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Individualisation in Psychotherapy Research

Personality Disorders Spearheading the Way.

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MSc. Loris Noël Grandjean

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Experts:

Prof. Dr. Thomas Berger and PD. Dr. Ueli Kramer

To the darkness and beauty of the human psyche.

Preface

This thesis is submitted in partial fulfillment of the requirements for the degree of *Philosophiae Doctor* at the University of Bern. The research presented here was conducted at the University of Bern and at the Lausanne University Hospitals (CHUV), under the supervision of Prof. Dr. Thomas Berger and PD. Dr. Ueli Kramer. This work was supported by the Swiss National Science Foundation through grant 100014_179457/1.

The thesis is a collection of three papers, presented in chronological order of writing. The papers are joint work with varying coauthors; I am the first author of all three papers. The papers are preceded by an introductory chapter that relates them to each other and provides background information and motivation for the work. The papers are followed by a discussion of their key findings, implications, and limitations.

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Writing a Ph.D. is not a smooth journey. It is hard and stressful (all the more so when almost nothing goes according to plan). Yet, when I look back, I feel joy as well as pride. In the course of almost 4 years, I have learned so much, met amazing people, and experienced unforgettable moments.

You read it everywhere: “I could not have done it without you”, and one day, you happen to experience the meaning of this sentence on another level.

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To all of you, merci.

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"If sanity and insanity exist, how shall we know them?"
Dr. David Rosenhan, Ph.D., 1973

Method in the Madness.

It was the initial title of my thesis. Provocative, yet to the point. To my point. No matter how strange or foolish someone's actions seem to be, there are always good reasons to it. One just needs to pay attention to understand what they are. What is normal for the spider is chaos for the fly. So why is it that "madness" is so negatively connoted? I suspect no one would bat an eye at "Method in the Cancer" or "Methods to Diabetes". Could it be that, after all, mental health cannot be equated to somatic medicine and that this comparison is long outdated? Most definitely. In the process of writing my doctorate, faced with the daunting task of making my point as clearly and concisely as possible, I sometimes felt like I was going to "lose it". Like falling down a rabbit hole. Every paper I read lead me to another. Every thought I had sparked ten more. In the end though, I must say I revelled in it. High on knowledge—or the illusion of it. Those who know me are accustomed to hear me repeat that I actually do not know much. That the more I learn, the more humble I feel. To me, this doctorate does not certify the end of anything. It is a token of a process; that of always staying critical an open-minded. Science is a method, not a result.

Overview of Papers

Paper I

Grandjean, L., Beuchat, H., Gyger, L., de Roten, Y., Despland, J. N., Draganski, B., & Kramer, U. (2020). Integrating core conflictual relationship themes in neurobiological assessment of interpersonal processes in psychotherapy. *Counselling and Psychotherapy Research, 20*(3), 123–456. DOI: 10.1002/capr.12294.

Paper II

Grandjean, L., Hummel, J., Wyer, D., Beuchat, H., Caspar, F., Sachse, R., Berger, T., & Kramer, U. (2021). Psychotherapeutic case formulation: Plan analysis for narcissistic personality disorder. *Personality and Mental Health, 15*,(4), 309–316. DOI: 10.1002/pmh.1521

Paper III

Grandjean, L., Rohrbach, T., Garbani, A., Läderach, F., Culina, I., Blanco Machinea, J., Beuchat, H., Alerci, L., Ranjibar, S., Berger, T., & Kramer, U. (*under review*). Emotional arousal in borderline personality disorder during an experiential task focusing on self-criticism. *Submitted to the Journal of Personality Disorders.*

Summary

Decades of research could find no conclusive evidence that "mental disorders" exist as natural separated entities. Not only have epidemiological studies pointed out excessively high rates of comorbidity as well as short-term diagnostic instability, but the current nosology has also demonstrated its inability to clearly delimit "normal" from "abnormal"——or to use its vocabulary—"sane" from "sick". As a result, the biomedical paradigm and its ensuing categorical classification have proven unfit to investigate, comprehend and accurately describe psychological distress. Since issues with the current categorical taxonomy considerably affect research and treatment development, it is paramount to move beyond categorical models and improve the conceptualisation, studying and classification of psychological distress. In this regard, personality disorders (PDs) provide a great opportunity since the very nature of the concept makes shortcomings of a categorical paradigm arguably even more salient: either someone's personality is inherently ill (disordered) or it is healthy. Yet, research has demonstrated the superior validity of a dimensional approach where individual differences in personality are continuously distributed and do not consist of two discrete categories (ill vs. healthy). As a result, the field of PDs is taking a leading role in the integration of alternative approaches to provide fully accurate descriptions of people's difficulties rather than forcing individuals into imprecise categories. In psychotherapy research, the field follows a similar rationale and draws from the dimensional paradigm to focus on the individualisation of methods.

The aim of the present doctoral dissertation is to demonstrate the theoretical

and methodological potential of said individualised and integrated approaches on the basis of three articles in the field of PDs. The first article illustrates how the individualisation of stimuli and the integration of the field of research in psychotherapy with neuroimaging can enhance our understanding of changes during psychotherapy for Borderline Personality Disorder (BPD). The second article presents the elaboration of a prototypical Plan Analysis of Narcissistic Personality Disorder (NPD) from individual case formulations and its implications for treatment. Finally, the third article is a study investigating the differences in emotional arousal between participants with a BPD and controls during an individualised experiential task focusing on self-criticism. The discussion reviews and analyses the findings of each article and addresses the limits as well as the broader theoretical and practical implications of their designs for psychotherapy research. The thesis concludes with a summary and an outline of future directions of the field of PDs and mental health.

Keywords: psychotherapy research, individualised methods, personality disorders, dimensional approaches

Zusammenfassung

In jahrzehntelanger Forschung konnte kein schlüssiger Beweis dafür gefunden werden, dass "psychische Störungen" als natürliche, voneinander getrennte Einheiten existieren. Epidemiologische Studien haben nicht nur auf übermässig hohe Komorbiditätsraten und kurzfristige diagnostische Instabilität hingewiesen, sondern auch gezeigt, dass die derzeitige Nosologie nicht in der Lage ist, eine klare Abgrenzung zwischen "normal" und "abnormal" vorzunehmen—oder, um ihr Vokabular zu verwenden—, zwischen "gesund" und "krank" zu unterscheiden. Infolgedessen erweisen sich das biomedizinische Paradigma und die daraus resultierende kategorische Klassifizierung als ungeeignet, um psychisches Leid zu beschreiben, zu verstehen und zu untersuchen. Da die Mängel der derzeitigen kategorialen Taxonomie die Forschung und die Entwicklung von therapeutischen Behandlungen erheblich beeinträchtigen, ist es von grösster Bedeutung, unsere Konzeptualisierung, Untersuchung und Klassifizierung von psychischem Leid zu verbessern. Persönlichkeitsstörungen (PS) bieten eine grosse Chance zur Überwindung des kategorialen Paradigmas, da durch die Natur ihres Untersuchungsobjekts die Unzulänglichkeiten biomedizinischer Ansätze besonders hervortreten: Entweder ist die Persönlichkeit einer Person von Natur aus krank (gestört) oder sie ist gesund. Denn in Forschung zu PS gilt die Überlegenheit eines dimensionalen Ansatzes, bei dem die individuellen Unterschiede in der Persönlichkeit kontinuierlich verteilt sind und nicht aus zwei diskreten Kategorien (krank vs. gesund) bestehen, als fest etabliert. Damit nimmt das Fachgebiet der PS eine führende Rolle bei der Integration alternativer

Ansätze ein, um psychische Schwierigkeiten von Menschen genau zu beschreiben, anstatt sie in ungenaue Kategorien zu zwingen die keine vollständig akkuraten Beschreibungen liefern. In der Psychotherapieforschung folgt das Feld einer ähnlichen Logik und stützt sich auf das dimensionale Paradigma, indem sie sich auf die Individualisierung ihrer Methoden konzentriert.

Ziel dieser Dissertation ist es, anhand von drei Artikeln im Bereich der PS, die theoretischen und methodischen Potenziale individualisierter und integrierter Ansätze aufzuzeigen. Der erste Artikel veranschaulicht, wie die Individualisierung von Stimuli und die Integration des Forschungsfeldes der Psychotherapie mit dem Neuroimaging unser Verständnis der Veränderungen während der Psychotherapie der Borderline-Persönlichkeitsstörung (BPS) verbessern kann. Der zweite Artikel stellt die Ausarbeitung einer prototypischen Plananalyse (Fallkonzeption) der narzisstischen Persönlichkeitsstörung (NPS) anhand von Einzelfallkonzeptionen und deren Auswirkungen auf die Behandlung vor. Der dritte Artikel präsentiert eine Studie, in der die Unterschiede in der emotionalen Aktivierung zwischen TeilnehmerInnen mit einer BPS und Kontrollpersonen während einer individualisierten Erfahrungsaufgabe mit Schwerpunkt auf Selbstkritik untersucht wurden. In der Diskussion werden die Ergebnisse der einzelnen Artikel kritisch durchleutet sowie die Grenzen und die breiteren theoretischen und praktischen Implikationen der vorgestellten Designs für die Psychotherapieforschung thematisiert. Die Dissertation schliesst mit einer Zusammenfassung und Überlegungen zu zukünftigen Forschungsperspektiven im Bereich der PS und der psychischen Gesundheit.

Keywords: Psychotherapieforschung, individualisierte Methodologie, Persönlichkeitsstörungen, dimensionaler Ansatz

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Chapter 1

Introduction

1.1 The current paradigm of mental health at an impasse

The main purpose of this dissertation is to discuss how the field of Personality Disorders (PDs) can spearhead the much-needed ongoing paradigm shift from the medically oriented categorical approach to an alternative system where individualisation of research is standard. To this effect, it will present three studies that applied individualised integrated methodologies to investigate psychotherapy on clients diagnosed with a PD.

However, to establish its point in a coherent way, this dissertation will first discuss the current categorical model used to classify mental disorders, its advantages, as well as its shortcomings and their consequences. It will become apparent that PDs represent a case in point and that the categorical paradigm hinders the improvement of their understanding as well as the development of more effective treatments. On the other hand, there is overwhelming evidence favouring the superior validity of dimensional models in the field of PDs. This dissertation will present their advantages whilst also considering their limitations. This will in turn lead to the introduction and discussion of emerging models which, in light of a phenomenon that is eminently dimensional but still needs categories to communicate and organise knowledge, are integrated. First, it will present the inclusion of dimensional features in DSM-5 (American Psychiatric Association, 2013; Helzer et al., 2009) and ICD-11 (Mulder, 2021) for the classification of PDs before introducing the Research Domain Criteria (RDoC) project and the Hierarchical Taxonomy of Psychopathology (HiTOP), two explicitly dimensional alternative frameworks of psychological distress. This

dissertation will then discuss how the PD field draws from the dimensional paradigm to elaborate innovative integrated individualised research designs to investigate psychotherapy. The three papers composing this doctoral thesis are part of this framework.

Before presenting said papers in complete manuscript forms, it will highlight their individualised methods and summarise their main findings. This dissertation concludes by discussing and integrating their main findings, paying particular attention to theoretical and methodological implications for research in psychotherapy. Finally, this dissertation concludes with some methodological considerations, and limitations, as well as a discussion on future directions for the field of PDs and mental health.

1.1.1 Categorical approach to mental health

The current dominant categorical model used in the study and treatment of psychological distress is the legacy of psychiatry's quest for scientific credibility (Nesse & Stein, 2012). In order to establish itself as a legitimate branch of medicine, psychiatry posits that mental disorders are brain diseases and emphasises pharmacological treatment to target presumed biological abnormalities (Deacon, 2013; Kiesler, 2000). Akin to other medical specialisations, this biomedical paradigm required a codified categorical taxonomy, prompting the development of the Diagnostic and Statistical Manual of Mental Disorder (DSM) by the American Psychiatric Association (APA) and of the Chapter on "Mental and behavioural disorders" of the International Classification of Diseases (ICD) by the World Health Organisation (WHO).

The first versions of these new psychiatric nosologies were criticised for their lack of reliability and validity, inducing a collective effort to improve them. Robins and Guze (1970) for instance proposed five criteria: clinical description,

laboratory study, exclusion of other disorders, follow-up study, and family study whereas others (Kendell, 1989; Kendler, 1980, 1990) have added more potential validators, such as treatment response and diagnostic consistency over time. In the end, these endeavours led to the adoption of a structure initiated with the DSM III – and still in use – where each diagnosis was no longer merely described but delineate with specific signs and symptoms as well as the method by which they needed to be combined to establish it (Lilienfeld & Treadway, 2016).

In the field of mental health, the DSM paradigm – and its international counterpart – have long become “the gold standard for mental health diagnosis” (Khoury et al., 2014, p. 1). If their successive versions saw an improvement in reliability (though some argue "modestly" at best, Kirk & Kutchins, 2017), their lack of validity remains concerning (Insel, 2013). More importantly, their assumption that “mental disorders” are biological afflictions of the mind reflected in distinct categories has shaped the conceptualisation of mental health and illness as well as its treatment (Kawa & Giordano, 2012).

1.1.2 Advantages and disadvantages of the current approach

Supporters of the DSM model argue that it displays at least some construct validity and that disorders such as major depression, bipolar disorder or schizophrenia have demonstrated consistent relations with laboratory indicators, biological correlates and family history (e.g., Bech et al., 2001; Grande et al., 2016; Tsuang et al., 2000). They also point to its capacity for providing a common language to mental health professionals around the world, thereby enhancing mutual comprehension (Van Heugten - Van Der Kloet & Van Heugten, 2015). According to them, it offers an organizing system for training said professionals as well as for researching, assessing and treating psychopathology. Furthermore, although this argument will be heavily contested below, they also contend that it reduces stigma attributed to individuals with a diagnosis by bringing validation and legitimacy to their distress (Dalgleish et al., 2020).

To promote their agenda, supporters of the biomedical categorical model of psychiatry commonly use comparisons with somatic diseases. Yet, if advances in medicine have been impressive in the past century, our understanding of the components and processes of "mental disorders" has been disappointing at best (Clark et al., 2017; Kapur et al., 2012; Kendler, 2012). In the almost 40 years of research since the publication of the DSM-III (which was the first edition to be based largely on the biomedical model), "none of the putative underlying disease processes have been uncovered" (Bakker, 2019, p. 2). If this in itself is quite discouraging, it is even more worrisome that this inability to provide the field with an adequate theoretical framework has resulted in stagnation in the development of new treatments.

Shortcomings of the biomedical model are so severe that it even led some of its foremost advocates to acknowledge them (Table 1.1).

It is unsurprising then, that the spawn of the biomedical paradigm, namely

Table 1.1: Selected critics from prominent sources on the biomedical model's shortcomings.

Quotation	Source
"What we are missing is an understanding of the biology of the disorders and what is really going wrong."[a]	Thomas Insel M.D., NIMH Director (2002-2015)
"Medications developed over the past five decades have been prescribed widely but have not been sufficient for reducing the morbidity and mortality of mental disorders."[b]	
"Although the past two decades have produced a great deal of progress in neurobiological investigations, the field has thus far failed to identify a single neurobiological phenotypic marker or gene that is useful in making a diagnosis of a major psychiatric disorder or for predicting response to psychopharmacological treatment."[c]	Michael First M.D., Editor of DSM-IV
"... brain science has not advanced to the point where scientists or clinicians can point to readily discernible pathologic lesions or genetic abnormalities that in and of themselves serve as reliable or predictive biomarkers of a given mental disorder or mental disorders as a group."[d]	American Psychiatric Association
"Psychopharmacology is in crisis. The data are in, and it is clear that a massive experiment has failed: despite decades of research and billions of dollars invested, not a single mechanistically novel drug has reached the psychiatric market in more than 30 years."[e]	H. Christian Fibiger Ph.D., former vice president of neuroscience at Eli Lilly and Amgen
"Chemical imbalance is sort of last-century thinking. It's much more complicated than that. It's really an outmoded way of thinking."[f]	Joseph Coyle M.D., Editor of *Archives of General Psychiatry*
"In truth, the 'chemical imbalance' notion was always a kind of urban legend—never a theory seriously propounded by well-informed psychiatrists."[g]	Ronald Pies M.D., Editor of *Psychiatric Times*

Notes. Table adapted from Deacon (2013). NIMH: National Institute of Mental Health.[a]Insel (2007), [b]Insel (2012), [c]First (2002), [e]American Psychiatric Association (2003a, 2003b), [d]Fibiger (2012), [f]Spiegel (2012), [g]Pies (2011).

the DSM model, has been the object of extensive, widespread, unrelenting criticism (Allsopp et al., 2019; Avenat et al., 2013; Bakker, 2019; Bentall, 2014; Deacon, 2013; Goldacre, 2014; Guerin, 2017; Hengartner & Lehmann, 2017; Kinderman, 2019; Middleton, 2015; Pemberton & Wainwright, 2014; Salicru, 2020; Timimi, 2014). Allen Frances, past chair of the American Psychiatric Association task force overseeing the development and revision of the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), described the current taxonomy as follows:

> "We must accept the fact that our diagnostic classification is the result of historical accretion and accident without any real underlying system or scientific necessity. The rules for entry have varied over time and have rarely been very rigorous. Our mental disorders are no more than fallible social constructs" (Phillips et al., 2012, p. 25)

Based on a review of recurring criticism of the DSM by several authors, this dissertation regroups them into five key issues.

Categories. First, these traditional systems see disorders as binary concepts: either we have it, or we do not. Yet, research evidence indicates that, in fact, numerous disorders are "sequentially comorbid, recurrent/chronic,and exist on a continuum" (Caspi et al., 2014, p. 119). This imposition of categories on dimensionally distributed phenomena leads to as substantial loss of information and to diagnostic instability (Kotov et al., 2017). Moreover, to define whether a concept falls within a category or outside of it, it needs to pass a certain illness-threshold, and as it has become apparent already, deciding past what point a psychological state is "disordered" is contentious. All the more so when one has to rely on individual self-reports

combined with clinicians' experience and (potentially biased) judgment to conclude what is above threshold (Clark et al., 2017).

Validity and clinical utility. Second, the imposition of arbitrary categories on dimensional phenomena also results in poor reliability (Freilich et al., 2022), excessive rates of comorbidity (Cramer et al., 2010; Kessler et al., 2005) and broad within-groups heterogeneity (Ormel et al., 2015; Teesson et al., 2009). Taken together, these might all be strong indicators that boundaries between disorders are in fact arbitrary, rendering the whole system itself clinically irrelevant.

Stigmatisation. Third, the categorical paradigm can be a source of stigmatisation through labelling (Peter et al., 2021). The DSM and ICD organise the universe of mental disorders and impose their language. Unfortunately, individuals do not use diagnoses within these classifications in a heuristic way; they have been reified. People (professionals and "patients" alike) talk about disorders from the psychiatric nosology as if they were natural kinds, real entities that exist independently (Kendell & Jablensky, 2003). This goes with its share of problems, specifically stigmatisation. Although many professionals strive to favour an adequate phrasing, it is common to say that one has a cold or a broken arm but is borderline or depressed posing the risk for an individual to identify with their diagnosis, their sickness. Ben-Zeev et al. (2010) described three types of negative outcomes associated with psychiatric diagnoses. The first, public stigma, relates to the "phenomenon of large social groups endorsing stereotypes about, and subsequently acting against, a stigmatised group: in this case, people with mental illness" (p.319). The second, self-stigma, encompasses the loss of self-esteem and self-efficacy occurring when individuals internalise public stigma. Finally, label avoidance, refers to the avoidance of people in

psychological distress to seek out mental health services in order to avoid the impact of a stigmatizing label. Thus, contrary to the assertion from proponents of the biomedical categorical model that diagnoses reduce stigma, they appear to do just the opposite (Pescosolido et al., 2010). When people believe in the veracity of mental diseases they are more likely to distance themselves (Angermeyer & Matschinger, 2005) from the sick they view as untreatable (Deacon & Baird, 2009; Haslam, 2011; Lam et al., 2005), unpredictable and dangerous (Read et al., 2006).

