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Group intervention for improving interpersonal skills

GRIPS

Statistical Analysis Plan

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Trial statistician
Dr. rer. nat. Daniel Schulze
Charité – Universitätsmedizin Berlin
Charité Campus Mitte
Institut für Biometrie und klinische Epidemiologie

Sponsor Representative & Coordinating Investigator
PD Dr. rer. nat. Anne Guhn
Charité - Universitätsmedizin Berlin
Charité Campus Mitte
Klinik für Psychiatrie und Psychotherapie

File history

Version	Date	Major changes	Comment
0.2	08.07.2026	Mediation analysis for EMA data removed	Preregistration created separately
1.0	25.08.2026	Specified moderator analysis with CTQ	

Abbrevations

SCID-5=Structured Clinical Interview for DSM-5

IIP-32=Inventory for Interpersonal Problems, short version

IMI-R=Impact Message Inventory, revised version

BDI-V=Beck Depression Inventory, simplified

HAM-D=Hamilton Depression Rating Scale

HAM-A=Hamilton Anxiety Rating Scale

ACA= Questionnaire on panic-related Anxieties, Cognitions and Avoidance

SEDI = Short version of the Multidimensional Emotional Disorder Inventory

IIM= Inventar zur Erfassung Interpersoneller Motive

PHQ= Patient Health Questionnaire

WHOQoL-BREF = Assessment of quality of life

PID5BF+=Personality Inventory for DSM-5 Brief Form Plus

LPFS-BF= Level of Personality Functioning Scale-Brief Form 2

CAMSQ=Certainty About Mental States Questionnaire

CTQ=Childhood Trauma Questionnaire

EMA = Ecological Momentary Assessment

SAEs= serious adverse events monitoring

INEP=Inventory for the Assessment of Negative Effects of Psychotherapy

NUGE-24=Questionnaire for the Assessment of Side Effects and Negative Experiences in Group Therapy.

Content

1. Introduction

In recent years, mental health research has transitioned from a categorical model, where disorders are defined by distinct symptom clusters (as in DSM-5 (American Psychiatric Association, 2022)), to a transdiagnostic perspective that views psychopathology as dimensional and driven by shared underlying processes. The categorical approach struggles to explain high comorbidity rates and the broad symptom improvements seen with disorder-specific treatments, suggesting that many mental health conditions share common etiological mechanisms. The transdiagnostic model emphasizes core processes across disorders, including cognitive, emotional, and behavioral domains, advocating for treatments that target these universal factors.

This study focuses on interpersonal problems that are a key transdiagnostic process in the behavioral domain. Interpersonal difficulties, defined as persistent, distressing challenges in relationships, are prevalent across psychiatric conditions, not just personality disorders. Individuals with mental health diagnoses report significantly more interpersonal issues than healthy controls and experience greater social distress. These problems are a robust predictor of poorer psychotherapy outcomes, underscoring the need to address them directly in treatment.

Early adverse experiences, particularly child maltreatment (e.g., emotional abuse and neglect (Nelson et al., 2017)), are strongly linked to later interpersonal dysfunction and increased risk for depression and anxiety (Gardner et al., 2019; Humphreys et al., 2020). A meta-analysis confirmed that childhood maltreatment correlates with impaired social functioning and poorer interpersonal relationships. While its impact on treatment outcomes remains debated, evidence suggests that therapies incorporating patients' biographical histories—especially those addressing interpersonal trauma—are more effective. For instance, patients with histories of emotional neglect and abuse showed better outcomes with the Cognitive Behavioral System of Psychotherapy (CBASP) than with generic supportive therapy (Goerigk et al., 2024).

To address these issues, the Kiesler Circle Training (KCT) was developed (Guhn et al., 2019). Grounded in the Contemporary Integrative Interpersonal Theory, KCT uses a circumplex model to map interpersonal behaviors along two axes: agency (dominant to submissive) and communion (friendly to hostile). This model helps patients recognize and modify rigid interpersonal patterns such as social avoidance (low agency and low communion) that are common in depression and anxiety. KCT is a group intervention that fosters interpersonal awareness and flexibility through corrective experiences, informed by patients' significant-other histories.

