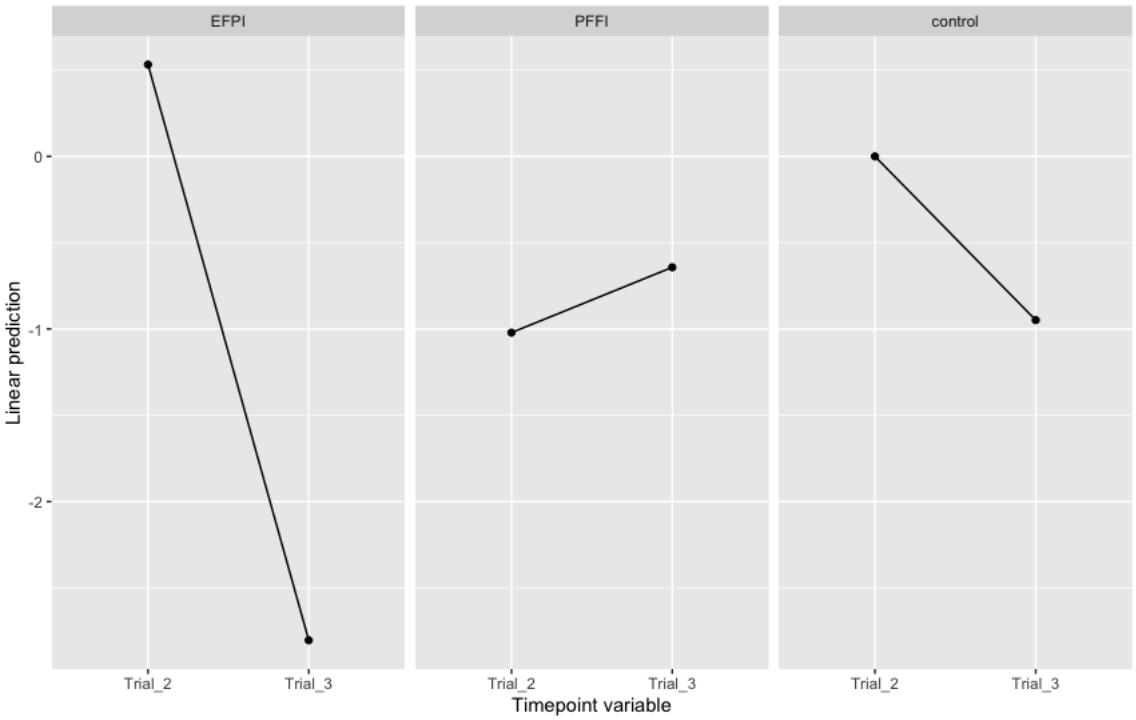
The MSSD-differences between the first and second iterated prisoner' dilemma



Note. Abbreviations: MSSD mean square successive differences, PD prisoner's dilemma 1, EFPI expectation focused psychological intervention, PFFI psychological flexibility focused intervention and control represents the control group. Error bars represent standard errors.

Figure 5.

Calculated contrasts for the different groups over the second and third trial of the second iterated prisoner's dilemma



Note. Abbreviations: EFPI expectation focused psychological intervention, PFFI psychological flexibility focused intervention, control represents the control group.

Table 1.

Demographics: Mean and standard deviations of different variables.

	Total sample n = 100	**Group EFPI n = 31**	**Group PFFI n = 35**	**Control group N=34**
Age [M (SD)]	23.3 (4.65)	22.0 (2.92)	24.4 (4.67)	23.4(5.61)
Gender [F/M]	68 / 32	21 / 10	25 / 10	22 / 12
$M_{expectationsPD1}$ [(SD)]	33.21 (17.28)	30.57 (13.70)	37.44 (20.23)	31.26 (16.56)
$M_{expectationsPD2}$ [(SD)]	50.12 (16.16)	49.11 (17.88)	51.57 (14.25)	49.85 (16.31)
MSSD expectations PD 1[M (SD)]	724.66 (724.16)	622.3 (525.37)	805.2 (928.18)	735.1 (646.41)
MSSD expectations PD 2[M (SD)]	691.41 (680.26)	926.7 (822.04)	629.2 (675.50)	541.0 (473.70)
PF (AAQ-II) [M (SD)]	19.9 (7.52)	19.4 (7.61)	19.7 (7.09)	20.6 (7.98)

Note. Abbreviations: n sample size, M mean, SD standard deviation, F female, M male, MSSD mean square successive differences, PD 1 iterated Prisoner's Dilemma first round, PD 2 iterated Prisoner`s Dilemma second round, $M_{expectationsPD1}$ overall Mean over all Trials of the first iterated prisoner's dilemma, $M_{expectationsPD2}$ overall Mean over all Trials of the second iterated prisoner's dilemma, PF psychological flexibility, AAQ-II Acceptance and Action Questionnaire - II

Appendix

Fig A.1
Instructions of the iterated prisoner's dilemma

Spielregeln:

Ziel dieses Spiels ist es so viele Punkte wie möglich zu sammeln. Der Haken dabei ist jedoch, dass der eigene Gewinn abhängig von der Antwort des anderen Spielers ist. Es gibt immer 2 Antwort-Möglichkeiten: *Verrat (*Kreis 1) oder *Kooperation* (Kreis 2). Sie werden aber nicht wissen, was der gegenübersitzende Spieler wählen wird. Wählen Sie zu verraten indem Sie 1 drücken, während der/die gegenübersitzende Spieler/in kooperiert indem er/sie auf 2 drückt, werden Sie 5 Punkte bekommen, während die andere Person 0 Punkte bekommt. Wählen beide Spieler/innen zu kooperieren und drücken die 2, bekommt jede/r Spieler/in 3 Punkte und wenn beide Spieler/innen die 1 wählen, bekommen beide Spieler/innen 2 Punkte. Wählen Sie die 2 (Kooperation) und der/die gegenübersitzende Spieler/in die 1 (Verrat), erhalten Sie 0 Punkte und der /die andere Spieler/in 5 Punkte. Nach jeder Wahl wird Ihnen ihr Punktekonto und dessen des/der Gegenspielers/in angezeigt. So werden Sie immer nach der getroffenen Wahl wissen, wie viele Punkte Sie gemacht haben und welche Strategie der/ die Gegenspieler/in gewählt hat. Das Spiel wird mehrmals wiederholt und die gewonnenen Punkte nach jedem Spiel werden aufsummiert.

Je nachdem, was der andere Spieler für eine Strategie wählt, kann Kooperation oder Verrat zu einem höheren Gewinn führen. Im Folgenden sehen Sie eine Tabelle für die Punktvergabe:

Spieler 1	Spieler 2	Punkte Spieler 1	Punkte Spieler 2
1	2	5	0
2	2	3	3
1	1	2	2
2	1	0	5

Table A.2

Coefficients of the fixed effects of logistic regression mixed effect model.

	Odds ratio	**S.E.**	**z-value**	***p*-value**
Model 1: shown behavior between trial 2 and trial 3				
Intercept	1.70	0.56	0.94	0.35
PFFI group	0.21	0.82	0.82	0.06.
Control group	0.59	0.77	0.77	0.49
Trial 3	0.04	0.96	0.96	0.00***
PFFI group x trial 3	41.00	1.17	3.17	0.002**
Control group x trial 3	10.88	1.08	2.20	0.03*
Model 2: shown behavior between trial 5 and trial 6				
Intercept	0.06	0.77	-3.59	0.00***
PFFI group	5.17	0.84	1.95	0.05.
Control group	3.16	0.87	1.32	0.19
Trial 6	16.65	0.85	3.32	0.00***
PFFI group x trial 6	0.17	0.98	-1.81	0.07.
Control group x trial 6	0.49	1.01	-0.71	0.48
Model 3: shown behavior between trial 10 and trial 11				
Intercept	1.10	0.47	0.20	0.85
PFFI group	0.85	0.65	-0.25	0.80
Control group	0.78	0.66	-0.38	0.71
Trial 11	0.23	0.66	-2.24	0.03*
PFFI group x trial 11	0.78	0.88	-0.29	0.77
Control group x trial 11	1.11	0.87	0.12	0.91

Note. *** p<0.001, ** p<0.01, * p< 0.05, . p<0.1, *PFFI* psychological flexibility focused intervention

Table A.3

Table of variance with Satterthwaite's method showing the main results of the mixed effect analysis with the MSSD score in the first and second iterated prisoner's dilemma as dependent variable

	Sum Sq	**Mean Sq**	**df_1**	**df_2**	**F-value**	***p*-value**
Timepoint	773	773	1	96	0.96	0.96
group	444816	222408	2	96	0.78	0.46
Timepoint x group	2239226	1119613	2	96	3.92	0.02 *

Note. *** p<0.001, ** p<0.01, * p< 0.05, . p<0.1; *sq* sum o-f squares, *df* degree of freedom

Table A.4

Coefficients of the mixed effect analyses for the hypothesized moderators' psychological flexibility, the value assertiveness, the value teamwork and importance to win.

	Sum Sq	Mean Sq	df_1	df_2	F-value	*p*-value
Psychological flexibility PF						
Timepoint	762010	762010	1	93	2.74	0.10
group	274148	137074	2	93	0.49	0.61
PF	136180	136180	1	93	0.49	0.49
Timepoint x group	1446830	723415	2	93	2.60	0.079.
Timepoint x PF	850953	850953	1	93	3.06	0.083.
Group x PF	128246	64123	2	93	0.23	0.79
Group x timepoint x PF	506795	253397	2	93	0.91	0.41
Value of assertiveness VA						
Timepoint	69325	69325	1	93	0.24	0.62
group	3729329	1864664	2	93	6.58	0.002 **
VA	6867	6867	1	93	0.02	0.88
Timepoint x group	1740470	870235	2	93	3.06	0.05.
Timepoint x VA	68094	68094	1	93	0.63	0.63
Group x VA	3332428	1666214	2	93	5.87	0.003 **
Group x timepoint x VA	998443	499222	2	93	1.76	0.18
Value of teamwork VT						
Timepoint	62404	62404	1	93	0.2142	0.6446
group	316001	158000	2	93	0.5424	0.5832
VT	250822	250822	1	93	0.8610	0.3559
Timepoint x group	693574	346787	2	93	1.1904	0.3087
Timepoint x VT	62207	62207	1	93	0.2135	0.6451
Group x VT	193581	96791	2	93	0.3322	0.7182
Group x timepoint x VT	297922	148961	2	93	0.5113	0.6014
Importance to win						
Timepoint	606655	606655	1	93	2.19	0.14
group	1457184	728592	2	93	2.63	0.08.
IW	110	110	1	93	0.00	0.98
Timepoint x group	893714	446857	2	93	1.61	0.20
Timepoint x IW	888633	888633	1	93	3.21	0.076.
Group x IW	1233937	616968	2	93	2.22	0.11
Group x timepoint x IW	683800	341900	2	93	1.24	0.30

Note. *** $p<0.001$, ** $p<0.01$, * $p< 0.05$, . $p<0.1$; *sq* sum o-f squares, *df* degree of freedom, *PF* psychological flexibility measured by the AAQ-II, *VA* value of assertiveness, *VT* value of teamwork, *IW* importance to win

Table A.5

Analyses of Variance comparing the basic model with the models including moderators.

	AIC	χ^2	χ_{df}	*p*-value
Basic model	3116.2			
PF model	3121.4	6.7381	6	0.35
VA model	3112.5	15.663	6	0.02 *
VT model	3125.6	2.6108	6	0.86
IW model	3117.3	10.893	6	0.09 .

Note. *** $p<0.001$, ** $p<0.01$, * $p< 0.05$, . $p<0.1$; *sq* sum o-f squares, *df* degree of freedom, *PF* psychological flexibility measured by the AAQ-II, *VA* value of assertiveness, *VT* value of teamwork, *IW* importance to win. The Basic model includes the mean square successive differences MSSD scores as dependent variable and the group * timepoint as predictors. The PF model includes the triple interaction group * timepoint *psychological flexibility, the VA model the triple interaction group * timepoint * value of assertiveness, the VT model the triple interaction group * timepoint * value of teamwork and the IW model the triple interaction group * timepoint * importance to win

7.2.Study 2

Exploring the path of persisting dysfunctional expectations – Development of the Immunization Scale IMS

Ewen, A.[a], Rief, W.[a] & Wilhelm, M.[a]

[a] Philipps-University of Marburg, Germany, Department clinical psychology and psychotherapy

Author information:

Corresponding author: Anne-Catherine Ewen, M. Sc.

Philipps-University of Marburg, department clinical psychology and psychotherapy,

Gutenbergstraße 18, 35032 Marburg, Germany

E-Mail: ewen@staff.uni-marburg.de

Prof. Dr. Winfried Rief

Philipps-University of Marburg, department clinical psychology and psychotherapy,

Gutenbergstraße 18, 35032 Marburg, Germany

E-Mail: rief@staff.uni-marburg.de

Dr. Marcel Wilhelm

Philipps-University of Marburg, department clinical psychology and psychotherapy,

Gutenbergstraße 18, 35032 Marburg, Germany

E-Mail: marcel.wilhem@staff.uni-marburg.de

Abstract

Objectives. Persistent dysfunctional expectations seem to be core features of mental disorders. The aim of this study is to develop a questionnaire that assesses mechanisms responsible for the consistency of dysfunctional expectations. Processes *before* (i.e., assimilation) and *after* (i.e., immunization) expectation-violating experiences have been considered.

Design. The Immunization Scale (IMS) is constructed and validated with the help of an explorative (EFA) and confirmatory factor analysis (CFA) in two conducted studies.

Methods. For the first study the initially formulated 75-item version was completed online by 230 participants. For the second study, 299 participants completed the reduced scale at the first measurement point, thereof 75 participants also one month later. For validity and reliability analyses, participants in both studies answered demographic information, the Beck Depression Inventory (BDI-II), the Depressive Expectation Scale (DES), the Beck Anxiety Inventory (BAI), and the German Version of the Acceptance and Action Questionnaire (FAH-II).

Results. The initially 75 items were reduced to 23 items. The EFA revealed three main factors: negative expectations, assimilation, and cognitive immunization. The three-factor structure could be confirmed in study 2 by the CFA. Reliability measures showed excellent internal consistency of the entire IMS. Significant correlations between the IMS and DES, BDI-II, BAI, and FAH-II resulted. A very good test-retest-reliability was found.

Conclusion. Psychometric properties of the IMS are promising. Future studies should verify the reliability and validity measures in other population samples. The IMS can be very useful in expectation research, especially in the examination of expectation focused therapy.

Keywords: expectations, cognitive immunization, self-rating questionnaire, psychopathology

Theoretical background

The concept of expectations play an important role in explaining human functioning. They are part of theoretical frameworks in psychology for decades. In social psychology, self-fulfilling prophecy and the Pygmalion-effect (Rosenthal & Jacobson, 1968) are typical theoretical examples representing the power of expectations. Further on, expectancy value theories summarizing different decision and action theories, trying to explain human behavior, as Atkinson's theory of achievement motivation (Atkinson & Feather, 1966), the Rubicon-model of action phases (Heckhausen & Gollwitzer, 1987), or the prospect theory describing choice behavior in economic and decision psychology (Kahneman & Tversky, 1979).

In clinical psychology, expectations gained explicit relevance as the most important mechanism of the placebo effect (Imel et al., 2008; Kirsch et al., 2016; Wampold & Imel, 2015). Already Jerome D. Frank (1961) postulated that psychotherapy is effective through building positive expectations for improvement defeating demoralization. Greenberg and colleagues (2006) also argue that most psychotherapies inevitably go hand in hand with the change and revision of patients' expectations. Research integrated different forms of expectations accordingly as predictors of therapy outcomes (Constantino et al., 2012). Depressed patients' expectations of outcome are associated with therapeutic alliance and alliance expectations (Barber et al., 2014). Meta-analytic evidence shows that patients' presurgical expectations determine postsurgical outcomes and post-operative quality of life (Auer et al., 2016). In psychotherapy, the effect size of early treatment outcome expectations on patients' posttreatment outcome seems to be small but significant (Constantino et al., 2018). Therefore, expectations should be made explicit by the psychotherapist in order to enhance therapy outcome.

Thus, recent research assigns expectations a pivotal role in psychotherapy, defining them as "core features" of mental disorders (Rief et al., 2015). Not only the quantity of

dysfunctional expectations seems overrepresented, but also the change of these after an expectation-disconfirming experience seems to be inhibited. Pinquart and colleagues (2021) compared different models dealing with expectations concluding three important process mechanisms: expectations can firstly be changed, they can be maintained by minimizing the importance of expectation-disconfirming evidence or by the search or production of future expectation-confirming evidence. One proposed model explaining the persistence or change of expectations is the ViolEx-model (Rief et al., 2015). Different reactional information-processing mechanisms to an expectation-violating experience are proposed: assimilation and immunization (Gollwitzer et al., 2018; Pinquart, Rothers, et al., 2021). Assimilation describes the concept of searching or producing (i.e. avoidant behavior) expectation confirming information. It consists of two mechanisms, one defining the avoidance of any possible expectation-inconsistent experiences and the other defining the active contribution seeking expectation-confirming information (i.e. self-fulfilling prophecy). Immunization describes the concept of reappraising inconsistent evidence in a way that it is no longer disconfirming the expectation.

In anxiety disorders, situation-specific, dysfunctional expectations are already successfully targeted by performing exposure therapy with cognitive elements, such as seeking situations most likely violating the specific expectation, leading to a faster and efficient change of the dysfunctional expectation (Craske et al., 2014). This directly targets the avoidant behavior *before* a certain expectation-violating situation can be experienced. Patients with anxiety disorders are often avoiding situations presumed to be dangerous, leading to a non-experience of expectation violation, which makes it impossible to update expectation of danger (Marks, 1979; Myers & Davis, 2007; Pittig et al., 2020). Patients with depression also tend to have a higher amount of dysfunctional negative expectations towards future events (Kube et al., 2017), while failing to update their expectations after an

expectation violation, suggesting involved immunization processes (Kube, Rief, et al., 2019). These immunization processes cause experienced expectation violations to be (re)interpreted as exceptions instead of a new experience (Rief et al., 2015). Thus, the flexible formation of expectations and their adaptation to the environment seem to be disturbed. Liknaitzky and colleagues (2017; 2018) postulate cognitive rigidity, probably a consequence of high immunization processes, as a crucial obstacle in changing interpretations, beliefs, expectations in people with depression.

Some interventions addressing dysfunctional expectations and cognitive immunization processes were already developed (Kube, Glombiewski, Gall, et al., 2019; Kube, Glombiewski, & Rief, 2019; Rief & Glombiewski, 2016). However, as a validated instrument to measure the patient's immunization level is lacking, cognitive immunization being responsible for the patient's rigid expectations is a presumption. The goal of this study was to develop and validate a questionnaire operationalizing the main mechanisms presumably responsible for persisting dysfunctional expectations. In a first step (*study 1*), a questionnaire based on the theoretical background is constructed and a factor structure is established. In a next step (*study 2*), the shortened questionnaire is confirmed in an independent sample.

Materials and Methods

Ethics

The local ethics committee of the Department of Psychology, Philipps-University Marburg approved the study (reference number 2020-31k).

Procedure, concept definition and scale development

For elaborated scale development, an extensive literature review on the two main constructs *assimilation* and *immunization* was conducted. This was followed by a discussion with psychologists, psychotherapists, and researchers about their understandings of mechanisms leading to the persistence of (dysfunctional) expectations and a lack of

expectation adaptation. The questionnaire was designed as a transdiagnostic measure, as assimilation and immunization processes behavior can be found in different kinds of psychopathologies (Kashdan & Rottenberg, 2010).

Consequently, and in line with the ViolEx-model, a distinction between mechanisms that occur before an experience of expectation violation and mechanisms after an experience of an expectation violation should be considered. Besides the concept of cognitive immunization (Rief et al., 2015) and assimilation (Gollwitzer et al., 2018) other defined constructs were taken into account. In another article including the ViolEx-model, the concept of behavioral immunization is proposed (Rief & Joormann, 2019). They distinguish between cognitive and behavioral immunization, both leading to the invalidation of a positive, expectation-violating experience. As examples for behavioral immunization avoiding expectation-violating situations, selective attention or ignoring contradictory information are mentioned. Important to notice here, is that behavioral immunization includes different mechanisms occurring *before* (e.g., avoiding the situation), *in* (e.g., attentional processes) and *after* (e.g., avoiding a second expectation-violating situation) an expectation violation. The distinction between processes that are solely cognitive or solely behavioral is nearly impossible. Furthermore, the concept of behavioral avoidance, well known in anxiety disorders as the consequence of cognitive or emotional processes, should be considered as a mechanism *before* an expectation-violating situation. But also here expectations seem to mediate the link between avoidance and anxiety (Lovibond et al., 2008). Though, people seem to avoid due to rigid negative expectations of the output, which does not directly link avoidance to anxiety, but rather on the believability or fusion with a certain outcome-expectation. They avoid a certain situation with the possible occurrence of expectation violation due to disbelief (e.g., “I am not going to join the party, because I know, it will be terrible”). In the Acceptance and Commitment Therapy, this process is called fusion with

proper thoughts leading to psychological inflexibility and experiential avoidance (Hayes et al., 2012). Thus, all these differently defined processes prevent an expectation-violating experience before a certain situation and should be considered in terms of persisting (dysfunctional) expectations.

These processes can be grouped up as every cognitive and behavioral processes "invalidating the effect of positive experiences"(Rief & Joormann, 2019). As this questionnaire has the goal to assess different processes leading to the persistence of negative expectations, we categorized processes into *before* and *after* expectation-violating experiences, whereas processes involved *after* expectation-violation can be resumed into the concept of cognitive immunization. Processes involved *before* an expectation-violation will be resumed for simplicity under the concept of assimilation proposed by Gollwitzer and colleagues (2018). The concept of assimilation seems to be more consistently and durably used in literature. As these processes are mostly unconscious, the focus of the item-formulation was based on the behavioral and cognitive outputs of these different processes.

Further constructs as pessimism, neuroticism, openness for new experiences, emotion regulation, external or internal control belief, cognitive and psychological flexibility have been identified to be overlapping with the concept of assimilation and cognitive immunization. The following main topics were identified for the first item formulation: *the awareness of negative expectations, awareness of expectation-violating experiences, number of negative expectations, flexibility in sense of acceptance of and fusion with negative expectations, behavioral and cognitive immunization*.

The items were originally formulated in German, a native English speaker translated the questionnaire to English. A five-point Likert-Scale to rate the items has been chosen from 1=*Do not agree* to 5=*Agree.* A higher sum score indicates a higher level of assimilation and immunization behavior.

After a first pretest (n = 15) items were optimized for understanding. Pilot recruitment was launched in Mai 2020 with 95 initially formulated items. A first item analysis and correlation matrix were conducted with a sample size of 139 healthy participants ($mean_{age}$= 28.14, SD = 10.79; 72% women, 28% men). A good internal consistency of α =.88 was reached. Especially, qualitative questions were taken into account regarding item composition. After the first test-sample, 47 out of 95 items were discarded due to bad item discrimination, poor item understanding and item formulation, whereas another 27 items were added.

The adapted questionnaire resulted in a 75-item scale. Considering the first sample, these items were intended to fit 4 subscales: *number of negative expectations, general psychological flexibility, avoidant behavior before an experience of possible expectation violation and cognitive immunization after an experience of expectation violation.* For the final dataset, 230 healthy subjects filled out the questionnaire.

Participants

Participants were for both studies mainly recruited through mailing lists, social networks (i.e., facebook, twitter, Instagram, LinkedIn) and participant recruitment pages (i.e., surveycicle, Thesius). For remuneration, a participation in a voucher raffle of four 25 Euro Coupons redeemable for Online Media has been offered to the participants.

The recruitment for the final sample for study 1 was done between July and September 2020. In total, 366 participants followed the link and agreed to the informed consent, whereby already 44 interrupted the study directly after the informed consent. Of these, 230 participants completed the study.