Overpathologisation. Fourth, as a result of its scientific weakness, the biomedical categorical model of mental health tends to pathologise normal behaviours on a social/political basis (Horwitz, 2011; White, 2017). This vulnerability to social construction inherent to "mental disorders" has more than questionable consequences. For instance, the DSM considered same-sex attraction a mental illness until 1973 (Drescher, 2015), whereas the WHO removed homosexuality from its classification (the ICD-10) only in 1990. Transgender individuals nevertheless are still considered sick (Gender Dysphoria, 302.6, F64.2), while being "too upset" when receiving a cancer diagnosis is motive to receive a Somatic Symptom Disorder (300.82 (F45.1), Johnstone, 2014). Although correlation is not equal to causation, it is reasonable to speculate that this overpathologisation of behaviours could have lead to the explosion in the use of antidepressant, stimulant, mood stabilizing, and antipsychotic drugs - especially among young people – observed in recent years in the U.S.A. (Medco Health Solutions, 2020; Moreno et al., 2007; Olfson et al., 2006).

Conflicts of interest. Fifth, following on the previous point, links between pharmaceutical companies and proponents of the biomedical categorical model of psychological distress have also raised concerns (Frances &

Widiger, 2012; Pilecki et al., 2011). Some authors argue that pathologizing every aspect of life (see point above) and creating a plethora of psychiatric diagnoses (labels), serve not the people but selected groups of interest that can then propose "cures" to these so-called "diseases" (Carpenter, 2000; Greenberg, 2013; Ritzer, 2013). Moynihan et al. (2002) summarise it as follows: "a lot of money can be made from healthy people who believe they are sick" (p.886) while Gøtzsche et al. (2019) goes as far as comparing the pharmaceutical industry to the mob. In other words, the will to retain the categorical system and its diagnoses might stem more from the pharma industry's interests than from scientific evidence.

Overall, although the systematic organisation of psychological distress in a set of codified "mental disorders" has represented an important progress by bringing order and parsimony to the field of mental health, the current paradigm is riddled with major shortcomings; the main one being its lack of validity.

1.2 Case in point: The field of personality disorders and shifting paradigms

If the latest re-editions of both the DSM-5 and the ICD-11 revived the longstanding opposition to the (biomedical) categorical classifications of "mental disorders" (Stein et al., 2013), the field of Personality Disorders (PDs) has been particularly concerned by the debate (Bach et al., 2022; Herpertz et al., 2017; Krueger et al., 2007; Skodol, 2012).

1.2.1 Personality

As illustrated already, one of the more challenging issues in psychopathology research relates to defining what is normal from what is abnormal. Considering

the very nature of personality, this proves arguably even harder to achieve with PDs (Krueger et al., 2007). Indeed, if one can imagine psychotherapy (or psychopharmacology) treating "depression", how should we understand the treatment of personality? If an exhaustive presentation of the field of personality is beyond the scope of this dissertation, it needs to summarise its key concepts before moving on to its "pathologies".

If an exhaustive presentation of the field of personality is beyond the scope of this dissertation, it needs to summarise its key concepts before moving on to its "pathologies".

Personality refers to individual differences in relatively enduring characteristic patterns of thinking, feeling and behaving (Major et al., 2000) and has a vast impact on an array of outcomes such as subjective wellbeing, physical health, longevity, relationship satisfaction, occupational choice and performance, as well as values and criminality (Ozer & Benet-Martínez, 2006; Soto, 2019). Since the groundwork of Allport (1937), these individual differences are customarily considered from two perspectives: their form (how they look like, the "traits" they take) and their role (the "function" they have).

The current dominant model to assess general personality structure is the Five Factor Model (FFM; Caspi et al., 2005; Deary et al., 2010; John et al., 2008), which is based on the NEO Personality Inventory-Revised (Costa & McCrae, 1992). It consists of the five broad domains of Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness with each of these further differentiated into six underlying facets (Costa & McCrae, 1995). The FFM has amassed considerable empirical support (McCrae & Costa, 2008) and is accepted as a reasonable outline of the major organizing dimensions for understanding human personality variation. If competing models (like HEXACO; Ashton & Lee, 2008) may differ in the number of dimensions, personality traits are widely

accepted to exist along continua rather than categories (Zimmermann et al., 2022).

Originally, personality models such as the FFM were designed to index normal—"healthy"—personality. However, this dimensional structure of personality appears to be considerably overlapping in clinical and non-clinical populations (O'Connor, 2002), suggesting that the FFM may also be successful at achieving an integrative classification of normal and abnormal personality functioning.

1.2.2 Personality Disorders

Although evidence indicates that PDs are merely maladaptive variants of personality traits that are evident within everybody (Widiger & Costa, 2012), the biomedical paradigm sees it otherwise. According to the DSM-5, a personality disorder is an enduring pattern of inner experience and behaviour that deviates markedly from the expectations of the individual's culture, is pervasive and inflexible, has an onset in adolescence or early adulthood, is stable over time, and leads to distress or impairment (American Psychiatric Association, 2013). The manual claims that there are ten specific types of PDs organised in three distinct clusters (see Table 1.2):

Table 1.2: Types of personality disorders arranged by cluster according to the DSM.

Cluster A Odd or eccentric behavior	**Cluster B** Dramatic or erratic behavior	**Cluster C** Anxious behavior
Paranoid	Antisocial	Avoidant
Schizoid	Borderline	Dependent
Schizotypal	Histrionic	Obsessive-Compulsive
	Narcissistic	

With the exception of BPD (Gunderson et al., 2018; Gunderson et al., 2011; Zanarini et al., 2010), there is a remarkable lack of epidemiological data on

PDs (Tyrer et al., 2015). Nevertheless, a meta-analysis conducted by Volkert et al. (2018) gives a general idea of their presumed prevalence in the general adult population of western countries. The authors reported rates as high as 12.16% (95% CI, 8.01–17.02%) for any PD, 7.23% (2.37–14.42) for Cluster A PDs, 5.53% (3.20–8.43) for Cluster B PDs, and 6.70% (2.90–11.93) for Cluster C PDs. In the details, prevalence was highest for the obsessive–compulsive PD (4.32%; 95% CI, 2.16–7.16%) and lowest for the dependent PD (0.78%; 95% CI, 0.37–1.32%).

Although the DSM paradigm assumes there is a finite number of personality disorder types, each of which with its fundamental nature (Kendler, 2009), there is little empirical research supporting the existence of such a set of categories (Eaton et al., 2011; McCrae et al., 2006). On the contrary, as demonstrated already, it appears that personality and personality pathology share a common conceptual dimensional framework (Leising & Zimmermann, 2011). It is no surprise then that the categorical approach used to classify and describe PDs is riddled with issues that Freilich et al. (2022) group as follows: (1) poor diagnostic reliability, (2) comorbidity and (3) intergroup heterogeneity and (4) limited clinical utility.

The imposition of categories (discrete PDs) on naturally dimensional phenomena (dysfunctional personality variation) results in poor diagnostic reliability (1) and a lower test-retest reliability of categorical diagnoses than dimensional assessments (Morey & Hopwood, 2013). The literature also provides evidence that individuals diagnosed with any PD frequently meet criteria for more than one (Grant et al., 2005; Zimmerman et al., 2005), making comorbidity (2) the rule rather than the exception. Furthermore, Andión et al. (2013) used Borderline Personality Disorder (BPD) to exemplify the extreme prevailing heterogeneity within categories (3): since the DSM-5 system lists nine criteria

of which a minimum of five must be present to receive this diagnosis, there exists 256 distinct clinical presentations. A meta-analysis from Verheul and Widiger (2004) also revealed that the personality disorder not otherwise specified diagnosis (PD-NOS) is one of the most frequent PD in research settings and the most frequent in clinical ones, indicating poor personality pathology coverage (4).

These flaws with the current categorical taxonomy impede the development of robust clinical guidelines (Zanarini et al., 2010) and might lead to confused or contradictory treatment recommendations (Morey et al., 2015). If a client is diagnosed with a BPD and a Paranoid Personality Disorder (PPD) what clinical presentation is the result of what disorder? Which one should be treated first? How? Concretely, let us say that in the context of an intimate relationship, said hypothetical client presents with severe paranoid ideations of being cheated on by their partner and behaves in an extremely controlling and jealous manner. Is this a set of BPD symptoms (criteria 1, 2 and 9 from the DSM-5) that should be addressed through a so called "disorder specific therapy" (e.g., Mentalisation-based therapy, MBT; Daubney & Bateman, 2015), or a symptom of PPD (for which there is no specific treatment)? As a result of this vagueness, the current evidence for the treatment of PDs (which is essentially limited to BPD) has no claim of having a diagnostic specific efficacy as opposed to general efficacy (Bateman et al., 2015). For example, Dialectic Behavioural Therapy (DBT; Linehan, 2014), which was originally developed to treat BPD has shown to be effective in handling an array of other clinical problems including eating disorders, ADHD and depression (Rizvi et al., 2013).

The superiority of dimensional models of PDs (and of "mental disorders" altogether for that matter) is hardly disputable (Haslam et al., 2020). Nonetheless, several authors have called attention to potential disadvantages

and risks associated with a sole dimensional system (First, 2005; Herpertz et al., 2017; Shedler et al., 2010). In substance, they warn that a complete shift of paradigm might create enormous administrative adjustment as well as clinical barriers between PDs and other mental or medical conditions. They further argue that it could complicate clinicians' efforts to integrate prior clinical research using PD categories, disturb research efforts and complicate record keeping.

Moreover, there is some data suggesting that PDs might involve genetics and/or neurobiological abnormalities that qualitatively deviate from normality (Amad et al., 2014; Schmahl et al., 2018). For instance, research suggests that "negative symptoms" of the schizophrenia-like personality trait known as "schizotypy" (e.g. anhedonia and withdrawal) are better conceptualised using categories whereas "positive symptoms" (e.g. perceptual dysregulation and unusual experiences) are rather dimensional in their nature (Mason, 2014). In other words, there is some reason to believe that PDs may also have a biological etiology and that an exclusive use of dimensions might not be indicated.

1.3 Moving towards a new paradigm

As presented already, research in the field suggests that PDs are a phenomenon best apprehended on continua. Nevertheless, even when adopting a fully dimensional paradigm the use of categories is inevitable, if only to structure our thinking (Allport, 1954; Stangor et al., 2022). One solution is to adopt alternative integrated models where categories are not applied in the context of a categorical paradigm but used in a considered and limited way to reflect a dimensional rational (Huprich, 2020).

1.3.1 Dimensional extensions to categorical models for PDs

As this dissertation has discussed above, even when considering biological bases to "mental disorders", categorical approaches are not only an inadequate representation of psychological distress, but also limited in their ability to guide effective research and treatment development. For one, the inadequacy of categorical approaches constitutes one of the key lessons learned in research on PDs, as there is robust evidence showing that the structure of PDs is dimensional, not categorical (Trull & Durrett, 2005). Since the shortcomings of categorical models are especially blatant for PD (Lenzenweger & Depue, 2016), the field is playing a leading role in bringing a much-needed paradigm shift towards alternative integrated frameworks for organizing and understanding mental health (see, e.g., Widiger et al., 2009)

This section presents how conceptualisation of personality (and its two facets of "traits" and "functionality"; see 1.2.1.) served as a template for the inclusion of dimensional features in DSM-5 (American Psychiatric Association, 2013; Helzer et al., 2009) as well as in the ICD-11 (Mulder, 2021) for the classification of PDs (for a concise summary see Kramer & Timulak, 2022). Then, it introduces the explicitly dimensional alternative frameworks of "mental disorders" that are the RDoC (Insel et al., 2010) project, and HiTOP (Kotov et al., 2017)).

1.3.1.1 Alternative Model for Personality Disorders of the DSM 5

In its 5th edition, the DSM maintained a categorical classification of PDs (see Table 1.2) while also creating the Alternative Model for Personality Disorders (AMPD) situated in "Section III Emerging Measures and Models" of the manual (for a detailed overview see Krueger & Hobbs, 2020). In this model, a PD is defined as the combination of a clinically significant impairment in

personality functioning (Criterion A) along with at least one maladaptive personality trait (Criterion B). These are organised around five broad domains (negative affectivity, detachment, antagonism, disinhibition, and psychoticism), themselves maladaptive variants of the domains of the 5-factor model of normative personality structure (Five Factor Model; Widiger & Crego, 2019). This (or these) trait(s) must be inflexible (Criterion C), stable over time (Criterion D), and not better explained by other defined causes (Criteria E, F and G).

In the AMPD, by combining functioning and maladaptive traits it is possible to recreate some DSM-IV PD constructs such as the antisocial, avoidant, borderline, narcissistic, obsessive-compulsive, and schizotypal ones. Thus, it shows how "specific DSM-IV PD types could be understood as specific combinations of personality functioning and pathological traits, as opposed to categorical symptom lists" (Krueger & Hobbs, 2020, p. 127).

1.3.1.2 The revised ICD 11

The International Statistical Classification of Diseases and Related Health Problems (ICD) is an internationally diagnostic tool used for epidemiology, health management and clinical purposes with a dedicated chapter to "Mental, behavioural or neurodevelopmental disorders". In its 11th version (ICD 11), the classification of PDs dropped its previous categorical model with ten distinct diagnoses in favour of an integrated one. From now on, only the "Personality disorder" category remains and is described as a marked disturbance in personality functioning, which is nearly always associated with considerable personal and social disruption. The central manifestations of Personality Disorder are impairments in functioning of aspects of the self (e.g., identity, self-worth, capacity for self-direction) and/or problems in interpersonal functioning (e.g., developing and maintaining close and mutually

satisfying relationships, understanding others' perspectives, managing conflict in relationships). Impairments in self-functioning and/or interpersonal functioning are manifested in maladaptive (e.g., inflexible or poorly regulated) patterns of cognition, emotional experience, emotional expression, and behaviour (World Health Organization, 2020).

In line with evidence that stresses the importance of taking severity into account in the diagnosis (Zimmermann et al., 2022), once clinicians have diagnosed a PD, they must assess its severity (mild, moderate or severe). Moreover, whereas there are no longer distinct PD categories, clinicians have still the option of specifying one or more prominent trait domain qualifiers: Negative Affectivity, Detachment, Disinhibition, Dissociality, and Anankastia as well as a Borderline Pattern (for a comparison between the classification of PDs in the ICD-10 and in the ICD-11, see Bach et al., 2022).

1.3.2 Explicitly dimensional frameworks for psychological distress

The shortcomings of the categorical paradigm for conceptualising psychological distress are not confined to PDs. Accordingly, there have been efforts to shifting the whole nosology toward dimensions (Lilienfeld & Treadway, 2016; Widiger et al., 2019).

1.3.2.1 The Research Domain Criteria (RDoC)

The Research Domain Criteria (RDoC) project was initiated in 2009. It aimed at encouraging and promoting studies that use dimensional approaches and multidisciplinary methods to understand the nature of mental health and illness based on empirical data from genetics and neuroscience (Insel et al., 2010). According to its authors, the information gained using the

RDoC framework may help develop a new psychopathology classification based on neurobiological measures that are associated with observable, clinically problematic behaviours as well as inform the creation of mental health screening tools and treatments(NIMH, 2022).

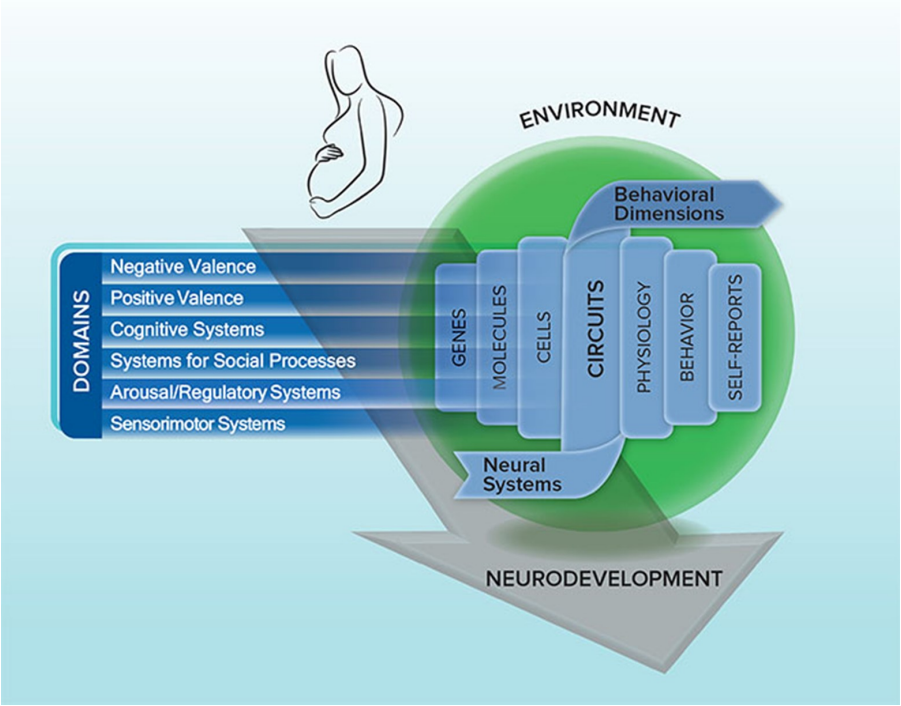

Figure 1.1: Overview of the Research Domain Criteria (RDoC) taken from (NIMH, 2022).

The RDoC framework is composed of a dynamic matrix comprising six major domains of human functioning: negative and positive valence, systems for cognitions, for social processes, for arousal/regulatory and for sensorimotor functions (Figure 1.1). Within each domain, there are several behavioural components (constructs) that are studied along a functioning continuum ranging from normal to abnormal. These constructs are "situated in, and affected by, environmental and neurodevelopmental contexts. Measurements of constructs

can be made using several different classes of variables, or units of analysis, which include genetic, physiological, behavioural, and self-report assessments" (NIMH, 2022a).

Despite acknowledging the inadequacy of the current categorical paradigm of mental health and promoting dimensional conceptions of psychological distress, the RDoC project has also been criticised for its heavily (neuro)biological leaning (Bakker, 2019). This overfocus on a biomedical etiology of psychological distress has raised similar concerns to those caused by the DSM paradigm, including doubts about its clinical utility and ability to alter diagnostic reification and advance knowledge in significant ways (Kraemer, 2015; Lilienfeld, 2014; Weinberger et al., 2015).

1.3.2.2 Hierarchical Taxonomy of Psychopathology (HiTOP)

Similarly to RDoC, the Hierarchical Taxonomy of Psychopathology (HiTOP) is not exclusive to PDs but is a new classification of psychological distress designed to address the major shortcoming of traditional taxonomies by developing an "empirically driven classification system based on advances in quantitative research on the organisation of psychopathology" (Kotov et al., 2017, p. 456).

Using a bottom-up procedure, HiTOP approaches psychopathology structures starting from the most basic building blocks and proceeding to the highest level of generality. It combines symptoms into homogeneous traits, assembling them into empirically-derived syndromes, and finally grouping them into psychopathology spectra (e.g., internalizing and externalizing). HiTOP allows for integration of existing categorical diagnoses in its structure (figure 1.2), addressing at the same time logistic concerns raised by the abandonment of the current system.