A pilot study in an inpatient CBASP setting found that patients with persistent depressive disorder and histories of maltreatment showed significant reductions in interpersonal problems and depression severity after 12 weeks of KCT (Guhn et al., 2021). However, there were limitations, including a homogeneous sample, inpatient setting, and lack of a control group.

2. Study Objective

GRIPS aims to investigate the efficacy and feasibility of KCT, a transdiagnostic group intervention for improving interpersonal skills. To that end, individual, state-of-the-art Cognitive Behavioral Therapy (CBT) augmented by KCT group sessions will be compared with individual CBT-only. For both conditions, patients with a categorical diagnosis of either depression or anxiety and significant interpersonal problems will be eligible. Interpersonal distress represents the primary outcome. The reduction of interpersonal distress is supposed to accompany symptomatic change of the respective categorical diagnosis (depression or anxiety disorder). The main hypotheses are:

(1) Compared to CBT alone, the combination of CBT and KCT (CBT+) is expected to result in a greater reduction in interpersonal problems from pre- to post-assessment.

(2) The reduction in interpersonal problems will be associated with greater symptomatic improvement in the primary diagnosis, with patients in the CBT+ condition demonstrating greater symptom reduction compared to those receiving CBT alone.

The study will also examine secondary hypotheses related to moderating effects on interpersonal functioning. Specifically, we will test the hypothesis that the impact of KCT on reducing interpersonal problems is moderated by experiences of child maltreatment, with individuals reporting higher levels of maltreatment benefiting more from the intervention.

The study protocol has been published (Ollrogge et al., 2026).

3. Study Design

This prospective randomized controlled phase II trial (RCT) compares two active conditions: CBT in individual sessions augmented by 12 weekly KCT group sessions (experimental group, CBT+) versus CBT in individual sessions only (control group, CBT). After study inclusion, patients will be assessed at baseline (T1, week 1-2), mid-treatment (T2, week 8), post-treatment (T3, week 14) and follow-up (T4, three months later). The study will be conducted in the outpatient wards at:

1) Centre for Psychological Psychotherapy (ZPP) at the University of Greifswald, Germany
2) Institute for Integrative Psychotherapy Training (IPB) at the Medical School Berlin, Germany

Patients with a categorical diagnosis of either a depressive or an anxiety disorder according to DSM 5 and significant interpersonal problems: One standard deviation above the norm according to a German representative sample by Thomas et al. (2011, IIP-32>1.81) will be recruited. Further inclusion and exclusion criteria can be found in the study protocol. The study centers recruit the patients.

Study inclusion is possible at any point during the course of ongoing individual CBT. After checking eligibility of a patient, they can be included in the study after giving informed consent. We aim for reducing protocol deviations by offering KCT to patients randomized to the control after T4. We will not include these second-period results in the analysis.

3.1. Randomization & Blinding

Individual patients will be randomized 1:1 to each condition, with randomization conducted separately at each study center and stratified by primary diagnosis (anxiety disorder or depression) to ensure balanced group distribution. Due to the nature of the intervention, neither the therapist nor the patient can be blinded to the condition. We will, however, have blinded raters to assess the outcomes independently from the therapists. Patients are advised not to reveal any information that might indicate their group assignment during the trial visits. In case the group assignment is revealed, a back-up rater will conduct the pending trial visits.

4. Variables

An overview of all measurement instruments and measurement occasions can be found in Table 1.

4.1. Primary Outcome

The primary outcome is the change in interpersonal distress by self-report from baseline (T1) to post-assessment (T3). Interpersonal distress will be assessed by the IIP-32 (Thomas et al., 2011).

4.2. Secondary Outcomes

The clinician-rated secondary outcomes are:

- Anxiety patients: Hamilton Anxiety Rating Scale (HAM-A)
- Depressive patients: Hamilton Rating Scale for Depression (HAM-D)