The recruitment for the second study took place between January and March 2022. In total, 597 participants followed the link (249 interrupted the study directly after confirming

the informed consent). Of these, 299 participants completed T1, and 136 participants started T2. 75 participants completed both timepoints.

Other measurements

Socio-demographics. Participant information included age, sex, native language, nationality, education, current or past mental disorder and current or past psychotherapy.

Depressive symptoms. For the assessment of depressive symptoms, the validated and reliable German Version of the Beck Depression Inventory-II (Hautzinger et al., 2009) was used. The inventory consists of 21 depressive symptoms that are rated in severity and presence in the past two weeks on a four-point rating scale (0-3). Based on the sum scores, cut-off values indicate minimal, mild, moderate, and severe depression. The internal consistency of our sample can be considered as excellent, with a Cronbach`s alpha of α = 0.94.

Anxiety Symptoms. For the assessment of subjective experienced anxiety symptoms, the validated and reliable German Version of the Beck Anxiety Inventory (Margraf & Ehlers, 2007) was used. With 21 items, the BAI asks about the presence of different anxiety symptoms during the last week on a four-point rating scale. A categorization into minimal, mild, moderate and clinically relevant anxiety is defined through sum score cut-of values. In this sample an excellent internal consistency (α = 0.92) could be reached.

Negative Expectations. Situation-specific depressive expectations were measured using the German Version of the Depressive Expectations Scale (Kube et al., 2017). Four subscales were defined: expectations about social rejection, social support, emotion regulation (i.e., being helpless in coping with negative mood), and ability to perform (i.e., being helpless in coping with performance-related situations). In this sample, the 25-item self-report measure showed a good internal consistency (α = 0.83).

Psychological flexibility. The German version of the Acceptance and Action Questionnaire II (Hoyer & Gloster, 2013) is a validated and reliable self-reported 7-item scale measuring psychological flexibility, respectively experiential avoidance. A higher sum-score represents higher inflexibility. In this sample, a good internal consistency could be reached ($\alpha = 0.87$).

Statistical analyses

All analyses are conducted using RStudio version 1.2.5042 (RStudio, 2009-2020). Firstly, the IMS was checked for outliers. In In study 1, six outliers and in study 2, five outliers could be identified, showing critical values in calculated boxplots (1,5*IQR) and 10 outliers were identified by the mahalanobis distance. The authors decided to firstly include the outliers into the calculations.

For study 1, comprehensive item-analysis was calculated with the first and second sample, including item difficulty, item-total correlations for item discrimination, and Cronbach's alpha as reliability measure. Further on, to determine the number of factors for the initial factor analysis (EFA), parallel analysis, appropriate for Likert-type data by using ploychoric correlation matrices (Weng & Cheng, 2005) with 100 simulations was calculated. An EFA with diagonally weighted least squares estimation and varimax rotation was conducted with the included items fulfilling inclusion criteria of the item analysis. The Kaiser-Meyer-Olkin criterion and Bartlett's test of sphericity were calculated to guarantee the suitability of our data for structure detection. Further on, items with factor loadings >.30 can be attributed to the corresponding factor (Costello & Osborne, 2005). Pairwise correlations were calculated between the sum scores of the IMS, its subscales, BDI-II, BAI, FAH-II and DES for reliability and validity analyses. Alpha error level was set at 5%.

In the second study, the lavaan package (Rosseel et al., 2017) was used to calculate the confirmatory factor analysis (CFA). As before, the factor analysis was followed

by correlations and t-tests to evaluate test-retest reliability and associations between the IMS and the other validation measurements. Alpha error level was set at 5%. Moreover, no missing values had to be dealt with.

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Results – Study 1

Sample characteristics

The data of 230 participants were included in our analyses. The mean age of the sample is 30.08 years (*SD* = 11.49), 77 % of the subjects were female. German was the native language of 91 % and 83 % had German nationality. Higher education (university degree) was indicated in 42 % of the participants.

The different mean and standard deviations in the assessed questionnaires are resumed in table 1. The mean sum score of the BDI-II was 10.93 (SD= 10.70), while 71.74 % of the participants reached a BDI-II sum score ≤ 13, indicating the presence of no to minimal depressive symptoms, 12.18 % showed mild, 9.57 % moderate, and 6.52 % severe depressive symptoms (Hautzinger et al., 2009). The mean sum score of the BAI was 10.40 (SD = 9.53). 48.26 % of the participants had no to minimal anxiety level, 28.26 % a mild, 15.65 % moderate and 7.83 % showed clinically relevant anxiety symptoms (Margraf & Ehlers, 2007). In de DES-questionnaire a mean sum score of 59.35 (SD=12.02) has been found (Spitzer et al., 2011). A mean sum score of 22.33 (SD=10.62) for inflexibility measured with the German Version of the AAQ-II (Hoyer & Gloster, 2013) was found (see figure 1 for pair panels).

Item analysis

All answer options (from 1 to 5) were ticked for each item. Items showing a lower item-total correlation below .40 were excluded to guarantee a homogeneous item-pool and a

good item-total correlation (Moosbrugger & Kelava, 2012). In this sample, 2 items showed an item-total correlation below .40, whereupon they were excluded resulting in a 73-item scale. Further on, the theoretical scale *general psychological flexibility* showed a lot of items with high item-total correlations above .70, but lower than .80 (range=0.49-0.76).

Exploratory Factor Analysis (EFA)

An EFA has been conducted with the 73-item scale to describe the factor structure including the theoretical assumption of the following factors: *quantity of negative expectations, general psychological flexibility, assimilation, cognitive immunization after expectation-violation.* Based on the parallel analysis, four factors have been considered. The Kaiser-Meyer-Olkin test indicated very good sampling adequacy of .95 [range of items: .89-.97]. The Bartlett test showed a heterogeneity of variance ($\chi 2$ (72) = 148.04, $p < .0001$), indicating a conduction of a factor analysis as reasonable.

A total variance of 53% can be explained by the assumed four factors. The theoretical scale *general psychological flexibility* had a high item-total correlation and accordingly, the factor analysis showed unclear factor attribution of these items. According to these findings, the authors decided to discard these 19 formulated items. All item loading less then 0.3 on a factor was excluded. Every item kept should load at least 0.5 on a specific factor. Every item loading on two factors higher then 0.40 was excluded. Moreover, every item has been checked on redundancy. In terms of those items defined as being redundant in content, the item with the higher and clearer factor-loading has been chosen. At the end, a 23-item scale resulted in a supposed 3-factor structure.

Reliability and Validity analyses

While the 75-item scale showed an excellent internal consistency (Cronbach's alpha α=.98), the 23-item scale is not inferior also showing an excellent Cronbach's alpha of

α=.94. The Cronbach's alpha of the following factors *negative expectations* (α=.87), *assimilation* (α=.85), *cognitive immunization* (α=.93) showed good to excellent reliability.

The three subscales, although representing 3 different factors, seem to be highly correlated with another (r = 0.58 – 0.65). This indicates that individuals with high amount of negative expectations seem to show a higher level of assimilation and immunization processes. For convergent validity, bivariate associations between the described questionnaires were calculated, whereby depressive symptoms, anxiety symptoms, negative expectations and experiential avoidance was highly correlated with the sum score of the 23-item IMS (see table 3).

The sum score of the IMS is not significantly correlated with the age (r = -0.04) or education level (r = -0.03).

Results – Study 2

Sample characteristics

The data of 299 participants were included in our analyses. The mean age of the sample is 25.85 years (SD = 9.72), 71 % of the subjects were female. German was the native language of 94 % and 94 % had German nationality. Higher education (university degree) was indicated in 24 % of the participants.

The different mean and standard deviations in the assessed questionnaires are resumed in table 1. The mean sum score of the BDI-II was 7.61 (SD= 7.80), while 73.58 % of the participants reached a BDI-II sum score ≤ 13, indicating the presence of no to minimal depressive symptoms, 13.71 % showed mild, 7.36 % moderate, and 5.35 % severe depressive symptoms (Hautzinger et al., 2009). The mean sum score of the BAI was 9.88 (SD = 9.33). 54.18 % of the participants had no to minimal anxiety level, 23.08 % a mild, 14.72 % moderate and 8.03 % showed clinically relevant anxiety symptoms (Margraf & Ehlers, 2007).

In de DES-questionnaire a mean sum score of 56.56 (SD=10.72) has been found (Spitzer et al., 2011). A mean sum score of 21.09 (SD=9.33) for inflexibility measured with the German Version of the AAQ-II (Hoyer & Gloster, 2013) was found (see figure 1 for pair panels).

Confirmatory factor analysis (CFA)

Results of the CFA based in a three-factor structure suggest a good model fit with X^2 (227) =193.32, p = 0.949, a good Comparative Fit Index of CFI = 1.00, a good normed fit index NFI= 0.983 a good Tucker-Lewis Index of TLI = 1.003 and a good Root Mean Square Error of Approximation RMSEA = 0.000 (90% confidence interval 0.000 – 0.002).

Reliability and validity analyses

While the 23-item scale showed an excellent internal consistency with a Cronbach's alpha of α=.93. The Cronbach's alpha of the following factors *negative expectations* (α=.89), *assimilation* (α=.77), *cognitive immunization* (α=.93) showed good to excellent reliability. For the test-retest reliability we found a high consistency over time (4 weeks) with a correlation of r=0.87 (t(73) = 15.18, p<.001) suggesting that the IMS reliably measures the underlying construct over time.

Like in study 1, the three subscales, although representing 3 different factors, seem to be highly correlated with another (r = 0.49 – 0.56). Bivariate associations between the described questionnaires were calculated, whereby depressive symptoms, anxiety symptoms, negative expectations and experiential avoidance was highly correlated with the sum score of the 23-item IMS (see table 4). The sum score of the IMS is not significantly correlated with the age (r = -0.04) or education level (r = -0.03). A significant difference in the IMS sum score between individuals with a current diagnosed mental disorder (M=55.66, SD= 15.86) and without (M=68.75, SD= 19.35) was found (t(31)=3.46, p = 0.002). The same could be found for a diagnosed mental disorder in the past (M=55.81, SD= 15.86; M=62.67, SD= 19.37; t(31)=2.23, p = 0.03). The more, individuals, who have been in psychotherapy (M=61.91,

SD= 18.28) show a significant higher IMS score then those, not having been in psychotherapy in the past (*M*=55.11, *SD*= 15.66; *t*(119)=2.93, *p* = 0.004). This difference could not be found for individuals currently in psychotherapy (*M*=63.52, *SD*= 19.78) vs. not in psychotherapy (*M*=56.33, *SD*= 16.26; *t*(25)=1.70, *p* = 0.102).

Discussion

The IMS is the first self-rating scale measuring assimilation and cognitive immunization, as it is defined in the ViolEx-model (Rief et al., 2015), which are assumed to be responsible for persisting dysfunctional expectations. This article includes psychometric properties and factorial structure of the IMS in a mainly healthy, not restricted sample population. Starting with a 75-item scale, a reduced 23-item scale including three subscales *negative expectations, assimilation* and *cognitive immunization* resulted with the help of an EFA. The resulted questionnaire showed excellent internal consistency and good to excellent consistency for the three factors. Further on, the suggested three-factor structure of the 23-item scale could be confirmed in a second study by a CFA, showing good fit measures. The internal consistency remained good to excellent for the overall questionnaire and the three subscales. A very good test-retest reliability could be proven.

Validity analyses showed significant correlations between the sum score of the IMS, as well as its subscales, and validated questionnaires measuring depressive symptoms (BDI-II), anxiety symptoms (BAI), depressive expectations (DES) and psychological flexibility (FAH-II), indicating good concurrent validity. Consistent with the assumptions, in both studies, the IMS score was highest correlated with the FAH-II, measuring experiential avoidance and the DES, measuring negative expectations. As the IMS includes the subscale negative expectations, the high correlation with the DES was expected. Experiential avoidance can be defined as “the phenomenon that occurs when a person is unwilling to remain in contact with particular private experiences (e.g., bodily sensations, emotions,

thoughts, memories, images, behavioral predispositions). [It] takes steps to alter the form or frequency of these experiences or the contexts that occasion them, even when these forms of avoidance cause behavioral harm" (Hayes et al., 2004). As assimilation and immunization processes are also defined as avoidance processes the high correlation was intended. The positive correlations with depressive and anxiety symptoms are consistent with the assumptions, that assimilation and immunization processes play a central role in psychopathology, but are not reflecting psychopathological symptoms per se. The subscales assimilation and cognitive immunization are highly correlated with the amount of negative expectations measured by the first subscale and the DES. This implies, that individuals with high levels of assimilation and immunization show a higher amount of negative expectations, matching the idea of lacking expectation change leading to persistence of expectations (Rief et al., 2015; Rief & Joormann, 2019). The comparison of people with and without a diagnosed mental disorder, as well as having absolved a psychotherapy in the past, goes in the same direction of interpretation, concluding higher assimilation and immunization processes in psychopathology.

Research and practical implications

The ViolEx-model (Rief et al., 2015) has initiated a relatively new branch of research analyzing the specific role of expectations and its adaptation mechanisms in psychopathology. However, it needs to be empirically conformed. Until now, the ViolEx-model including immunization strategies are only indirectly assessed by experimental paradigms (D'Astolfo et al., 2019; Kube, Rief, et al., 2019). In these studies, situation-specific negative expectations are induced through certain feedback. In a next step, these induced expectations are systematically violated, and the expectation change is observed. The lack of expectation change is then defined as immunization, whereas other factors could also be responsible for the expectation persistency (e.g., paradigm properties, characteristics of the induced

expectations). The IMS is a promising and helpful tool to operationalize assimilation and cognitive immunization in a very efficient way in further experimental studies. This strongly facilitates the influence of assimilation and immunization processes for various scientific questions as for example verifying the ViolEx-model. The IMS enables researchers to analyze factors responsible for expectation persistence as personality traits, social surroundings or prior experiences as proposed by the ViolEx-model.

In the context of cognitive-behavioral therapy, practitioners observe the consistency of certain dysfunctional cognitions, including expectations, even if certain cognitive and/ or behavioral interventions have been conducted (Rief & Glombiewski, 2016; Rief et al., 2015; Rief & Joormann, 2019). It is of great importance to reveal the mechanisms responsible for this rigidity. One approach to address this are expectation focused psychological interventions (Rief & Glombiewski, 2016), defining expectations as core features of psychopathology. This questionnaire can provide the practitioner with important information about the general level of assimilation and cognitive immunization processes of the patient. Practitioners can adapt their therapy plan accordingly, by directly addressing the main problematic mechanism with the aim of making existing expectations more flexible. First, a more conscious observation of the patients' expectations and second, a more flexible adaptation of personal expectations to the given environment could be the consequence. Moreover, a more active and conscious decision-making is promoted (Grawe, 2000). The idea of flexibilizing cognitions in the sense of promoting a better adaptation to the environment is a very prominent idea in psychology and directly addressed by the approach Acceptance and Commitment Therapy (Hayes et al., 2012).

Strengths and Limitations

This article is the first to present a methodically clean validated questionnaire measuring assimilation and cognitive immunization processes. The supposed factor structure

could be found through performed factor analyses with a very good fit. Moreover, reliability and validity analyses have already been conducted in both studies and yielded promising results. Yet, several limitations should be considered. At first, the sample of this study to develop the IMS consisted of a predominantly healthy population. In both studies, more females participated than men. Moreover, the race and ethnicity were not explicitly assessed, whereby an overrepresentation of the white ethnic category is assumed. Therefore, the generalization of the questionnaire is still limited (Simons et al., 2017). The IMS should be tested in clinical samples to evaluate the ability of discrimination between healthy and psychopathological groups. Due to the finding of a left-skewed distribution of the IMS and the correlations with questionnaires measuring psychopathological symptoms, a certain group discrimination can be assumed. First comparative analyses show discriminative results, but rather a small group of individuals with psychotherapy experience and a diagnosed mental disorder was included in the studies. Second, further validity analyses should be done to define predictive and content validity. The translated IMS should also be validated in an English-speaking population. The more, it would be important to find out if certain interventions as for example expectation focused psychological interventions (Rief & Glombiewski, 2016) can change IMS scores.

Conclusion

With the IMS, the first self-rating scale for the assessment of two important processes leading to a rigid maintenance of expectations was developed. These processes are a) assimilation leading to non-tested expectations and b) cognitive immunization as a form of interpretation of certain expectation violations. In this article, the IMS showed excellent internal consistency in two independent studies. An overall score of assimilation and/ or cognitive immunization can be drawn, which will be useful in experimental research, clinical

trials and clinical practice, as it enables the direct assessment of underlying mechanisms of the maintenance of certain expectations.

Literature

Atkinson, J. W., & Feather, N. T. (1966). *A theory of achievement motivation* (Vol. 66). Wiley New York.

Auer, C. J., Glombiewski, J. A., Doering, B. K., Winkler, A., Laferton, J. A., Broadbent, E., & Rief, W. (2016). Patients' expectations predict surgery outcomes: a meta-analysis. *International journal of behavioral medicine*, *23*(1), 49-62.

Barber, J. P., Zilcha-Mano, S., Gallop, R., Barrett, M., McCarthy, K. S., & Dinger, U. (2014). The associations among improvement and alliance expectations, alliance during treatment, and treatment outcome for major depressive disorder. *Psychotherapy Research*, *24*(3), 257-268.

Constantino, M. J., Ametrano, R. M., & Greenberg, R. P. (2012). Clinician interventions and participant characteristics that foster adaptive patient expectations for psychotherapy and psychotherapeutic change. *Psychotherapy*, *49*(4), 557.

Constantino, M. J., Vîslă, A., Coyne, A. E., & Boswell, J. F. (2018). A meta-analysis of the association between patients' early treatment outcome expectation and their posttreatment outcomes. *Psychotherapy*, *55*(4), 473.

Costello, A. B., & Osborne, J. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical assessment, research, and evaluation*, *10*(1), 7.

Craske, M. G., Treanor, M., Conway, C. C., Zbozinek, T., & Vervliet, B. (2014). Maximizing exposure therapy: An inhibitory learning approach [Article]. *Behaviour Research and Therapy*, *58*, 10-23. https://doi.org/10.1016/j.brat.2014.04.006

D'Astolfo, L., Kirchner, L., & Rief, W. (2019). *No1likesU – An Internally and Ecologically Valid Paradigm to Investigate Social Rejection Expectations and Their Adjustment in Human Samples* Word Conference od behavioral and cognitive Therapies, Berlin.

Gollwitzer, M., Thorwart, A., & Meissner, K. (2018). Editorial: Psychological Responses to Violations of Expectations [Editorial Material]. *Frontiers in Psychology*, *8*, 3, Article 2357. https://doi.org/10.3389/fpsyg.2017.02357

Grawe, K. (2000). *Psychologische Therapie* (2. korrigierte Auflage ed.). Hogrefe.

Greenberg, R. P., Constantino, M. J., & Bruce, N. (2006). Are patient expectations still relevant for psychotherapy process and outcome? *Clinical psychology review*, *26*(6), 657-678.

Hautzinger, M., Keller, F., & Kühner, C. (2009). BDI II. Beck-Depressions-Inventar. In (Vol. 2. Auflage). London: Pearson.

Hayes, S. C., Strosahl, K., Wilson, K. G., Bissett, R. T., Pistorello, J., Toarmino, D., . . . Bergan, J. (2004). Measuring experiential avoidance: A preliminary test of a working model. *The psychological record*, *54*(4), 553-578.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2012). *Acceptance and Commitment Therapy. The Process and Practice of Mindful Change.* (2 ed.). Guilford.

Heckhausen, H., & Gollwitzer, P. M. (1987). Thought contents and cognitive functioning in motivational versus volitional states of mind. *Motivation and emotion*, *11*(2), 101-120.

Hoyer, J., & Gloster, A. T. (2013). Psychologische Flexibilität messen= Measuring psychological flexibility: Der Fragebogen zu Akzeptanz und Handeln–II (FAH-II): The Acceptance and Action Questionnaire–II (AAQ-II). *Verhaltenstherapie*, *23*(1), 42-44.

Imel, Z. E., Malterer, M. B., McKay, K. M., & Wampold, B. E. (2008). A meta-analysis of psychotherapy and medication in unipolar depression and dysthymia. *Journal of Affective Disorders*, *110*(3), 197-206. https://doi.org/10.1016/j.jad.2008.03.018

Kahneman, D., & Tversky, A. (1979). Prospect Theory of Decisions Under Risk. *Econometrica*, *47*(2), 1156-1167.

Kashdan, T. B., & Rottenberg, J. (2010). Psychological flexibility as a fundamental aspect of health [Article]. *Clinical Psychology Review*, *30*(7), 865-878. https://doi.org/10.1016/j.cpr.2010.03.001

Kirsch, I., Wampold, B., & Kelley, J. M. (2016). Controlling for the placebo effect in psychotherapy: Noble quest or tilting at windmills? *Psychology of Consciousness: Theory, Research, and Practice*, *3*(2), 121.

Kube, T., D'Astolfo, L., Glombiewski, J. A., Doering, B. K., & Rief, W. (2017). Focusing on situation-specific expectations in major depression as basis for behavioural experiments - Development of the Depressive Expectations Scale. *Psychology and Psychotherapy-Theory Research and Practice*, *90*(3), 336-352. https://doi.org/10.1111/papt.12114

Kube, T., Glombiewski, J. A., Gall, J., Touissant, L., Gartner, T., & Rief, W. (2019). How to modify persisting negative expectations in major depression? An experimental study comparing three strategies to inhibit cognitive immunization against novel positive experiences. *Journal of Affective Disorders*, *250*, 231-240. https://doi.org/10.1016/j.jad.2019.03.027

Kube, T., Glombiewski, J. A., & Rief, W. (2019). Expectation-Focused Psychotherapeutic Interventions for People with Depressive Symptoms. *Verhaltenstherapie*, *29*(4), 281-291. https://doi.org/10.1159/000496944

Kube, T., Rief, W., Gollwitzer, M., Gartner, T., & Glombiewski, J. A. (2019). Why dysfunctional expectations in depression persist - Results from two experimental studies investigating cognitive immunization. *Psychological Medicine*, *49*(9), 1532-1544. https://doi.org/10.1017/s0033291718002106

Liknaitzky, P., Smillie, L. D., & Allen, N. B. (2017). Out-of-the-Blue: Depressive Symptoms are Associated with Deficits in Processing Inferential Expectancy-Violations Using a Novel Cognitive Rigidity Task [Article]. *Cognitive Therapy and Research*, *41*(5), 757-776. https://doi.org/10.1007/s10608-017-9853-x

Liknaitzky, P., Smillie, L. D., & Allen, N. B. (2018). The low and narrow: A preliminary test of the association between depressive symptoms and deficits in producing divergent inferences. *Creativity Research Journal*, *30*(1), 67-77.

Lovibond, P. F., Saunders, J. C., Weidemann, G., & Mitchell, C. J. (2008). Evidence for expectancy as a mediator of avoidance and anxiety in a laboratory model of human avoidance learning. *Quarterly journal of experimental psychology*, *61*(8), 1199-1216.

Margraf, J., & Ehlers, A. (2007). *Beck Angst-Inventar (BAI) – Deutsche Ausgabe*. Harcourt.

Marks, I. (1979). Exposure therapy for phobias and obsessive-compulsive disorders. *Hospital Practice*, *14*(2), 101-108.

Moosbrugger, H., & Kelava, A. (2012). Testtheorie und Fragebogenkonstruktion.

Myers, K. M., & Davis, M. (2007). Mechanisms of fear extinction. *Molecular psychiatry*, *12*(2), 120-150.

Pinquart, M., Endres, D., Teige-Mocigemba, S., Panitz, C., & Schütz, A. C. (2021). Why expectations do or do not change after expectation violation: A comparison of seven models. *Consciousness and Cognition*, *89*, 103086.