Overall, both alternative models approach nosology from distinct perspectives but with the possibility of working with one another to produce a unified

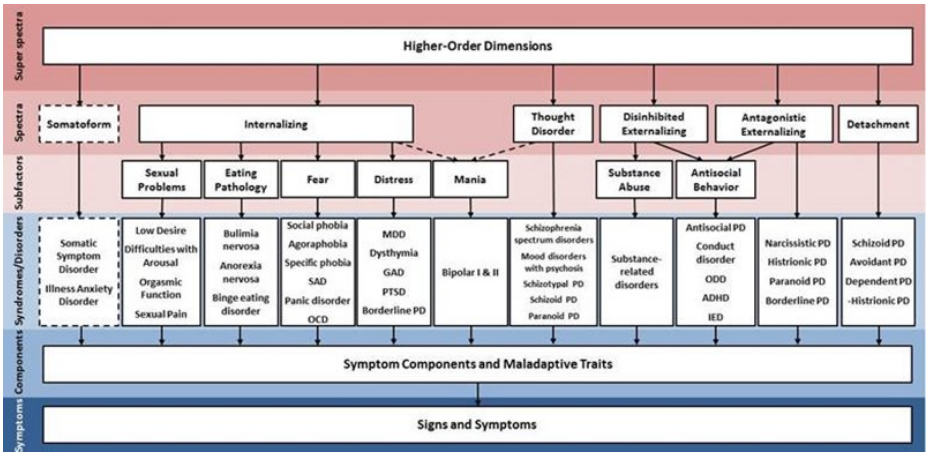

Figure 1.2: Overview of the Hierarchical Taxonomy of Psychopathology (HiTOP) taken from (Kotov et al., 2017).

system. Concretely, Patrick and Hajcak (2016, p. 416) suggest that dimensional systems such as the HiTOP should be used to characterise symptoms and their interrelation while taking into account the tenets of RDoC, specifically "operationalisation of constructs using variables from multiple domains, so that the clinical-descriptive systems remains permeable to new data and can evolve with advances in multiunit, process-based understanding".

1.3.3 Understanding how psychotherapy works

This section will present research designs used to investigate psychotherapy. First, it will introduce *randomised controlled trials* (RCTs) and discuss how they are a legacy of the biomedical categorical paradigm. It will highlight its limitations and possible solutions to improve them. Following a similar pattern, it will then move on to methods related to dimensional paradigms: the individualisation research designs.

1.3.3.1 Randomised Controlled Trials (RCTs)

At this point, it is evident that the prevailing biomedical categorical model of psychological distress has influenced our way to conceptualise and investigate psychological distress. For example, in psychotherapy research, the focus of the last decades has been on demonstrating empirical evidence for treatments of specific forms of psychopathology by means of RCTs (Hershenberg & Goldfried, 2015). RCTs are the practice of patient selection based on DSM symptoms and diagnoses. By recruiting diagnostically homogeneous samples, it allows for enhanced matching of treatment and control groups as well as clarity of outcome criteria but may be poorly generalisable to a broader population with clinically complex presentations.

On the bright side, decades of such research have established the efficacy of psychotherapy (Chambless & Ollendick, 2001; Dragioti et al., 2017; Lambert, 2014) and lists of disorder-specific Empirically Supported Treatments (EST). However, there has been no real breakthrough in the understanding of *what* makes it efficient. Our knowledge of *how* ESTs improve various "mental disorders" remains quite limited. As summarised by Kazdin (2007, p. 1), "after decades of psychotherapy research we cannot provide an evidence-based explanation for how or why even our most well-studied interventions produce change, that is, the mechanism(s) through which they operate". Because RCTs study artificial sets of treatments under controlled conditions, they not only fail to be useful for everyday life of clinicians but also at identifying central mechanisms of change, leaving us with effective but unspecific treatments of psychological distress and hardly any ways to optimise them.

Despite the dominance of biomedical theories and treatments, psychotherapy (and its investigation) has proven particularly promising (Deacon, 2013; Miller, 2010). It is considered the first-line intervention for numerous conditions, has

far fewer contraindications, adverse side effects and dangerous interactions than psychopharmacology—which has not made any significant progress in the past 50 years (Deacon, 2013; Schwartz, 2010; van Gerven & Cohen, 2011)—and is the preferred treatment for most clients (McHugh et al., 2013). These are decisive arguments in favour of increasing the focus and resources allocated to the development of cutting-edge methods in the field of psychotherapy research to identify its active ingredients. Those—also called "mechanisms of change"—need to fulfil seven requirements (see Kazdin, 2007, 2009):

1. **Strong association**: the changing variable must be related with symptom change
2. **Time sensitivity**: the changes on the mechanism of change need to happen before the outcome is measured
3. **Plausibility or coherence**: theory predicts change and its role for outcome
4. **Specificity**: the observed change is sufficiently differentiated from other constructs and change variables
5. **Gradient**: amount of change in the mechanism maps onto the amount of symptom change
6. **Consistency**: the results are observed across studies
7. **Experimental manipulation**: the change found holds true under controlled experimental conditions

Since it has always been standard for therapists to tailor treatment to the individuality and singularity of their clients (Norcross & Wampold, 2011), individualising research designs might be an alternate solution that could contribute to their identification.

1.3.3.2 From dimensions to individualisation

Following his analysis that we know too little on mechanisms of change, Kazdin (2007) propounded several research recommendations to identify them—most compatible with RCTs designs. Examples include assessing more than one potential mediator/mechanism simultaneously, establishing the timeline of the proposed mediator/mechanism and outcome or qualitative research. Lundh and Falkenström (2019), on the contrary, have argued that RCTs are biased altogether because of their focus on studying effects of standardised treatments at a group level of analysis, while ignoring the patterns of change at the individual one. To address this drawback, they suggest favouring the overarching holistic-interactionist paradigm (Magnusson, 2001), which manages to easily integrate a number of methodological innovations, such as experience sampling and ecological momentary assessment (Beuchat et al., 2021; Csikszentmihalyi & Larson, 2014; het Rot et al., 2012; Myin-Germeys et al., 2009) or single-subject designs (Kazdin, 2019). In this framework, "each person is initially conceived of as a possibly unique system of interacting dynamic process, the unfolding of which gives rise to an individual life trajectory in a high-dimensional psychological space" (Molenaar, 2004, p. 202). This stance results in the necessity of focusing on the idiosyncratic level and individualisation of at least parts of psychotherapy research designs—without refraining to look for general regularities. In that regard, the dimensional approaches this dissertation has discussed provide an excellent framework since they organise a person's characteristics of interest and represent them on one or more scales or continua, rather than assigning them to a category, working in a more holistic and differentiated way.

There exist several ways of individualising research designs. In the context of experimental study of emotions for instance, Pascual-Leone et al. (2016) provide

a compelling argument in favour of individualising research designs by calling to focus on the desired reaction's validity rather than the stimulus'. Instead of using similar stimuli for all participants (for instance a set of validated pictures) to elicit a desired emotion, they suggest using idiosyncratic stimuli. A study by Hooley et al. (2012) on perceived self-criticism is an excellent example of this. In their design, they presented participants with audio-recorded critics from their own caregiver. To do so, they interviewed participants' mothers. Other examples from the literature include studies by Beblo et al. (2006) using autobiographical memories narratives or by Whelton and Greenberg (2005) and Kramer et al. (2018) using self-critical dialog from emotion-focused psychotherapy. While they originally made their point for the study of emotions, this dissertation argues it holds for the investigation of other concepts as well.

Case formulation is another optimal possibility when it comes to individualisation and idiosyncratic data collection (Kramer, 2020). More than three decades ago, Persons (1991) already argued that psychotherapy research based on individualised case formulations might be a possible way to increase the clinical utility of results, bridging the gap between science and practice. A case formulation may be defined as "the process of developing a hypothesis about the causes, precipitants, and maintaining influences of a person's psychological, interpersonal and behavioural problems, as well as a plan to address these problems" (Eells, 2022, p. 2). Its main goal is to organise information and help make sense of apparent contradictions and inconstancies about a person, thereby providing clinicians with a tool to integrate clinical observations within an explanatory model, in order to individualise psychotherapy. Examples of case conceptualisations methods may focus on emotional experiences (Strating & Pascual-Leone, 2019), rely on Cognitive and Behavioural theory (Sturmey & McMurran, 2019), Psychodynamic theory (Levy et al., 2019) or Clarification-

Oriented theory (Eells, 2011; Sachse, 2019). Regardless of the method, they all enable researchers to elaborate fundamental hypotheses by providing them with multiple types of information.

1.3.3.3 Multidisciplinary integrated research designs

Incidentally, the multitude of data source is paramount to sound research and the integration of different research methods is decisive to adopt a more comprehensive approach to investigating psychological distress (Hershenberg & Goldfried, 2015). Much like RDoC, this doctoral thesis refers to multidisciplinary as the combination and integration of several academic disciplines and their methods in an approach to a topic or problem. By acknowledging how psychotherapy research and its object of investigation (i.e. psychological distress) stand at the crossroads of several fields (psychopathology, personality psychology, sociology, neurosciences, neurobiology, neuroimaging etc.) it is not only natural to individualise its designs but also to embed them into multidisciplinary multilevel assessments. For instance, because of the significant role neural circuits are thought to play in mediating personality (see chapter 1.3.2.1 of the present dissertation; for a review see Schmahl et al., 2018), it appears necessary to integrate rationales and methods from neurosciences into psychotherapy research of PDs. However, whereas the integration of neuroscience to the study of psychotherapy can be meaningful, it should by no means imply that it is the main pathway to understand psychological distress. Biological reductionism in the field of mental health is a fallacy and only a proper integration of different levels of analysis can hope to bring about substantial improvements.

Chapter 2

Present Thesis

The paradigms we use to understand the world around us have consequences, namely by shaping it accordingly. In its introduction, this dissertation has highlighted the failure of the (biomedical) categorical approach to make adequate sense of "mental disorders". It paid particular attention to describing how this unfitted paradigm also results in the inability of science to make any significant progress in understanding psychological distress—and most importantly— find ways to alleviate it (1.1). As part of its argument, this dissertation emphasised on the one hand the central role PDs (1.2.) played in developing alternative classification models that integrate dimensions (1.3.), and on the other hand, the role it can play in spearheading new ways to conceptualise psychological distress and investigate its mitigation.

Indeed, since comorbid heterogeneous clinical presentations characterise PDs, this dissertation contends that they represent ideal candidates for individualised multidisciplinary integrated psychotherapy research designs (1.3.3.2 and 1.3.3.3.). Furthermore, it has argued that in the hope of determining the active ingredients of psychotherapy, its research designs should focus on patterns of change at individual level—without ceasing to look out for general regularities. Once mechanisms of change explaining *how* psychotherapy works are identified, it will become possible to actively develop and test transdiagnostic treatments *ex ante* instead of finding out that some treatments also happen to work transdiagnostically ex post.

The findings of the three papers composing the present doctoral dissertation

Table 2.1: Individualisation and integration methods of each paper as well links to the RDoC

	Paper I (2020)	**Paper II** (2021)	**Paper III** (submitted)
Individualisation	Stimuli	Case conceptualisation	Assessment
Integration	CCRT and fMRI	Qualitative and quantitative	Self and observer scales
RDoC	Nucleus Accumbens	—	Self-Assessment Manikin

Notes. In the RDoC matrix, the nucleus Accumbens (NAcc) is a "circuit" unit of analysis in the Affiliation and Attachment construct of the Social Process Domain. The Self-Assessment Manikin (SAM) is a "self-report" unit of analysis in the Arousal construct of the Arousal and Regulatory Systems Domain.

not only attempt to address the challenges discussed above by proposing ways of applying individualised research methods to investigate psychotherapy for PDs but they also insert themselves in this dimensional framework of integrated multiple approaches (see Table 2.1).

Paper I: Integrating core conflictual relationship themes in neurobiological assessment of interpersonal processes in psychotherapy (Grandjean et al., 2020)

The first paper describes a complementary neurobehavioural methodology that integrates individualisation of stimuli with neuroimaging to assess interpersonal processes in psychotherapy. It illustrates this integration by presenting selected data from a pre-post pilot study on interpersonal processes' change in brief treatment for Borderline Personality Disorder (BPD).

Key findings: Implementation of the methods allowed for the observation that Linda's symptom reduction between pre- and post-treatment was reflected on the neurobiological level in changes in the hippocampus, the

insula and nucleus accumbens (NAcc).

Paper II: Psychotherapeutic case formulation: Plan analysis for narcissistic personality disorder (Grandjean et al., 2021)

The second paper presents a prototypical Plan structure of Narcissistic Personality Disorder (NPD) based on the individual Plan Analyses of fourteen participants diagnosed with this PD. It combines case formulation, qualitative and quantitative methods to investigate the narcissistic symptoms severity of the clients by the presence (respectively absence) of certain Plans in their individual Plan Analysis.

Key findings: The synthesis of the fourteen individual Plan Analyses revealed that clients with pathological narcissism share common basic motives (see Appendix A) and that the presence of the Plan "*be strong*" acted as a protective factor, significantly reducing the narcissistic symptoms.

Paper III: Differences in Emotional Arousal between Clients with a Borderline Personality Disorder and Healthy Controls during an Experiential Task (Grandjean et al., *submitted*)

The third paper investigates emotional arousal and psychological distress of clients diagnosed with a BPD compared to healthy controls when faced with self-criticism. It assesses the emotional activation of both groups during the individualised experiential Two Chair Task (TCT) focusing on the elaboration of self-criticism

Key findings: During the experiential Two Chair Task (TCT) focusing on the elaboration of self-criticism, participants diagnosed with a BPD displayed significantly more observed emotional arousal variation than controls. Participants with a BPD also showed significantly higher psychological distress than participants in the control group. In the

control group, more observed emotional arousal was associated with more reported psychological distress.

In the following, the three studies constituting the core of this dissertation are presented in manuscript form.

Papers

Paper I

Integrating core conflictual relationship themes in neurobiological assessment of interpersonal processes in psychotherapy

Loris Grandjean[1*], Hélène Beuchat[1], Lucien Gyger[4], Yves de Roten[1], Jean-Nicolas Despland[1], Bogdan Draganski[4,5*], Ueli Kramer[1,2,3*]

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[1]Institute of Psychotherapy, [2]General Psychiatry Service, Department of Psychiatry, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland
[3]Department of Psychology, University of Windsor, Windsor, Ontario, Canada
[4]Laboratory for Research in Neuroimaging (LREN), Department of Clinical Neuroscience, Lausanne University Hospital and University of Lausanne, Switzerland
[5]Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany

*These authors contributed equally to the work.

Correspondance: Loris Grandjean, Institute of Psychotherapy, Department of Psychiatry, Lausanne University Hospital and University of Lausanne, Bâtiments des Cèdres 1, Site de Cery, CH-1009 Prilly, Lausanne, Switzerland. Email: loris.grandjean@chuv.ch

Abstract

Interpersonal processes are a key target in counselling and psychotherapy. It is of paramount importance to sharpen their assessment using integrated methods. Hence, this methodological paper describes how fields of research in psychotherapy and neuroimaging can be integrated into one novel complementary neurobehavioural paradigm that can be applied to enhance our understanding of interpersonal processes in psychotherapy. To illustrate this integration, we present selected data from a pilot pre-post-study where the authors assessed interpersonal processes in brief treatment for Borderline Personality Disorder (BPD) using the Core Conflictual Relationship Theme (CCRT), functional Magnetic Resonance Imaging (fMRI) and outcome questionnaires. To do so, they measured individual changes in neural activity using an fMRI task pre and post treatment where clients gave feedback on the emotional valence of sentences extracted from their own Relationship Anecdote Paradigm (RAP) interviews mixed with neutral ones. In this paper, using data from two participants of said study, we discuss how to implement this methodology and what can be achieved in terms of results.

Keywords: methodological paper, functional magnetic resonance imaging, core conflictual relationship theme, neuroimaging assessment, interpersonal processes, borderline personality disorder

I.1 Introduction

Interpersonal processes are a key target in counselling and psychotherapy. Across helping contexts, clients present problems in the interpersonal domain and therapists and counsellors are asked to intervene based on interpersonally informed intervention models (e.g., Benjamin, 2003; Pettit & Joiner, 2006; Schnell & Herpertz, 2018). A core task in many psychotherapy approaches has been to develop and validate descriptive methods aiming at the precise assessment of interpersonal processes (Barber & Crits-Christoph, 1993; Luborsky & Diguer, 1998), and of change observed in these processes over the course of treatment (Tompkins & Swift, 2015). In this context, interpersonal processes may be defined as the client's representations of interaction patterns which have been internalized and which generate current experiences and interaction styles (Benjamin, 2003).

Various interpersonal conceptualizations exist (Benjamin, 2003; Horowitz & Eells, 1997; Kiesler, 1996; Leary, 1957; Schaefer, 1965) but tend to focus on the represented pattern of interaction, leaving out, for the most part, the client's motivational component related to one's wishes, needs and fears. The Core Conflictual Relationship Theme, derived from Luborsky's work on psychodynamic psychotherapy (CCRT; Luborsky & Crits-Christoph, 1998) addressed this shortcoming of the earlier models and proposed to conceptualize mental representations of interaction patterns by using three components: a) the wish (desire, need or intention of the client), b) the response from others and c) the response of the self.

A few studies focused on neurobiological underpinnings of interpersonal processes in psychotherapy and psychopathology (Buchheim et al., 2006; Kessler et al., 2011). Whereas these studies used systematized methodologies to assess interpersonal processes, they did not specifically focus on core conflictual relationship processes as conceptualized within the CCRT tradition. This was done in the study by Loughead et al. (2010). These researchers recruited healthy controls (N = 16) who underwent a Relationship Anecdote Paradigm (RAP; Luborsky, 1998) as psychological assessment, including a series of relationship episodes and the participant's rating of emotional arousal related with the episode. A summary score of interpersonal processes' pervasiveness across the narratives serves as indicator of repetitiveness of a specific core theme for a particular participant. Six weeks later, the same participants underwent an fMRI assessment in which the specific narratives were presented in extended formats. The neural activations related to the individual's CCRT narratives are compared with the ones associated with neutral narratives; the latter had no autobiographical content, but were similar in terms of structure, emotion and CCRT content. The selection of the control sentences is central here and

demonstrates the researchers' particular interest in the role of autobiographical memories in the interpersonal processes. Consistent with this approach, this study evidenced that the individual's CCRT correlated with activation in the left hippocampus, parahippocampal gyrus and middle occipital gyrus. Interpreting these results, Loughead et al. (2010) suggested that "the recall of RAP autobiographical relationship narratives leads to increased activation in region associated with autobiographical memory, emotion processing, theory of mind, and a putative mirror system" (p.330).

Given these findings, it appears that integrating the CCRT methodology with fMRI is promising, although several challenges need to be addressed beforehand. Mainly it is important to disentangle as best as possible the assessment of memory structures (e.g., a specific episodic memory of an interaction from the past) from interpersonal processes (e.g., a more schematic memory implying the representation of typical and repetitive interaction patterns).