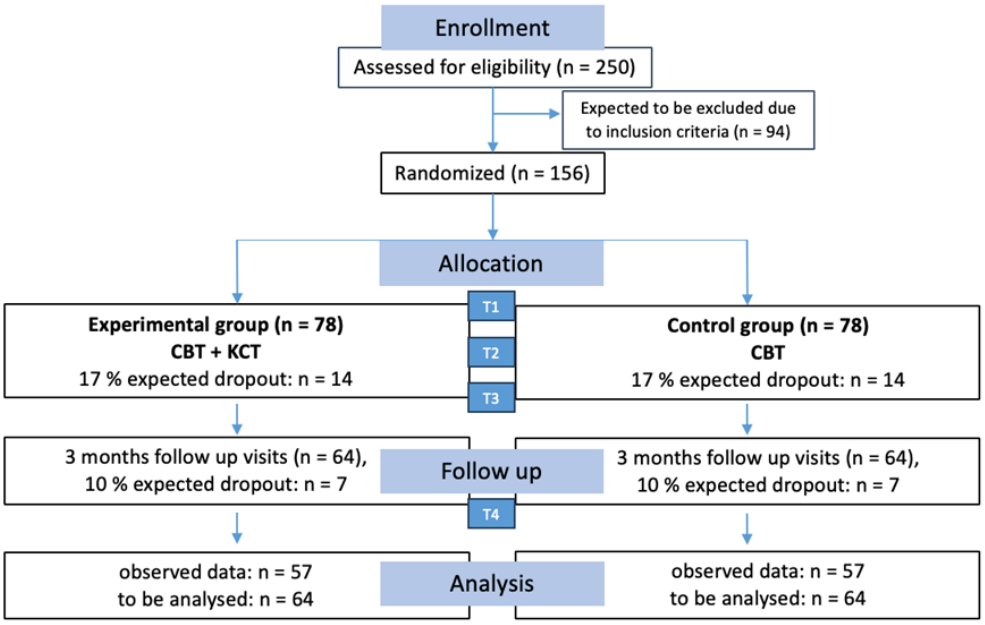

FIGURE 1: Schematic representation of the GRIPS design.

Change sum scores from pre (T1) to post (T3) assessment will be standardized into z-values so that HAM-A and HAM-D scores can be combined for the analysis. The reliable change index (RCI) will be calculated to assess whether difference scores can be considered clinically meaningful.

Moderator:

- Child maltreatment will be assessed as moderator of change using the Childhood Trauma Questionnaire (CTQ)

Further questionnaires will be assessed as exploratory outcomes (pre-post differences; self-rated instruments are marked with *):

- Symptom severity: Depression (BDI-V)*
- Symptom severity: Anxiety (ACQ & BCQ)*
- Emotional disorder spectrum: Short version of the Multidimensional Emotional Disorder Inventory (SEDI)*
- Depression, somatic symptoms, and generalized anxiety symptoms: Patient Health Questionnaire (PHQ)*
- Subjective quality of life: World Health Organization Quality of Life, Kurzversion (WHOQoL-BREF)*
- Interpersonal relationships and perceived relational signals (Dominance, Submission, Affiliation, Hostility): Impact Message Inventory – Revised (IMI-R)
- Interpersonal motives and motivational orientations in relationships: Inventar zur Erfassung Interpersoneller Motive (IIM)*
- Maladaptive personality trait domains according to the DSM-5 alternative model: Inventory for DSM-5 – Brief Form Plus (PID-5-BF+)*
- Impairments in identity, self-direction, empathy, and intimacy: Level of Personality Functioning Scale – Brief Form 2 (LPFS-BF)*
- Disturbances in self-concept and identity functioning: Clinical Assessment of Maladaptive Self and Identity Questionnaire (CAMSQ)*

5. Sample size calculation

The sample size calculation is based on Holgersen et al. (2020), who argue that clinical significance can only be assumed with an effect size of Cohen's d = 0.5, considering the costs of implementing an additional group therapy. Our sample size calculation relies on a two-tailed two-sample t-test, while a baseline-adjusted ANCOVA will be used for the primary efficacy analysis. This results in a higher power compared to the two-sided t-test, which ignores the influence of different baseline values. This strategy for calculating the sample size is a conservative procedure. With a two-sided t-test with equal variance, the power analysis resulted in a group sample size of 64. This sample size achieves a power of 80% for rejecting the null hypothesis of equal means at a significance level alpha of 0.05. Considering approximately 17% dropouts during the treatment phase (based on our phase I study, Guhn et al., 2019), the total number of patients to be recruited is 156 (78 per group). Consequently, approximately 250 patients will undergo eligibility screening.