Pinquart, M., Rothers, A., Gollwitzer, M., Khosrowtaj, Z., Pietzsch, M., & Panitz, C. (2021). Predictors of coping with expectation violation: an integrative review. *Review of General Psychology*, *25*(3), 321-333.

Pittig, A., Wong, A. H., Glück, V. M., & Boschet, J. M. (2020). Avoidance and its bi-directional relationship with conditioned fear: Mechanisms, moderators, and clinical implications. *Behaviour research and therapy*, *126*, 103550.

Rief, W., & Glombiewski, J. A. (2016). Expectation-Focused Psychological Interventions (EFPI). *Verhaltenstherapie*, *26*(1), 47-54. https://doi.org/10.1159/000442374

Rief, W., Glombiewski, J. A., Gollwitzer, M., Schubö, A., Schwarting, R., & Thorwart, A. (2015). Expectancies as core features of mental disorders. *Current opinion in psychiatry*, *28*(5), 378-385.

Rief, W., & Joormann, J. (2019). Revisiting the cognitive model of depression: The role of expectations. *Clinical Psychology in Europe*, *1*, 1-19.

Rosenthal, R., & Jacobson, L. (1968). Pygmalion in the classroom. *The urban review*, *3*(1), 16-20.

Rosseel, Y., Oberski, D., Byrnes, J., Vanbrabant, L., Savalei, V., Merkle, E., . . . Barendse, M. (2017). Package 'lavaan'. *Retrieved June*, *17*, 2017.

RStudio, I. (2009-2020). *RStudio*. In (Version 1.2.5042) www.rstudio.com

Simons, D. J., Shoda, Y., & Lindsay, D. S. (2017). Constraints on generality (COG): A proposed addition to all empirical papers. *Perspectives on Psychological Science*, *12*(6), 1123-1128.

Spitzer, C., Hammer, S., Löwe, B., Grabe, H., Barnow, S., Rose, M., . . . Franke, G. (2011). Die Kurzform des Brief Symptom Inventory (BSI-18): erste Befunde zu den psychometrischen Kennwerten der deutschen Version. *Fortschritte der Neurologie· Psychiatrie*, *79*(09), 517-523.

Wampold, B. E., & Imel, Z. E. (2015). *The Great Psychotherapy Debate: The Evidence for What Makes Psychotherapy Work* (sec. edition ed.). Routledge.

Weng, L.-J., & Cheng, C.-P. (2005). Parallel analysis with unidimensional binary data. *Educational and Psychological Measurement*, *65*(5), 697-716.

Figures

Figure 1.

Paired panels indicating the distributions by histograms, the linearity by the scatter plots and bivariate Pearson correlations between the different sum scores of the questionnaires and the Immunization Scale IMS for study 1 (left) and study 2 (right).

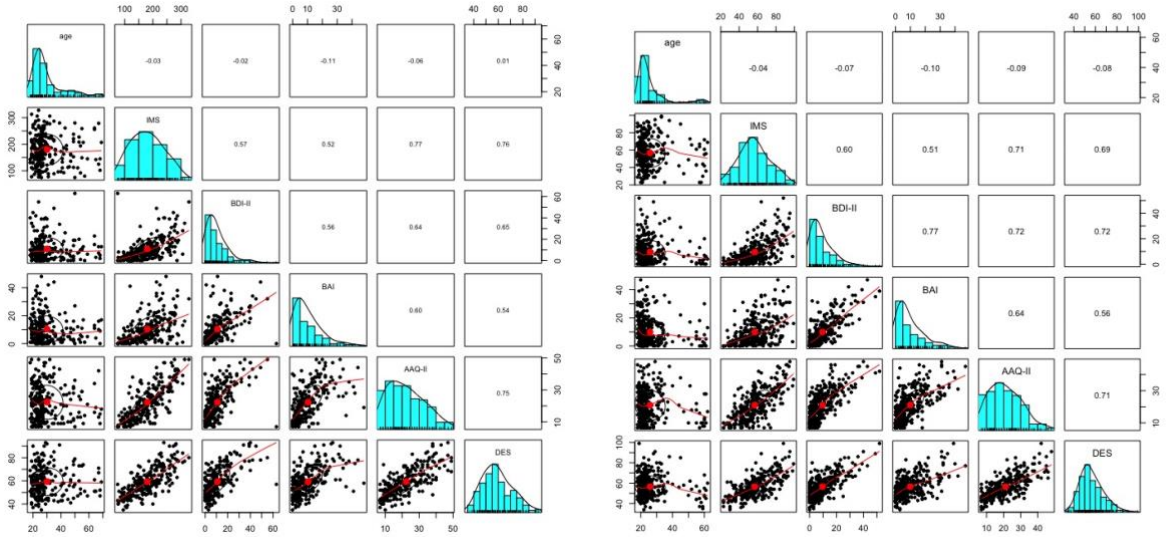
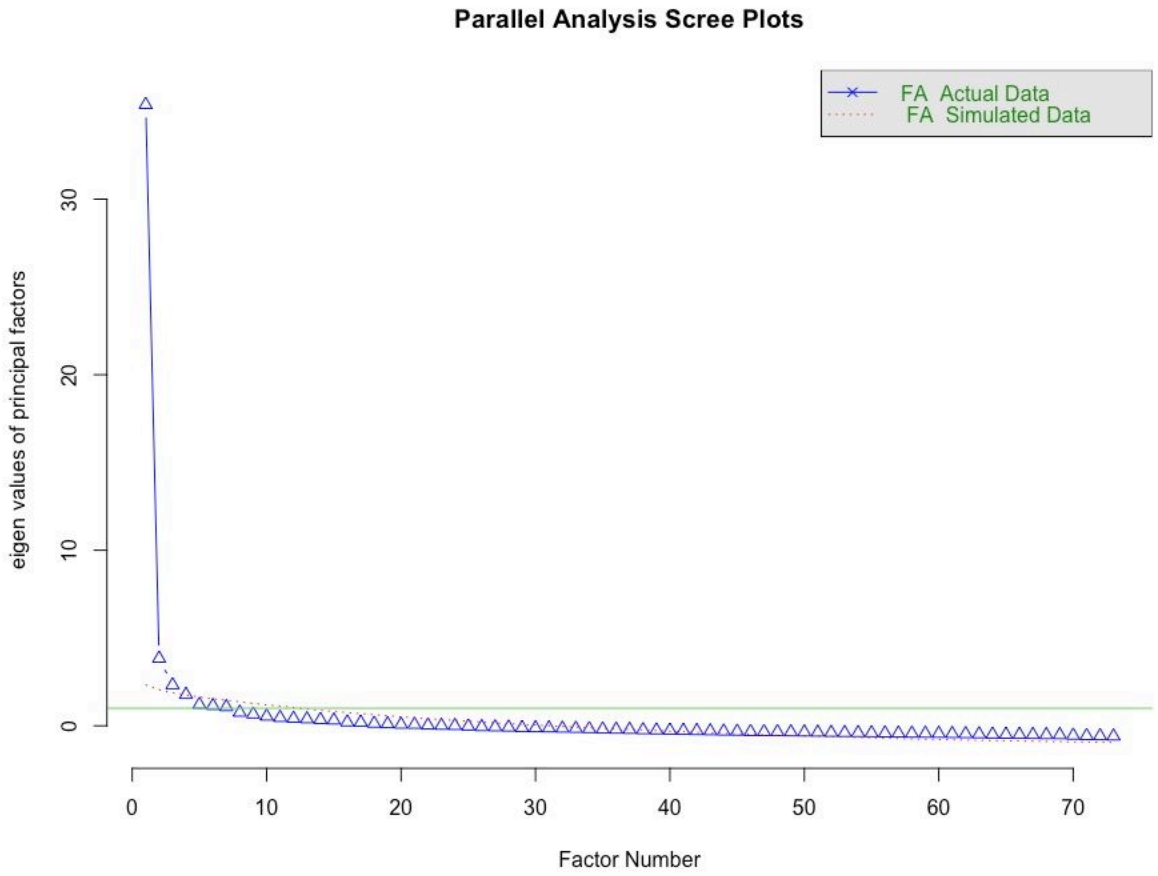


Figure 2.

Scree plot suggesting 4 factors for the 73-item scale.



Tables

Table 1.

Demographics: Mean and standard deviations of different variables involved in study 1 and study 2.

	Total sample Study 1 n = 230	**Total sample Study 2 n = 299**
Age [M (SD)]	30.08 (11.49)	25.85 (9.52)
Gender [F/M/other]	178/51/1	213/85/1
M_{BDI} [(SD)]	10.93 (10.70)	9.59 (9.26)
$M_{BDI\ female}$ [(SD)]	10.94 (10.47)	10.38 (9.71)
$M_{BDI\ male}$ [(SD)]	9.86 (8.98)	7.61 (7.80)
M_{BAI} [(SD)]	10.40 (16.16)	9.88 (9.34)
$M_{BAI\ female}$ [(SD)]	10.85 (9.76)	11.24 (9.87)
$M_{BAI\ male}$ [(SD)]	9.04 (8.58)	6.49 (6.85)
M_{DES} [(SD)]	59.35 (12.02)	56.56 (10.72)
$M_{DES\ female}$ [(SD)]	59.39 (12.05)	57.04 (11.14)
$M_{DES\ male}$[(SD)]	59.25 (12.15)	55.15 (9.44)
M_{FAH} [(SD)]	22.33 (10.62)	21.09 (9.33)
$M_{FAH\ female}$ [(SD)]	23.11 (10.66)	21.81 (9.31)
$M_{FAH\ male}$ [(SD)]	19.94 (10.10)	19.20 (9.20)

Note. Abbreviations: n sample size, M mean, SD standard deviation, F female, M male, BDI-II Beck Depression Inventory, BAI Beck Anxiety Inventory, DES Depressive Expectation Scale, FAH-II German Version of the Acceptance and Action Questionnaire, IMS Immunization Scale

Table 2.

Item Loadings of the EFA (study 1).

	factor 1	**factor 2**	**factor 3**	**factor 4**
Quantity of negative expectations				
Item 2	0.31	**0.66**	0.13	0.20
Item 3	0.12	**0.65**	0.24	0.16
Item 9	0.35	**0.68**	0.15	0.18
Item 11	0.22	**0.76**	0.12	0.19
Item 12	0.30	**0.57**	0.17	0.11
Item 7	0.29	**0.68**	0.27	0.26
Assimilation				
Item 8	0.26	0.14	**0.53**	0.21
Item 10	0.13	0.15	**0.57**	0.24
Item 12	0.13	0.15	**0.54**	0.10
Item 13	0.24	0.28	**0.62**	0.14
Item 14	0.29	0.27	**0.62**	0.22
Item 15	0.33	0.30	**0.55**	0.24
Cognitive immunization				
Item 7	**0.60**	0.29	0.11	0.25
Item 8	**0.68**	0.13	0.18	0.28
Item 12	**0.52**	0.22	0.11	0.13
Item 13	**0.67**	0.13	0.21	0.24
Item 19	**0.68**	0.35	0.11	0.12
Item 20	**0.66**	0.26	0.21	0.12
Item 21	**0.72**	0.36	0.00	0.19
Item 23	**0.68**	0.33	0.19	0.00
Item 24	**0.61**	0.22	0.26	0.27
Item 25	**0.71**	0.13	0.17	0.21
Item 26	**0.57**	0.30	0.21	0.00

Table 3.

Pearson correlations between the sum scores of used questionnaires measuring depressive symptoms, anxiety symptoms, depressive expectations, and psychological inflexibility as well

as the sum score of the constructed 23-item and 73-item questionnaire and the three factors of the IMS negative expectations, assimilation, and cognitive immunization (study 1).

	BDI-II	BAI	DES	FAH-II	73-item IMS	23-item IMS	factor 1	factor 2	factor 3
BDI-II	-	.56***	.65***	.64***	.57***	.54***	.59***	.39***	.44***
BAI		-	.54***	.60***	.52***	.49***	.56***	.37***	.37***
DES			-	.75***	.76***	.73***	.75***	.52***	.62***
FAH-II				-	.77***	.74***	.81***	.55***	.59***
73-item IMS					-	.92***	.86***	.78***	.87***
23-item IMS						-	.85***	.80***	.91***
factor 1							-	.59***	.65***
factor 2								-	.58***
factor 3									-

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. Abbreviations: BDI-II Beck Depression Inventory, BAI Beck Anxiety Inventory, DES Depressive Expectation Scale, FAH-II German Version of the Acceptance and Action Questionnaire, IMS Immunization Scale; factor 1 represents the subscale negative expectations of the IMS, factor 2 assimilation, and factor 3 cognitive immunization.

Table 4.

Pearson correlations between the sum scores of used questionnaires measuring depressive symptoms, anxiety symptoms, depressive expectations, and psychological inflexibility as well as the sum score of the IMS and the three factors of the IMS negative expectations, assimilation, and cognitive immunization (study 2).

	BDI-II	BAI	DES	FAH-II	IMS	factor 1	factor 2	factor 3
BDI-II	-	.77***	.72***	.72***	.60***	.66***	.41***	.46***
BAI		-	.56***	.64***	.51***	.59***	.35***	.36***
DES			-	.71***	.69***	.67***	.43***	.60***
FAH-II				-	.71***	.80***	.47***	.52***
IMS					-	.82***	.75***	.89***
factor 1						-	.55***	.56***
factor 2							-	.49***
factor 3								-

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. Abbreviations: BDI-II Beck Depression Inventory, BAI Beck Anxiety Inventory, DES Depressive Expectation Scale, FAH-II German Version of the Acceptance and Action Questionnaire, IMS Immunization Scale; factor 1 represents the subscale negative expectations of the IMS, factor 2 assimilation, and factor 3 cognitive immunization.

Appendix

A1. Item-analysis of the 75-item scale

Component 1

Row	*Missings*	*Mean*	*SD*	*Skew*	*Item Difficulty*	*Item Discrimination*	*α if deleted*
NE_1	0.00 %	2.65	1.29	0.21	0.53	0.69	0.98
NE_2	0.00 %	2.56	1.21	0.35	0.51	0.68	0.98
NE_3	0.00 %	3.35	1.2	-0.38	0.67	0.61	0.98
NE_4	0.00 %	3.16	1.3	-0.17	0.63	0.59	0.98
NE_5	0.00 %	2.82	1.34	0.17	0.56	0.60	0.98
NE_6	0.00 %	2.02	1.23	0.99	0.40	0.66	0.98
NE_7	0.00 %	1.98	1.06	0.92	0.40	0.45	0.98
NE_8	0.00 %	2.09	1.12	0.86	0.42	0.54	0.98
NE_9	0.00 %	2.32	1.25	0.6	0.46	0.71	0.98
NE_10	0.00 %	2.08	1.21	0.87	0.42	0.66	0.98
NE_11	0.00 %	2.31	1.29	0.61	0.46	0.67	0.98
NE_12	0.00 %	2.52	1.33	0.35	0.50	0.60	0.98
NE_13	0.00 %	2.5	1.26	0.32	0.50	0.64	0.98
NE_14	0.00 %	3.06	1.23	-0.02	0.61	0.21	0.98
PF_1	0.00 %	2.89	1.2	-0.05	0.58	0.66	0.98
PF_2	0.00 %	2.52	1.13	0.27	0.50	0.69	0.98
PF_3	0.00 %	2.77	1.17	0.06	0.55	0.64	0.98
PF_4	0.00 %	2.72	1.2	0.21	0.54	0.56	0.98
PF_5	0.00 %	2.5	1.16	0.36	0.50	0.75	0.98
PF_6	0.00 %	2.13	1.24	0.74	0.43	0.75	0.98
PF_7	0.00 %	2.51	1.34	0.39	0.50	0.72	0.98
PF_8	0.00 %	2.66	1.2	0.01	0.53	0.49	0.98
PF_9	0.00 %	2.48	1.17	0.33	0.50	0.65	0.98
PF_10	0.00 %	2.34	1.26	0.54	0.47	0.68	0.98
PF_11	0.00 %	2.43	1.26	0.48	0.49	0.55	0.98
PF_12	0.00 %	2.55	1.23	0.22	0.51	0.59	0.98
PF_13	0.00 %	2.38	1.23	0.35	0.48	0.72	0.98
PF_14	0.00 %	2.1	1.19	0.83	0.42	0.53	0.98
PF_15	0.00 %	2.43	1.27	0.42	0.49	0.76	0.98
PF_16	0.00 %	2.71	1.31	0.13	0.54	0.74	0.98
PF_17	0.00 %	2.68	1.26	0.16	0.54	0.69	0.98
PF_18	0.00 %	2.57	1.13	0.09	0.51	0.25	0.98
PF_19	0.00 %	2.46	1.25	0.31	0.49	0.69	0.98
PF_20	0.00 %	2.49	1.15	0.15	0.50	0.71	0.98
A_1	0.00 %	1.97	1.1	0.98	0.39	0.71	0.98
A_2	0.00 %	2.39	1.21	0.43	0.48	0.64	0.98
A_3	0.00 %	2.24	1.19	0.6	0.45	0.67	0.98
A_4	0.00 %	2.55	1.23	0.34	0.51	0.72	0.98
A_5	0.00 %	2.77	1.27	0.08	0.55	0.54	0.98
A_6	0.00 %	2	1.08	0.77	0.40	0.66	0.98
A_7	0.00 %	2.3	1.16	0.38	0.46	0.55	0.98
A_8	0.00 %	2.32	1.23	0.66	0.46	0.54	0.98
A_9	0.00 %	2.53	1.14	0.23	0.51	0.74	0.98
A_10	0.00 %	2.63	1.29	0.2	0.53	0.50	0.98
A_11	0.00 %	2.5	1.28	0.41	0.50	0.65	0.98
A_12	0.00 %	2.63	1.2	0.09	0.53	0.44	0.98
A_13	0.00 %	2.85	1.32	0.08	0.57	0.62	0.98
A_14	0.00 %	2.97	1.25	-0.06	0.59	0.67	0.98
A_15	0.00 %	2.78	1.23	0.12	0.56	0.69	0.98
CIM_1	0.00 %	2.32	1.18	0.61	0.46	0.70	0.98
CIM_2	0.00 %	2.08	1.06	0.87	0.42	0.70	0.98
CIM_3	0.00 %	2.25	1.13	0.56	0.45	0.62	0.98
CIM_4	0.00 %	2.26	1.21	0.55	0.45	0.71	0.98
CIM_5	0.00 %	2.22	1.2	0.53	0.44	0.69	0.98
CIM_6	0.00 %	2.23	1.22	0.64	0.45	0.51	0.98
CIM_7	0.00 %	2.42	1.25	0.55	0.48	0.64	0.98
CIM_8	0.00 %	2.12	1.08	0.7	0.42	0.64	0.98
CIM_9	0.00 %	2.47	1.3	0.28	0.49	0.71	0.98
CIM_10	0.00 %	1.83	1.04	1.13	0.37	0.54	0.98
CIM_11	0.00 %	1.68	0.96	1.45	0.34	0.44	0.98
CIM_12	0.00 %	1.78	1.03	1.2	0.36	0.51	0.98
CIM_13	0.00 %	2.17	1.19	0.61	0.43	0.63	0.98
CIM_14	0.00 %	2.13	1.11	0.65	0.43	0.69	0.98
CIM_15	0.00 %	2.13	1.17	0.65	0.43	0.60	0.98
CIM_16	0.00 %	2.41	1.28	0.39	0.48	0.71	0.98
CIM_17	0.00 %	2.31	1.21	0.47	0.46	0.72	0.98
CIM_18	0.00 %	2.37	1.28	0.44	0.47	0.70	0.98
CIM_19	0.00 %	2.41	1.16	0.37	0.48	0.67	0.98
CIM_20	0.00 %	2.19	1.15	0.65	0.44	0.65	0.98
CIM_21	0.00 %	2.34	1.23	0.48	0.47	0.70	0.98
CIM_22	0.00 %	2.53	1.29	0.27	0.51	0.72	0.98
CIM_23	0.00 %	2.43	1.17	0.27	0.49	0.68	0.98
CIM_24	0.00 %	2.06	1.11	0.7	0.41	0.68	0.98
CIM_25	0.00 %	1.98	1.07	0.73	0.40	0.62	0.98
CIM_26	0.00 %	1.92	1.12	0.93	0.38	0.59	0.98

Mean inter-item-correlation=0.405 · Cronbach's α=0.981

A2. Factor loadings of 73-item-scale

	WLS2	WLS1	WLS3	WLS4
IM04_01	0.25	0.72	0.12	0.24
IM04_02	0.31	0.66	0.13	0.20
IM04_03	0.12	0.65	0.24	0.16
IM04_04	0.16	0.63	0.25	
IM04_05	0.19	0.66	0.17	0.13
IM04_06	0.40	0.64		0.10
IM04_07	0.32	0.34	0.14	
IM04_08	0.37	0.39	0.21	
IM04_09	0.35	0.68	0.15	0.18
IM04_10	0.30	0.70		0.17
IM04_11	0.22	0.76	0.12	0.19
IM04_12	0.30	0.57	0.17	0.11
IM04_13	0.17	0.56	0.28	0.27
IM05_01	0.15	0.54	0.26	0.38
IM05_03	0.25	0.46	0.22	0.49
IM05_04		0.45	0.39	0.42
IM05_05		0.48	0.36	0.18
IM05_06	0.19	0.65	0.36	0.28
IM05_07	0.29	0.67	0.27	0.26
IM05_08	0.22	0.68	0.24	0.26
IM05_09		0.36	0.42	0.12
IM05_10	0.19	0.46	0.48	0.16
IM05_11	0.27	0.53	0.35	0.17
IM05_12	0.24	0.39	0.36	
IM05_13	0.11	0.44	0.46	0.19
IM05_14	0.37	0.29	0.27	0.59
IM05_15	0.19	0.44	0.23	0.19
IM05_16	0.26	0.44	0.29	0.61
IM05_17	0.17	0.46	0.40	0.52
IM05_18	0.11	0.43	0.42	0.50
IM05_20	0.29	0.45	0.25	0.42
IM05_21	0.28	0.39	0.36	0.45
IM06_01	0.49	0.30	0.42	0.22
IM06_02	0.35	0.19	0.61	0.16
IM06_03	0.47	0.25	0.53	
IM06_04	0.38	0.46	0.42	0.16
IM06_05	0.42	0.34	0.32	
IM06_06	0.53	0.32	0.32	0.11
IM06_07	0.39	0.13	0.41	0.19
IM06_08	0.26	0.14	0.53	0.21
IM06_09	0.37	0.30	0.40	0.48
IM06_10	0.13	0.15	0.57	0.24
IM06_11	0.29	0.24	0.62	0.21
IM06_12	0.13	0.15	0.54	0.10
IM06_13	0.24	0.28	0.62	0.14
IM06_14	0.29	0.27	0.62	0.22
IM06_15	0.33	0.30	0.55	0.24
IM07_01	0.43	0.26	0.19	0.62
IM07_02	0.42	0.22	0.28	0.56
IM07_03	0.48	0.20	0.32	0.26
IM07_04	0.56	0.16	0.19	0.59
IM07_05	0.52	0.21	0.13	0.57
IM07_06	0.56		0.14	0.22
IM07_07	0.60	0.29	0.11	0.25
IM07_08	0.68	0.13	0.18	0.28
IM07_09	0.59	0.23	0.12	0.51
IM07_10	0.49	0.13	0.24	0.25
IM07_11	0.39	0.23	0.12	
IM07_12	0.52	0.22	0.11	0.13
IM07_13	0.67	0.13	0.21	0.24
IM07_14	0.65	0.15	0.32	0.26
IM07_15	0.61	0.13	0.26	0.19
IM07_16	0.41	0.19	0.39	0.52
IM07_17	0.41	0.32	0.30	0.47
IM07_18	0.41	0.29	0.23	0.54
IM08_01	0.68	0.35	0.11	0.12
IM08_02	0.66	0.26	0.21	0.12
IM08_03	0.72	0.36		0.19
IM08_04	0.50	0.38	0.15	0.43
IM08_05	0.68	0.33	0.19	
IM08_06	0.61	0.22	0.26	0.27
IM08_07	0.71	0.13	0.17	0.21
IM08_08	0.57	0.30	0.21	

	WLS2	WLS1	WLS3	WLS4
SS loadings	12.20	12.06	7.79	6.90
Proportion Var	0.17	0.17	0.11	0.09
Cumulative Var	0.17	0.33	0.44	0.53

A3. Items of the Immunization Scale (IMS) – English Version

	Do not agree	Do Rather not agree	neutral	Rather agree	agree
Negative expectations					
I rarely expected good things to happen.					
I often worried about future events.					
I generally had many negative expectations.					
I often expected to be left alone with my problems.					
I expected not to be able to deal well with my feelings.					
Negative expectations made my life difficult.					
Assimilation					
If I had a negative expectation, …					
... I was rarely curious about what would happen.					
...I did not like being surprised.					
... I tried not to think about the expectation.					
... it made me avoid certain situations or people.					
... it was difficult to be open to the situation or experience.					
… it largely controlled my behavior.					
Immunisation					
If I had an experience that did not correspond with my negative expectation, then ...					
...I still held on to that expectation.					
...it was usually an exception.					
...something was wrong.					
...I usually found an explanation why the expectation was still right.					
If something went well, although I had a negative expectation, then...					
...it was just luck or coincidence.					
...I could not be responsible for it.					
...this was an exception.					
...it was only due to the specific situation.					
...there was no point in questioning the expectation anyway.					
...my expectation was still right.					
...it was just fate.					