I.2 Description of the methodology

Two core aspects of the methodology we used are its integration of the CCRT in neurobiological assessments (fMRI) and the individualization of stimuli. To address the memory structures challenge (episodic/schematic), we standardized the individualized stimuli in a way that left more autobiographic markers out, so that they would evoke generalized interactional patterns rather than autobiographical memories. We think that this way the proposed task assesses the process that was originally being conceptualized by the CCRT (Luborsky & Crits-Christoph, 1998). While the CCRT provides a validated and clinically relevant way of studying idiosyncratic interpersonal processes in counselling and psychotherapy, neuroimaging allows us to monitor its change at a neurobiological level. As shown in earlier studies (Hooley et al., 2012) the use of personalized

stimuli is productive under certain methodological circumstances (Kramer, 2020).

Pascual-Leone et al. (2016) described the sometimes overlooked problems researchers run into when they use standardized stimuli in experimental designs in the study of emotion. They argued that the assumption that a particular standardized stimulus (e.g., from a picture databank) evokes a comparable emotional reaction across participants is problematic. Instead of standardizing the emotional stimulus, Pascual-Leone et al. (2016) proposed to standardize the anticipated emotional response, and to individualize the emotional stimulus deemed to evoke the named emotional response. We would suspect that, even though this criticism mostly applies to emotion research, similar tenets might apply to the study of interpersonal processes in counselling and psychotherapy. The assumption that a standardized interpersonal stimulus (e.g., a picture or a movie demonstration of social exclusion) evokes a between-individual comparable reaction (substantiated by emotion arousal) is problematic. Individualizing the specific interpersonal stimulus (e.g., by providing the words used when rejecting this particular individual) enables to study the salient core process, and the individual's emotional reaction to it. Across time (and with effective psychotherapy), the individual's core meaning of social interactions may change across time points in a way that may let emerge increasingly adaptive information. This process might be underpinned by the regularities described from memory reconsolidation, where the construction of new and healthier narratives is the end-product of a complex process of memory recall, emotional arousal and transformation (Lane et al., 2015). Thus, we propose that assuming all individuals react to the same standardized interactional stimulus in the same way is problematic and undermines internal and external validity of an experimental design.

I.2.1 Assessment

Assessments should take place at least before and after the treatment. Clients should be tested in the fMRI at the same point of their menstrual cycles. The assessment of interpersonal processes on a neurobehavioural level should encompass (1) a behavioural assessment component and (2) a neuroimaging assessment component, planned 1 week apart for both assessment points. Treatment outcome and level of arousal should also be assessed.

I.2.1.1 Neurobehavioural assessment of interpersonal processes

Psychological Assessment

Individualized narrative descriptions of interpersonal functioning can be obtained from participants using the Relationship Anecdotes Paradigm (RAP). This method uses a semi-structured interview to elicit narratives about the individual's relationships with others (Luborsky & Diguer, 1998). The RAP was designed to elicit Core Conflictual Relationship Patterns, and focuses primarily on the elicitation of negative CCRTs. As such, it provides a validated interview framework to directly assess the psychological components of the CCRT which are the Wish (W), the Response from Others (RO) and the Response from the Self (RS).

When well trained in the use of the method, CCRT judges achieve good reliability (Crits-Christoph et al., 1988) and Barber et al. (1995) found a high degree of agreement and fairly good kappas. Luborsky et al. (1985) found a good convergent validity of CCRT "improvement" with standard improvement measures such as the Hopkins Symptom Checklist total score (change in the main positive RO was significantly correlated with change on the Symptom Checklist, r = -.79, $p < .05$) and the Health-Sickness Rating Scale (change in the pervasiveness of the main negative response to self was significantly

correlated with change in Health-Sickness Rating Scale, r = -.81, $p < .05$, and change on the main wish, r = -.73, $p < .05$.)

Using the RAP method, participants should be asked to recall and describe 6 meaningful interpersonal interactions they experienced within 3 different fields. The first one should be related to relationships episodes with friends, family members or significant others, the second one to work colleagues, bosses, teachers or school mates while the third and last one should be related to caregivers such as psychotherapists, psychologists, counsellors, psychiatrists or nurses. The RAP interview should last around 35 minutes, be video-taped, transcribed word by word and then used for two aims in the following step of the procedure: a) coding of the CCRT (Luborsky & Crits-Christoph, 1998) and b) extracting 15 stimulus sentences for the presentation during the neuroimaging assessment with the same client. The interviews should be transcribed and scored by trained raters using the standard CCRT method by Luborsky and Crits-Christoph (1998).

Neuroimaging assessment

Participants should undergo MRI scanning during a passive viewing task. The stimuli should be 15 individualized relationship brief sentences with identical syntax retrieved from their respective RAP interview and 15 standardized neutral unspecific brief sentences (see Tables I.1 and I.2). The sentences should be presented in a randomized order in the Cogent software developed by the Cogent 2000 team at the FIL and the ICN and Cogent Graphics developed by John Romaya at the LON at the Wellcome Trust Centre for Neuroimaging, University College London, UK. Cogent Graphics is a graphics toolbox for MATLAB on the PC that can be used to generate real-time graphical animations for use as stimuli in visual experiments. The participants should receive the following instruction: “Read the sentence and imagine the situation”. After

each presentation of a stimulus, the emotional arousal should be assessed on the Self-Assessment Manikin scale (Bradley & Lang, 1994) projected while in the scanner.

fMRI data acquisition. The neuroimaging experiments for fMRI data acquisition should follow the well-established methodology of blood-oxygen-level-dependant (BOLD) imaging followed by standard data processing and statistical analysis in the framework of SPM12. The fMRI data should be acquired on a 3T MRI scanner with a 64-channel head coil using a 2D EPI sequence. The acquisition parameters should be as follows: $3 \times 3 \times 3$ mm^3: TE =30 ms, slice TR = 66 ms, 30 slices, flip angle = 90°. The structural MRI data should consist of T1-weighted MPRAGE images (TR = 2000 ms; TI = 920 ms; $\alpha = 9°$; BW = 250 Hz / pixel; readout in inferior-superior direction; FoV = 256 × 232 mm; 176 slices) at 1 mm resolution. At the current stage of knowledge, a whole brain analysis should be used.

fMRI data pre-processing. All data pre-processing should be performed using the freely available Statistical Parametric Mapping software (SPM12; Wellcome Trust Centre for Neuroimaging, http://www.fil.ion.ucl.ac.uk/spm/) running under Matlab 7.13 (The MathWorks, Inc., Natick, Massachusetts, United States). EPI images should be realigned to the subject's average image across runs, corrected for spatial distortions using the SPM field-mappig tools (Hutton, 2002). The parameters of registration to standardized MNI space should be calculated on the anatomical image and the default settings of the "unified segmentation" framework followed by the diffeomorphic registration algorithm DARTEL (Ashburner, 2007; Ashburner & Friston, 2005). The spatial registration parameters should then be applied to the functional time-series co-registered to the corresponding individual's anatomical scan. Prior to statistical analysis, a spatial smoothing with a Gaussian kernel of 8 mm full-width-at-half-

maximum should be applied.

Because of length constraints, further technical details on the fMRI assessment are available upon request to the first author.

Level of arousal

*Self-Assessment Manikin.*The SAM (Bradley & Lang, 1994) is a self-assessed questionnaire using a single item to measure the momentary level of arousal using a 9-point Likert scale, ranging from "not excited at all"(1) to"very excited"(9). The scale is illustrated as a series of human shaped figures displaying varied levels of activation. It is widely used in emotion research and has proven its validity and reliability (e.g., Bradley & Lang, 1994).

While we applied this methodology in the context of a pilot pre-post-study for assessing interpersonal processes in treatment for Borderline Personality Disorder (BPD) and showed its feasibility in this context, the present methodological paper assumes the relevance of this methodology for any longitudinal assessment of interpersonal processes related to intervention in counselling and psychotherapy.

I.3 Illustration of a study applying this methodology in the context of psychotherapy research

We present here two female participants' complete dataset related to their interpersonal processes from a pre-post pilot study. Both clients were diagnosed with BPD and received a brief 10-session treatment as part of the study. More details on the study design, the treatment and the sample of this pilot study can be found in the original study that took place in a French-speaking University environment (Kramer et al., 2018). We chose Linda and Suzan (names were changed in order to protect their identity) because of their marked between-

Table I.1: Linda's and Suzan's individualised functional magnetic resonance imaging stimuli pre- and post-therapy

Linda	Suzan
Pre-therapy	
• I want to say goodbye to my grandfather (W), he dies (RO) and I feel sad (RS) • I want my girlfriends to support me, they are against me and I feel like a looser • I want to be respected by my family, I am being ignored and I feel sad • I want Laura to defend me, she's tough and I feel powerless • I want to trust Diana, she turned the whole class against me and I feel sad • I want my grandmother to stay here, she leaves and I feel sad	• I want to be respected by the therapist (W), he interrupts me (RO) and I feel angry (RS) • I want my father to leave me alone, he shouts at me and I feel angry • I want my physician to listen to me, he does not respect me and I feel angry • I want to be respected by my physician, he is on his phone and I feel angry • I want my brother to listen to me, he does not respect me and I'm acting haughty • I want to be respected by the caregivers, they do not respect me and I do as I please
Post-therapy	
• I want the physician to be warm, he is cold and I feel uncomfortable • I want my father to accept me, he excludes me and I feel sad • I want my therapist to be present, he distances himself and I distance myself • I want to be left alone by my mother, she controls me and I feel sad • I want Karin to understand me, she ignores me and I distance myself • I want my friend to support me, she criticizes me and I scream	• I want my psychiatrist to explain how he can help me, he doesn't understand and I feel frustrated • I want my former psychologist to give me a certificate, she doesn't understand and I cry • I want my social worker to leave me alone, she doesn't care and I feel helpless • I want my social worker to explain how she can help me, she refuses and I feel depressed • I want my psychiatrist to leave me alone, he doesn't care and I feel incomprehension • I want my ex-boyfriend to leave me alone, he refuses and I cry

Notes. Names were changed to protect the identity of persons involved. All stimuli have similar syntax. Abbrevations: RO, response from others; RS, response from the self; W, wish.

person differences in relationship patterns as reflected in their individualized stimuli (see Table I.1). Both were assessed by trained clinicians using the SCID-II, a diagnostic structured interview used to determine DSM-IV Axis II disorders (First & Gibbon, 2004). They were non-medicated, right-handed and presented no neurological disorders, bipolar disorder I nor schizophrenia. They accepted that their data be used for research and the trial was approved by the competent institutional ethics board (internal identification number 125/15).

Table I.2: Neutral functional magnetic resonance imaging stimuli pre- and post-therapy for both Linda and Suzan

- I want to trust the cashier (W), she helps me (RO) and I feel ok (RS)
- I want to avoid conflict with the tick office employee, he respects me and I feel ok
- I want to deal with an open-minded pharmacy assistant, she supports me and I feel ok
- I want to assert myself with the vegetables salesman, he cooperates and I feel ok
- I want to be independent from the cleaning lady, she respects me and I feel ok
- I want to be open with the receptionist, he helps me and I feel ok
- I want to be respected by the theatre employee, he gives me what I need and I feel ok
- I want to be myself with the stewardess, she understands me and I feel independent
- I want to be accepted as I am by the swim teacher, he facilitates my independence and I feel ok
- I want to be helped by the cleaning lady, she is open to it and I feel ok
- I want to be correct with the flowers salesman, he accepts me and I feel ok
- I want to succeed in what I am doing with the fitness instructor, he supports my ambition and I feel ok
- I want to be correct with the cashier, she respects me and I feel ok
- I want to be supported by the butler, he helps me and I feel ok
- I want to trust the taxi driver, he understands me and I feel ok

I.3.1 Treatment outcome

I.3.1.1 Outcome Questionnaire–45.2

This self-report questionnaire encompasses 45 items aiming at assessing results yielded from treatment (Lambert et al., 2004), including a global score and three subscale scores: symptomatic level, interpersonal relationships, and social role. These items were assessed on a Likert-type scale ranging from 1 (never) to 4 (always); a total sum score (ranging from 0-180) and scores per subscale were computed. On the total score, which is calculated by summing all 45 items, the higher the score, the more disturbed the client. There is a cut-off score at 63 or more that indicates symptoms of clinical significance. The scale has been translated and validated in French (Emond et al., 2004). This questionnaire was given at intake and at discharge of treatment. Cronbach's alpha for the 8-participant sample was $\alpha = .89$.

I.3.1.2 Borderline Symptom List

The Borderline Symptom List (BSL-23) is a self-report questionnaire that assesses specific borderline symptomatology using 23 items, and it is a short version of the more extensive BSL-95 (Bohus et al., 2009), for which excellent psychometric properties were reported. Similar results were found for the short version (Bohus et al., 2009). The items are assessed using a Likert-type scale ranging from 0 (absent) to 4 (clearly present); an overall mean score is computed (0-4). The French translation (Page, Kramer, & Berthoud, unpublished data, 2010) was approved by the authors of the scale. Cronbach's alpha for the 8 participants sample was $\alpha = 0.90$.

I.3.2 Procedure

Linda and Suzan received information concerning confidentiality, the voluntary aspect of their participation and on the detailed study procedure. A member of the research team reviewed the different points of the informed consent with each participant making sure they were thoroughly understood and answered any questions. Both participants agreed and signed the informed consent. Linda and Suzan were assessed pre and post treatment. They both met a researcher who led the psychological investigation. They answered self-reported questionnaires (OQ-45, BSL-23, and SAM) and completed the semi-structured Relationship Anecdotes Paradigm (RAP) interview. Specific narratives stimuli were then extracted and turned into 15 individualized sentences. One week after that, they were invited to the neuroscience lab where they underwent a functional magnetic resonance (fMRI) imaging. During the fMRI, they were shown their individualized interpersonal sentences and standardized sentences in a randomized order (see Tables I.1 and I.2). They were asked to rate their emotional arousal after seeing the stimuli. Right after the end of the treatment, they underwent the same assessment (self-reported questionnaires and RAP interview, fMRI). For the post-therapy fMRI assessment, the clients were exposed to their own sentences that were extracted from the post-therapy psychological assessment (RAP). On a methodological level, the decision to present different stimuli at T1 and T2 was made to avoid an habituation effect. On a conceptual one, we chose to use different individualized stimuli at T1 and T2 because our aim was to assess change in the individual's representation of interpersonal processes, their psychological and neurofunctional correlates at both time points, rather than the change in the individual's reaction to the initial formulation of the CCRT. Providing new stimuli at the second assessment leaves the door open to new content, which is more central to the individual, so

it ultimately is in keeping with our fundamental assumption of the centrality of the individual's own content at each time point.

I.3.3 Behavioral data analysis

For the behavioural outcome, we calculated the pervasiveness for each component of the CCRT (W, RO, RS) of each participant's RAP interview—that is, one before the treatment and one after it.

I.4 Results

Post-treatment, both Linda and Suzan had good outcome. They both showed clinically significant improvement on their OQ-45 and BSL-23 scores implying a reduction in symptoms' severity (see Table I.3). On the OQ-45 total score, Linda's score decreased of 34 points (-64.2%) going from 95 pre-therapy to 61 post-therapy whereas on the BSL-23 she showed a 0.6 point decrease (-51.3%) going from a 1.17 mean pre-therapy to a 0.57 one post-therapy. On the OQ-45 total score, Suzan's score decreased of 55 points (-35.9%) going from 153 pre-therapy to 109 post-therapy and showed a 1.65 point decrease (-45.2%) on her BSL-23 mean, going from 3.65 pre-therapy to 2.00 post-therapy.

Table I.3: Changes in Linda's and Suzan's symptoms pre- and post-therapy

Timepoint	Questionnaires	Linda	Suzan
Pre-therapy	OQ-45 (0-180) BSL-23 (0-4)	95 1.17	153 3.65
Post-therapy	OQ-45 (0-180) BSL-23 (0-4)	67 0.57	109 2.00

Despite having very distinct individualized sentences (Table I.1), Linda and Suzan have roughly similar predominant CCRT patterns on the level of the CCRT categorical system (Table I.4). For both of the participants, the RO themes are identical pre- and post-therapy: "They are rejecting and opposing

me" (CCRT cluster 5). Similarly, their post-therapy RS themes also identical: "I am disappointed and despaired" (CCRT cluster 7). However, they differ in their W themes pre- and post-therapy: "To be distant, avoid conflict" (CCRT cluster 4) and "To be loved and understood" (CCRT cluster 6) for Linda and twice "To be close to others and accept them" (CCRT cluster 5) for Suzan.

Regarding the individualized stimuli related to their CCRT, it appears that for Linda, the main RS' associated emotion is sadness and hopelessness ("I feel sad", "I feel powerless") whereas for Suzan, it seems that it is rather anger and hostility ("I feel angry", "I'm acting haughty"). Thus, despite having received the same diagnosis both clients show great discrepancy in their RS which may speak to an individualized perspective on assessment of interpersonal processes.

Table I.4: Linda's and Suzan's CCRT themes pre- and post-therapy

Linda	Suzan
Pre-therapy	
• **W:** To be distant, avoid conflicts (40%) • **RO:**They are rejecting and opposing me (60%) • **RS:** No specific response (20%)	• **W:** To be close to others and accept them (67%) • **RO:** They are rejecting and opposing me (50%) • **RS:** I am disappointed and despaired (71%)
Post-therapy	
• **W:** To be loved and understood (67%) • **RO:**They are rejecting and opposing me (33%) • **RS:** I am disappointed and despaired (67%)	• **W:** To be close to others and accept them (83%) • **RO:** They are rejecting and opposing me (83%) • **RS:** I am disappointed and despaired (50%)

Notes. Abbrevations: RO, response from others; RS, response from the self; W, wish.

Figures I.1 and I.2 represent statistical parametric maps (SPMs) of blood-

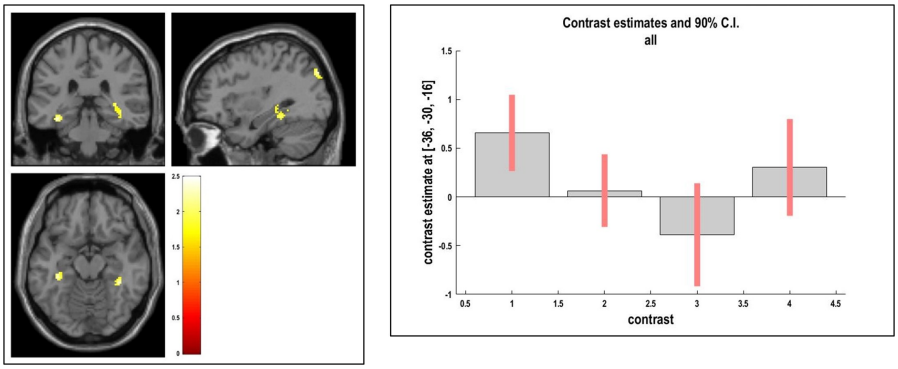

Figure I.1: Statistical parametric maps (SPMs) interaction analysis between SENTENCES (personalized [PERS] or neutral [N]) and TIME (time point 1 [TP1] versus time point 2 [TP2]) in the bilateral hippocampus for Linda. T-values surviving $\alpha = 0.05$ uncorrected for multiple comparisons projected on a canonical anatomical image in Montreal Neurological Institute (MINI) space.

oxygen-level-dependent (BOLD) correlates of neural activity changes in Linda's brain obtained using our integrative neuro-behavioural approach. FMRI data acquired during the interpersonal task are analysed on voxel-by-voxel basis using the General Linear Model. SPMs projected on a T1-weighted image in standard Montreal Neurological Institute (MNI) space represent the statistically significant voxels corresponding to greater neural activity changes over time associated with the personalized sentences compared with neutral ones. Given the fact that we present statistical results from a single individual at two time points, the validity of our inferences is limited. Nevertheless, the fact that we demonstrate intervention-associated changes in neural activity in the hippocampus, the insula and nucleus accumbens representing part of the limbic network, lends some confidence in our approach. Given the many distinct and simultaneous brain activations required to read (individualized) stimuli that can interfere with our research target - the change of CCRTs during treatment - we rely on the assumption of cognitive subtraction (i.e., additive effects, see Price et al., 1997) to infer on CCRTs unique contribution. Here, the inference

on CCRT-associated neural activity is calculated using the differential contrast between individualized stimuli vs neutral stimuli over time, rather than the main effect of individualized stimuli versus the rest condition over time. In this way, we are convinced that the cognitive subtraction strategy, particularly in the context of time/intervention-dependent changes will minimize the polluting effect of additional cognitive resources on the specific networks underlying CCRT. Of course, the assumption of cognitive subtraction precludes the absence of interaction effects at different levels that will surely be true for at least some of the studies functions.