6. Statistical Analyses

The database will be locked and all analyses will be conducted only after completion of data collection for all included patients, including the assessment of the primary and secondary outcome and all follow-up assessments. The statistician will be blinded to treatment allocation.

Primary analyses will be carried out with a two-sided p-value of .05 indicating statistical significance. All other analyses will be treated exploratorily, unless otherwise preregistered. 95%-CIs will be reported as appropriate.

6.1. Statistical Analysis sets

Analyses of the primary and secondary outcomes will be carried out as intention-to-treat analysis, including all participants as randomized.

A sensitivity analysis based on the per-protocol population will be conducted in addition. The per-protocol population consists of all patients without major protocol violations.

6.2. Covariates for Adjustment

Covariates will be used to adjust for possible confounding due to 1) the naturalistic outpatient setting and 2) the multi-center characteristic of the study. These covariates will subsume:

- Baseline measurements of the respective outcome in each analysis
- the number of individual sessions (T1-T3, or T1-T4, respectively)
- study site (2 sites)
- interaction effects of all covariates with the variable study site.

6.3. Missing Data

In all analyses, missing values on either the outcome measures or on the covariates will be handled by using multiple imputation (MI) with m = 30 imputed datasets. For testing the assumption of MI that missing values are occurring missing at random, we will use graphical comparisons of present and imputed data. The imputation variables set will consist of all baseline variables plus all self-rated questionnaires from the time points T1 thru T3, plus HAM-A and HAM-D. For the binary evaluation of HAM-D and HAM-A, the imputations from the continuous scores will be used, ie, dichotomization due to RCI will be run *after* MI.

In the sensitivity analyses mentioned below, a full information maximum likelihood (FIML) estimator in the context of mixed effect models will be used instead of MI.

TABLE 1: Measurement instruments and visit schematic

	Screening	**Baseline**	**Intervention**						**FU**
Trial visits	T0	T1			T2			T3	T4
Week	0	1-2	4	6	8	10	12	14	26
Informed consent	X								
In-/exclusion criteria	X								
SCID-5-CV	X								
SCID-5-PD	X								
Demographic	X								
Primary outcome									
IIP-32 (SR)	X	X			X			X	X
Secondary outcome									
Symptom severity (OR) - Depression: HAM-D - Anxiety: HAM-A		X			X			X	X
Moderator of change									
CTQ (SR)		X							
Mediator of change*									
EMA*		X			X			X	
Exploratory outcome									
Symptom severity (SR) - Depression: BDI-V - Anxiety: BCQ & ACQ		X			X			X	X
IMI-R (OR)		X						X	X
IIM (SR)		X						X	X
SEDI (SR), PHQ (SR)		X						X	X
WHOQoL-BREF (SR)		X						X	X
PID5BF+ (SR)		X						X	X
LPFS-BF (SR)		X						X	X
CAMSQ (SR)		X						X	
Adverse events and side effects									
Medication		X						X	X
Side effects (INEP)								X	
NUGE-24 (CBT+KCT only)					X			X	X

SR=self-rating; OR=blinded observer-rating; * otherwise pre-registered

Notes: SCID-5=Structured Clinical Interview for DSM-5 (CV=clinical version, PD=personality disorders); SR=self-rating; OR=blinded observer-rating; IIP-32=Inventory for Interpersonal Problems, short version; IMI-R=Impact Message Inventory, revised version; HAM-D=Hamilton Depression Rating Scale; BDI-V=Beck Depression Inventory, simplified; HAM-A=Hamilton Anxiety Rating Scale; ACA= Questionnaire on panic-related Anxieties, Cognitions and Avoidance (subscales Body Sensations Questionnaire (BSQ) and the Agoraphobic Cognitions Questionnaire (ACQ); SEDI = short version of the Multidimensional Emotional Disorder Inventory; IIM=Inventar zur Erfassung Interpersoneller Motive; PHQ= Patient Health Questionnaire (subscales PHQ-9, PHQ-15 and GAD-7)); WHOQoL-BREF for the assessment of quality of life; PID5BF+=Personality Inventory for DSM-5 Brief Form Plus; LPFS-BF= Level of Personality Functioning Scale-Brief Form 2; CAMSQ=Certainty About Mental States Questionnaire; CTQ=Childhood Trauma Questionnaire; EMA = Ecological Momentary Assessment, SAEs= serious adverse events monitoring; INEP=Inventory for the Assessment of Negative Effects of Psychotherapy; NUGE- 24=Questionnaire for the Assessment of Side Effects and Negative Experiences in Group Therapy.