Items of the Immunization Scale (IMS) – German Version

	Stimme nicht zu	Stimme eher nicht zu	Teils/teils	Stimme eher zu	Stimme zu
Negative Erwartungen					
Ich ging selten vom Guten aus.					
Ich machte mir oft Sorgen über zukünftige Ereignisse.					
Ich hatte im Allgemeinen viele negative Erwartungen.					
Ich erwartete häufig allein mit meinen Problemen gelassen zu werden.					
Ich erwartete, nicht gut mit meinen Gefühlen umgehen zu können.					
Negative Erwartungen machten mir das Leben schwer.					
Vermeidung					
Wenn ich eine negative Erwartung hatte, …					
...war ich selten neugierig, was passieren wird.					
...ließ ich mich nicht gerne überraschen.					
...versuchte ich nicht über die Erwartung nachzudenken.					
...führte diese dazu, dass ich verschiedene Situationen oder Personen vermied.					
...war es schwierig dem Ereignis oder der Erfahrung offen gegenüberzutreten.					
...steuerte diese Erwartung größtenteils mein Verhalten.					
Immunisierung					
Wenn ich eine Erfahrung machte, die nicht meiner negativen Erwartung entsprach, …					
...hielt ich trotzdem an dieser Erwartung fest.					
...war das meistens eine Ausnahme.					
...stimmte irgendetwas nicht.					
...fand ich meistens eine Erklärung, wieso die Erwartung trotzdem richtig war.					
Wenn mal etwas gut gelaufen ist, obwohl ich eine negative Erwartung hatte…					
...war das nur Glück oder Zufall.					
...konnte ich nicht dafür verantwortlich sein.					
...war das eine Ausnahme.					
...lag das nur an der spezifischen Situation.					
...brachte es sowieso nichts, die Erwartung in Frage zu stellen.					
...war meine Erwartung trotzdem richtig.					
...war es nur Schicksal.					

7.3. Study 3

A randomized-controlled online-intervention study for mild psychopathology promoting flexibility in expectations

Ewen, A.[a], Rief, W.[a] & Wilhelm, M.[a]

[a] Philipps-University of Marburg, Germany, Department clinical psychology and psychotherapy

Author information:

Corresponding author: Anne-Catherine Ewen, M. Sc.

Philipps-University of Marburg, department clinical psychology and psychotherapy,

Gutenbergstraße 18, 35032 Marburg, Germany

E-Mail: ewen@staff.uni-marburg.de

Dr. Marcel Wilhelm

Philipps-University of Marburg, department clinical psychology and psychotherapy,

Gutenbergstraße 18, 35032 Marburg, Germany

E-Mail: marcel.wilhem@staff.uni-marburg.de

Prof. Dr. Winfried Rief

Philipps-University of Marburg, department clinical psychology and psychotherapy,

Gutenbergstraße 18, 35032 Marburg, Germany

E-Mail: rief@staff.uni-marburg.de

Abstract

Theoretical background: Expectations in psychotherapy are coming to the forefront of psychotherapy research as general and specific influencing factors of treatment success. Literature not only shows evidence for specific dysfunctional expectations in different mental disorders, but also a lack of expectation adaptation after expectation-violating experiences. The ViolEx model proposes the construct cognitive immunization as a possible explanation. Expectation-focused psychological interventions (EFPI) aim facilitating expectation update. Preliminary experimental studies suggest potential efficacy of EFPI. This study investigates a standalone online intervention platform to deliver EFPI to individuals with mild depressive and/ or anxiety symptoms.

Methods: Using the program formr.org, participants were randomly assigned to one of three groups after automated screening for inclusion criteria (PHQ-D: scores 5-9 and/or BAI: scores 8-25). The first two groups (EFPI group & active control group; ACG) received a psychoeducation video at baseline focusing on expectations and their influence on adequate behavior. The EFPI group should plan, evaluate, and perform behavioral experiments testing proper expectations two times per week for four weeks. The ACG was asked to challenge stressful expectations with cognitive strategies. The third group received no task during the 4-week study period (no treatment control; CG). A post and a follow-up survey took place four and eight weeks after the baseline survey for all three groups.

Results: The EFPI group showed a significant reduction in cognitive immunization over the three time points. Moreover, the EFPI condition was superior to the no treatment control group. The more, the anxiety level could be reduced by the EFPI intervention.

Discussion: This study is the first to test effectiveness of online EFPI for mild depression and/or anxiety symptoms. EFPI appears to have a positive effect on cognitive immunization, i.e., persistent expectations. Expectation focused interventions should be

explicitly integrated into CBT to make expectation-violating experiences salient and reduce immunization processes. In follow-up studies, therapist delivered live EFPI should be investigated in a clinical sample with a higher symptom burden.

Key words: expectation violation, immunization, ViolEx-model, expectation focused psychological intervention EFPI, online interventions, subclinical to mild symptoms

Introduction

The question of developing a most effective psychotherapeutic approach has not been sufficiently answered so far. Consequently, research of non-specific, common factors becomes increasingly important. This includes, among others, the influencing factors defined by Grawe (2000; 1994) the therapeutic relationship, activation of resources, actualization of the patient's problems, motivational clarification, and problem solving, as well as alliance, empathy, expectations, cultural adaptation, and therapist differences (Wampold, 2015; Wampold & Imel, 2015).

The concept of expectation as a promising main mechanism involved in the therapeutic process is recently focused (Constantino et al., 2012; Constantino et al., 2011; Greenberg et al., 2006). It is undisputed that different expectations have an influence on the success of therapy: Placebo research shows the power of treatment expectations (Bingel, 2020; Evers et al., 2018; Kirsch, 2018; Kirsch et al., 2016; Wampold et al., 2005) and specific expectations prove to have an influence towards the therapeutic relationship (Al-Darmaki & Kivlighan, 1993; Finsrud et al., 2022; Wright & Davis, 1994), proper self-efficacy (Bandura, 1977; Lightsey, 1999), or the effectiveness of different intervention techniques (Craske et al., 1988; Rief & Glombiewski, 2017).

In clinical psychology research, some authors could observe not only a higher amount of dysfunctional expectations but also a lack of expectation adaptation after expectation violating experiences (Kirchner et al., 2022; Kube, Kirchner, et al., 2019; Kube et al., 2020; Rief &

Joormann, 2019). Not only the content of a certain expectation should be considered, but also to involve responsible information processing factors that are responsible for expectation origination, maintenance, and modification. The concept of expectation is prominent in action planning and decision-making models (Atkinson & Feather, 1966; Kahneman & Tversky, 2013). A similar generalized model called the ViolEx-model was developed (Rief et al., 2015) to describe rigid expectations as core features of mental disorders. It postulates that generalized expectations are formed by previous experiences, social influences, and individual differences (Gollwitzer et al., 2018; Rief et al., 2015). From these generalized expectations, situation-specific predictions are derived. Depending on the experience, these situation-specific expectations can be confirmed or violated. Normally, after an expectation violation, the next situation-specific expectations are altered and matched to the made experience. In mental disorders such as depression, these expectation adjustments, happen too seldom. One problem, as suggested by the ViolEx model and several experimental studies, could be cognitive immunization (Gollwitzer et al., 2018; Kube, Rief, et al., 2019; Pinquart et al., 2021). It refers to a reappraisal of an expectation-violating experience in order to maintain the original expectation. A typical example can be the thought "*it was only an exception"*.

Through different experimental studies, processes leading to a lack of expectation adjustment to disconfirming experiences seem to be particularly relevant (Kube, Glombiewski, Gall, et al., 2019; Kube, Rief, et al., 2017; Kube, Rief, et al., 2019). A prominent and long known process in cognitive behavioral theories leading to persistence of dysfunctional expectations or beliefs is avoidance (Aldao et al., 2010; Hofmann & Hay, 2018; Servatius, 2016). When anxiety disorders are invoked, dysfunctional expectations as for example *"Something bad will happen"* or "*They will laugh at me"* are addressed explicitly with the help of exposure, whereby avoidance is counteracted (Clark, 1999; Craske et al., 1988; Craske et al., 2014). People with mental disorders do not only show an increased

number of dysfunctional expectations and increased avoidant behavior, but also a lack in the ability to accommodate these dysfunctional expectations after new expectation-disconfirming experiences (Kube, D'Astolfo, et al., 2017; Rief & Joormann, 2019). Patients with depression for example show more difficulties in changing negative performance expectations after expectation-violating experience (Kube, Rief, et al., 2019). This seems to confirm the idea of immunization processes after expectation violation leading to expectation persistence. Increased dysfunctional expectations as well as a dysfunction in the adaptation process are hypothesized to be a part of the psychopathology of several mental disorders, and thus, should be directly and explicitly addressed as mechanisms of change (Craske et al., 2014). To do so, the integration of expectation focused psychotherapeutic interventions (EFPI) in psychotherapy was proposed (Kube, Glombiewski, & Rief, 2019; Rief & Glombiewski, 2016). Besides psychoeducation about dysfunctional and persistent expectations, treatment expectations should be made conscious, whereby change motivation can be fostered. During the therapy process, it should be encouraged to test and evaluate expectations and at best to make new, expectation violating experiences. Psychological flexibility is considered to be a general goal of psychological interventions (Hayes et al., 2012), but this is typically hindered by cognitive immunization strategies. Therefore, a reduction of cognitive immunization should support participant's well-being by opening options for psychological flexibility.

The COVID pandemic led to an increase in depression and anxiety (Salari et al., 2020), leading to a high demand of supportive offers due to the increasing waiting lists (Brakemeier et al., 2020) for psychotherapeutic help. Internet-based interventions seem to be promising to allow subliminal help as they can have an effect on psychopathological symptoms, whereas some authors even speak about similar effectiveness as face-to-face therapy (Andersson et al., 2013; Barak et al., 2008).

This article aims at verifying the effectiveness of online expectation focused psychological interventions on immunization processes in people with mild depressive and/ or anxious symptoms. We assume that dealing with expectations and their influence on feelings and behavior, as well as promoting the active testing of these expectations by making new experiences, leads to a reduction of immunization and, thus, to a more flexible expectation adaptation. In this online randomized controlled trial, mildly depressed or anxious subjects are divided into 3 groups. The experimental group (active control group ACG) receives a psychoeducation video and is asked to conduct behavioral experiments over four weeks. The ACG is instructed to observe personal expectations over four weeks. The passive control group (CG) receives no interventions during the four weeks. It is assumed that the EFPI group compared to the ACG and the CG will experience the highest reduction in cognitive immunization processes. Moreover, psychopathological symptom severity, e.g., depressive and anxiety symptom severity, will moderate the effect of the online interventions on immunization processes, suggesting higher symptom burden goes along with a higher immunization level leading EFPI to be more effective.

Materials and Methods

Participants

Recruitment. Participants were recruited via flyers in public places like university buildings, supermarkets, general practitioner practices, pharmacies, and hospitals, via groups on social media platforms, via SONA (Research Participation System of the Philipps-University of Marburg), as well as via mailing lists of the Philipps-University of Marburg (students and employees) and other Universities in German-speaking countries. Further on, support groups for depression and anxiety disorders were contacted. The recruitment took place between April 2021 and February 2022. For each participant, one Euro was donated to

an organization dedicated to anti-stigmatization of people with mental illness. Psychology students could receive credit points for their Bachelor's degree.

Inclusion criteria. The target sample should fulfill mild depressive and/ or anxiety symptoms. A cutoff range in the German version of the Patient Health Questionnaire PHQ-9 (Gräfe et al., 2004) of five to nine indicating a mild depression was set. Alternatively, a cut-off range in the Beck Anxiety Inventory BAI (Margraf & Ehlers, 2007) between 8 to 25 indicating mild to moderate anxiety not clinically relevant, could be fulfilled. A minimum of 18 years of age, sufficient German language skills, and access to a personal E-Mail-Account should be given.

Study design

The study was completely conducted online using the survey framework formr (Arslan et al., 2020). At all measurement points, the questionnaires were automatically sent by formr per E-mail to the participants. The E-Mail-address is gathered at the beginning of the study and is stored pseudonymously by the program. After clicking on the study link, participants were let to the study information and informed consent that they had to agree to in order to continue with the study. The subjects were then automatically randomized by the program (Arslan et al., 2020) into one of three groups: the EFPI group, the ACG or the CG (see below). Further, all the participants were asked to complete baseline questionnaires (see variables for details). After the baseline assessment, further procedure differed between the groups (see figure 1).

For the EFPI group, a psychoeducation video about the role of expectations on adequate behavior and emotion, as well as the link to problematic expectations was presented directly after the completion of the baseline questionnaires. After three days, participants were introduced to behavioral experiments for the first time with the goal to test their burdensome and situation-specific expectations (see instructions appendix A1). The chosen expectation should be very specific and testable during the next three days. Participants wrote down the

planned experiment, their specific expectation concerning that situation, and their actual belief in this expectation (in percentage 0-100%). The associated feeling was also documented. Moreover, they should reflect their behavior in the future situation (How can I confirm / disconfirm the expectation through my behavior?). After three days, the individuals evaluated the experiment and planned a new one. This procedure was repeated twice a week over 4 weeks.

For the ACG, the same psychoeducation video was shown. The participants did not learn about behavioral experiments. Instead, this group was asked to document their own (burdensome) expectations during the days between the questionnaires and to rate them as helpful or unhelpful, as well as their associated feelings and behaviors. Every three days over 4 weeks they answered these questions.

The CG did not receive any psychoeducation or questionnaires in between.

After four weeks, all groups were asked to complete the post questionnaires. After four more weeks, the participants completed a follow-up measurement.

Materials

Psychoeducation video. The video leads the individual through five questions: *What are expectations? Why do humans have expectations? How do expectations arise? Why do certain expectations remain stable? When are expectations causing problems?* The questions were answered by the basic explanation of the ViolEx model and by the content suggestions of a psychoeducation given by Rief & Glombiewski (2016). Expectations are defined as thoughts directed to future. They can be neutral, positive, or negative and stand in the interaction to the environment. They are automatically created and not always conscious. Expectations are created by experience, by our social environment and individual differences. The evolutionary adaptiveness of planning proper behavior to avoid harm is highlighted. Stability in functional expectations is defined as adaptive, but the maintenance of dysfunctional expectations can

lead to suffering through avoidance of different situations. Avoidance and immunization processes are highlighted leading rigidity in expectations. Avoidance leads to reduced fact gathering by experiences leading to a distorted reception of reality. Even if an expectation-violation is experienced, the human brain can interpret it as a not considerable fact, whereby a distorted view of the reality can't be corrected. The importance of the conscious observation of negative expectations and the occasional testing of these is emphasized.

Cognitive intervention. The cognitive intervention was absolved by the EFPI group and the ACG. A situation analysis or SORC model often used in cognitive-behavioral psychotherapy presented the basis of the cognitive intervention (Borg-Laufs, 2020). This method allows a specific analysis of different situations by naming the thoughts, physical sensations, feelings, shown behavior, and its consequences. Participants chose one burdensome expectation in the last three days. Then they should try to name the feeling and the physical sensations triggered by this specific expectation. The shown behavior as a reaction to this expectation should be described as well as the consequences of shown behavior.

Behavioral experiments. Behavioral experiments were only performed by the EFPI group. The instructions of the behavioral experiments are based on the suggestions of Rief and Glombiewski (2016). A certain negative or incriminating expectation should be chosen. This expectation should be formulated in a very precise and situation-specific way, so it could be testable in the next three days. The believability in the expectation in question should be rated (0-100%) and the suitable emotion should be specified. Moreover, the future behavior in that testing situation should be reflected (*How can I behave to confirm my expectation? How can I behave to disconfirm my expectation?*). After three days, the participant should rate the believability of expectation again. Moreover, perceived indications confirming, or

disconfirming should be written down, as well as further possible interpretations of the situation different from the initial expectation.

Measures

Demographics. Age, sex, nationality, education, profession, diagnosed mental disorder (now and past), psychotherapeutic treatment (now and past) was assessed.

Cognitive Immunization. Immunization processes were measured with the 23-item immunization scale (Ewen et al., [in submission]) capturing on three subscales negative expectations, assimilation and cognitive immunization.

Psychopathology. To assess depressive symptoms, the Patient Health Questionnaire – German Version PHQ-9 (Gräfe et al., 2004) was used. The 9-item scale records primarily the depression criteria defined by the Diagnostic and Statistical Manual of Mental Disorders DSM-IV. Severity is defined as follows: a sum score of 1 to 4 represents minimal depressive symptoms, 5 to 9 mild, 10 to 14 medium and 15 to 27 severe depressive symptoms. The Beck Anxiety Inventory BAI (Margraf & Ehlers, 2007) captures the anxiety level with 21 items. A sum score of 0 to 7 classifies minimal, 8 to 15 mild, 16 to 25 moderate and 26 to 63 severe anxiety symptoms. A sum score of 26 or above is defined as clinically relevant anxiety.

Ethics

The local ethics committee of the Department of Psychology, Philipps-University Marburg approved the study (reference number 2020-84k). The study has been preregistered at the open science framework OSF (osf.io/cxzb9).

Statistical analyses

All analyses are conducted using RStudio version 1.2.5042 (RStudio, 2009-2020).To counteract the influence of missing values at the second and third assessment time point, non-completed sum scores of the different dependent variables were estimated with multiple

imputation (Donders, van der Heijden, Stijnen, & Moons, 2006) using the MICE package (Van Buuren & Groothuis-Oudshoorn, 2011).

Before the analyses were conducted, the Mahalanobis distance was calculated and checked against a χ^2-cut-off of α=.001. No conspicuous data could be found. The mixed effects analyses were calculated using the package *lme4* (Bates et al., 2018) and *lmerTest* (Kuznetsova et al., 2015). As predictors, the interaction term *time*group* was included, as random effect the intercepts of the participants and the slope, allowing the trend over time to vary for each participant, were implemented. The package emmeans (Lenth et al., 2018) was used to calculate contrasts. For moderator analyses the moderator variables were inserted as a triple interaction into the model. Moreover, the model with and without the moderating term were compared by using the Chi-square difference test. The homoscedasticity and normality were checked by using residual plots showing the expected pattern. Due to an increased amount of missings, the number of imputations was set on 50 (Bodner, 2008; White et al., 2011). The distribution of the missing values is assumed to be missing at random (MAR), so that the missing values are independent of the value itself. The baseline assessment included no missing values (n = 128), the second assessment timepoint showed 54%, and the third timepoint 66% of missing values.

Results

Sample characteristics

543 individuals agreed on the informed consent, whereas 230 participants were excluded due to incomplete data in the baseline assessment. Moreover, 185 participants did not fulfill the inclusion criteria resulting in a data set with 128 participants. 41 individuals were randomized in the EFPI group, 38 in the ACG and 49 in the CG (see figure 2).

The mean age of the sample was 28.88 (13.00). 82.81 % of the participants were female, 16.41 % male and 0.78 % assigned to the category other. 91.41 % had a German nationality.

Higher education (university degree) was indicated in 24.22 % of the participants, whereas 78.13 % represented university students. 21.88 % participants indicated a diagnosed mental disorder in the past, 8.59 % participants an actual one. 33.59 % absolved a psychotherapy during lifetime, whereas 12.50 % of the participants were in psychotherapeutic treatment while undergoing the study. The different mean and standard deviations of the assessed questionnaires for imputed and non-imputed data for the post and follow-up measurement are resumed in table 1.

Cognitive Immunization

The main effect timepoint ($F(2, 122) = 19.96$, $p < 0.001$) showed a highly significant result, whereas the group effect ($F(2,122) = 2.21$, $p = 0.114$) was not significant. The interaction of timepoint and group ($F(4,122) = 2.12$, $p = 0.082$) were only marginally significant.

Looking at the contrasts of the timepoints between the groups, we found in the first group significant differences between all the measurement timepoints (baseline-post: $t(121)= 3.08$, $p = 0.007$; post-follow-up: $t(120)=3.15$, $p = 0.006$; baseline-follow-up: $t(122)= 5.24$, $p < 0.001$). In the ACG we found a significant difference between Baseline and the follow-up measurement timepoint ($t(121)= 3.46$, $p = 0.002$), whereas the difference between baseline and post was marginally non-significant ($t(121)= 2.17$, $p = 0.080$). CG showed a significant difference between Baseline and post measurement timepoint ($t(122)=2.60$, $p = 0.028$). A significant group difference was found at the follow-up timepoint between the EFPI group and the CG ($t(122)= -3.25$, $p = 0.004$). The interaction plot can be seen under figure 3.

Psychopathology

Depressiveness PHQ. No significant main (timepoint: $F(2,121) = 0.18$, $p = 0.311$; group: $F(2,122) = 0.20$, $p = 0.820$) or interaction ($F(4,121) = 1.23$, $p = 0.300$) effects could be found. Contrast analyses showed no significant differences between groups and timepoints, the only

marginally non-significant result was found between the post and follow-up measurement timepoint in the EFPI group ($t(122)= 2.31$, $p = 0.058$; see interaction plot figure 4).

Anxiety BAI. A strong significant main effect for timepoint could be found ($F(2,125) = 14.46$, $p < 0.001$). The main effect group ($F(2,122) = 0.20$, $p = 0.819$) was non-significant, the interaction effect ($F(4,125) =2.89$, $p = 0.025$) showed a significant result.

Contrast analyses showed a significant difference between the timepoints in the EFPI group. In the EFPI group, baseline and post was marginally non-significant ($t(121)= 2.29$, $p = 0.061$), post and follow-up showed a significant difference ($t(119)= 5.03$, $p < 0.001$; see interaction plot figure 4).

Moderations

IMS and PHQ. The model integrating the depressive symptoms as a moderator (AIC 3013.2) explains only nearly significant more variance as the model without moderator (AIC 3016.5; $\chi^2(9) = 16.28$, $p = 0.061$).

In the triple interaction model, the main effect timepoint ($F(2,123) = 4.68$, $p = 0.011$) and the interaction of timepoint and PHQ ($F(2,123) = 3.48$, $p = 0.034$) showed significant results. The triple interaction was not significant ($F(4,123) = 3.48$, $p = 0.417$).

IMS and BAI. Integrating anxiety as a moderator in the mixed model (interaction model: AIC 2981.6 triple interaction model: AIC 2974.1), explained the data significantly better ($\chi^2(9) = 25.45$, $p < 0.003$).