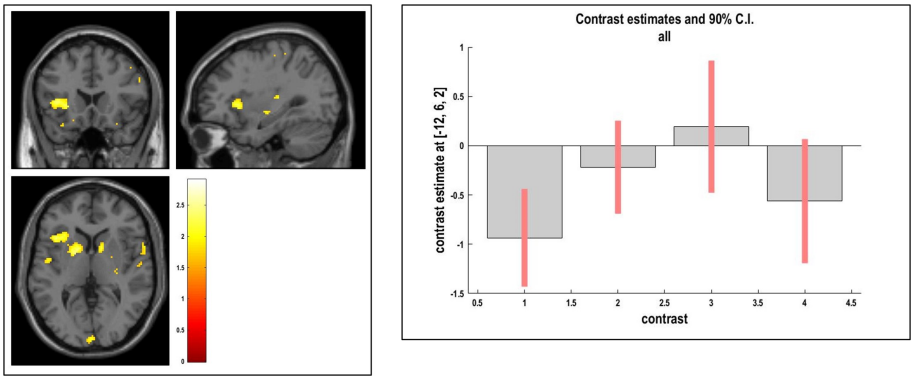

Figure I.2: Statistical parametric maps (SPMs) interaction analysis between SENTENCES (personalized [PERS] or neutral [N]) and TIME (time point 1 [TP1] versus time point 2 [TP2]) in the nucleus accumbens and the insula for Linda. T-values surviving $\alpha = 0.05$ uncorrected for multiple comparisons projected on a canonical anatomical image in Montreal Neurological Institute space (MINI).

I.5 Discussion of the illustration

The present methodological contribution aims to argue in favour of an integrated methodology drawing from psychotherapy process and neuroimaging, when assessing interpersonal processes. We argued that the use of individualized stimuli might, under certain circumstances, be a productive way of assessing the

multi-level activations related with interpersonal processes in psychotherapy and their expected change over time. The main advantage of combining methods from the field of psychotherapy research and of neuroimaging is to address interpersonal processes with various complementary perspectives to better grasp its properties, but also inherent limitations. There is a partial overlap between our observations and those of Drapeau and Perry (2009), providing further evidence that the diagnosis of BPD is associated with very specific, and individual-dependent narrative descriptions of interpersonal functioning and processes. The use of the proposed integrated methodology allows for a more detailed information collection. Between T1 and T2, there is a reduction of Linda's RO's pervasiveness (Table I.4) which is also associated with a reduction in symptomatology (Table I.3) and may be reflected on the neurobiological level in changes in parts of the limbic network, namely the hippocampus, the insula and nucleus accumbens (Figures I.1 and I.2).

The psychological component alone of the proposed methodology can inform practice and lead to the use of CCRT manual-based treatments (Jarry, 2010; Perry et al., 2019; Sahin et al., 2017). The clinical application of using the conjunction of a CCRT and an fMRI assessment remains unclear. However, studies using the proposed integrated methodology could help setting benchmarks in regard of what changes at a psychological as well as a neurofunctional level can be expected to happen, in what timeframe and where in the brain. When a client in a clinical setting would deviate from such newly developed norms, clinicians could adjust the treatment accordingly. Following our protocol, let us take the example of a patient diagnosed with a BPD following a treatment. He/she would change as expected on the psychological level (CCRT) but would present with a different pattern of neurofunctional activation at the end of the treatment, for example an increased activation

in prefrontal areas rather than the expected decrease observed in the other clients. The clinician, mindful of this divergence in his/her client could then focus on the themes brought up by this client in order to help him/her moving past repetitive interpersonal patterns, or clarify and transform the traumatic origins of the memories incorporated in the CCRT. The treatment would have been informed by the neurobehavioural integrated methodology and adjusted accordingly.

Although challenging to implement, this integrated neurobehavioural paradigm may be useful, notably for assessing processes of change in complex mental disorders, where there is evidence of interpersonal processes affecting both the psychological structures, as well as neurofunctional activations: Borderline Personality Disorder (Marceau et al., 2018; Ruocco et al., 2013). It may also be of interest for the assessment of other clinical presentations like Antisocial Personality Disorder (Herpertz, 2013), hostility (Mancke et al., 2015) or the interpersonal aspects of depression/chronic depression (Schnell & Herpertz, 2018). More generally, it may cast lights on the interpersonal processes unfolding in counselling and psychotherapy such as alliance ruptures and repair (Eubanks et al., 2018). Moreover, understanding of the brain activation during key interpersonal processes could lead to more precise research conclusions and more tailored—-and presumably more effective—psychotherapies (Schnell & Herpertz, 2018).

For practice-based research, once the interpersonal task we propose is well validated and explored thanks to the state-of-the-art fMRI technology, one promising "lighter", less time-consuming assessment could be the functional near-infrared spectroscopy (fNRIS). As demonstrated in a study by Ruocco et al. (2016), it is possible to use the fNRIS neuroimaging procedure in clinical settings.

In conclusion, because interpersonal processes are as crucial in everyday interaction (Lieberman, 2007) as in counselling and psychotherapy (Henry et al., 1990), we must develop ingenious research methodologies to study them. Integrating CCRT procedure in a neurobiological assessment of interpersonal processes in psychotherapy and counselling might be one reasonable solution to face this challenge.

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Paper II

Psychotherapeutic case formulation: Plan analysis for narcissistic personality disorder

Loris Grandjean[1,2], Jana Hummel[2], Dominik Wyer[2], Hélène Beuchat[1], Franz Caspar[2], Rainer Sachse[3], Thomas Berger[2], Ueli Kramer[1,4,5]

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[1]Institute of Psychotherapy, Department of Psychiatry, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland
[2]Department of Clinical Psychology and Psychotherapy, Institute of Psychology, Faculty of Human Sciences, University of Bern, Bern, Switzerland
[3]Institut für Psychologische Psychotherapie, Bochum, Germany
[4]General Psychiatry Service, Department of Psychiatry, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland
[5]Department of Psychology, University of Windsor, Windsor, Ontario, Canada

Correspondance: Loris Grandjean, Institute of Psychotherapy, Department of Psychiatry, Lausanne University Hospital and University of Lausanne, Bâtiments des Cèdres 1, Site de Cery, CH-1009 Prilly, Lausanne, Switzerland. Email: loris.grandjean@chuv.ch

Abstract

Background: One of the relevant case formulation methods for personality difficulties is plan analysis. The present study aimed at delivering a prototypical plan analysis for clients presenting with a diagnosis of narcissistic personality disorder (NPD).
The sample consisted of 14 participants diagnosed with an NPD. Based on audio clinical material, we developed 14 individual plan analyses that we then merged into a single prototypical plan analysis. For explorative purposes, we ran an ordinary least squares regression model to predict the narcissistic symptoms severity (NAR) measured on a scale of 1–7 of the 14 clients by the presence (respectively absence) of certain plans in their individual plan analysis. The synthesis revealed that clients with pathological narcissism share common basic motives. Results of the regression model reveal that the presence of the plan 'be strong' reduces the NAR scale by 1.52 points ($p = 0.011$).
Discussion: In the treatment of psychological disorders, precise case formulations allow therapists for making clinically appropriate decision, personalizing the intervention and gaining insight into the client's subjective experience. In the prototypical plan structure we developed for NPD, clients strive to strengthen their self-esteem and avoid loss of control, criticism and confrontation as well as to get support, understanding and solidarity. When beginning psychotherapy with a client presenting with NPD, the therapist can use these plans as valuable information to help writing tailored, and therefore more efficient, case formulations for their patients presenting with an NPD.

Keywords: narcissistic personality disorder, psychotherapy research, Plan Analysis, case formulation, mixed methods

II.1 Introduction

Over the past years, research in the field of personality disorders reached the consensus that the clinical presentation of clients with pathological narcissism is mainly characterized by its heterogeneity (Bender, 2012; Caligor et al., 2015; Ronningstam, 2020). In an attempt to understand and structure this clinical variability, experts relied on a categorical approach - as embodied by the Diagnostic and Statistical Manual of Mental Disorders paradigm and its diagnosis of Narcissistic Personality Disorder (NPD). Yet, the sole reliance on standardized diagnostic criteria focusing on the "overt type" (characterized by the grandiose manifestation of the pathology) failed to cover the core

psychological features of the disorder including vulnerable self-esteem, feelings of inferiority, emptiness and boredom as well as affective reactivity and distress (Levy, 2012; Ogrodniczuk, 2013; Ronningstam, 2009, 2011). As a result, this categorical approach did not encompass the heterogeneity of pathological narcissism (Kernberg, 2009; Pincus et al., 2009; Roberts & Huprich, 2012; Skodol et al., 2014).

An alternative route to understanding and structuring the clinical variability associated with pathological narcissism is to focus on its dimensionality. Clinicians and scholars acknowledge that narcissistic phenomena are not strictly pathological but that they are an essential part of general personality functioning. Narcissism has its roots in normal development during which it can be disturbed to varying degrees by environmental stress and failures of nurturing (Bender, 2012) and ranges from "healthy and exaggerated to pathological, including high and low functioning NPD, as well as severe forms with malignant or psychopathic functioning" (Ronningstam, 2020, p. 2)

Recent research suggests that pathological narcissism is associated with significant functional impairment and psychosocial disability as well as decreased life satisfaction and lower quality of life (for a brief review of relevant investigations on the subject and putative explanations see Ellison et al., 2020), making the accurate diagnosis, effective case formulation and the development of tailored interventions a priority. Pathological narcissism is associated with the prognosis of difficulties in building a good therapeutic relationship and in the success of a therapy (Caligor et al., 2015; Levy & Clarkin, 2006; Ronningstam, 2017). In order to understand and explain the heterogeneity in personality disorders, case formulations may be crucial (Eells, 2011; Kramer, 2019). They link "the clinical theory with the unique case, and the general with the particular" (Kramer, 2019, p. 19), thereby providing clinicians with a tool to integrate

clinical observations with the explanatory model, with the aim of personalizing psychotherapy. Case formulation appears thus a necessary step to understand qualitatively the heterogeneity observed in clients with NPD.

Examples of case conceptualizations methods may focus on emotional experiences (Strating & Pascual-Leone, 2019), rely on Cognitive and Behavioural theory (Sturmey & McMurran, 2019), Psychodynamic theory (Levy et al., 2019) or Clarification-Oriented theory (Eells, 2011; Sachse, 2019). Regardless of the method, they all enable clinicians to elaborate fundamental therapeutic hypotheses to guide their interventions.

Among these methodologies, Plan Analysis is a case conceptualisation instrument in Psychotherapy developed by Grawe (Grawe & Dziewas, 1978) and (Caspar, 2007). Historically, its origin traces back to the 70s when Grawe observed that so-called "difficult clients" - many would nowadays likely receive a personality disorder diagnosis - would not engage in therapy or struggled with their therapist despite irreproachable technique from their part. Based on the concept of Plan as coined by Miller et al. (1960) and on the assumption that understanding and psychotherapeutic care of clients could only succeed if their motivational structure was understood, (Grawe & Dziewas, 1978) developed the Vertical Behaviour Analysis in complement to the horizontal analysis of behaviour which explains the sequential unfolding of stimuli and responses on the time axis. Vertical Behaviour Analysis emphasized the importance of identifying and understanding clients' important motives and how they related with instrumentally-relevant behaviours. The assumption was that doing so should lead to a simplified representation of the complexity and uniqueness of clients' experience and behaviour(s). Vertical Behaviour Analysis later developed into Plan Analysis.

Plan Analysis incorporates the conceptualization of thoughts, beliefs and

emotions, by taking verbal and para/non-verbal aspects into account. It is compatible with most therapeutic approaches. It is used to develop an individualized case conceptualisation, which may serve therapy planning and aims at guiding the therapeutic process and improving the relationship between therapists and client. Central to Plan Analysis is the assumption that behaviours are repeated and consolidated into implicit structures of action organized to serve a specific purpose. Even instrumental behaviours are not necessarily conscious (Caspar, 2019), as exemplified by the case of Charles, a 30 year old psychotherapy client diagnosed with NPD , who failed his math studies and who presented himself to others in a grandiose fashion by insisting that he may eventually solve a major mathematical problem. For this clinical case, it appears that the self-presentation 'show that you are capable of solving a still unsolved math problem' serves the higher Plans of 'present as a genius' and 'avoid admitting your failures', which may serve to strengthen his self-esteem in interpersonal situations. Another case is the one of Barbara, a 45 year old psychotherapy client diagnosed with NPD, who works as a nurse. Facing her current psychotherapist, she describes herself as a "therapist too", not without expressing contempt. For this clinical case, it appears that her self-presentation 'show that you are competent' and 'explain that you have high therapeutic skills" may serve the higher Plans of 'present as competent' and 'avoid that the therapist asks intrusive questions', which may serve to strengthen both her integrity and self-esteem in interpersonal situations. For each of these individual case conceptualisations, the client's individual Plans as hypothetically inferred by the therapist are taken into account. Such Plans are units consisting of a motivational component (motive, purpose, goal) and one or more means to achieve these goals.

Plan Analysis is a useful tool to facilitate the development of meaningful and

coherent explanations or conceptualizations of the client's symptoms, disorders, and problems. A prototypical Plan structure aims at assisting psychotherapy trainees in the elaboration of a case conceptualization/formulation and refers to a framework outlining what is frequently observed amongst clients presenting with a particular diagnosis or clinical problem and can therefore serve as default hypotheses. Such a prototypical Plan structure has already been developed for the neighbouring disorder of Borderline Personality Disorder (Berthoud et al., 2013) and several other problems. In their study, the authors could highlight two main prototypical tendencies ("Dependent" and "Autonomous") along with the Plans aiming at emotion regulation in both subtypes. They also found that all clients in their sample intended to seek support ('make sure you get support'). They also discussed the prototypical Plan structure's subsequent clinical implications, namely for the building of an individualized, or motive oriented, therapeutic relationship (Caspar, 2019). For instance, "facing a client with the 'make sure you get support' Plan activated, the therapist, after deciding if this Plan serves the basic motives 'get healed', 'avoid being alone' or 'stay in control' (and/or any other motive involved), proactively focuses on this motive. If the motive is 'avoid being alone', the therapist will have a soothing non-verbal attitude and will assure the patient that the therapist does not intend to abandon the patient and conveys acceptance to the patient as a person" (Berthoud et al., 2013, p. 7). More generally, Motive-oriented Therapeutic Relationship (MOTR) has proven to be a promising intervention, as based on Plan Analysis, in treatments for Borderline Personality Disorder. In two randomized controlled trials (Kramer et al., 2011; Kramer, Kolly, et al., 2014), small but consistent outcome advantages in a brief treatment have been found favouring MOTR. Several process advantages, for example a stronger session-by-session evolution of the therapeutic alliance was also observed. Apart

from a case study, no evidence exists for the neighbouring disorder of NPD and pathological narcissism more generally (Kramer, Berthoud, et al., 2014).

The aim of this article is to contribute to the existing literature by developing a prototypical plan structure for NPD using the Plan Analysis approach (Caspar, 2019). Ultimately, the goal is to provide a basis that will help elaborating NPD case formulations more easily in order to optimize treatment planning and eventually enhancing treatments.

II.2 Methods

II.2.1 Sample

A total of 14 clients at a German outpatient clinic were included in this study. The client's ages ranged between 25 and 58 years old with a mean of 40.36 (SD = 10.49). Six of them were women (43%) and eight men (57%). All of them fulfilled the SCID-II (First et al., 1995) criteria for a NPD. In addition, we assessed dimensionally the narcissistic symptom severity (NAR) of each client on an ordinal scale ranging from 1 (*mild symptoms*) to 7 (*extremely severe and pervasive symptoms*). In line with the SCID-II, values of 2 (*symptoms are present*) and above indicate a clinically relevant narcissistic symptomatology and the presence of the disorder. In this sample the values varied between 2 and 5 ($M = 3.43$, $SD = 1.09$). Aside from the NPD diagnoses, six clients had a comorbid diagnosis of major depression (43%), three clients had a diagnosis of substance abuse disorder (21%) and two of somatoform disorder (14%). On the Axis 2, two clients were also diagnosed with a Histrionic Personality Disorder (14%). In this sample, we also evaluated the participant's depressive symptomatology using the 'Beck Depression Inventory II' (BDI-II Beck et al., 1996). The German translation has satisfactory validity (r = .68 to .89) and reliability (internal consistence: $.89 \leq \alpha \leq .94$) coefficients. The BDI-II's values

in this sample ranged from 1 to 39 ($M = 19.38$, $SD = 13.07$).

II.2.1.1 Plan analysis (Caspar 2019)

To elaborate a Plan Analysis we need to follow three steps: First, watch the video-recording from the psychotherapy session or listen to its audio-recording (given the importance of para/non-verbal aspects, video-recordings should always be preferred if they are available). Since in this study only audio recordings and no video recordings of the clients were available as source material, it is important to note that the present analysis focuses on para-verbal and verbal aspects of behaviour and experiences. In the second step, potentially relevant synthetic information is noted, so-called "extensions". These are based both on verbal (and possibly para- and/or non-verbal), as well as information which appears necessary for a better understanding of the client's behaviour. These intermediate steps are important to make the link from the observable presumably instrumental behaviours to the development of a Plan structure as transparent and comprehensible as possible. Then, based on the information extracted, the Plans are developed and the client's individualized Plan structure is created. The Plans are described in the imperative (e.g., "present as particularly competent"), while behaviours are formulated in the indicative (e.g., "expresses contempt of the person of the therapist", for the case of Barbara in the introduction). This results in a hierarchical structure where lower Plans are intermediate motives serving to achieve the ones (basic motives) at the top.

In the present study, two raters applied the three aforementioned steps for all 14 clients and each came up with 14 individualized Plan structures. The inter-rater reliability was determined using Benkert's method (1997) on a randomly 14% of the data (two cases). In these two cases, the 10 most important Plans of a client from the first Plan structure (selected by the rater) were compared with

all Plans of the second Plan structure. In order to determine a value for each of these 10 selected Plans, the following matching criteria were applied and points were distributed accordingly: 1 point was awarded if the Plan itself occurs in both raters' structures, 2 points if the higher-level Plans in the hierarchy matched, and 2 points if the lower-level ones matched. Finally, the maximum score of 5 points for a Plan, with the raters' complete agreement. The average agreement should be at least 60% in order to be considered sufficient (Benkert, 1997).

II.2.2 Procedure

Once the 14 individual Plan Analyses' were formulated and drawn on paper, we elaborated a synthesized Plan structure (Berthoud et al., 2013; Kramer et al., 2009):

1. Plans of different clients whose meaning content overlapped to a sufficient extent were combined into one formulation item.