6.4. Primary Outcome

The main hypothesis is the superiority of the treatment group compared to the control with regard to interpersonal distress as measured by the IIP-32. Primary analysis will consist of an analysis of covariance (ANCOVA) for the treatment effect at T3 by group, adjusted for interpersonal distress at baseline, the number of individual sessions between T1 and T3, and treatment site.

As a sensitivity analysis, a longitudinal linear mixed effects model with all four assessments over the complete study period (T1, T2, T3, T4) will be run. The model will be set up with a random subject-specific intercept, while a fixed slope with regard to the categorical time variable will be implemented. The interaction of time and group will be evaluated as fixed treatment effect, with the number of individual sessions between T1 and T4 and treatment site as further fixed effects.

6.5. Secondary & Exploratory Outcomes

Regarding further outcomes, ANCOVA models will be run as well, again adjusted for the respective outcome at baseline, the number of individual sessions between T1 and T3, and treatment site. The only exception to these linear models will be symptom severity as assessed by HAM-D and HAM-A (secondary outcomes): These outcomes will be evaluated as both, continuous and binary (RCI). For the binary rating, logistic regression will be applied with the predictor group and the covariates number of individual sessions between T1 and T3 and treatment site.

As sensitivity analyses, longitudinal mixed effects models akin to the primary sensitivity analysis will be run, with three to four time points (depending on the outcome, see Table 1). These models will be linear for all outcomes but the RCI of HAM-D and HAM-A, where a logistic mixed model will be implemented.

To test the moderator hypothesis about child maltreatment (CTQ), a further ANCOVA will be conducted, including interaction effects. CTQ as moderator will be evaluated as both the total score as well as the emotional neglect subscore. CTQ scores will be used as continuous and binary moderator variables (total: a score above 51 will be rated as relevant trauma experiences; emotional neglect: values above 14).

Within the treatment group, we will exploratory evaluate whether the number of group sessions attended in the CBT+ group (x/12) has a relationship with the change in IIP-32, HAM-D and HAM-A via multiple linear regression.

6.6. Interim analyses

No interim analysis will be carried out.

6.7. Software

We will use the open-source software R for all analysis steps in version 4.5.2 or greater (R Core Team, 2021). The packages providing specific functions will include:

- mi (Multiple imputation)
- lme4 (mixed models)
- lavaan (SEM)
- ggplot2 (figures)

7. Safety Analyses

7.1. Safety Outcomes & Monitoring

Adverse events AE and serious adverse events (SAE) as well are regularly documented at all trial visits. During the weekly KCT group sessions, group therapists are encouraged to carefully monitor for any (S)AEs and, if necessary, interview the patient using a paper-and-pencil version of the eCRF documentation.

SAEs include:

- death
- any life-threatening event

AEs include:

- exacerbation of symptoms
- appearance of new symptoms
- passive suicidal thoughts
- active suicidal plans or intentions

All SAEs, particularly severe adverse treatment reactions have to be reported to the principal and co-principal investigators and will be discussed with a Data Safety Monitoring Board (DSMB). Suicidality and hospitalization in reaction to the group intervention (severe adverse treatment reactions) are defined as individual stop criteria leading to discontinuation of the trial. The whole trial will be discontinued in case the study (co)principal investigators or members of the DSMB have serious ethical concerns regarding participants' safety.

7.2. Analyses

Final analysis and depiction of safety outcomes after conclusion of recruitment will be carried out according to the actually received treatment. Group comparisons will be done using incidence rate ratios and 95%CI. Results of safety analyses will be discussed for risk ratios greater than 1.20 (20% greater risk for treatment group). This will be carried out independent of statistical significance as statistical tests might be impaired by low incidence rates and are thus of less importance in this regard.

8. Differences to the Protocol

The protocol comprised a minor mathematical inaccuracy concerning the primary analysis: The planned ANCOVA will (and cannot) include a time effect.

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