Significant main effect in group ($F(2,119) = 6.23$, $p = 0.002$) was found. The interaction between timepoint and BAI ($F(2,122) = 6.43$, $p = 0.002$) and group x BAI ($F(2,119) = 4.27$, $p = 0.016$) were significant. The triple interaction was non-significant ($F(4,122) = 0.40$, $p = 0.806$).

Discussion

The main aim of this study was to evaluate expectation-focused online-interventions in the effectiveness of reducing immunization. The first hypothesis postulating a higher reduction in immunization, in the EFPI group in a population with mild symptom severity can be interpreted as partially confirmed. The nearly significant interaction between timepoint and group indicates a difference in immunization, depending on the group and the timepoint. Contrast analyses clearly showed that the EFPI could reduce the immunization level, at least compared to the CG. Moreover, the EFPI group was the only one, in which over the three timepoints, the immunization level was significantly reduced. Based on the results, online EFPI can be postulated as effective in reducing immunization. This is in line with the findings of some other studies (Kube, Glombiewski, Gall, et al., 2019; Kube, Glombiewski, & Rief, 2019; Rief & Joormann, 2019). The results, although not significant, sign off a superiority of interventions integrating cognitive and behavioral changes in contrast to purely cognitive interventions. It strengthens the relevance and effectiveness of corrective experiences (Castonguay & Hill, 2012a, 2012b; Constantino & Westra, 2012), whereby it can be fostered by reducing immunization processes which blocks the effect of these.

Further on, the EFPI seemed to have an influence on psychopathological symptoms. Even if the interaction term was not significant including for the model including depressive symptoms, the regression model integrating the anxiety symptoms showed a significant interaction between the groups and timepoints. The EFPI seems to be able to significantly reduce anxiety symptoms. Looking at the moderator analyses, the model including the anxiety symptoms could significantly better explain the data, the model including the level of depressive symptoms was nearly significant. It seems like psychopathology, and especially anxiety, plays a role and is related to the immunization level. This goes in line with the findings of the effectiveness of behavioral experiments for anxiety disorders and the idea of

exposing rather as avoiding dysfunctional expectations (Craske et al., 2014; McMillan & Lee, 2010).

The decline in immunization even at four weeks follow-up, may be an indication, that these interventions not only work at symptom level but rather leading to changes in information processing mechanisms. Subjects were encouraged to make new experiences and to explicitly use these experiences to challenge preexisting expectations. Through the regular updating process, the discrepancy between proper assumptions and reality decreases, which is often the case for people with mental illnesses (Berg et al., 2021). In other words, EFPI make people more flexible in thinking, by fostering the regular updating process, through which different situational interpretations can be consulted and considered (Fröber et al., 2018; Liknaitzky et al., 2017; Liknaitzky et al., 2018; Meiran et al., 2011).

Strengths and limitations

This study is the first one proposing and testing expectation focused psychological interventions in a longitudinal online study in a very economical way. Until now, cognitive immunization was always assessed through complex experimental designs, whereby this study firstly shows the effectiveness of EFPI in reducing immunization over time by using a simple self-rating questionnaire in a naturalistic setting (Ewen et al., [in submission]). This study contributes to the validation of the IMS showing the possibility to influence immunization after an expectation violation with the help of specific interventions. Moreover, through the CG, processes of immunization seem to be stable over time. Another advantage is that the design allowed subliminal support in an uncertain situation during the COVID pandemic. Moreover, this study shows, that EFPI can even have an influence on subliminal or mild psychopathological symptoms, whereas EFPI probably have a positive effect on well-being.

The results should be interpreted considering the limitation. Several participants were lost to post assessments and follow-up. The lack of therapeutic contact in a standalone therapeutic online program made it very easy for the participants to drop out early. Following studies could address that by using smartphone apps or by offering therapeutic support. As the design of this study was constructed using e-mail-addresses to contact the participants, the accessibility, and the control over the completion of the questionnaires was limited. This limitation entails a caution interpretation of the data due to the imputation of the missing data, even if this method is already well established (Enders, 2017). In addition, the inclusion criteria seemed to be rather restrictive, resulting in a smaller study sample.

Future research and practical implications

In future research, participants with mental disorders should be included, whereby the use of EFPI in psychotherapy should be evaluated over the course of a sufficient Cognitive Behavioral Therapy (Wilhelm et al., 2022). Moreover, although this study showed no significant moderations of psychopathology on immunization processes, moderating effects should be looked at more closely in further studies. To better understand the underlying mechanisms of cognitive immunization, it would be interesting to look at the cognitive flexibility as it is done in the studies mentioned above (Fröber et al., 2018; Liknaitzky et al., 2018). The connection of expectation management and predictive coding approaches is a growing research area, which should also be investigated (Kube et al., 2021). Furthermore, the question arises if other forms of mental illnesses present a similar increase in immunization and if EFPI could also be of help.

Regarding practical implications, this study suggests the integration of EFPI into psychotherapy (Kube, Glombiewski, & Rief, 2019; Rief & Glombiewski, 2016). The interventions show to have a long-term impact on psychopathology. By actively addressing persistent and dysfunctional expectations in psychotherapy, the therapist is empowered to

help patients change these inhibiting cognitive patterns. EFPI offer the blueprint to do so by reducing cognitive immunization and therefore helping to make the expectation adaptation more flexible.

Conclusion

This study is the first proving the effectiveness of expectation-focused psychological interventions over a two-month period. These interventions, while delivered online without offering therapeutic support, have shown to reduce cognitive immunization processes. These are responsible for persistent dysfunctional expectations, leading to a higher expectation adaptation to situational experiences in individuals with mild depressive and / or anxiety symptoms. Furthermore, cognitive immunization and psychopathology seem to be related, whereby the reduction of cognitive immunization leads presumably to the reduction of psychopathological symptoms.

Literature

Al-Darmaki, F., & Kivlighan, D. M. (1993). Congruence in client-counselor expectations for relationship and the working alliance. *Journal of Counseling Psychology*, *40*(4), 379.

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review [Review]. *Clinical Psychology Review*, *30*(2), 217-237. https://doi.org/10.1016/j.cpr.2009.11.004

Andersson, G., Carlbring, P., Ljótsson, B., & Hedman, E. (2013). Guided internet-based CBT for common mental disorders. *Journal of Contemporary Psychotherapy*, *43*(4), 223-233.

Arslan, R. C., Walther, M. P., & Tata, C. S. (2020). formr: A study framework allowing for automated feedback generation and complex longitudinal experience-sampling studies using R. *Behavior Research Methods*, *52*(1), 376-387.

Atkinson, J. W., & Feather, N. T. (1966). *A theory of achievement motivation* (Vol. 66). Wiley New York.

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological review*, *84*(2), 191.

Barak, A., Hen, L., Boniel-Nissim, M., & Shapira, N. a. (2008). A comprehensive review and a meta-analysis of the effectiveness of internet-based psychotherapeutic interventions. *Journal of Technology in Human services*, *26*(2-4), 109-160.

Bates, D., Maechler, M., Bolker, B., Walker, S., Christensen, R. H. B., Singmann, H., . . . Green, P. (2018). Package 'lme4'. *Version*, *1*(17), 437.

Berg, M., Feldmann, M., & Kube, T. (2021). Oversampled and undersolved: Depressive rumination from a predictive coding perspective.

Bingel, U. (2020). Placebo 2.0: the impact of expectations on analgesic treatment outcome. *Pain*, *161*, S48-S56.

Bodner, T. E. (2008). What improves with increased missing data imputations? *Structural equation modeling: a multidisciplinary journal*, *15*(4), 651-675.

Borg-Laufs, M. (2020). *Die Funktionale Verhaltensanalyse: Ein praktischer Leitfaden für Psychotherapie, Sozialarbeit und Beratung*. Springer.

Brakemeier, E.-L., Wirkner, J., Knaevelsrud, C., Wurm, S., Christiansen, H., Lueken, U., & Schneider, S. (2020). Die COVID-19-Pandemie als Herausforderung für die psychische Gesundheit. *Zeitschrift für Klinische Psychologie und Psychotherapie*.

Castonguay, L. G., & Hill, C. E. (2012a). Corrective experiences in psychotherapy: An introduction.

Castonguay, L. G., & Hill, C. E. (2012b). *Transformation in psychotherapy: Corrective experiences across cognitive behavioral, humanistic, and psychodynamic approaches*. American Psychological Association.

Clark, D. M. (1999). Anxiety disorders: Why they persist and how to treat them. *Behaviour research and therapy*, *37*(1), S5.

Constantino, M. J., Ametrano, R. M., & Greenberg, R. P. (2012). Clinician interventions and participant characteristics that foster adaptive patient expectations for psychotherapy and psychotherapeutic change. *Psychotherapy*, *49*(4), 557.

Constantino, M. J., Arnkoff, D. B., Glass, C. R., Ametrano, R. M., & Smith, J. Z. (2011). Expectations. *Journal of clinical psychology*, *67*(2), 184-192.

Constantino, M. J., & Westra, H. A. (2012). An expectancy-based approach to facilitating corrective experiences in psychotherapy.

Craske, M. G., Rapee, R. M., & Barlow, D. H. (1988). THE SIGNIFICANCE OF PANIC-EXPECTANCY FOR INDIVIDUAL PATTERNS OF AVOIDANCE [Article]. *Behavior Therapy*, *19*(4), 577-592. https://doi.org/10.1016/s0005-7894(88)80025-x

Craske, M. G., Treanor, M., Conway, C. C., Zbozinek, T., & Vervliet, B. (2014). Maximizing exposure therapy: An inhibitory learning approach [Article]. *Behaviour Research and Therapy*, *58*, 10-23. https://doi.org/10.1016/j.brat.2014.04.006

Enders, C. K. (2017). Multiple imputation as a flexible tool for missing data handling in clinical research. *Behaviour research and therapy*, *98*, 4-18.

Evers, A. W., Colloca, L., Blease, C., Annoni, M., Atlas, L. Y., Benedetti, F., . . . Colagiuri, B. (2018). Implications of placebo and nocebo effects for clinical practice: expert consensus. *Psychotherapy and psychosomatics*, *87*(4), 204-210.

Ewen, A., Rief, W., & Wilhelm, M. ([in submission]). *Immunization Scale*.

Finsrud, I., Nissen-Lie, H. A., Vrabel, K., Høstmælingen, A., Wampold, B. E., & Ulvenes, P. G. (2022). It's the therapist and the treatment: The structure of common therapeutic relationship factors. *Psychotherapy Research*, *32*(2), 139-150.

Fröber, K., Raith, L., & Dreisbach, G. (2018). The dynamic balance between cognitive flexibility and stability: the influence of local changes in reward expectation and global task context on voluntary switch rate. *Psychological Research*, *82*(1), 65-77.

Gollwitzer, M., Thorwart, A., & Meissner, K. (2018). Editorial: Psychological Responses to Violations of Expectations [Editorial Material]. *Frontiers in Psychology*, *8*, 3, Article 2357. https://doi.org/10.3389/fpsyg.2017.02357

Grawe, K. (2000). *Psychologische Therapie* (k. Auflage, Ed.). Hogrefe.

Grawe, K., Donati, R., & Bernauer, F. (1994). *Psychotherapie im Wandel: von der Konfession zur Profession*. Hogrefe, Verlag für Psychologie Göttingen.

Greenberg, R. P., Constantino, M. J., & Bruce, N. (2006). Are patient expectations still relevant for psychotherapy process and outcome? *Clinical psychology review*, *26*(6), 657-678.

Gräfe, K., Zipfel, S., Herzog, W., & Löwe, B. (2004). Screening psychischer Störungen mit dem "Gesundheitsfragebogen für Patienten (PHQ-D)". *Diagnostica*, *50*(4), 171-181.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2012). *Acceptance and Commitment Therapy. The Process and Practice of Mindful Change.* (2 ed.). Guilford.

Hofmann, S. G., & Hay, A. C. (2018). Rethinking avoidance: Toward a balanced approach to avoidance in treating anxiety disorders. *Journal of anxiety disorders*, *55*, 14-21.

Kahneman, D., & Tversky, A. (2013). Prospect theory: An analysis of decision under risk. In *Handbook of the fundamentals of financial decision making: Part I* (pp. 99-127). World Scientific.

Kirchner, L., Schummer, S. E., Krug, H., Kube, T., & Rief, W. (2022). How social rejection expectations and depressive symptoms bi-directionally predict each other‐A cross-lagged panel analysis. *Psychology and Psychotherapy: Theory, Research and Practice*.

Kirsch, I. (2018). Response expectancy and the placebo effect. *International review of neurobiology*, *138*, 81-93.

Kirsch, I., Wampold, B., & Kelley, J. M. (2016). Controlling for the placebo effect in psychotherapy: Noble quest or tilting at windmills? *Psychology of Consciousness: Theory, Research, and Practice*, *3*(2), 121.

Kube, T., D'Astolfo, L., Glombiewski, J. A., Doering, B. K., & Rief, W. (2017). Focusing on situation-specific expectations in major depression as basis for behavioural experiments - Development of the Depressive Expectations Scale. *Psychology and Psychotherapy-Theory Research and Practice*, *90*(3), 336-352. https://doi.org/10.1111/papt.12114

Kube, T., Glombiewski, J. A., Gall, J., Touissant, L., Gartner, T., & Rief, W. (2019). How to modify persisting negative expectations in major depression? An experimental study comparing three strategies to inhibit cognitive immunization against novel positive experiences. *Journal of Affective Disorders*, *250*, 231-240. https://doi.org/10.1016/j.jad.2019.03.027

Kube, T., Glombiewski, J. A., & Rief, W. (2019). Expectation-Focused Psychotherapeutic Interventions for People with Depressive Symptoms. *Verhaltenstherapie*, *29*(4), 281-291. https://doi.org/10.1159/000496944

Kube, T., Kirchner, L., Lemmer, G., & Glombiewski, J. A. (2021). How the Discrepancy Between Prior Expectations and New Information Influences Expectation Updating in Depression−The Greater, the Better? *Clinical Psychological Science*, 21677026211024644.

Kube, T., Kirchner, L., Rief, W., Gartner, T., & Glombiewski, J. A. (2019). Belief updating in depression is not related to increased sensitivity to unexpectedly negative information. *Behaviour Research and Therapy*, *123*, Article 103509. https://doi.org/10.1016/j.brat.2019.103509

Kube, T., Rief, W., & Glombiewski, J. A. (2017). On the Maintenance of Expectations in Major Depression - Investigating a Neglected Phenomenon. *Frontiers in Psychology*, *8*, Article 9. https://doi.org/10.3389/fpsyg.2017.00009

Kube, T., Rief, W., Gollwitzer, M., Gartner, T., & Glombiewski, J. A. (2019). Why dysfunctional expectations in depression persist - Results from two experimental studies investigating cognitive immunization. *Psychological Medicine*, *49*(9), 1532-1544. https://doi.org/10.1017/s0033291718002106

Kube, T., Schwarting, R., Rozenkrantz, L., Glombiewski, J. A., & Rief, W. (2020). Distorted cognitive processes in major depression: a predictive processing perspective. *Biological psychiatry*, *87*(5), 388-398.

Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2015). Package ‘lmertest’. *R package version*, *2*(0), 734.

Lenth, R., Singmann, H., Love, J., Buerkner, P., & Herve, M. (2018). Emmeans: Estimated marginal means, aka least-squares means. *R package version*, *1*(1), 3.

Lightsey, R. (1999). Albert Bandura and the exercise of self-efficacy. *Journal of Cognitive Psychotherapy*, *13*(2), 158.

Liknaitzky, P., Smillie, L. D., & Allen, N. B. (2017). Out-of-the-Blue: Depressive Symptoms are Associated with Deficits in Processing Inferential Expectancy-Violations Using a Novel Cognitive Rigidity Task [Article]. *Cognitive Therapy and Research*, *41*(5), 757-776. https://doi.org/10.1007/s10608-017-9853-x

Liknaitzky, P., Smillie, L. D., & Allen, N. B. (2018). The low and narrow: A preliminary test of the association between depressive symptoms and deficits in producing divergent inferences. *Creativity Research Journal*, *30*(1), 67-77.

Margraf, J., & Ehlers, A. (2007). *Beck Angst-Inventar (BAI) - Deutsche Ausgabe*. Harcourt.

McMillan, D., & Lee, R. (2010). A systematic review of behavioral experiments vs. exposure alone in the treatment of anxiety disorders: A case of exposure while wearing the emperor's new clothes? *Clinical psychology review*, *30*(5), 467-478.

Meiran, N., Diamond, G. M., Toder, D., & Nemets, B. (2011). Cognitive rigidity in unipolar depression and obsessive compulsive disorder: Examination of task switching, Stroop, working memory updating and post-conflict adaptation. *Psychiatry research*, *185*(1-2), 149-156.

Pinquart, M., Rothers, A., Gollwitzer, M., Khosrowtaj, Z., Pietzsch, M., & Panitz, C. (2021). Predictors of coping with expectation violation: an integrative review. *Review of General Psychology*, *25*(3), 321-333.

Rief, W., & Glombiewski, J. A. (2016). Expectation-Focused Psychological Interventions (EFPI). *Verhaltenstherapie*, *26*(1), 47-54. https://doi.org/10.1159/000442374

Rief, W., & Glombiewski, J. A. (2017). The role of expectations in mental disorders and their treatment. *World Psychiatry*, *16*(2), 210.

Rief, W., Glombiewski, J. A., Gollwitzer, M., Schubö, A., Schwarting, R., & Thorwart, A. (2015). Expectancies as core features of mental disorders. *Current opinion in psychiatry*, *28*(5), 378-385.

Rief, W., & Joormann, J. (2019). Revisiting the cognitive model of depression: The role of expectations. *Clinical Psychology in Europe*, *1*, 1-19.

RStudio, I. (2009-2020). *RStudio*. In (Version 1.2.5042) www.rstudio.com

Salari, N., Hosseinian-Far, A., Jalali, R., Vaisi-Raygani, A., Rasoulpoor, S., Mohammadi, M., . . . Khaledi-Paveh, B. (2020). Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Globalization and health*, *16*(1), 1-11.

Servatius, R. J. (2016). Avoidance: From basic science to psychopathology. In (Vol. 10, pp. 15): Frontiers Media SA.

Van Buuren, S., & Groothuis-Oudshoorn, K. (2011). mice: Multivariate imputation by chained equations in R. *Journal of statistical software*, *45*, 1-67.

Wampold, B. E. (2015). How important are the common factors in psychotherapy? An update. *World Psychiatry*, *14*(3), 270-277.

Wampold, B. E., & Imel, Z. E. (2015). *The Great Psychotherapy Debate: The Evidence for What Makes Psychotherapy Work* (sec. edition ed.). Routledge.

Wampold, B. E., Minami, T., Tierney, S. C., Baskin, T. W., & Bhati, K. S. (2005). The placebo is powerful: estimating placebo effects in medicine and psychotherapy from randomized clinical trials. *Journal of clinical psychology*, *61*(7), 835-854.

White, I. R., Royston, P., & Wood, A. M. (2011). Multiple imputation using chained equations: issues and guidance for practice. *Statistics in medicine*, *30*(4), 377-399.

Wilhelm, M., Bleichhardt, G., Ewen, A.-C., & Rief, W. (2022). Erwartungsfokussierte psychotherapeutische Interventionen bei Depression: ein Behandlungsmanual. *Psychotherapeut*, *67*(3), 204-212.

Wright, J. H., & Davis, D. (1994). The therapeutic relationship in cognitive-behavioral therapy: Patient perceptions and therapist responses. *Cognitive and behavioral practice*, *1*(1), 25-45.

Figures and tables

Figure 1.
Procedure of the experiment.

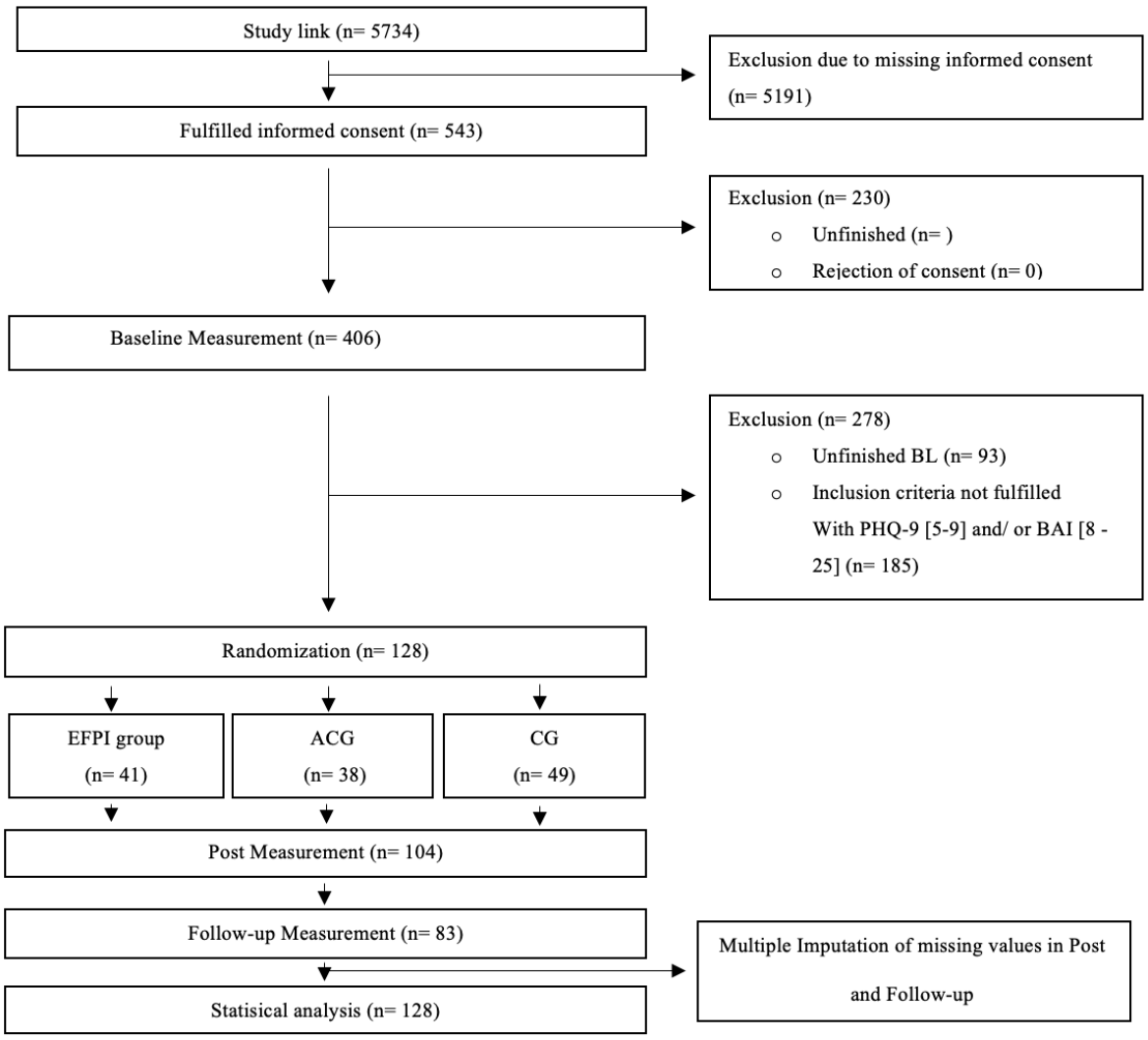


Figure 2.
Flow chart.