2. All clients' Plans and motives (excluding observed behaviours) were grouped into a single list with occurrence of each Plan (ranging between 1 and 14; see Supporting Information). Based on the standard of five (Berthoud et al., 2013) and in an attempt to find an acceptable trade-off between sensitivity and specificity we only included Plans present in at least four distinct clients in the prototypical structure.

3. A thematic analysis of these "prototypical plans" revealed groupings and instrumental connections between them, so that a single prototype Plan structure could be created.

II.3 Results

II.3.1 Inter-rater plan analysis reliability

In our study, the reliability of the plan structure achieved 60.5%.

II.3.2 Prototypical plan structure

Once we regrouped all the 14 clients' initial Plans into semantically identical units, we elaborated a list of 98 Plans (see Appendix). Out of those, 29 prototypical Plans were more frequent than the abovementioned criterion of 4 while the other 69 Plans' frequency did not make the cut.

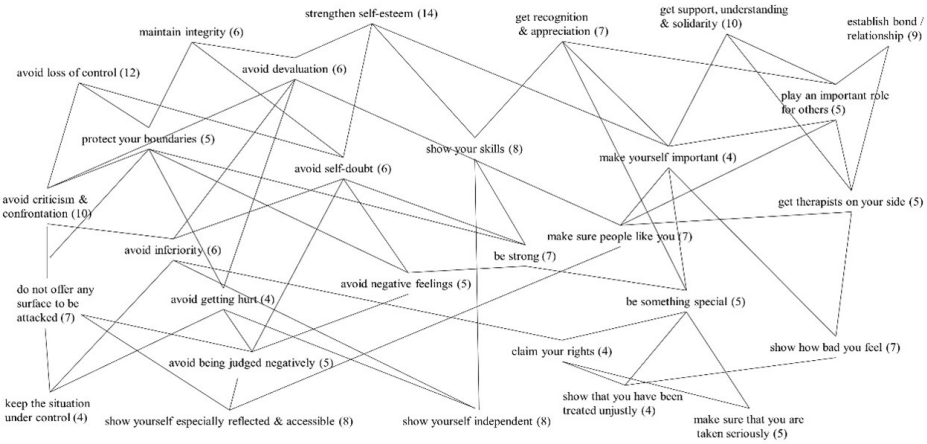

Figure II.1: Prototypical plan structure for narcissistic personality disorder (n = 14). In brackets is the number representing the plan's presence within the structure of a client

Figure II.1 shows the resulting NPD prototypical Plan structure (behaviours are left out). Drawn lines represent a direct instrumental relationship between Plans and motives. The structure is a vertical hierarchy in which lower-levels Plans serve higher-order Plans, goals and motives. The numbers in brackets indicate the frequency of Plans' occurrence in the sample. Certain Plans are

highly prevalent in the prototypical Plan structure of NPD: namely, on the higher motive-level, 'strengthen self-esteem' appears in every individual Plan structure, 'avoid loss of control' in 12 (86%), 'get support, understanding and solidarity' in 10 (71%), 'establish bond /relationship' in 9 (64%), 'get recognition and appreciation' in 7 (50%), and 'maintain integrity' in 6 (43%). On the lower Plan levels, 'avoid criticism and confrontation' appears in 10 (71%) individual Plan Analyses whereas 'show yourself especially reflected and accessible', 'show your skills' and 'show yourself independent' appear in 8 (57%) of them.

Table II.1: Summary of linear regressions predicting NAR

		NAR	
Predictors	Estimates	*95%CI*	*p*
(Intercept)	4.59	3.08–6.10	**<0.001**
Be strong	−1.52	−2.59;−0.45	**0.011**
Show feelings	−0.52	-1.78–0.75	0.376
Be likeable	−0.84	−2.09–0.41	0.161
Get recognition	0.13	−1.04–1.30	0.806
Avoid attack	0.42	−0.78–1.62	0.442
Observations	14		
R^2/R^2adjusted	0.640/0.415		
F(5,8)	2.842		

Notes. Bold emphasis indicates significant results

A Plan structure has implications for treatment planning and relationship building by the therapist, in particular by using the MOTR. If Figure II.1 would represent the case formulation of an individual client, then the therapist could use it to understand the client's individualized inter- and intrapersonal functioning in order to create a tailored idiosyncratically safe therapeutic relationship (Kramer, Kolly, et al., 2014). To achieve and foster this, the therapist should choose the lowest Plan in the structure that is also acceptable in terms of how it relates to relationship and cooperation within psychotherapy. For explorative purposes, we ran an ordinary least square regression model to predict NAR of the 14 clients by the presence of Plans that appeared in 7 clients ($n = 5$). Results reveal that the presence of the Plan "be strong" reduces

the NAR scale by 1.52 points ($p = .011$; see Table II.1)

II.4 Discussion

In the field of research of personality disorders, there exists two competing approaches: the categorical and the dimensional one. The problem in this debate is that both perspectives do not provide sufficient support for the essential personalization of psychotherapy. A third perspective integrating both approaches within an evidence-based case formulation approach is needed in order to provide clear guidance to the practising clinician working in the field of personality disorders. A case formulation approach has the additional advantage to take into account clinically essential idiosyncratic information from each client and manages to accommodate and integrate both perspectives.

Pathological narcissism is a particular case in point. The present study has as objective to develop a prototypical case formulation template, using the qualitative methodology of Plan Analysis. It appears that several aspects of the present NPD prototypical Plan structure are in line with the existing literature. The structure encompasses basic motives and Plans consistent with dimensions of pathological narcissism ranging from the conceptual *grandiose* type ('get recognition and appreciation', 'strengthen self-esteem', 'avoid inferiority', 'show your skills') to the *vulnerable* one ('get support, understanding and solidarity', 'establish bond/relationship', 'show how bad you feel') and the presumed core features ('make yourself important', 'be something special').

Prototypical Plan structures are designed for education and research purposes. When used in the analysis of individual patients, they can be used as default assumptions which can speed up an individual analysis but have to be verified with the individual patient while self-critically controlling a possible confirmation bias. For whole groups of patients, such as NPD patients,

they have clinical implications mainly considering how crucial the alliance building is in the treatment of NPD (Adler, 2000; Bender, 2005; Ronningstam, 2012). They provide a good basis for training psychotherapists to write a case conceptualisation and implement a corresponding individualized complementary, or MOTR (Caspar, 2007; Grawe, 1992). As reported by Ronningstam (2017), in pursuance of admiration and heightened self-esteem, clients presenting with a NPD may use emotion-regulating strategies ('avoid negative feelings', 'do not offer any surface to be attacked', 'avoid getting hurt'). To achieve their various goals of grandiosity and/or bonding, they may also use interpersonal control strategies (Caligor et al., 2015) such as 'get therapists on your side', 'show that you have been treated unjustly', 'make sure that you are taken seriously' or 'show yourself especially reflected and accessible'. Using the MOTR concept, the therapist can look for the Plans that do not threaten or limit the therapeutic alliance. Upper Plans do not, by definition, threaten nor limit the therapeutic procedure but the therapist should look for the lowest acceptable motive in the structure and adjust therapy accordingly.

In light of our explorative analyses, the therapist could focus on the Plan 'be strong' and develop complementary techniques to foster it. Indeed, since it appears to be a predictor of a less severe narcissistic symptomatology, working on the fulfilment of this motive on a relationship level could prove useful to reduce NPD severity. The therapist could have a reinforcing attitude, highlighting the strength and competences of the client when faced with adversity in order to let him/her know that he/she is strong. Clinical implications of the use of Plan Analysis facing clients with pathological narcissism are numerous. An illustration of alliance-building moment-by-moment processes has been provided in a case study by Kramer, Berthoud, et al. (2014). In this case, the client named Mark presented a set of Plans ('present yourself as responsible', 'present

as a flawless employee' and 'present as someone who has success') serving the basic needs of maintenance of control and of a positive self-image. Using MOTR-principles a therapist may productively underline that Mark is a good father and a good employee (both serving the need of positive self-image) and/or convey this on a non-verbal level.

For Charles, the failed math student mentioned in the introduction, a MOTR –consistent intervention may consist in highlighting some elements of the extraordinary competencies this math student may have (i.e., complementary to strengthen a good self-esteem, by showing your skills and present as strong), despite the difficulty he encountered and to express clear acceptance of his value unconditioned to his performances. The therapist may monitor his affective reaction to such an intervention and as soon as he shows signs of readiness, offer genuine astonishment about his failure given these extraordinary skills. The latter may then shift the therapeutic discussion towards an effective problem solution, which should enhance the therapeutic collaboration between the client and the therapist. For Barbara, the client expressing contempt in the therapeutic relationship and considering herself a "therapist too", the therapist could behave in a complementary fashion to Plans like "present as competent", while at the same time avoiding to label her problem. He/she may for example offer a discussion "among therapists" by saying: "As you know, as a therapist, it is important to continually improve oneself, so would you be interested in using this therapy to becoming an even more effective therapist?", depending on the readiness of the client. For both Charles and Barbara, we would assume that these offers of collaboration – all consistent with the client's acceptable Plans (yet still specific enough to each individual) – may increase their collaboration and strengthen the therapeutic alliance. Empirical research should examine this hypothesis for clients with pathological narcissism.

The study presented here has several limitations. Both the small sample size and absence of video material hinder reporting the complexity and heterogeneity of the NPD's clinical presentations. However, despite these limitations, the present prototypical Plan structure still has the potential to inform clinicians when dealing with clients presenting with NPD and helping them come up with individualized case formulations to tailor the treatment to the (motives) need of their client. Future research should try to replicate this methodology on a bigger sample to investigate the validity of this NPD prototypical structure and investigate 'be strong' as a predictor of symptom severity.

II.5 Ethics Statement

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

II.6 Conflict of Interest

There were no conflicts of interest.

II.7 Data Availability Statement

Data are made available upon reasonable request to the corresponding author.

II.8 Supporting Information

The additional supporting information to this article may be found online in the Supporting Information section at the end of the article available at https://doi.org/10.1002/pmh.1521 in Appendix A of this thesis.

Paper III

Emotional arousal in borderline personality disorder during an experiential task focusing on self-criticism

Loris Grandjean[1,2], Tobias Rohrbach[3], Aline Garbani[2], Fabienne Läderach[2], Ines Culina[1], José Blanco Machinea[1], Hélène Beuchat[1], Livia Alerci[4], Setareh Ranjbar[5], Thomas Berger[2], Ueli Kramer[1,4]

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[1]Institute of Psychotherapy, Department of Psychiatry, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland
[2]Department of Clinical Psychology and Psychotherapy, Institute of Psychology, Faculty of Human Sciences, University of Bern, Bern, Switzerland
[3] Department of Health Sciences and Medicine, University of Lucerne, Lucerne, Switzerland
[4]General Psychiatry Service, [5] Centre for Psychiatric Epidemiology and Psychopathology, Department of Psychiatry, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland

Correspondance: Loris Grandjean, Institute of Psychotherapy, Department of Psychiatry, Lausanne University Hospital and University of Lausanne, Bâtiments des Cèdres 1, Site de Cery, CH-1009 Prilly, Lausanne, Switzerland. Email: loris.grandjean@chuv.ch

Abstract

Background: Emotional arousal is a combination of expressive displays (postures, gestures, facial and vocal expressions) and bodily responses (i.e. changes in the somatic and autonomic nervous system as well as in the endocrine and immune system) following a stimulus (Hamm, Schupp, & Weike, 2003). In this paper, we hypothesize that participants diagnosed with a Borderline Personality Disorder (BPD), show more emotional arousal during an experiential task than healthy controls (HC). Furthermore, we also posit that the relationship between the emotional arousal elicited in the experiential task and its short term psychological distress outcome follows an inverted U-curve.
Methods: We assessed the emotional arousal of clients diagnosed with a BPD (n=30) and HC (n=35) via self-reported (Self-Assessment Manikin; SAM; Bradley & Lang, 1994) and observer-rated (Client Emotional Arousal Scale-III; Warwar & Greenberg, 1999a) scales to take into the analysis their changes during the experiential Two Chair Task (TCT) focusing on the elaboration of self-criticism. We also assessed the participants' psychological distress levels with the Outcome Questionnaire 45 (OQ-45).
Results: As expected, the psychological distress was significantly higher for participants in the BPD group. Furthermore, those diagnosed with a BPD showed significantly more variation in observed emotional arousal during the TCT. However, we could find no inverted curvilinear relationship between emotional arousal during the TCT and psychological distress. Discussion: People diagnosed with a BPD show observed emotional arousal when confronted with emotional stress suggesting that for this specific population too much emotional arousal is related to marked psychological distress.

Keywords: emotional arousal, borderline personality disorder, psychotherapy research

III.1 Introduction

One of the core symptoms of Borderline Personality Disorder (BPD) is emotional instability (Lieb et al., 2004). It remains unclear though if their emotional arousal is different in specific clinical situations, such as when working through idiosyncratically important content related with self-criticism.

Emotional arousal plays a pivotal role in their expression, development and maintenance (Frijda et al., 1992; Kennedy-Moore & Watson, 2001). There is also considerable evidence as well as a large consensus amongst researchers and

clinicians alike that emotional arousal within psychotherapy sessions is essential to psychotherapy success (Auszra et al., 2013; Lane et al., 2015; Peluso & Freund, 2018). The Research Domain Criteria (RDoC) initiative which is a framework for investigating and understanding the nature of mental health and illness in terms of varying degrees of dysfunction in general psychological/biological systems defines arousal as one of its six major domains of human functioning (NIMH, 2022).

When investigating emotional arousal, one is faced with several methodological challenges. Not only does emotional arousal depend on the stimuli and the context but also on the assessment method, resulting in sometimes inconsistent results (Pascual-Leone et al., 2016). In their paper, Pascual-Leone et al. (2016) also suggest how individualizing stimuli by using a two chair dialogue might be relevant for the study of emotional arousal. Furthermore, additional longitudinal studies are needed to disentangle emotional arousal as state (defined as a temporary reaction to stimuli) from emotional arousal as a trait (relating rather to more of a stable personality feature). In this paper, we adopt the perspective where emotional arousal is seen as part of emotional processing and as a continuing component of emotion itself (Greenberg & Pascual-Leone, 2006; Kring & Sloan, 2009). We also use definitions from the experimental psychology to refer to emotional arousal as a combination of expressive displays (postures, gestures, facial and vocal expressions) and bodily responses (comprising changes in the somatic and autonomic nervous system as well as in the endocrine and immune system) following an (emotionally arousing) stimulus (Schupp et al., 2003).

The literature suggests that emotional arousal is both related to the expression of psychological distress as well as its treatment (Lane et al., 2015). It might indeed be a key ingredient in the success of many different forms of

psychotherapy. So far, research in the field indicates that when it comes to emotional arousal in a therapeutic setting, *the more, the better* does not apply but that there must be an optimum, somewhat similarly to the Yerkes-Dodson law of arousal and performance (Diamond et al., 2007).

Adequate level of emotional arousal within therapy sessions is paramount to therapy success (Diener & Hilsenroth, 2009; Greenberg & Pascual-Leone, 2006; Lane et al., 2015; McLean et al., 2015). Two studies using a valid observer-rated method of assessing patient's in-session arousal (CEAS-III; Warwar & Greenberg, 1999) to try defining this optimum have yielded promising results suggesting that both too little and too much emotional arousal are less productive to facilitate the healthy treatment and transformation of psychologically distressing emotions (Carryer & Greenberg, 2010; Pos et al., 2017).

Research in the field of Borderline Personality Disorder (BPD) also provides us with some insight with varied theories surrounding its etiological and pathological factors (for a systematic review see Ahluwalia Cameron et al., 2019), one of them being emotional processing. Difficulties in emotional processing have been found to be a key factor related with borderline personality disorder (Dixon-Gordon et al., 2017; McMain et al., 2010). Namely, emotional dysregulation, as conceptualized by Linehan (1993) in her Biosocial Theory, and Affective Instability (AI), as defined by Marwaha et al. (2014), which are two overlapping constructs lying at the core of the BPD symptomatology. Both assume that BPD is associated with an emotional hypersensitivity and that clients diagnosed with a BPD feel emotions significantly stronger, longer and are more easily activated (see also Carpenter & Trull, 2012; Kramer & Timulak, 2022; Rosenthal et al., 2008). A recent study by Kivity et al. (2021) showed that an enhanced understanding of mental states was associated reduced emotional arousal and might have an emotion regulatory role in psychotherapies for BPD. Of note, and

because of its relevance to the methods we used, it is important to also point that there is evidence supporting the particular importance of self-criticism in BPD (Donald et al., 2019; Sato et al., 2020).

Research in the field of psychotherapy for BPD also highlights how change in emotional processing is possible and important. Goodman et al. (2014) found that emotion regulation measured with the Difficulties in Emotion Regulation Scale (DERS) significantly improved with Dialectical Behaviour Therapy (DBT) in BPD patients. Improved amygdala habituation to repeated-unpleasant pictures in patients was associated with improved overall emotional regulation measured by the DERS. McMain et al. (2013) provided evidence to support the theory that specific improvements in emotion and cognitive processes are associated with positive treatment outcomes. In their pilot study, Kramer et al. (2018) observed that participants with a Borderline Personality Disorder (BPD) experienced a medium-sized decrease in subjective arousal between the beginning and the end of brief treatment and that said decrease was associated with symptom reduction. Interestingly, the latter study used an experiential assessment focusing on the resolution of self-criticism in an emotion-eliciting two-chair dialogue task (Greenberg, 2002a). Based on these various results, it appears that for at least this specific population, a decrease in emotional arousal in reaction to aversive emotional stimuli could act as a process of change and lead to symptomatology reduction. Nevertheless, the optimal window wherein emotional arousal in psychotherapy sessions can be productive remains to be defined. When is high is too high and low too low? What disorders call for a regulation of emotional arousal and what ones would benefit from its activation?

To clarify the complex roles of emotional arousal in psychological distress we can turn to research in the field of experiential psychotherapy and more specifically concepts from emotion-focused therapy (EFT; Goldman &

Greenberg, 2015; Greenberg, 2002a). EFT conceptualizes emotional arousal as a gateway to integrating affect and cognition in order to generate idiosyncratic new meanings to transform old responses, leading to the restructuration of implicit emotional meaning structures (Greenberg, 2002b; Greenberg & Pascual-Leone, 1995; Greenberg & Safran, 1987). In other words, it is how the emotional experience is processed once activated that is key to bringing about change rather than its mere manifestation (Greenberg et al., 2007). Thus the goal of emotional arousal is to activate the patterns of neural activation related to a network of affective meanings in order to make them available for transformation.

In order to address the above-mentioned challenges associated with the study of emotional arousal (namely the methodological complications of rating it) it might be of interest to create the conditions to control for its apparition and then assess it in action. Considering how central emotional arousal seems to be in the field of mental health, an enhanced comprehension of its role is capital. In an attempt to bring some clarity to the complex and sometimes contradictory theories regarding its role in psychological distress and psychotherapy, in this paper we seek to elicit it in a quasi-experimental fashion in participants diagnosed with a BPD as well as in healthy controls to investigate it. Our goal is to observe how emotional arousal differs between them during an experiential emotion eliciting task and, how it relates to psychological distress.

III.2 Current study and hypotheses

The present study is framed within a greater ongoing trial that investigates the effectiveness of a brief psychiatric treatment for the treatment of BPD compared with an equally brief nonspecific psychiatric treatment (that is not focused on BPD), as well as the changes in neurofunctional activation in networks associated with emotion and sociocognitive processing (for details and the

complete methodology see Kramer et al., 2020). Of note, the data we use in this paper is solely based on the first time point (at the beginning of therapy). In light of the current knowledge on emotional arousal's role in BPD, we assume that:

> *Hypothesis 1.* The group of participants diagnosed with a BPD shows more emotional arousal during the experiential task than the control group.