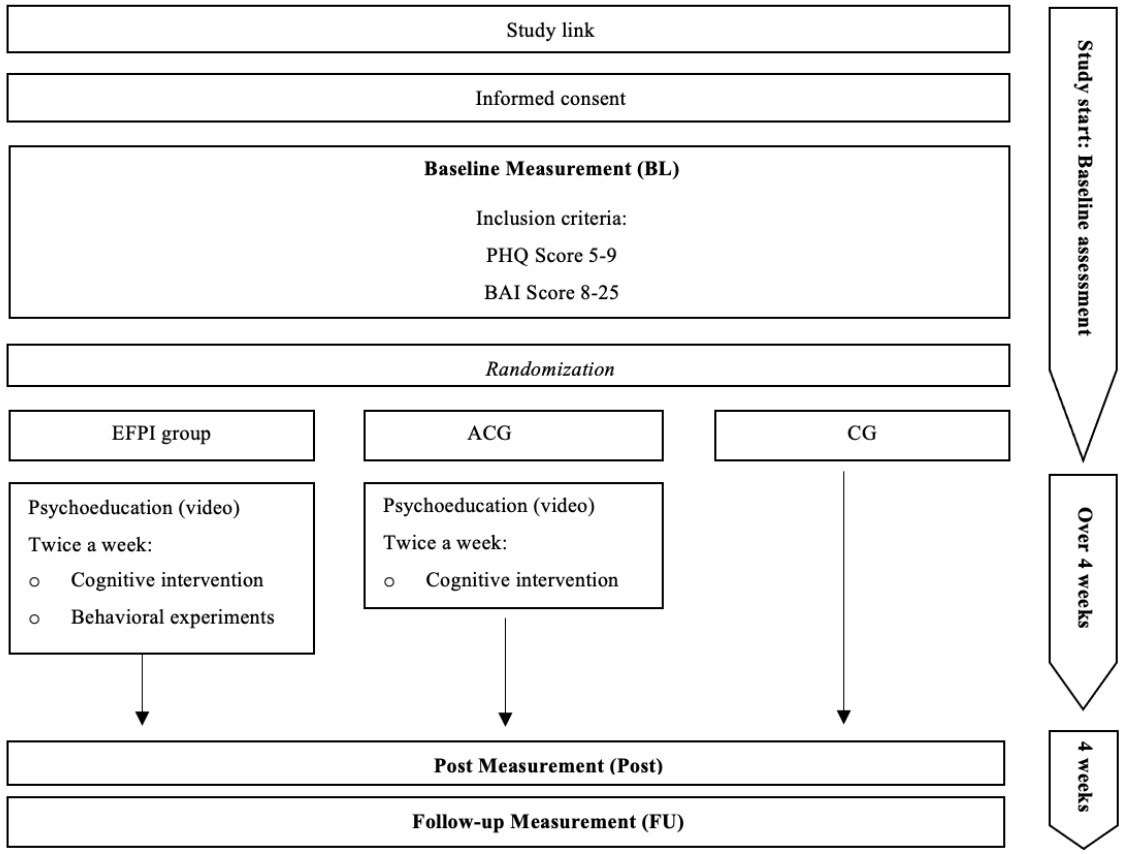
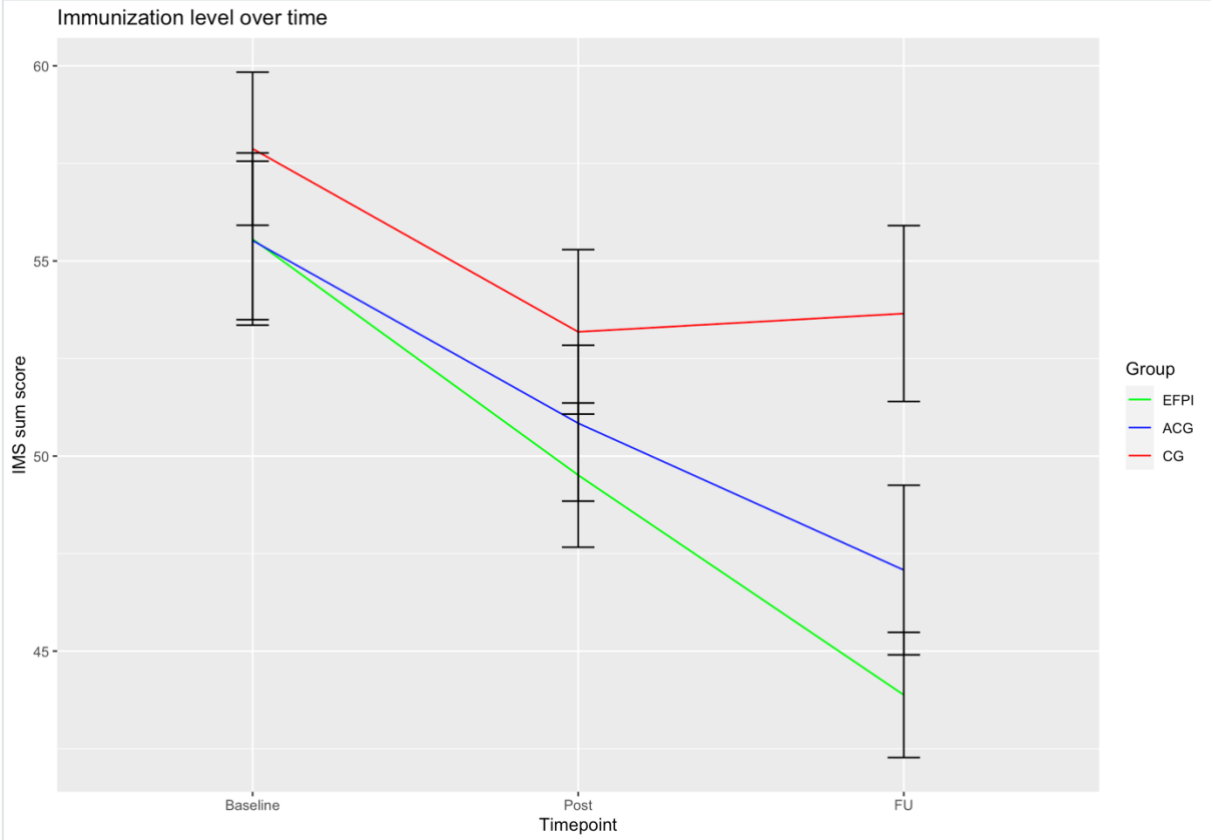
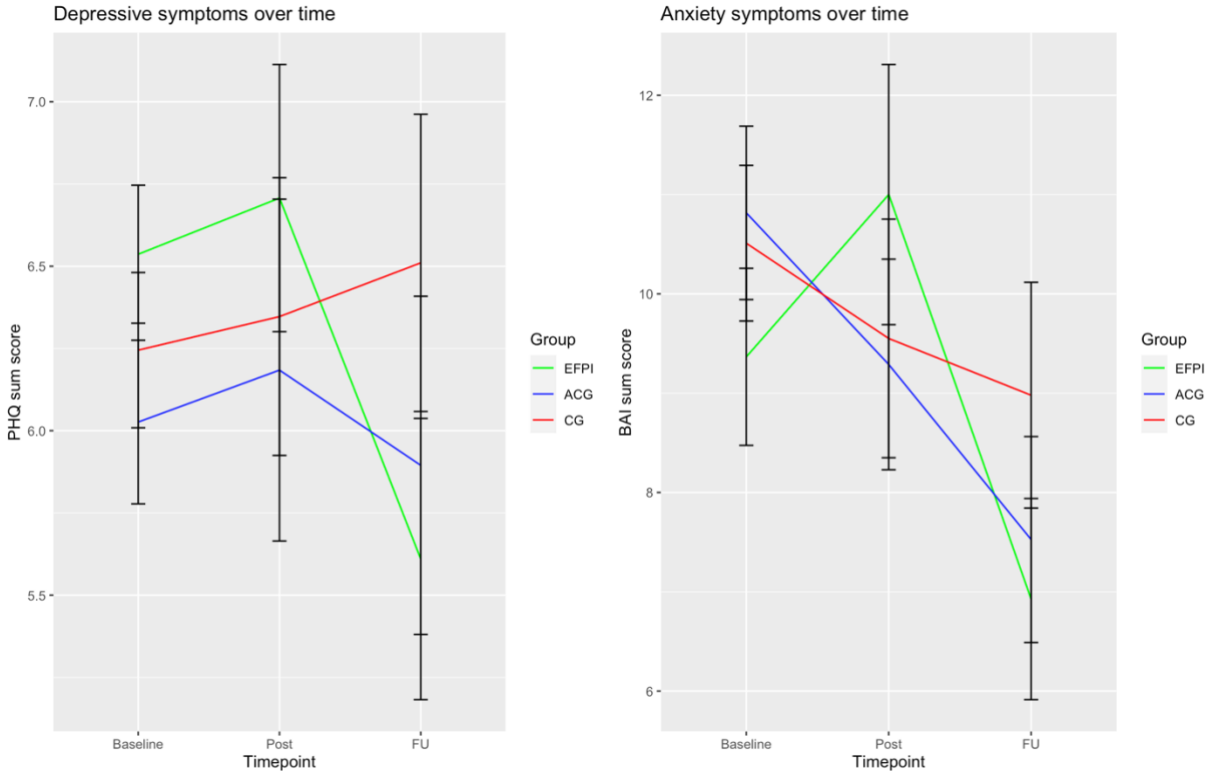


Figure 3.
Interaction plot mapped for the Immunization Scale.



Note. IMS Immunization Scale, Baseline Baseline measurement, Post Post measurement, FU Follow up measurement; EFPI expectation focused psychological interventions, ACG active control group, CG control group.

Figure 4.
Interaction plot mapped for the depressive and anxiety symptoms.



Note. PHQ Patient Health Questionnaire, BAI Beck Anxiety Inventory, Baseline Baseline measurement, Post Post measurement, FU Follow up measurement; EFPI expectation focused psychological interventions, ACG active control group, CG control group.

Table 1.
Demographics: Mean and standard deviations of different variables for the assessment points post and follow-up.

	Total sample n = 128	EFPI n = 41	ACG n = 38	CG n = 49
Age [M (SD)]	28.88 (13.00)	28.07 (12.83)	26.89 (9.89)	31.10 (15.02)
Gender [F/M/N]	106 / 21 / 1	32 / 8 / 1	34 / 4 / 0	40 / 9/ 0
$PHQ_{Baseline}$ [M (SD)]	6.27 (1.53)	6.54 (1.34)	6.03 (1.53)	6.24 (1.65)
PHQ [$_{Post}$M (SD)]	6.81 (3.03)	6.71 (2.60)	6.18 (3.20)	6.35 (2.95)
$PHQ_{Follow\text{-}up}$ [M (SD)]	6.04 (3.04)	5.61 (2.74)	5.89 (3.17)	6.51 (3.16)
$BAI_{Baseline}$ [M (SD)]	10.23 (5.52)	9.37 (5.71)	10.82 (5.28)	10.51 (5.49)
BAI_{Post}[M (SD)]	10.85 (7.89)	11.00 (8.39)	9.29 (6.53)	9.55 (8.40)
$BAI_{Follow\text{-}up\_}$[M (SD)]	7.89 (7.06)	6.49 (6.49)	7.53 (6.39)	8.98 (7.96)
$IMS_{Baseline}$ [M (SD)]	56.44 (13.45)	55.56 (14.13)	55.53 (12.52)	57.88 (13.73)
IMS_{Post} [M (SD)]	51.31 (13.15)	49.51 (11.84)	50.84 (12.31)	53.18 (14.75)
$IMS_{Follow\text{-}up}$[M (SD)]	48.57 (14.05)	43.88 (10.27)	47.08 (13.40)	53.65 (15.78)

Note. Abbreviations: n sample size, M mean, SD standard deviation, F female, M male, N neutral, PHQ Patient Health Questionnaire, BAI Beck anxiety inventory, IMS Immunization scale, NE negative expectations subscale of IMS, avoid avoidance subscale of the IMS, immu immunization subscale of the IMS, EFPI expectation focused psychological intervention, ACG active control group, CG control group

Appendix

A1.

Instructions of the expectation testing experiments to plan during the study.

Vorbereitung	***Preparation***
Im Folgenden geht es nun darum, eigene, vor allem negative und belastende Erwartungen zu testen, welche Sie als nicht hilfreich oder übertrieben einstufen. Dazu werden Sie sogenannte Verhaltensexperimente durchführen. Zuerst können Sie sich eine negative, unangenehme oder belastende Erwartung ausdenken, die bei Ihnen möglicherweise ein negatives Gefühl wie zum Beispiel Angst auslöst. Versuchen Sie zusätzlich eine Erwartung zu finden, die Sie während der nächsten drei Tagen testen können. Versuchen Sie dafür eine sehr konkrete und spezifische Erwartung zu formulieren. Denn je globaler die Erwartung ist, je schwieriger wird es, diese zu überprüfen. Hier ein paar Beispiele von möglichen Erwartungen, die sich einfach testen lassen: „Ich erwarte, morgen meinen Vortrag zu verhauen." Experiment: Ich halte den Vortrag und bin aufmerksam für Hinweise, die meine Erwartung bestätigen oder ablehnen. „Ich erwarte, dass das Familienessen morgen in einem riesen Streit enden wird" Experiment: Ich gehe zum Familienessen hin und achte auf erwartungsverletzende oder erwartungsbestätigende Hinweise. "Ich erwarte, mich beim nächsten Anruf zu versprechen." Experiment: Ich rufe eine Person (z.B. Kollege oder Kollegin/ Arzt oder Ärztin/ Steuerberaterin	In the following, you will now test your own expectations, especially negative and stressful ones, which you classify as unhelpful or exaggerated. To do this, you will conduct so-called behavioral experiments. First, you can think of a negative, unpleasant or stressful expectation that may trigger a negative feeling in you, such as fear. In addition, try to find an expectation that you can test during the next three days. For this, try to formulate a very concrete and specific expectation. This is because the more global the expectation is, the more difficult it will be to test it. Here are a few examples of possible expectations that are easy to test: "I expect to flunk my presentation tomorrow." Experiment: I give the talk and am alert for clues that confirm or deny my expectation. "I expect the family dinner tomorrow to end in a huge fight". Experiment: I go to the family dinner and am alert for cues that violate or confirm my expectation. "I expect to promise myself on the next call." Experiment: I call a person (e.g., colleague/ doctor/ accountant...) and see if I really promise myself. "If I tell my partner that I am not feeling well, he or she will react with incomprehension."

oder Steuerberater...) an und schaue, ob ich mich wirklich verspreche. "Wenn ich meinem Partner oder meiner Partnerin sage, dass es mir nicht gut geht, wird sie oder er mit Unverständnis reagieren."	
Welche negative oder belastende Erwartung möchte ich gerne in den nächsten 3 Tagen testen?	What negative or stressful expectation would I like to test in the next 3 days?
Wieso möchte ich diese Erwartung testen?	Why do I want to test this expectation?
Welches Gefühl löst diese Erwartung bei Ihnen aus?	What feeling does this expectation trigger in you?
Welche Situation möchte ich aufsuchen, um meine Erwartung zu testen? Wie möchte ich meine Erwartung testen?	What situation do I want to go to in order to test my expectation? How do I want to test my expectation?
Was sind meine Erwartungen an die konkrete Situation? Was wird passieren?	What are my expectations for the specific situation? What will happen?
Für wie wahrscheinlich von 0 (gar nicht wahrscheinlich) bis 100 (absolut sicher) halten Sie es, dass diese Erwartung eintreten wird?	From 0 (not at all likely) to 100 (absolutely certain), how likely do you think it is that this expectation will occur?
Was sind mögliche Zeichen, an denen ich erkenne, dass meine Erwartung(en) zutreffen wird?	What are possible signs that I can tell my expectation(s) will be true?
Was sind mögliche Zeichen, an denen ich erkenne, dass meine Erwartung(en) nicht zutreffen wird?	What are possible signs that I can tell that my expectation(s) will not be met?
Wie kann ich verhindern, in der Situation eine neue Erfahrung zu machen?	How can I avoid having a new experience in the situation?
Wie möchte ich mich stattdessen verhalten?	How would I like to behave instead?

Nachbereitung	***Evaluation***
Zuerst würden wir Sie bitten, folgende Fragen zu dem Experiment, das Sie seit der letzten Befragung durchführen sollten, auszufüllen	First, we would like you to complete the following questions about the experiment you were asked to conduct since the last survey.
Konnten Sie das geplante Experiment durchführen?	Were you able to perform the planned experiment?

Falls Nein, wieso konnten Sie das Experiment nicht durchführen?	If not, why could you not perform the experiment?
Was ist in der Situation passiert? Versuche die Situation so objektiv und neutral wie möglich wiederzugeben. Dafür kann es helfen, die Situation wie aus einem Film zu beschreiben.	What happened in the situation? Try to describe the situation as objectively and neutrally as possible. To do this, it can help to describe the situation as if it were a movie.
Welches Gefühl haben Sie während des Verhaltensexperimentes wahrgenommen?	What feeling did you notice during the behavioral experiment?
Welches Gefühl haben Sie während des Verhaltensexperimentes wahrgenommen?	What feeling did you notice during the behavioral experiment?
Welches Gefühl haben Sie nach dem Verhaltensexperiment wahrgenommen?	What feeling did you perceive after the behavioral experiment?
Welches Gefühl haben Sie nach dem Verhaltensexperiment wahrgenommen?	What feeling did you perceive after the behavioral experiment?
Zu wieviel % ist die Erwartung eingetroffen?	What percentage of the expectation has been met?
Wie habe ich mich verhalten?	How did I behave?
Wie interpretiere ich die Situation?	How do I interpret the situation?
Welche Zeichen habe ich wahrgenommen, die gegen meine Erwartungen sprechen?	What signs did I perceive that went against my expectations?
Welche Zeichen habe ich wahrgenommen, die für meine Erwartungen sprechen?	What signs have I perceived that speak to my expectations?
Ergebnisse meines Verhaltensexperimentes - Das nehme ich mit:	Results of my behavioral experiment - This is what I'm taking with me:

A2.

Demographics: Mean and standard deviations of different variables with and without imputed data for the assessment points post and follow-up.

	Total sample n = 128	EFPI n = 41	ACG n = 38	CG n = 49
Age [M (SD)]	28.88 (13.00)	28.07 (12.83)	26.89 (9.89)	31.10 (15.02)
Gender [F/M/N]	106 / 21 / 1	32 / 8 / 1	34 / 4 / 0	40 / 9/ 0
$PHQ_{Baseline}$ [M (SD)]	6.27 (1.53)	6.54 (1.34)	6.03 (1.53)	6.24 (1.65)
PHQ_{Post} [M (SD)]	6.41 (2.91)	7.77 (2.92)	6.29 (3.10)	6.67 (3.06)
$PHQ_{Post\_imputed}$ [M (SD)]	6.81 (3.03)	6.71 (2.60)	6.18 (3.20)	6.35 (2.95)
$PHQ_{Follow\text{-}up}$ [M (SD)]	6.30 (3.20)	7.17 (3.41)	5.82 (2.36)	6.05 (3.52)
$PHQ_{Follow\text{-}up\_imputed}$ [M (SD)]	6.04 (3.04)	5.61 (2.74)	5.89 (3.17)	6.51 (3.16)
$BAI_{Baseline}$ [M (SD)]	10.23 (5.52)	9.37 (5.71)	10.82 (5.28)	10.51 (5.49)
BAI_{Post} [M (SD)]	9.94 (7.87)	12.73 (8.86)	10.06 (4.64)	10.30 (8.97)
$BAI_{Post\_imputed}$ [M (SD)]	10.85 (7.89)	11.00 (8.39)	9.29 (6.53)	9.55 (8.40)
$BAI_{Follow\text{-}up}$ [M (SD)]	9.70 (7.30)	10.42 (8.04)	10.36 (6.10)	8.90 (7.72)
$BAI_{Follow\text{-}up\_imputed}$ [M (SD)]	7.89 (7.06)	6.49 (6.49)	7.53 (6.39)	8.98 (7.96)
$IMS_{Baseline}$ [M (SD)]	56.44 (13.45)	55.56 (14.13)	55.53 (12.52)	57.88 (13.73)
IMS_{Post} [M (SD)]	53.14 (13.34)	54.71 (12.05)	50.29 (12.63)	54.11 (14.54)
$IMS_{Post\_imputed}$ [M (SD)]	51.31 (13.15)	49.51 (11.84)	50.84 (12.31)	53.18 (14.75)
$IMS_{Follow\text{-}up}$ [M (SD)]	52.28 (14.81)	50.67 (12.13)	49.27 (15.72)	54.90 (15.99)
$IMS_{Follow\text{-}up\_imputed}$ [M (SD)]	48.57 (14.05)	43.88 (10.27)	47.08 (13.40)	53.65 (15.78)
IMS subscale_$NE_{Baseline}$ [M (SD)]	16.62 (4.74)	16.98 (4.82)	15.97(4.70)	16.82 (4.73)
IMS subscale NE_{Post} [M (SD)]	16.18 (4.64)	18.64 (4.12)	14.53 (4.12)	16.22 (5.11)
IMS subscale $NE_{Post\_imputed}$ [M (SD)]	16.81 (4.81)	16.10 (4.78)	15.05 (4.17)	16.35 (4.95)
IMS subscale NE_{FU} [M (SD)]	15.72 (5.27)	16.25 (5.22)	13.64 (4.52)	16.55 (5.61)
IMS subscale $NE_{FU\_imputed}$ [M (SD)]	12.47 (6.34)	12.49 (6.00)	11.39 (6.07)	13.29 (6.80)
IMS subscale $avoid_{Baseline}$ [M (SD)]	17.18 (4.31)	16.78 (4.40)	17.34 (4.26)	17.39 (4.34)
IMS subscale $avoid_{Post}$ [M (SD)]	16.28 (4.59)	16.07 (3.79)	16.82 (4.64)	16.04 (5.05)
IMS subscale $avoid_{Post\_imputed}$ [M (SD)]	16.90 (4.05)	16.76 (3.35)	17.74 (4.16)	16.04 (5.05)
IMS subscale $avoid_{FU}$ [M (SD)]	16.23 (4.51)	16.00 (3.25)	17.27 (6.00)	15.80 (4.37)
IMS subscale $avoid_{FU\_imputed}$ [M (SD)]	14.88 (4.86)	14.54 (4.06)	14.74 (5.16)	15.27 (5.30)
IMS subscale $immu_{Baseline}$ [M (SD)]	22.64 (7.55)	21.80 (7.37)	22.21 (7.51)	23.67 (7.76)
IMS subscale $immu_{Post}$ [M (SD)]	20.55 (6.99)	20.00 (5.63)	18.94 (7.98)	21.85 (6.97)
IMS subscale $immu_{Post\_imputed}$ [M (SD)]	20.45 (6.86)	19.93 (5.79)	20.29 (7.63)	21.02 (7.15)
IMS subscale $immu_{FU}$ [M (SD)]	20.33 (7.58)	18.42 (6.32)	18.36 87.57)	22.55 (8.01)
IMS subscale $immu_{FU\_imputed}$ [M (SD)]	14.79 (6.21)	14.20 (4.94)	13.68 (5.31)	16.14 (7.55)

Note. Abbreviations: n sample size, M mean, SD standard deviation, F female, M male, N neutral, PHQ Patient Health Questionnaire, BAI Beck anxiety inventory, IMS Immunization scale, NE negative expectations subscale of IMS, avoid avoidance subscale of the IMS, immu immunization subscale of the IMS, EFPI expectation focused psychological intervention, ACG active control group, CG control group

7.4. Study 4

Expectation focused and frequency enhanced cognitive behavioral therapy for patients with major depression (EFFECT): A study protocol of a randomized active-control trial

Ewen, A. [a], Bleichhardt, G. [a], Rief, W. [a], von Blanckenburg, P. [a], Wambach, K. [a] & Wilhelm, M. [a]

[a] Philipps-University of Marburg, Germany, Department clinical psychology and psychotherapy

Author information:

Corresponding author: Anne-Catherine Ewen, M. Sc.

Philipps-University of Marburg, department clinical psychology and psychotherapy,

Gutenbergstraße 18, 35032 Marburg, Germany

E-Mail: ewen@uni-marburg.de

Dr. Gaby Bleichhardt

Philipps-University of Marburg, department clinical psychology and psychotherapy,

Gutenbergstraße 18, 35032 Marburg, Germany

E-Mail: gaby.bleichhardt@staff.uni-marburg.de

Prof. Dr. Winfried Rief

Philipps-University of Marburg, department clinical psychology and psychotherapy,

Gutenbergstraße 18, 35032 Marburg, Germany

E-Mail: rief@staff.uni-marburg.de

Dr. Pia von Blanckenburg

Philipps-University of Marburg, department clinical psychology and psychotherapy,

Gutenbergstraße 18, 35032 Marburg, Germany

E-Mail: blanckep@staff.uni-marburg.de

Dr. Katrin Wambach

Philipps-University of Marburg, department clinical psychology and psychotherapy,

Gutenbergstraße 18, 35032 Marburg, Germany

E-Mail: wambach@staff.uni-marburg.de

Dr. Marcel Wilhelm

Philipps-University of Marburg, department clinical psychology and psychotherapy,

Gutenbergstraße 18, 35037 Marburg, Germany

E-Mail: marcel.wilhem@staff.uni-marburg.de

Abstract

Introduction. The effectiveness of psychotherapy in depression is subject of an ongoing debate. The mechanisms of change are still underexplored. Research tries to find influencing factors fostering the effect of psychotherapy. In that context, the dose-response relationship should receive more attention. Increasing the frequency of one to two sessions per week seems to be a promising start. Moreover, the concept of expectations and its influence in depression can be another auspicious approach. Dysfunctional expectations and the lack of their modification are central in symptom maintenance. Expectation focused

psychological interventions (EFPI) have been investigated, primarily in the field of depression. The aim of this study is to compare cognitive behavioral therapy (CBT) once a week with a more intensified version of CBT (twice a week) in depression as well as to include a third proof-of-principle intervention group receiving a condensed expectation focused CBT.

Methods and Analysis. Participants are recruited through an outpatient clinic in Germany. A current major depressive episode, diagnosed via structured clinical interviews should present as the main diagnosis. The planned randomized-controlled trial will allow comparisons between the following treatment conditions: CBT (1 session/week), condensed CBT (2 sessions/week), and EFPI (2 sessions/week). All treatment arms include a total dose of 24 sessions. Depression severity applies as the outcome variable (Beck Depression Inventory II; BDI-II, Montgomery Asperg Depression Rating Scale; MADRS). A sample size of n=150 is intended.

Ethics and dissemination. The local ethics committee of the Department of Psychology, Philipps-University Marburg approved the study (reference number 2020-68v). The final research article including the study results is intended to be published in international peer-reviewed journals.

Key words. cognitive behavioral therapy (CBT), once vs. twice weekly sessions, expectation focused psychological interventions (EFPI), depression, psychotherapy research

Strengths

- Naturalistic and practice-oriented randomized controlled design for testing the effectiveness of psychotherapy
- the article will provide first results concerning structural conditions allowing first conclusions for possible implications

- First study that includes expectation focused psychological interventions (EFPI) assuming dysfunctional expectations as main mechanisms of symptom persistence and the lack of change

Limitations

- Depression as a highly comorbid disorder, manualized psychotherapy studies may limit the transfer to practice
- For economic reasons, it was opted against a 2 x 2 design, including only three treatment arms: CBT once weekly, CBT twice weekly, EFPI twice weekly

Theoretical background

Major depression, as one form of mood disorders, is one of the most common mental disorders with a lifetime prevalence of 13 % in Europe [1]. In the last decades, research seemed to prove the effectiveness of different treatments in depression [2-5]. However, a meta-analysis reassessing the effects of psychotherapy for adult depression with the aim to control methodological biases in meta-analyses puts the effectiveness into question again [6, 7]. The need to find promising approaches to enhance effectiveness seems obvious. However, treatment research that focuses on theory-based factors might have reached its limits. A long line of research started to focus on common or unspecific factors leading to treatment success. Typical common factors are therapeutic relationship or alliance, treatment expectations, empathy and congruence [8, 9]. Especially the concept of expectations gets more and more attention as an important factor in psychopathology [10].

Furthermore, the consideration of common structural variables was rather neglected. It not only seems important to consider these factors to augment positive treatment outcome, but also for defining an evidence-based professional policy of psychotherapy in healthcare systems. Even in Germany, as one of the few European countries where psychotherapy is paid by health insurance, a length of twelve to sixty one-weekly 50-minute session for cognitive

behavioral therapy is the default [11]. With exception of the duration, the frequency of sessions per week seems to be rather randomly determined due to convenience and a lack of evidence.

In the last years psychotherapy researchers started investigating the dose-response relationship [12-14]. As “dose”, different factors can be considered, e.g., total number of sessions, number of sessions per week, or the session duration. Howard and colleagues [15] were one of the first to look at the number of sessions needed to reach symptom recovery by calculating a probit model (dose-response model). After eight sessions, 50% of the patients showed symptom improvement, whereas 75% of the patients improved after 26 sessions. Further evidence confirms the need of approximately 20 sessions to expect a symptom recovery by over the half to two-thirds of the patients [13, 14, 16, 17]. The change pattern seems to be negatively accelerated, as a greater effect per session occurs in earlier sessions, which then decreases in the later sessions [18-20].

A meta regression analysis showed no significant influence of the duration of the therapy, while replacing one session per week by two sessions per week increased the effect by a small to medium effect size [21]. These findings could be supported by an RCT comparing one versus two sessions per week, concluding that twice weekly sessions in clinical practice could improve treatment outcome in depression [12]. A higher session frequency seems to result in a faster recovery, making it a promising variable to improve the efficiency of psychotherapy [22].

Only very few studies dealt with the comparison of intensive and standard treatment regarding the duration of one therapy session. Especially for anxiety disorders, indicating mixed results about the superiority of intensive treatment forms, especially in long term [23-25]. In conclusion, it seems more promising to increase the frequency (i.e., two single sessions weekly) of psychotherapy instead of planning double length sessions.

As mentioned above, the concept of expectation and its role in psychopathology should be better considered. The concept of expectations in psychological research leads back to action and decision making theories [26-28]. A consistent definition is still lacking [29]. Humans learn through a constant prediction updating based on external input [30-32]. Experiences lead to the development of specific expectations towards future events and proper behavior [33, 34]. However, expectations are not only unidirectionally formed by the external input through experiences. They also influence beforehand the experience in future situations, as it is well-observed in the so-called placebo effects [35-37]. Thus, expectations play a central role in psychotherapy, regarding the therapy outcome [38, 39] or the therapeutic relationship [40, 41].

According to the underlying theoretical models [42, 43], the lack of expectation adaptation after expectation violating information is defined as fundamental. This is mainly explained through two mechanisms: the minimization of the importance of expectation-disconfirming evidence and the search for or the production of future expectation-confirming evidence [44]. Based on the ViolEx-model [10, 42], the process of cognitive immunization, i.e., the reappraisal of disconfirming information in order to maintain prior expectations, is demonstrated in first experimental designs, especially in people with depressive symptoms [45-47]. Depressed patients show increased dysfunctional expectations and at the same time a lack in the ability to accommodate these dysfunctional expectations after new expectation-disconfirming experiences [43, 48]. This was already described in the context of learned helplessness as a fundamental explanatory model of depression [49]. Different processes seem to inhibit expectation adaptation by expectation-inconsistent experiences, leading to rigid expectations and thinking [50].

Integrating expectation focused psychological interventions (EFPI) into psychotherapy to directly address immunization processes is the next logical step [51, 52]. Based on the presented theoretical background, mechanisms that lead to rigid thought patterns (e.g.,

immunization or avoidance processes) can be made salient. This entails the possibility to integrate new (positive) experiences in future expectations. Kolb and colleagues [53] emphasize that individuals should make new experiences to learn. It therefore seems crucial to support patients in making new experiences and to facilitate learning processes that challenge problem-specific expectations.

As major depression is one of the most prevalent mental disorders, this study aims to find possible ways to foster psychotherapy by firstly specifying the necessary frequency for an effective psychotherapeutic treatment in depression and, secondly prove the effectiveness of expectation focused cognitive behavioral therapy in depression.

For this study, three concrete hypotheses are formulated:

1. A standard CBT protocol leads to a higher reduction in depressive symptoms when applied twice weekly, compared to one session a week.

2. As a pilot, an innovative CBT program focusing and providing expectation-focused interventions (EFPI), also applied twice weekly, should lead to a significant reduction in depressive symptoms over time.

3. The EFPI condition approaching expectations as core mechanisms with two sessions a week will show a superiority over the CBT condition twice weekly.

Methods

The local ethics committee of the Department of Psychology, Philipps-University Marburg approved the study (reference number 2020-68v), which was pre-registered under drks.de (German Clinical Trials Register DRKS00023203).

Patient and Public involvement

Patients were primarily involved in the preparation of the study manuals (especially EFPI). Patients in treatment due to depression were giving input and feedback about the different interventions chosen and / or developed by the study investigators. We intend to provide the main results of the study to interested participants.

Population

Participants will mainly be recruited at the psychotherapy outpatient clinic (Psychotherapie Ambulanz Marburg; PAM) of the Philipps-University Marburg. If a current major depression episode is suspected in the initial interview, the patient will be informed about this study. The following inclusion criteria should be met: participants should be at least 18 years, have a sufficient knowledge of German, have a major depression episode according to DSM-IV as the main diagnosis and should fulfill a total BDI-II score over 13 (mild depression). Patients were excluded if they have had a psychotic disorder (now or in the past) or are addicted to substances such as alcohol, drugs, medication. Moreover, if psychopharmacological drugs are prescribed, the intake dose must be stable over the last 4 weeks and not be changed during the treatment and first follow-up phase. In accordance to Bruijniks and colleagues [12], a total sample size of 150 participants is planned (with a supposed small effect size of 0.25 and a alpha of 0.05, a power of 0.92 can be reached with a sample size of 150 by considering repeated measures, within-between interaction).

Study Design and procedure

Patients who are interested in study participation undergo a short telephone interview on the inclusion criteria and are then invited to a diagnostic appointment. The inclusion and exclusion criteria are then thoroughly checked. If the inclusion criteria are met, the study procedure is explained, and an informed consent (see Appendix A1) form is signed. The patients are randomly assigned by one study leader following simple randomization (computerized random numbers) to one of the three groups and assigned to a study therapist. A coding list is maintained by one of the study leader during the ongoing study and is going to be deleted after study completion. The first six sessions are used as a run-in phase for assessments and establishing a therapeutic relationship, as well as the collection of further questionnaires and clinical history to confirm the diagnosis. The run-in phase is six weeks, frequency and content are independent of the treatment condition. Subsequently, the twenty-

four therapy sessions start. Depending on the treatment condition, one respectively two therapy sessions take place per week. For those having appointments twice a week, the last four therapy sessions are spread over 10 weeks (see figure 1). Moreover, a diagnostic interview is conducted after the twentieth and twenty-fourth session. After the end of twenty-four sessions, a first follow-up diagnostic interview takes place after three months of the last (24^{th}) session. In that time, no therapeutic sessions are allowed, and antidepressant medication should be kept stable. Afterwards, further sessions can be conducted if necessary (e.g., for the treatment of secondary diagnosis or uncovered symptoms). A second follow-up diagnostic interview is planned two years after the end of study treatment (see figure 2).

Diagnostic assessments

Psychotherapists in post gradual training conduct the diagnostic interviews and are blinded to the condition. In the case of unblinding, the following diagnostic assessments will be conducted by another, still blinded, diagnostician. The diagnostic interviews are supervised by licensed therapists and supervisors. The first diagnostic interview consists of the study information, the informed consent, the implementation of the German version of the structural clinical interview for DSM-IV [54], and the BDI-II [55] by the client and the MADRS [56] by the diagnostician. In the following diagnostic interviews, only the major depression section of the SCID-IV is conducted to rate the MADRS. These external assessments by the diagnosticians take place at baseline, after the twentieth and twenty-fourth therapy session, as well as after three month and two years after therapy completion. All self-rating questionnaires are answered after the sessions on a tablet using SoScisurvey [57].

Type of Treatments

All therapists conducting the study therapy are psychotherapists in training and receive regular supervision (after every forth therapy session). The first cohort of study therapists receives a workshop on the different treatment conditions and the study flow. The workshop

is recorded to easily train new study therapists when needed. All therapists will be trained to do both kind of treatments.

In all, the study includes three treatment samples. First, the treatment-as-usual (TAU) group consists of one CBT session per week (TAU CBT). The second group receives a more condensed CBT version with two CBT sessions per week during the main parts of treatment (CBT condensed). The third group also receives two sessions per week, but the CBT approach is based on expectation focused psychological interventions (EFPI condensed). For the second and third condition, the last four sessions are spread over 10 weeks. After twenty-four sessions, the treatment according to study protocol is completed. As mentioned above, continuation of therapy, is possible after the 3-months follow up if necessary. After two years, a second follow-up measurement will take place to estimate long-term therapy effectiveness.

CBT manual. The CBT manual includes a description of the attitude and behavior of a CBT therapist [58]. The manual is modularized and enables personalization by a selection of up to three out of seven possible, problem-specific CBT modules. The first session deals with psychoeducation on depression. Typical symptoms are collected, and an individual case concept is developed including cognitions, feelings, and behavior. The seven modules include inactivity, cognitive work, relaxation, problem solving, emotion regulation, interpersonal difficulties, and self-esteem. Every module starts with a psychoeducational part linking the patient's own problems with the respective module. Further on, worksheets are presented, which were designed according to suggestions of different CBT-manuals for depression [58-60]. The manual closes in session 24 with relapse prevention.

EFPI manual. In the first six sessions, psychoeducation on the link between expectations and depressive symptoms is delivered. Participants should acquire knowledge about expectations as a specific form of thoughts and how expectations regulate human behavior. The advantages (e.g., fast behavior planning) and disadvantages (e.g., reduces

flexibility) of forming expectations are elaborated. The negative consequences of very rigid expectations are discussed. Through self-observation, personal expectations should be made salient. Explicit expectations on the therapy are addressed. Further on, the link between the patient's biography and the origin of their expectations is drawn. An introduction to behavioral experiments as an important tool to test, break, and change dysfunctional expectations is introduced. Cognitive immunization, as a mechanism of reappraising new information to fit into prior expectations and to prevent expectation change despite contradicting experiences, is explained, and introduced based on the patient's personal examples.

After the psychoeducation phase, behavioral experiments are to be planned and conducted with the aim to test dysfunctional expectations considering the patient's immunization strategies. The manual gives examples on behavioral experiments for different depression specific problems (parallel to modules CBT manual). The therapists are supposed to be very flexible in planning behavioral experiments. It is obligatory to carry out at least one behavior experiment between (or within) each session. For relapse prevention, which is addressed in the 24th session, the prior expectations towards therapy are reviewed, learned strategies are collected, and future plans are elaborated.

Assessments

The timepoints of the different assessments used are summarized in table 1.

Demographic variables. Different variables about the participants will be assessed including gender, age, nationality, mother language, education, and occupation.

Primary outcome. To analyze symptom reduction the self-rating scale Beck Depression Inventory II – German Version [55] is used, as well as the expert rating scale Montgomery Asperg Depression Rating Scale MADRS [56]. The MADRS is a ten-item questionnaire for clinicians to rate depressive symptoms on a seven-rating scale while the patient is interviewed by them. Again, a higher sum-score indicates a more severe depression.

A sum score of 0 to 7 means no depression, 7 to 19 indicates a mild depression, 20 to 34 moderate and a sum score over 34 is noted as severe depression.

Secondary outcome. To assess the general symptom burden, the revised German version of the symptom checklist SCL-90 [61] is used. With ninety items, different symptoms are assessed that are grouped into following subscales: somatization, compulsivity, depression, insecurity in social contact, anxiety, aggression, phobia, paranoia, psychoticism. Dysfunctional expectations are assessed with the depressive expectations scale DES [48]. Using 25 items, dysfunctional expectations about social rejection, social support, mood regulation, and ability to perform are assessed. The therapeutic alliance is assessed with the helping alliance questionnaire HAQ [62] integrating two eleven-item questionnaires, one for the patient and one for the clinician asking about the therapeutic relationship. To assess specific expectations towards the treatment, the six-item credibility/expectancy questionnaire CEQ [63] is used.

Table 1. *Overview of the study instruments and the survey timepoints.*

Domain	Instrument	Inclusion diagnostic	Probatory (6 sessions)	T 10	T20	T24	FU 1 after 3 moths	FU 2 after 2 years
Demographic and amnestic information	demographics	x	x					
Depressive symptom severity	BDI-II	x	x	x	x	x	x	x
	MADRS	x			x	x	x	x
	SCID-IV	x						
General symptoms	SCL-90		x	x	x	x	x	x
Therapeutic alliance	HAQ		x	x	x	x	x	x
Expectations and immunization	CEQ		x	x	x	x	x	x
	DES		x	x	x	x	x	x
	IMS		x	x	x	x	x	x
Analogue scales about homework, engagement, actual impairment, actual expectation towards treatment, negative expectations	self-formulated items	x	x	x	x	x	x	x

Note. BDI-II Beck Depression Inventiory, MADRS Montgomery Asperg Rating Scale, SCID-IV structural clinical interview for DSM-IV, SCL-90 Symptom Checklist, HAQ Helping Alliance Questionnaire, CEQ Credibility and Expectancy Questionnaire, DES Depressive Expectation Scale, IMS Immunization Scale; Analogue scales are assessed for every therapeutic session as momentary assessment

Moreover, to measure cognitive immunization the Immunization scale (IMS) including 23 items is used [64]. To test for acceptance, drop-out rates will be compared between the three conditions. Treatment adherence will be controlled by analyses of the recorded sessions by study independent raters.

Every-session monitoring.

In every therapy session, patients are supposed to answer questions regarding homework completion, engagement ("From the last session to this one, my commitment to therapy was": extreme low to extreme high 0-100), depressive symptoms [65], and own expectations [63] to monitor treatment progress. The questions were adapted by the authors for the progress diagnostics.

Statistical Analysis

The complete anonymous dataset including all important subject data is regularly supplemented during the ongoing study (a.o., demogrpahics, protocol violations, completed questionnaires). Intention-to-treat analyses are planned. At first, missing values and dropouts will be analyzed regarding their distribution. Due to clustered data, a certain estimated amount of missing data, as well as a time variable as a continuous variable, mixed models for repeated measures shall be calculated [66]. In accordance to the study of Bruijniks and colleagues [12], multilevel analyses will be calculated to analyze the frequency condition (once vs. twice weekly), as well as the intervention form (CBT vs. EFPI) on depressive symptoms (BDI-II scores and MADRS scores) over the treatment time first including the interaction terms time x frequency and time x treatment. To analyze if the frequency effect will differ between therapy forms, a second model with the interaction term time x frequency x intervention will be calculated. Significance levels will be set at $p < 0.05$. The same models will be used for secondary outcomes. Further on, effect sizes (Cohen´s *d*) will be calculated.

Discussion

This study will analyze the influence of session frequency, as well as the influence of specific expectations on psychotherapy effectiveness. Strengths and limitations are discussed in the following.

Limitations. To standardize the treatment groups, a CBT manual as well as an EFPI manual was written. Depression is known as a highly comorbid disorder [67, 68], the manual might not be flexible enough. To counteract the limitation, the CBT manual was modularized, so the therapists have the possibility to choose personalized modules. For the EFPI manual, only the psychoeducation sessions are completely predefined, whereas the chosen topics in therapy are mutually defined by patients and therapists. The only specification by the protocol is that at least one behavioral experiment must be conducted in / between every session. In that sense, the authors support the increasing idea of tailoring psychotherapy to the person [69]. As the EFPI treatment is still in its pilot phase as well as to avoid underpowered samples, we opted against a 2 x 2 design, and for the neglect of an EFPI once weekly condition.

Strengths. This study has a well-structured randomized controlled design, whereas the execution of the study is very practice oriented and naturalistic. The study directly addresses the structure of care, allowing people with mental health problems to be helped quickly. The study therapists are all in their psychotherapist training, whereby differences in psychotherapeutic experience and other therapeutic differences are tried to be kept low, as it is done by the randomization. They are all supervised by CBT- or EFPI-supervisors. Moreover, the innovative expectation focused therapy manual can directly be compared to a well-established and evidence-based psychotherapy form. We will also evaluate one treatment arm focusing on the maintenance and change of problem-specific expectations. Such a focus promises powerful efficacy, because its close relation to brain functions, central treatment mechanisms, and mechanisms of change.

Expected benefit. Important implications on therapy session frequency can be drawn to create optimal learning conditions. We address the practical execution of psychotherapy and may suggest a certain guideline concerning the frequency of psychotherapy sessions per week. If we confirm existing literature, psychotherapy should be implemented in a shorter time with a two-sessions-per-week-dose. This would especially be a benefit in reducing waiting time for psychotherapy. In Germany the waiting time amounted 2018 twenty weeks [70], whereas during the COVID pandemic the time is estimated to increase constantly [71].

Further on, this study will be the first one delivering information on the feasibility of an expectation focused therapy manual in depression. Well-established questionnaires measuring dysfunctional expectations as well as immunization are not available yet, whereas first attempts to operationalize the concepts are already done [48].Further research should foster valid instruments assessing and validating the constructs of the ViolEx-model. The EFPI intervention promises to be a theory-driven intervention, based on the ViolEx model considering disorder-unspecific common factors, with a clear treatment focus that can result in very powerful effects [72].

Contributorship statement

Anne-Catherine Ewen: Conceptualization, Writing – Original draft, Project administration

Gaby Bleichhardt: Conceptualization, Writing – Review & Editing, therapist supervision

Winfried Rief: Conceptualization, Supervision, Writing – Review & Editing **Pia von Blanckenburg:** Conceptualization, Writing – Review & Editing **Katrin Wambach:** Conceptualization, Writing – Review & Editing, therapist supervision **Marcel Wilhelm:** Conceptualization, Writing – Review & Editing, Supervision, Project administration

Competing interests: No conflict of interest to report.

Funding: This study is not funded.

Literature

1. Investigators, E.M., et al., *Prevalence of mental disorders in Europe: results from the European Study of the Epidemiology of Mental Disorders (ESEMeD) project.* Acta psychiatrica scandinavica, 2004. **109**: p. 21-27.
2. De Maat, S., et al., *Relative efficacy of psychotherapy and pharmacotherapy in the treatment of depression: A meta-analysis.* Psychotherapy Research, 2006. **16**(5): p. 566-578.
3. Ekers, D., D. Richards, and S. Gilbody, *A meta-analysis of randomized trials of behavioural treatment of depression.* Psychological Medicine, 2008. **38**(5): p. 611-623.
4. Gloaguen, V., et al., *A meta-analysis of the effects of cognitive therapy in depressed patients.* Journal of affective disorders, 1998. **49**(1): p. 59-72.
5. Arroll, B., et al., *Efficacy and tolerability of tricyclic antidepressants and SSRIs compared with placebo for treatment of depression in primary care: a meta-analysis.* The Annals of Family Medicine, 2005. **3**(5): p. 449-456.
6. Cuijpers, P., et al., *Was Eysenck right after all? A reassessment of the effects of psychotherapy for adult depression.* Epidemiology and Psychiatric Sciences, 2019. **28**(1): p. 21-30.
7. Cuijpers, P., et al., *How effective are cognitive behavior therapies for major depression and anxiety disorders? A meta-analytic update of the evidence.* World psychiatry, 2016. **15**(3): p. 245-258.
8. Wampold, B.E., *How important are the common factors in psychotherapy? An update.* World Psychiatry, 2015. **14**(3): p. 270-277.

9. Nahum, D., C.A. Alfonso, and E. Sönmez, *Common factors in psychotherapy*, in *Advances in psychiatry*. 2019, Springer. p. 471-481.

10. Rief, W., et al., *Expectancies as core features of mental disorders.* Current opinion in psychiatry, 2015. **28**(5): p. 378-385.