In view of the current literature regarding how emotional arousal and psychological distress could be related, we also suggest that:

> *Hypothesis 2.* The relationship between emotional arousal in an intervention and its short term psychological distress outcome follows an inverted U-curve. Participants who show either significantly less or significantly more emotional arousal during the experiential task also present with more acute symptoms.

III.3 Methods

III.3.1 Participants

The sample (N=65) consisted of clients with a diagnosis of BPD (n=30) and healthy controls (n=35). We recruited the participants from the BPD group from clients seeking treatment at a university outpatient clinic. Inclusion criteria were to be between 18 and 65 years old as well as to have been diagnosed with BPD according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (American Psychiatric Association, 2013). Additional diagnoses of neurocognitive disorders, psychosis and bipolar disorders were exclusion criteria. The clients' ages ranged between 19 and 51 years old with a mean of 29.67 (SD = 7.97). Six are men (20%) and 24 women (80%).

The participants from the control group were recruited through advertisement flyers distributed in two universities as well as through convenience sampling. Inclusion criteria were to be between 18 and 65 years old as well as to have no diagnosis of mental disorder. Their ages ranged between 20 and 30 years old with a mean of 23.46 ($SD = 3.15$). Seven of them are men (20%) and 28 women (80%).

III.3.2 Measures and interventions

Outcome Questionnaire 45 (OQ-45). The OQ-45 (Lambert et al., 2004) is a self-report questionnaire comprising 45 items assessing symptom distress (or subjective discomfort; intrapsychic functioning with an emphasis on depression and anxiety), interpersonal relationships (loneliness, conflict with others and marriage and family difficulties) and social role (difficulties in the workplace, school or home duties). Total scores range from 0 to 180 with a clinical cut-off at 64 and above. It has been translated and validated in French (Savard, 2009).

Two chair task (TCT). The two chair task (also known as the two chair dialogue) is an individualized therapeutic intervention from EFT designed to increase emotional arousal, process and resolve self-criticism (Greenberg, 2002a; Kramer & Pascual-Leone, 2016; Stiegler et al., 2018; Whelton & Greenberg, 2005). In this task, the participant is first (1) invited to imagine a personal situation of failure of their life, as vividly as possible (without reporting verbally). Then, (2) the researcher asks them to change chair. On this "self-critical" chair they should adopt the stance of the inner self-critical voice and express self-criticism to the self, as imagined on the initial chair. Finally (3), the participant (who is by now back again on the initial chair) describers their current emotional reaction to the self-criticism (for a complete description of the two-chair dialogue used in research, see Kramer & Pascual-Leone, 2016).

Self-Assessment Manikin (SAM). The SAM (Bradley & Lang, 1994) is a self-assessed questionnaire using a single item to measure the momentary level of arousal using a 9-point Likert scale, ranging from *not excited at all* (1) to *very excited* (9). The scale is illustrated as a series of human shaped figures displaying varied levels of activation. It is widely used in emotion research and has proven its validity and reliability (Bradley et al., 1992).

Client Expressed Emotional Arousal Scale – III (CEAS-III). The CEAS-III (Warwar & Greenberg, 1999) is a standardized, seven-point observer-rated assessment of the intensity of observable, expressed emotional intensity, including levels of affect and emotional restriction displayed verbally and nonverbally. The higher levels of the scale indicate higher emotional arousal intensities whereas the lower ones suggest emotional restriction. Based on these criteria, each defined amount of time of the selected recording (in our study those were chunk of 2-minutes) is assigned one of seven ordinal ratings of expressed arousal, ranging from *no emotional arousal* (1) to *extreme emotional arousal* (7). Raters rate both the modal (most frequent) and peak (highest) levels of intensity of the client's expressed emotional arousal.

III.3.3 Procedure

The procedure was recorded and lasted approximately 30 minutes (see Figure III.1). Two Ph.D. students in clinical psychology (one being the first author of this paper) and a psychologist were responsible for the data collection. They were all trained in the use of the TCT by an emotion-focused therapy (EFT) licensed -psychotherapist. Prior to participating, each participant provided informed consent.

Before coming to the session, participants were asked to fill an online or paper and pencil OQ-45 (1). At the beginning of the session, participants filled

a SAM (2). Then, they were asked to think (3) about a personal meaningful situation of failure, helped by the following prompt:

> "Try to remember a time in your life when you've failed at something. It may have been because you did something wrong, or maybe you just didn't do something that was needed at that time. Try to remember: What was going on? What was at stake? What were you hoping for? What did it feel like to be you at that moment?' (Kramer & Pascual-Leone, 2016, p. 321).

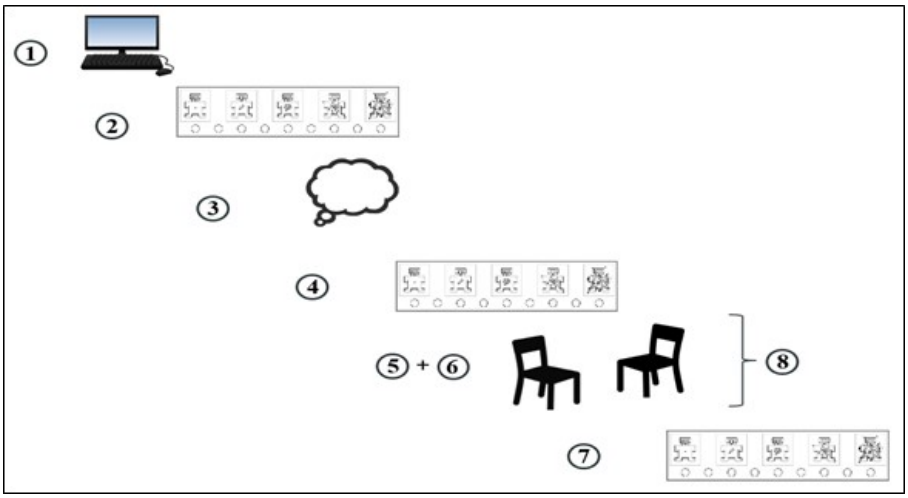

Figure III.1: Sequence of the experimental procedure with the OQ-45 (1), SAM (2,4,7), imaginary task (3), two chair task (5,6) and observer-rated emotional arousal coding with the CEAS-III (8).

Once the imagination task completed, they were asked to fill the SAM again (4). Then, participants were invited to sit in a new chair in front of them and imagine themselves still sitting in the first one. We asked them to voice their own critical voice (5), introducing this part as follows:

> "Every person has a side of themselves which watches, monitors, and evaluates what they do. What people criticize themselves for

> is different from person to person, but usually we all have some version of this self-critical voice in our heads. Now I am going to ask you to 'be that voice.' Imagine yourself where you were, sitting in that chair [across from participant], and that from where you sit now you are this critical judging part of yourself. Try saying out loud to him/her whatever the judging voice would say about the failure. Be that judging voice now and tell [participant name] what you have to say." (Kramer & Pascual-Leone, 2016, p. 321, adapted from Whelton & Greenberg, 2005, p. 1587)

Participants were then asked to return to the first chair and react to their self-criticism (6):

> "Here you are [participant name]: What is it like to be on the receiving end of this message? You are now facing your critic right over there. How do you respond? What do you want to say in reaction to this criticism? " (Kramer & Pascual-Leone, 2016, p. 321, adapted from Whelton & Greenberg, 2005, p. 1587)

At that point, we asked them to fill a last time the SAM (7).The raters then used the CEAS-III to code the observed emotional arousal during the experiential task by 2-minutes chunks (8). Each participant's session was coded by at least two raters whose scores were then combined. In the end, each participant's session had 2-minutes segments of combined scores ranging from 1 to 7.

III.3.4 Statistical analysis

The six raters in our study were three psychologists and three master-level psychology students all extensively trained in the use of the scale. In order to insure sufficient inter-rater agreement, prior to coding the study's material,

the raters practiced on other videos. We calculated an Intraclass Correlation Coefficient (ICC).

Our first hypothesis was that participants diagnosed with a BPD showed more emotional arousal than the controls during the experiential task. To investigate this, we chose to focus on the within-subject *variance* (over the three data collection time points) of each scale rather than its means, assuming that a greater amplitude of emotional arousal was associated with a dysregulated emotional arousal. We then ran independent t-tests between the BPD and the HC groups comparing the variance of their self-reported (SAM) as well as the observer-rated (CEAS-III) peak scores.

Our second hypothesis was that emotional arousal and psychological distress followed an inverted U-relationship. To test this, we ran separate OLS regression models for the variance of both the self-report and observer-rated emotional arousal scales. We entered both measures first as a linear then as a quadratic terms to predict psychological distress. We included participant group, BPD or HC, as a dummy predictor in all variables and tested the interaction between participant group and emotional arousal in separate models.

III.4 Results

III.4.1 Descriptive statistics and preliminary analyses

Both groups did not differ in gender repartition, $\chi^2(1,\ N = 65) = 0,\ p = 1$. However, the participants in the BPD group were significantly older (than the controls, $t(63) = 4{,}241,\ p < .\ 001$. As expected, the BPD group ($M = 87.70$, $SD = 25.80$) showed significantly higher scores of psychological distress than the controls ($M = 50.91$, $SD = 18.98$) as measured by the Outcome Questionnaire 45, $t(63) = 6{,}606,\ p < .\ 001$).

The average measure Intra-Class Coefficient Correlation (ICC) was .820

Table III.1: Independent *t-tests* comparing emotional arousal means between BPD and Controls

Logistic Parameter	BPD		Controls		$t(63)$	Cohen's d
	M	*SD*	*M*	*SD*		
Self-reported emotional arousal	5.62	0.33	5.52	0.26	0.81	0.05
Observer-rated emotional arousal	3.33	0.11	3.17	0.09	1.19	0.30

Notes. Self-reported emotional arousal coded with the SAM. Observer-rated emotional arousal coded with the CEAS-III. No significant results.

with a 95% confidence interval from .714 to .893 ($F(43,129)= 5.841$, $p<.001$) which can be interpreted as good (Koo & Li, 2016). Estimates and their 95% confident intervals were calculated using SPSS statistical package version 27 (IBM, 2020).

The correlation between the variance on the CEAS-III and the variance on the SAM was not significant (r = -.08, p = .515) and neither was the one on the CEAS-III code that overlapped with the third SAM measure (r = .09, p = .480).

Comparisons between means on both scales were not significant.

III.4.2 Emotional arousal

The participants in the BPD group (n = 30) reported higher emotional arousal *variance* on the self-reported SAM (M = 2.89) than the participants in the control group (n = 35, M = 1.83) with a small to moderate size effect (d = 0.43), yet only approaching significance (p = .086). The participants in the BPD group also demonstrated significantly (p = .004) higher variance on the observer-rated CEAS-III (M = 1.20) compared to the participants in the control group (M = .726) with a moderate to large size effect (d = 0.749).

Table III.2: Independent *t-tests* comparing emotional arousal variances between BPD and Controls

Logistic Parameter	BPD		Controls		$t(63)$	Cohen's d
	M	*SD*	*M*	*SD*		
Self-reported emotional arousal *variance*	2.89	3.15	1.83	1.59	1.75^{*}	0.43
Observer-rated emotional arousal *variance*	1.20	0.73	0.73	0.53	3.01^{**}	0.75
Psychological distress (OQ-45)	87.70	25.80	50.91	18.92	6.60^{***}	1.64

Notes. Self-reported emotional arousal coded with the SAM. Observer-rated emotional arousal coded with the CEAS-III. $^{*}p = .086$, $^{**}p = .004$, $^{***}p < 0.001$.

III.4.3 Emotional arousal and psychological distress

Both the self-report and observer-rated participants' emotional arousal *variance* are not significant predictors of psychological distress in our sample. This observation is true for both the linear and quadratic models (see appendix B and Figure III.2). A model comparison showed no difference in model fit for the linear and the quadratic model, $F(1, 61) = 0.049$, $p = 0.83$.

While neither the linear nor the quadratic models of the emotional arousal variance (self-reported or observed) proved statistically significant, the interaction depicted in Figure III.2 (panel B) shows that the observed emotional arousal *variance* may be positively associated with psychological distress for the group of healthy controls. This was confirmed by an exploratory linear regression between emotional arousal variance on the CEAS-III and psychological distress in the control group that was significant ($p = .048$). This this effect was not observed in SAM ($p = .473$).

III.5 Discussion

This study investigated how emotional arousal differs during an experiential task focusing on self-criticism between a group of participants diagnosed with a BPD and healthy controls. We also examined how the emotional arousal

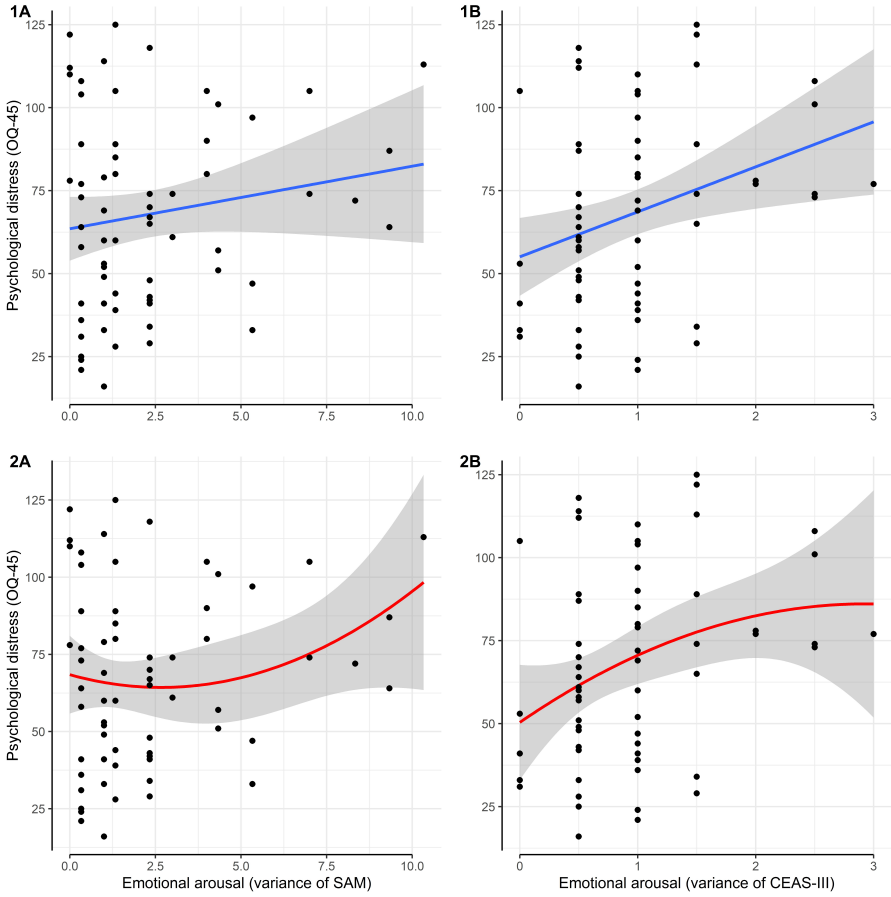

Figure III.2: Illustration of the relationship between psychological distress and emotional arousal variance. The blue plots (first row), represents the linear models whereas the red ones (second row) the quadratic models (SAM = column A; CEAS = column B).

elicited in this context related to symptoms levels. Since emotional arousal is a multifaceted concept and because methods focusing on one aspect are limited by principle (Jacob-Dazarola et al., 2016), we used a multimethod approach relying not only on a self-report measure but also on an observer-rated one where emotional arousal was identified in a controlled setting of a two-chair dialogue.

In line with our first hypothesis, participants in the BPD group showed more emotional arousal during the experiential task than the ones in the control group. The amplitude of emotional activation (as captured in its variance in peak arousal) for the participants in the BPD group was greater both when self-reported and when observed. These results are in line with the literature suggesting that clients diagnosed with a BPD experience stronger emotions and affect instability (Lynch et al., 2007). However, results show that only the group comparison in emotional arousal variance on the observer-rated measure is significant (with a moderate to large size effect $d = 0.749$) whereas those on the self-report scale approached significance (with a small to moderate size effect, $d = 0.434$). Since difficulty with emotional awareness are part of the BDP symptomatology (Derks et al., 2017), it is possible that the coders (using the CEAS-III) managed to capture some emotional arousal that participants with the diagnosis failed to self-report on the SAM.

Our second hypothesis was that, in accord with the literature, emotional arousal in an intervention might relate in an inverted quadratic fashion to the short term psychological distress outcome. We could not find such relationship. Furthermore, the linear model of emotional arousal and psychological distress was also not significant. Of interest, when we explored the data, we found a significant positive relationship between emotional arousal and psychological distress in the control group. More emotional arousal variance coded on the

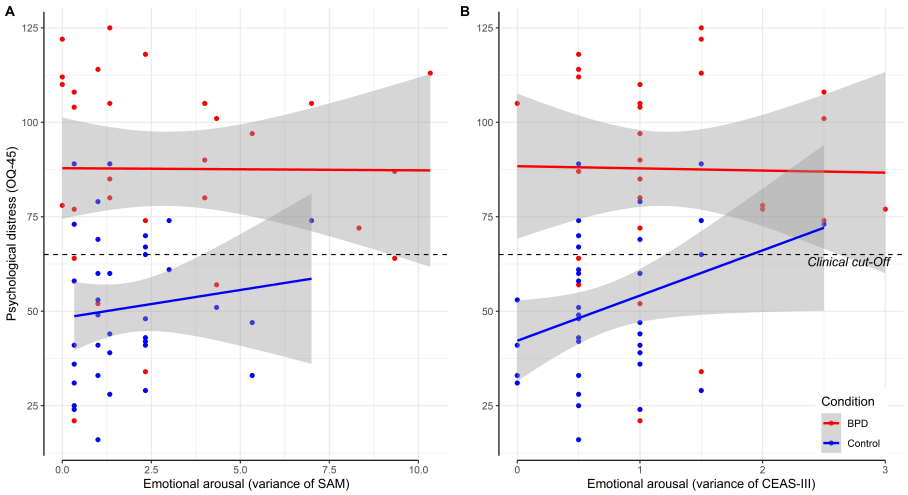

Figure III.3: Interaction effects from OLS regressions of participant group and the emotional arousal variance on psychological distress. Panel A displays the self-report scale and panel B the observer-rated scale.

observer-rated scale showed to be associated with more psychological distress. This was not the case for the variance on the self-report scale. It is plausible that regardless of the subgroup, higher levels of emotional arousal might be the result of harsher self-criticism. This in turn, most probably lead to higher general psychological distress.

Overall, these findings suggest that people diagnosed with a BPD do show significantly more emotional arousal than healthy controls when confronted with ideographically relevant emotional stress. However, they could not illustrate the theory that elicited emotional arousal and its related short term psychological distress outcome follow an inverted U-shaped relationship. Yet, our analyses showed that, in the control group, more emotional arousal variance on the observer-rated scale was associated with more psychological distress. Based on the observation that participants in the BPD group show significantly more emotional arousal variance than the HC, it might indicate that past a certain threshold, emotional arousal could impair mental health (Linehan et al., 2007).

Interestingly, this finding could not be replicated on the self-report scale. The difficulty to assess one's own emotional arousal might explain this discrepancy.