11. Bundesausschuss, G., *Psychotherapie-Richtlinie*. 2009, Bundesanzeiger.

12. Bruijniks, S.J.E., et al., *The effects of once- versus twice-weekly sessions on psychotherapy outcomes in depressed patients.* The British Journal of Psychiatry 2020: p. 1-9.

13. Harnett, P., A. O'Donovan, and M.J. Lambert, *The dose response relationship in psychotherapy: Implications for social policy.* Clinical Psychologist, 2010. **14**(2): p. 39-44.

14. Hansen, N.B., M.J. Lambert, and E.M. Forman, *The psychotherapy dose-response effect and its implications for treatment delivery services.* Clinical Psychology-Science and Practice, 2002. **9**(3): p. 329-343.

15. Howard, K.I., et al., *The dose–effect relationship in psychotherapy.* American psychologist, 1986. **41**(2): p. 159.

16. Anderson, E.M. and M.J. Lambert, *A survival analysis of clinically significant change in outpatient psychotherapy.* Journal of Clinical Psychology, 2001. **57**(7): p. 875-888.

17. Hansen, N.B. and M.J. Lambert, *An evaluation of the dose–response relationship in naturalistic treatment settings using survival analysis.* Mental Health Services Research, 2003. **5**(1): p. 1-12.

18. Barkham, M., et al., *Dose–effect relations in time-limited psychotherapy for depression.* Journal of consulting and clinical psychology, 1996. **64**(5): p. 927.

19. Kopta, S.M., et al., *Patterns of symptomatic recovery in psychotherapy.* Journal of consulting and clinical psychology, 1994. **62**(5): p. 1009.

20. Robinson, L., J. Delgadillo, and S. Kellett, *The dose-response effect in routinely delivered psychological therapies: A systematic review.* Psychotherapy Research, 2020. **30**(1): p. 79-96.

21. Cuijpers, P., et al., *How much psychotherapy is needed to treat depression? A metaregression analysis.* Journal of Affective Disorders, 2013. **149**(1-3): p. 1-13.

22. Erekson, D.M., M.J. Lambert, and D.L. Eggett, *The Relationship Between Session Frequency and Psychotherapy Outcome in a Naturalistic Setting.* Journal of Consulting and Clinical Psychology, 2015. **83**(6): p. 1097-1107.

23. Abramowitz, J.S., E.B. Foa, and M.E. Franklin, *Exposure and ritual prevention for obsessive-compulsive disorder: Effects of intensive versus twice-weekly sessions.* Journal of Consulting and Clinical Psychology, 2003. **71**(2): p. 394-398.

24. Herbert, J.D., et al., *Standard versus extended cognitive behavior therapy for social anxiety disorder: A randomized-controlled trial.* Behavioural and Cognitive Psychotherapy, 2004. **32**(2): p. 131-147.

25. Bohni, M.K., et al., *A randomized study of massed three-week cognitive behavioural therapy schedule for panic disorder.* Acta Psychiatrica Scandinavica, 2009. **120**(3): p. 187-195.

26. Atkinson, J.W. and N.T. Feather, *A theory of achievement motivation*. Vol. 66. 1966: Wiley New York.

27. Kahneman, D. and A. Tversky, *Prospect Theory of Decisions Under Risk.* Econometrica, 1979. **47**(2): p. 1156-67.

28. Ajzen, I., *From intentions to actions: A theory of planned behavior*, in *Action control*. 1985, Springer. p. 11-39.

29. Laferton, J.A., et al., *Patients' expectations regarding medical treatment: a critical review of concepts and their assessment.* Frontiers in psychology, 2017. **8**: p. 233.

30. Berg, M., M. Feldmann, and T. Kube, *Oversampled and undersolved: Depressive rumination from a predictive coding perspective.* 2021.

31. Smith, R., et al., *A Bayesian computational model reveals a failure to adapt interoceptive precision estimates across depression, anxiety, eating, and substance use disorders.* PLoS computational biology, 2020. **16**(12): p. e1008484.

32. Visalli, A., et al., *Bayesian modeling of temporal expectations in the human brain.* Neuroimage, 2019. **202**: p. 116097.

33. Bandura, A., *Self-efficacy: toward a unifying theory of behavioral change.* Psychological review, 1977. **84**(2): p. 191.

34. Lightsey, R., *Albert Bandura and the exercise of self-efficacy.* Journal of Cognitive Psychotherapy, 1999. **13**(2): p. 158.

35. Evers, A.W., et al., *Implications of placebo and nocebo effects for clinical practice: expert consensus.* Psychotherapy and psychosomatics, 2018. **87**(4): p. 204-210.

36. Kirsch, I., *Response expectancy theory and application: A decennial review.* Applied and preventive Psychology, 1997. **6**(2): p. 69-79.

37. Bingel, U., *Placebo 2.0: the impact of expectations on analgesic treatment outcome.* Pain, 2020. **161**: p. S48-S56.

38. Greenberg, R.P., M.J. Constantino, and N. Bruce, *Are patient expectations still relevant for psychotherapy process and outcome?* Clinical psychology review, 2006. **26**(6): p. 657-678.

39. Constantino, M.J., et al., *A meta-analysis of the association between patients' early treatment outcome expectation and their posttreatment outcomes.* Psychotherapy, 2018. **55**(4): p. 473.

40. Barber, J.P., et al., *The associations among improvement and alliance expectations, alliance during treatment, and treatment outcome for major depressive disorder.* Psychotherapy Research, 2014. **24**(3): p. 257-268.

41. Patterson, C.L., B. Uhlin, and T. Anderson, *Clients' pretreatment counseling expectations as predictors of the working alliance.* Journal of Counseling Psychology, 2008. **55**(4): p. 528.

42. Gollwitzer, M., A. Thorwart, and K. Meissner, *Editorial: Psychological Responses to Violations of Expectations.* Frontiers in Psychology, 2018. **8**: p. 3.

43. Rief, W. and J. Joormann, *Revisiting the cognitive model of depression: The role of expectations.* Clinical Psychology in Europe, 2019. **1**: p. 1-19.

44. Pinquart, M., et al., *Why expectations do or do not change after expectation violation: A comparison of seven models.* Consciousness and Cognition, 2021. **89**: p. 103086.

45. Kube, T., et al., *Why dysfunctional expectations in depression persist - Results from two experimental studies investigating cognitive immunization.* Psychological Medicine, 2019. **49**(9): p. 1532-1544.

46. Kube, T., W. Rief, and J.A. Glombiewski, *On the Maintenance of Expectations in Major Depression - Investigating a Neglected Phenomenon.* Frontiers in Psychology, 2017. **8**.

47. Kube, T., et al., *How to modify persisting negative expectations in major depression? An experimental study comparing three strategies to inhibit cognitive immunization against novel positive experiences.* Journal of Affective Disorders, 2019. **250**: p. 231-240.

48. Kube, T., et al., *Focusing on situation-specific expectations in major depression as basis for behavioural experiments - Development of the Depressive Expectations Scale.* Psychology and Psychotherapy-Theory Research and Practice, 2017. **90**(3): p. 336-352.

49. Abramson, L.Y., M.E. Seligman, and J.D. Teasdale, *Learned helplessness in humans: critique and reformulation.* Journal of abnormal psychology, 1978. **87**(1): p. 49.

50. Liknaitzky, P., L.D. Smillie, and N.B. Allen, *Out-of-the-Blue: Depressive Symptoms are Associated with Deficits in Processing Inferential Expectancy-Violations Using a Novel Cognitive Rigidity Task.* Cognitive Therapy and Research, 2017. **41**(5): p. 757-776.

51. Kube, T., J.A. Glombiewski, and W. Rief, *Expectation-Focused Psychotherapeutic Interventions for People with Depressive Symptoms.* Verhaltenstherapie, 2019. **29**(4): p. 281-291.

52. Rief, W. and J.A. Glombiewski, *Expectation-Focused Psychological Interventions (EFPI).* Verhaltenstherapie, 2016. **26**(1): p. 47-54.

53. Kolb, D.A., R.E. Boyatzis, and C. Mainemelis, *Experiential learning theory: Previous research and new directions*, in *Perspectives on thinking, learning, and cognitive styles*. 2014, Routledge. p. 227-248.

54. Wittchen, H.U., et al., *SKID. Strukturiertes klinisches Inter-view für DSM-IV, Achse I, deutsche Version* 1997, Göttingen: Hogrefe.

55. Hautzinger, M., F. Keller, and C. Kühner, *BDI II. Beck-Depressions-Inventar*. Vol. 2. Auflage. 2009, London: Pearson.

56. Schmidtke, A., et al., *Studies of the reliability and validity of the German version of the Montgomery-Asberg Depression Rating Scale (MADRS).* Schweizer Archiv fur Neurologie und Psychiatrie (Zurich, Switzerland: 1985), 1988. **139**(2): p. 51-65.

57. Leiner, D.J., *SoSci Survey (Version 3.1.06) [Computer software].* 2019.

58. Hautzinger, M., *Kognitive Verhaltenstherapie bei Depressionen*. 2013, Weinheim: Beltz Verlag.

59. Faßbinder, E., et al., *Therapie-Tools Depression: Mit E-Book inside und Arbeitsmaterial*. 2015: Beltz.

60. Schaub, A., E. Roth, and U. Goldmann, *Kognitiv-psychoedukative therapie zur bewältigung von depressionen: Ein therapiemanual*. Vol. 39. 2013: Hogrefe Verlag.

61. Schmitz, N., et al., *The symptom check-list-90-R (SCL-90-R): a German validation study.* Quality of Life Research, 2000. **9**(2): p. 185-193.

62. Bassler, M., B. Potratz, and H. Krauthauser, *Der "Helping Alliance Questionnaire" (HAQ) von Luborsky.* Psychotherapeut, 1995. **40**: p. 23-32.

63. Devilly, G.J. and T.D. Borkovec, *Psychometric properties of the credibility/expectancy questionnaire.* Journal of Behavior Therapy and Experimental Psychiatry, 2000. **31**(2): p. 73-86.

64. Ewen, A., W. Rief, and M. Wilhelm, *Immunization Scale*. 2021.

65. Gräfe, K., et al., *Screening psychischer Störungen mit dem "Gesundheitsfragebogen für Patienten (PHQ-D)".* Diagnostica, 2004. **50**(4): p. 171-181.

66. Krueger, C. and L. Tian, *A comparison of the general linear mixed model and repeated measures ANOVA using a dataset with multiple missing data points.* Biological research for nursing, 2004. **6**(2): p. 151-157.

67. Kessler, R.C., et al., *Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication.* Archives of general psychiatry, 2005. **62**(6): p. 617-627.

68. Goldberg, D. and J. Fawcett, *The importance of anxiety in both major depression and bipolar disorder.* Depression and anxiety, 2012. **29**(6): p. 471-478.

69. Norcross, J.C. and B.E. Wampold, *What works for whom: Tailoring psychotherapy to the person.* Journal of clinical psychology, 2011. **67**(2): p. 127-132.

70. Bundespsychotherapeutenkammer, B. *Ein Jahr nach der Reform der Psychotherapie-Richtlinie – Wartezeiten 2018*. 2018; Available from: https://www.bptk.de/wp-content/uploads/2019/01/20180411_bptk_studie_wartezeiten_2018.pdf.

71. Brakemeier, E.-L., et al., *Die COVID-19-Pandemie als Herausforderung für die psychische Gesundheit.* Zeitschrift für Klinische Psychologie und Psychotherapie, 2020.

72. Rief, W., et al., *Preoperative optimization of patient expectations improves long-term outcome in heart surgery patients: results of the randomized controlled PSY-HEART trial.* BMC medicine, 2017. **15**(1): p. 1-13.

Figures

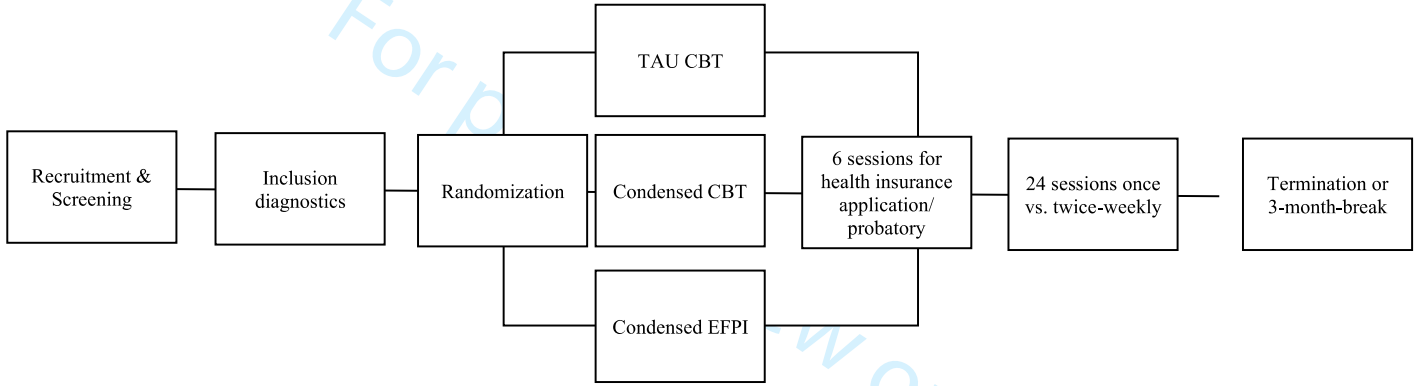
Figure 1. *Study Procedure.*

Note. Abbreviations: TAU treatment as usual, CBT cognitive behavioral therapy, EFPI expectation focused psychotherapeutic intervention

Figure 2. *Study Design*

Note. Abbreviations: TAU treatment as usual, CBT cognitive behavioral therapy, EFPI expectation focused psychotherapeutic treatment, T measurement timepoint, FU Follow-up

Figure 1. *Study Procedure.*



Note. Abbreviations: TAU treatment as usual, CBT cognitive behavioral therapy, EFPI expectation focused psychotherapeutic intervention

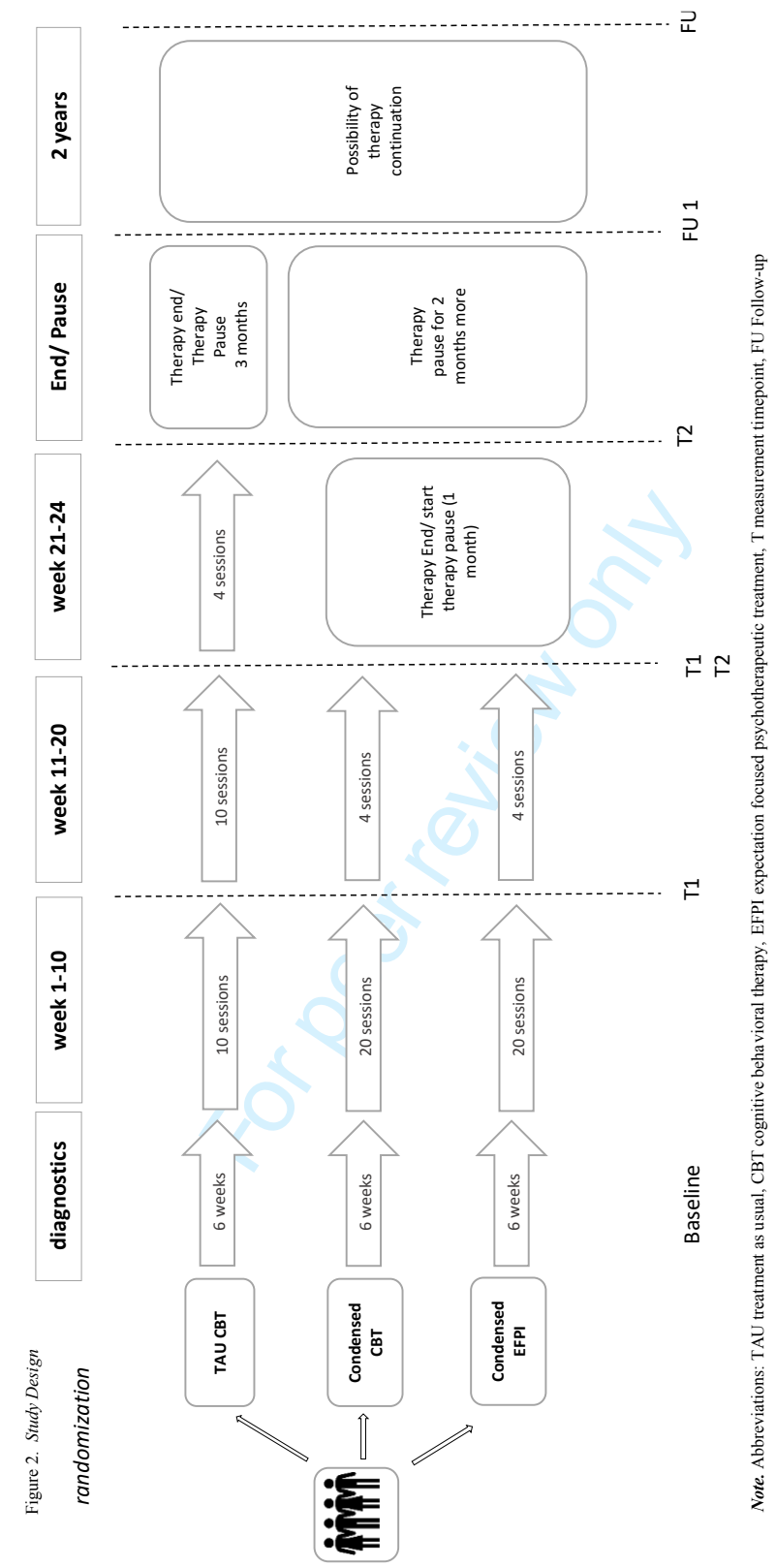


Figure 2. *Study Design*

Note. Abbreviations: TAU treatment as usual, CBT cognitive beha vioral therapy, EFPI expectation focused psychotherapeutic treatment, T measurement timepoint, FU Follow-up

7. Curriculum Vitae & Publications

Personal Information

Name:	Anne-Catherine Isabelle Ewen
Nationality:	Luxembourg
Date of birth:	11.05.1995 in Luxembourg

Education

Since 2019	advanced training for psychotherapy in CBT at the Institute for Psychotherapy Training Marburg IPAM PHD student in clinical psychology, Philipps-University of Marburg under Supervision of Dr. Marcel Wilhelm on the topic: "The role of dysfunctional expectation persistency in psychopathology"
2017-2019	Master program in clinical psychology and neuroscience (M.Sc.), University of Basel, Switzerland Master thesis: "Does psychological flexibility play a central role in the relationship of emotion regulation and mental health? - Analyzing the influence of affectivity on mental health under the concept of psychological flexibility."
2014-2017	Bachelor program psychology (B.Sc.), University of Basel, Switzerland Bachelorthesis: "Frühbeginn und Spätbeginn einer Zwangsstörung: Gibt es einen Unterschied im Behandlungserfolg?"
June 2014	Diplôme de fin d`études secondaires (Baccalaureate)
2007-2014	High school Athénée du Luxembourg (7 years)
2001-2007	Primary school in Kehlen, Luxembourg (6 years)

Work experience and internships

September 2022	Psychotherapist in training at Centre hospitalier Neuro-Psychiatrique CHNP in Luxembourg
September 2019 – September 2022	Scholarship «Marburger Modell»: Doctoral candidate at the Philipps University Marburg Supervised by Dr. Marcel Wilhelm

	Advanced training as a psychological psychotherapist at the Institute for Psychotherapy Training Marburg IPAM
Summer term 2021	Teaching experience as a tutor for the "Interventionspraktikum" of the master's program in psychology
January – April 2019	internship at the day clinic Münchenstein, psychiatry Baselland (PBL) in Basel, Switzerland
July – September 2018	internship in the adult psychiatry «Hôpitaux Robert Schuman – Hôpital Kirchberg» in Luxembourg
2017-2019	committee member of ALEP (Association Luxembourgeoise des Etudiants en Psychologie): Chief Editor «De Psycho-lo» & Responsible for the internship exchange
January - July 2017	internship at the Center for Developmental and Personality Psychology (ZEPP) University of Basel, Switzerland
July - September 2016	internship with mentally or cerebrally disabled persons, Ligue HMC, in Luxembourg

Teaching experience

Summer term 2021 March/ April & June/July	Instruction of the exercise on clinical-psychological Intervention Procedures ("Intervention Practicum IP II ")
Thesis Supervision	Supervision of 6 master students in psychology

Publications

Hofmann, S. G., Barber, J. P., Salkovskis, P., Wampold, B. E., Rief, W., **Ewen, A. C. I.,** & Schäfer, L. N. (2022). What Is the Common Ground for Modern Psychotherapy? A Discussion Paper Based on EACLIPT's 1st Webinar. Clinical Psychology in Europe, 4(1), 1-8.

Wilhelm, M., Bleichhardt, G., **Ewen, A. C.**, & Rief, W. (2022). Erwartungsfokussierte psychotherapeutische Interventionen bei Depression: ein Behandlungsmanual. Psychotherapeut, 67(3), 204-212.

Gauck, L., Reimann, G. & **Ewen, A.** (2018). Begabte Kinder mit Lern- und Leistungsstörungen: Beeinflussung der Begabungsentwicklung durch Familie und Schule, *Journal für Begabtenförderung*, *2*, 35-44.

Ewen, A. & Gauck, L. (2017). Hohe Begabung und Verhaltensauffälligkeit, *news&science (özbf), 44*(2), 4-10.

Congress contributions

Ewen, A., Rief, W., von Blanckenburg, P., Bleichhardt, G., Wambach, W. & Wilhelm, M. (2020). „Ist mehr mehr? – Studienprotokoll eines randomisiert-kontrollierten Designs zur Verdichtung ambulanter Psychotherapie bei Depression ". Abstract für Postervortrag (Absage des Kongresses aufgrund Pandemie). 38. Symposium der Fachgruppe Klinische Psychologie und Psychotherapie der DGPs.

Ewen, A., Rief, W., & Wilhelm, M. (2021). „Doch gar nicht so übel? Eine Mikrointerventionsstudie zur Anpassung sozialer Erwartungen im Gefangenendilemma".Postervortrag. 38. Symposium der Fachgruppe Klinische Psychologie und Psychotherapie der DGPs in Mannheim (online).

Ewen, A., Rief, W., & Wilhelm, M. (2022). „Flexibilisierung persönlicher Erwartungen: Eine randomisiert-kontrollierte online Interventionsstudie ". Poster auf dem 1. Deutschen Psychotherapie-Kongress in Berlin.

8. Declaration

I certify that I have written my dissertation

“The role of dysfunctional expectation persistency in psychopathology”

By myself and without any outside assistance. I have not used any other sources than those expressly cited. The dissertation has not been submitted in its present or similar form to any other university and has not served any other examination purposes.

Marburg, September 2022 Anne-Catherine I. Ewen

9. Percentage distribution of publications

Study 1: Not so bad after all? – A randomized controlled micro-intervention study on the adjustment of social expectations in the prisoner's dilemma

Anne-Catherine I. Ewen: 65%
Prof. Dr. Winfried Rief: 5%
Dr. Marcel Wilhelm: 30%

Study 2: Exploring the path of persisting dysfunctional expectations – Development of the Immunization Scale IMS

Anne-Catherine I. Ewen: 65%
Prof. Dr. Winfried Rief: 5%
Dr. Marcel Wilhelm: 30%

Study 3: A randomized-controlled online-intervention study for mild psychopathology promoting flexibility in expectations

Anne-Catherine I. Ewen: 65%
Prof. Dr. Winfried Rief: 5%
Dr. Marcel Wilhelm: 30%

Study 4: Expectation-focused and frequency enhanced cognitive behavioral therapy for patients with major depression (EFFECT): A study protocol of a randomized active-control trial

Anne-Catherine I. Ewen: 50%
Dr. Gaby Bleichhardt: 5%
Prof. Dr. Winfried Rief: 5%
Dr. Pia von Blanckenburg:5%
Dr. Katrin Wambach: 5%
Dr. Marcel Wilhelm: 30%