Our findings that clients diagnosed with BPD show more emotional arousal than healthy controls but that it is not related to psychological distress in an inverted quadratic fashion has clinical implications. Far from invalidating the theory that emotional arousal has an optimum (Lane & Nadel, 2020), in line with previous literature (McMain et al., 2015) our results suggest that BPD lies on the too much side and that for this specific population at least, the general goal in therapy would be to decrease emotional arousal (through emotion regulation) to bring about change. To this effect, the resolution of self-criticism and its ensuing arousal showed its relevance.

III.6 Limitations, Strengths, and future research

Because of the emotional arousal's apparent centrality in our psychological functioning, it is paramount to further investigate it. The use of the experiential two-chair dialogue in a quasi-experimental design is interesting namely for the control it gives us on the emotional arousal activation. It allows us to observe how emotional arousal differs between people (here clients with a BPD vs. healthy controls – and thus a lack of clinical comparison group) when activated in a similar fashion and how it relates to psychological distress.

Despite the focus on a multimethod measurement of emotional arousal that does not solely rely on a self-report scale, the lack of a third measure (e.g. a physiological measure) hinders the assessment validity and conditioned our results. We can suppose than some participants might have been highly aroused but so in control and disconnected from their emotional experience that both the observer-rated as well as the self-report scores did not reflect accurately their actual emotional arousal level. The small sample size and the gender disparity

prevents any generalization. However, by investigating a sample with healthy controls, our paper allows us for some important insight on the relationship between emotional arousal and psychological distress not exclusively in a clinical setting. Furthermore, the very same sample size that hinders generalization works also as a strength. Indeed, significant results on such small numbers hint at the presence of a robust effect at the risk of overlooking potential smaller effects.

III.7 Conclusion

Results of this study support once again the centrality of emotional arousal in the development and maintenance of psychological distress and the good feasibility of a Two Chair dialogue focusing on self-criticism in BPD. If this paper could not find an inverted curvilinear relationship between the two concepts, it managed to show that people diagnosed with a BPD experience more emotional arousal (assessed through self-reported as well as observer-rated scales) than healthy controls in emotionally stressing situations. Furthermore, we also observed that for healthy participants, more emotional arousal in the experiential task was associated with more psychological distress.

Chapter 3

Discussion

The goal of the present dissertation was to demonstrate the theoretical and methodological potential of individualised and integrated multidisciplinary approaches on the basis of three articles in the field of psychotherapy for PDs. It will now discuss their main findings and implications for research in psychotherapy before concluding with some methodological considerations, limitations, and discuss future directions for the field of PDs and mental health.

3.1 Main findings

Table 3.1 provides an overview of the main findings of each paper. The first article demonstrated the feasibility of integrating methods from the field of psychotherapy research and neuroimaging to assess interpersonal processes (Ia). It provides a guideline on applying innovative multidisciplinary methods to individualise stimuli and use them in an fMRI task in order to isolate mechanisms of change at work in psychotherapy. Its observation of intervention-associated changes in neural activity in the hippocampus, the insula and the nucleus accumbens (Ib) is particularly interesting despite being based on single individual measures. Indeed, in the field of neurosciences it seems usual to work with case studies (Shallice, 1979), entrenched in the rational that it helps determining whether a theory can be confirmed, challenged or extended [][p. 47](Yin, 2009).

The second article combined the individual Plan Analyses of 14 clients diagnosed with a NPD to come up with a prototypical Plan structure (IIa). To achieve this, it successfully replicated a method already applied to other disorders

Table 3.1: Summary of the papers' main findings

Paper		Main Findings
I	a	Feasibility of an integrated methodology drawing from psychotherapy process and neuroimaging to assess interpersonal processes.
	b	Intervention-associated changes in neural activity in the hippocampus, the insula and the nucleus accumbens.
II	a	Creation of a prototypical Plan Analysis for the NPD diagnosis to facilitate redaction of case conceptualisations.
	b	Presence of the Plan 'be strong' in individual Plan Analyses acted as a protective factor, reducing significantly reducing the narcissistic symptomatology.
III	a	Individuals diagnosed with a BPD show more emotional arousal than healthy controls during an experiential task focusing on the elaboration of self-criticism.
	b	In the control group, more emotional arousal variance was associated with more psychological distress.

(Berthoud et al., 2013; Kramer et al., 2009). The use of a rigorous process and an evidence-based case formulation guarantees a high level of internal validity. The paper also ran a linear regression to predict the narcissistic symptomatology severity (as assessed dimensionally by the NAR 7 points scale) of the 14 clients by the presence of Plans that appeared in at least half of their individual structures (n =5). The result revealed that the presence of the plan "*be strong*" significantly reduced the NAR scale by 1.52 points ($p = 0.011$) and acted as a protective factor (IIb). The presence of a statistical effect despite the small sample size is encouraging.

The third article found that participants diagnosed with a BPD showed more observed emotional arousal variation than healthy controls during an experiential task focusing on the elaboration of self-criticism (IIIa). In parallel, it also found that those in the control group who displayed more emotional arousal variance during the experiential task displayed more general psychological distress (IIIb). The use of the experiential task (i.e. the two-chair dialogue)

ensured that each participant was confronted to idiosyncratic (individualised) relevant stimuli, thereby providing a robust internal validity of the response (i.e. elicited emotional arousal) assessed on the observer-rated scale.

3.2 Implications for psychotherapy research

Whereas each article has a section dedicated to the discussion of its respective findings and their potential implications in detail, this sub-chapter focuses on the underlying conclusions for psychotherapy research.

As this dissertation has illustrated, psychiatric diagnoses fail to satisfactorily guide treatment (psychological or pharmacological) and the bio-medically outcome oriented RCTs are unable to pinpoint psychotherapy's active ingredients. Whereas RCTs can be adapted to identify mechanisms of change (and are not incompatible with some kind of individualisation), the assumption that they represent the ideal methodology for causal inference is skewed (see Deaton & Cartwright, 2018). Therefore, if we hope to achieve any substantial improvement in the field of mental health, the present doctoral thesis argues that there is a need for diversifying psychotherapy research designs.

To that end, each paper of the present dissertation strived to integrate multi-level analysis (behavioural/neurobiological/idiosyncratic/nomothetic/self-report/observer-rated) to their designs as well as (partially) individualising them.

Since *mental disorders* are "higher order disturbances in multi-level mechanisms" (Kendler, 2012, p. 17), it is imperative to avoid the oversimplification of complex phenomena by focusing solely on one level of analysis (bio, psycho or socio) or one method. The three articles of this doctorate apply this rational. The first paper introduces an innovative neurobehavioural methodology where the integration of methods from psychotherapy research to neuroimaging

addresses this pitfall and ensures a multifaceted approach. The second paper combines qualitative (case conceptualisation) and quantitative (inferential statistics) methods. The third paper uses self-report as well as observer-rated scales. Much like the parable of the "blind men and an elephant", psychotherapy research should strive to systematically integrate different perspectives on the same object of observation to achieve a deeper understanding of its functioning.

Research on the impact of case formulation/individualisation of treatment on outcome for different psychological disorders reveals a mixed picture (see Kramer, 2020) and indicates that individualised procedures might be irrelevant (and not cost-effective) for certain specific clinical presentations such as phobias. However, this raises (at least) two questions. First, how ecologically valid are "simple" non-comorbid psychiatric diagnoses? Second, can psychotherapy—even when manualised—not be individualised? This doctoral dissertation argues that since individualisation of psychotherapy is *de facto* always happening, the same observation should apply to psychotherapy research (Deacon, 2013). The first and third papers both individualised the stimuli (in the fMRI tasks respectively on the experiential chair) whereas the second article used case formulation as an individualisation tool. However, because of its potential (over)complexity and (over)specificity it is essential to guide and standardise its elaboration (Bergner, 1998). Therefore, the second paper applied a case formulation method where it organised clinically essential idiosyncratic information into a prototypical Plan structure for NPD, providing an informational tool that favours idiosyncrasy without forsaking all nomothetic ambition.

As discussed above, the optimisation of psychotherapy entails the identification of its active ingredients. The first and third papers assist in this effort by investigating a potential mechanism of change pinned by the literature, namely emotional arousal (Carryer & Greenberg, 2010; Lane et al., 2015). They use

individualised stimuli to ensure the response's (i.e. emotional arousal) validity (see methods section from paper I and III). Whereas the first article could assess its change over a brief treatment (on both a behavioural and a neurological level) the second article used self-reported and observer-rated measures at several time points to improve the understanding of the relationships and dynamics between emotional arousal and psychological distress in a sample of clients diagnosed with a BPD, and controls. The finding that higher levels of emotional arousal in a sample of healthy controls is associated with higher symptom levels (Paper III) suggests that once a certain threshold is exceeded, emotional arousal becomes harmful to mental health. The observation that the sample where participants had a BPD diagnosis displayed more observed emotional arousal supports this theory, as does the one that, following a brief treatment, a reduction in BPD symptoms was associated with change in the neural activity in the hippocampus, the insula and the nucleus accumbens (Paper I). The second paper tackles the improvement of psychotherapy by providing insight on potential ways of handling pathological narcissism. Using a mix method approach, it found that the presence of the motive (Plan) "*be strong*" acted as a protective factor and that fostering it might be an efficient therapeutic tool.

Following this dissertation's rationale, each paper is embedded into a framework that combines and integrates different individualised methods and levels of analysis to address the complexity inherent to the causes and maintenance factors of psychological distress. As part of its main argument, this dissertation has striven to demonstrate the benefit of such designs and advocates for their extended use in psychotherapy research.

3.3 Methodological considerations and limitations

This dissertation will now discuss the overarching and main challenges underlying the three article and associated with the use of individualised multidisciplinary methods. The Table 3.2 summarises some of specific limitations associated with each of the three papers from the present doctoral thesis.

Table 3.2: Summary of some of the papers' specific limitations

Paper		Main limitations
I	a	The proposed method is highly time consuming, complex and costly to implement.
II	a	The absence of video material when creating the 14 individual case formulations (Plan Analyses) results in a loss of information regarding the complexity and heterogeneity of the NPD's clinical presentations.
III	a	The absence of a third (e.g. physiological) measure of emotional arousal hinders the assessment's validity and conditioned our results.
	b	In contrast to the participants with a BPD, it is presumed that controls are not used to harshly criticising themselves, which in turn might have influenced their emotional arousal during the two-chair task.

If oversimplification poses a threat to a comprehensive and useful understanding of psychological distress, so does overcomplexification. Investigating psychotherapy at an idiographic level might be a potential solution to isolate mechanisms of change, but it also makes it arduous to generalise its findings, since what works for one individual might not work for others. The use of case formulation is a good example of this challenge. Let us take the example of Marine, a client presenting with a severe and pervasive—yet diffuse—general anxiety as well as recurrent panic attacks. The use of case formulation is an ideal tool to explain the origins of the problems (turbulent divorce, high stress work environment, sleeping problems), account for its factors of maintenance (ruminations, cycle of panic, avoiding behaviours), make predictions about

prognosis (rather good) and prescribe treatment options (cognitive restructuration, work on emotions, relaxation techniques, exposure therapy). However, it will not be possible to apply its conclusions to Roel, another client who also presents with a marked anxiety and recurrent panic attacks but on different grounds (poly traumatised asylum seeker). Same goes for Fabio, a young man diagnosed with a BPD with a clinical presentation primarily characterised by rage outbursts and impulsive behaviours (brawling, reckless sexual relations, cocaine consume) whereas Lola displays a marked fear of being abandoned, difficulty to trust others and the regular use of self-harming behaviours (cutting herself) to alleviate her "inner restlessness". On that matter, if the use of case formulation is excellent at hypothesizing about the causes, precipitants, and maintaining influences of an individual's problems, there is some literature indicating that it is often used to merely summarise information (Eells et al., 1998), substituting one descriptive system by another. Maybe because case formulation is time-consuming and idiographic, it has been rather underused in psychotherapy research although it is a promising way to track core processes throughout therapy and inform theory (as well as test it).

Additionally, the individualised multidisciplinary methods discussed in this dissertation remain markedly influenced by the bio-categorical model of mental health. Instead of relying on DSM diagnoses with marked heterogeneous clinical presentations to sample participants, future research should focus on higher overarching transdiagnostic (dimensional) concepts—like those suggested by HiTOP—to improve validity while maintaining a structure compatible with nomothetic aspirations.

As mentioned already, external validity is a common concern in psychotherapy research and small samples tend to be regarded as inherently suboptimal to yield generalisable results. In this regard, findings' generalisability of the

articles constituting this dissertation is limited (Paper I, $N = 1$; Paper II, $N = 14$; Paper III, $N = 65$). However, there is evidence suggesting that, regardless of the sample size, idiographic approaches are not incompatible with externally valid results (Beltz et al., 2016).

3.4 End of an era – what next?

So far, the (young) field of psychotherapy research has been able to raise to the challenges it faced first by demonstrating psychotherapy's efficacy beyond reasonable doubt and then by developing several ESTs. Its future however lies in the understanding of psychological distress and of the active ingredients at work in its mitigation. How do we suffer? And, most importantly, *how* do we get better? To answer these challenging questions, a change in the conceptualisation of mental health is required. Yet, instead of equating to a *tabula rasa*, this paradigm shift should aim at building on current knowledge and make a habit of integrating multidisciplinary individualised methodologies into research designs. To this effect, the present dissertation has highlighted the particular role of PDs. Given that personality and psychopathology are closely intertwined (Krueger et al., 2007), it is not surprising that they served as a gateway to the introduction of dimensional approaches into the categorical classification of *mental disorders* as well as to the use of idiographic tools in their study (see point 1.3.).

Two of the main challenges associated with psychotherapy research are people's individuality (1) and the complexity of most (but not all) psychological processes (2). Regarding the first point, traditional research designs seem to be quite insensitive to the specificity of how each person reacts to external (and internal) stressors as well as to treatment. One potential solution to this problem might reside in the individualisation of methods since the use of an

idiographic approach allows for the observation of variation and change within the individual client. Regarding the second point, the use of multiple levels of analysis is promising. Or, to borrow Kazdin's (2007) analogy: Much like chess, the game (of identifying mechanisms of change and optimizing treatments) is won on multiple fronts, in an integrated sequence of actions and converging moves that make checkmate possible.

To that end, this dissertation has showcased multiple approaches as well as individualised different aspects of their design with interesting results (see Papers I and II). Unfortunately, some problems remain unaddressed. For one, and as discussed above, the use of DSM diagnosis is suboptimal. Furthermore, future studies should put more emphasis on longitudinal designs and use time-series analysis for investigating intra-individual change that can in turn also provide valuable information for group-level analyses.

In conclusion, whereas this doctoral thesis does not claim to be revolutionary or to hold the solutions to all the problems it highlighted, it does propose a necessary reflection on possible alternatives. As an effort to co-construct the future of psychotherapy research, it has advocated for the advantages of adopting a dimensional rational, reflected in the individualisation of designs and use of multi-level of analysis. It also defended the position that PDs are ideal to integrate multidisciplinary individualised methodologies in psychotherapy research and can spearhead the way to the paradigm where psychological distress is not a sickness but a set of complex dimensions that should be studied—and treated—accordingly.

In other words, what if everybody is crazy, but nobody is ill?[1]

[1] Title of a symposium held by Prof. Dr. Peter Kinderman, former president of the British Psychological Society

3.5 Availability of data

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

3.6 Funding

The Swiss National Science Foundation (SNSF) under Grant 100014_179457/1 to Ueli Kramer supported this work. The SNSF did not dictate any specifications of the study design, data collection, analysis, or interpretation.

3.7 Conflicft of interest

The authors report no conflict of interest.

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Appendices

Appendix A

Supporting Information: Paper II

Table A.1: List of all the Plans (98) and their occurence in paper I

n	**Plan(s)**
14	strengthen self-esteem
12	avoid loss of control
10	get support, understanding & solidarity, avoid criticism & confrontation
9	establish bond / relationship
8	show your skills, show yourself especially reflected & accessible, show yourself independent
7	get recognition & appreciation, make sure people like you, be strong, do not offer any surface to be attacked, show how bad you feel
6	maintain integrity, avoid devaluation, avoid self-doubt, avoid inferiority
5	protect your boundaries, play an important role for others, get therapists on your side, be something special, avoid negative feelings, avoid being judged negatively, make sure that you are taken seriously
4	make yourself important, avoid getting hurt, claim your rights, show that you have been treated unjustly, keep the situation under control
3	get yourself some attention, avoid guilt, make sure that you are spared, avoid dependence
2	act insecure, avoid disappointment, show how successful you are, get therapists to stand up for you, do not make mistakes, be caring / a good friend, stand up for yourself, be a good worker, avoid comparisons with others, Avoid high performance demands
1	avoid feeling helpless, be performant, do not let yourself be constrained, show that you value therapy, show what you have been through, make yourself interesting, make sure you get what you deserve, emphasize your relevance to your wife, show yourself neglected, get special treatment, show that you're a hard case, avoid loneliness, avoid that others do not pay attention to you, show yourself ready for change, avoid further loss, emphasize good experience in relationships, make sure to be needed & desired, avoid hurting others, be interested in others, adapt to the expectations of others, avoid feeling bad, justify the therapy, show that you have special ideas, show that you've improved, emphasize that you feel free, cover your back, be reliable, fulfil, expectations & duties, be neat & hardworking, be perfectionist, abide strictly by the rules, devalue others, make it clear that your anger is justified, make it, clear that you have no support, behave appropriately, avoid losing your temper, criticize others to the therapist. delegate responsibility, avoid thinking about yourself, avoid arguing with yourself, support others, be likeable, show that you are being used, be demanding, be valuable for your environment, get support, avoid showing weaknesses, be accepted as part of your environment, be optimistic, show that you are entitled to be helped, avoid turning others against you, try to become calmer, take care of yourself and your health, make it clear that woman needs you, protect your wife

Appendix B

Supporting Information: Paper III

Table B.1: Summary of OLS regression comparing linear and quadratic models of observer-rated arousal variance and psychological distress

	Psychological distress (OQ-45)					
	Linear model			Quadratic model		
Predictors	*B*	*95%CI*	*p*	*B*	*95%CI*	*p*
(Intercept)	88.38	72.51–104.26	<0.001	85.67	65.53–105.81	<0.001
Control group	-46.18	-66.60– -25.76	<0.001	-40.28	-55.76– -24.81	<0.001
CEAS-III [a]	-0.57	-11.94–10.80	0.921	3.56	-24.82–31.94	0.803
CEAS-III × Control group	12.53	-5.74–30.80	0.175			
CEAS-III^2				-1.15	-10.67–8.37	0.810
CEAS-III^2× Control group				4.79	-3.39–12.96	0.246

Notes. Bold emphasis indicates significant results. [a]Variance of scale used as predictor.

Table B.2: Summary of OLS regression comparing linear and quadratic models of self-rated arousal variance and psychological distress

	Psychological distress (OQ-45)					
	Linear model			Quadratic model		
Predictors	*B*	*95%CI*	*p*	*B*	*95%CI*	*p*
(Intercept)	87.86	76.56–99.17	<0.001	88.67	75.63–101.71	<0.001
Control group	-39.67	-55.97– -23.37	<0.001	-37.99	-51.23– -24.74	<0.001
SAM [a]	-0.06	-2.72–2.61	0.966	-1.09	-9.02–6.85	0.785
SAM × Control group	1.55	-4.00–7.09	0.579			
SAM^2				0.12	-0.72–0.96	0.775
SAM^2× Control group				0.26	-0.63–1.15	0.562

Notes. Bold emphasis indicates significant results. [a]Variance of scale used as predictor.