

Supplementary Material S1: Prisma Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	2-3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	3
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	3-5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	3
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	3 – Supplementary Material S2
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	3
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	3-5
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and	4-6

		simplifications made.	
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	6
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	5-6
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	5-6
Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	6
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	6 & 7
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	7
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	Supplementary Material S6, 7
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	Dataset published online
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	9-12 - Dataset published online
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	7-14
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	13-14 & Supplementary Materials
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	14
DISCUSSION			

Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	14-16
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	17-18
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	17-18
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	18

Supplementary Material S2

Search Strings and Results from the Most Recent Literature Update (March 2019 to October 2019)

Psychinfo (OVID)

1. (borderline personality disorder/ or borderline states/ or borderline personality).mp. (13495)
2. Limit 1 to yr= "2019-Current". (335)
3. (clinical trials/ or (clinical trial* or controlled trial* or RCT*).mp. (76403)
4. Limit 3 to yr= "2019-Current". (2999)
5. 2 and 4. (20)

Medline (OVID)

1. (borderline personality disorder/ or borderline personality).mp. (8734)
2. Limit 1 to yr= "2019-Current". (483)
3. (clinical trial/ or (clinical trial* or controlled trial* or RCT*).mp. (1372224)
4. Limit 3 to yr= "2019-Current". (52694)
5. 2 and 4. (34)

Embase (OVID)

1. (Borderline state/ OR Borderline personality).mp. (14162)
2. Limit 1 to yr= "2019-Current". (629)
3. (clinical trial/ OR (clinical trial* or controlled trial* or RCT*).mp. (2015129)
4. Limit 3 to yr= "2015-Current". (101600)
5. 2 and 4. (54)

Cochrane Library

1. ("borderline personality"):ti,ab,kw AND ("clinical trial*" OR "controlled trial*" OR RCT*):pt,ab,kw,ti. (97)

Supplementary Material S3:

Quality Rating Checklist

1. BPD diagnosis made according to semi-structured diagnostic interviews, such as the SCID (0 = no or unknown, 1 = yes, but with inadequate or unknown inter-rater reliability [IRR], 2 = yes, with adequate IRR);
2. If a treatment manual was used (0 = no or unknown, 1 = yes, but treatment manual is unpublished, 2 = yes, with published treatment manual);
3. If therapists were trained either specifically for the study or in a general training (0 = no or unknown, 1 = no or unknown, but therapists are clearly experts, 2 = yes);
4. If treatment integrity was checked (0 = no or unknown, 1 = yes, by supervision, 2 = yes by independent raters);
5. If data were analyzed using intent-to-treat (ITT) analyses (0 = no or unknown, 1 = yes, but ITT analysis is partly violated, 2 = yes);
6. If the study was randomized (0 = no or unknown, 1 = yes, but randomization is partly violated, 2 = yes);
7. If applicable, if randomization was independent and adequately concealed;
8. If assessment interviews were conducted by independent or blind assessors (0 = no or unknown, 1 = yes, independent or blind, 2 = yes, blind and independent);
9. If dropout was reported (0 = no, 1 = yes, but no distinction between types of dropout, 2 = yes, with adequate distinction between types of dropout)

**Supplementary Material S4:
Estimation of Cohen's d from Binary Outcomes**

In case of binary outcomes, Cohens' d was defined as:

$$d = \ln(\text{OR}) \cdot \sqrt{3} / \pi \quad \text{Eq. (S1)}$$

with $\ln(\text{OR})$ (OR = odds-ratio) defined by:

$$\ln(\text{OR}) = \ln(\text{Odds}_{\text{pre}}) - \ln(\text{Odds}_{\text{post}}) = \ln(p'_{\text{pre}} / (1 - p'_{\text{pre}})) - \ln(p'_{\text{post}} / (1 - p'_{\text{post}})) \quad \text{Eq. (S2)}$$

and p'_{pre} = corrected proportion meeting the outcome at pretest, p'_{post} = corrected proportion meeting the outcome at posttest.

Corrected outcome proportions were calculated with the Agresti-Coull method:

$$p' = (n+2) / (N+4) \quad \text{Eq. (S3)}$$

with n = observed number meeting the outcome and N = total number (Agresti & Coull, 1998).

**Supplementary Material S5
Estimation of Hedges' g from Cohen's d**

Cohen's d was transformed into Hedges' g by the following formula:

$$g = (1 - 3 / (4 * \text{d.f.} - 1)) * d, \quad \text{Eq. (S4)}$$

with $\text{d.f.} = n - 1$, and n = the sample size

The variance of Hedges' g was defined by:

$$\sigma^2(g) = (\text{d.f.} / (n * (\text{d.f.} - 2))) + d^2 * (\text{d.f.} - (\text{d.f.} - 2) / J^2) / (\text{d.f.} - 2) * J^2, \quad \text{Eq. (S5)}$$

with $J = (1 - 3 / (4 * \text{d.f.} - 1))$

For the transformed effect sizes, we used the logarithmic relationship between time in weeks and effect size to calculate the effect size at 1 year. Thus, the transformed Hedges' g was defined as follows:

$$\text{Transformed.g} = a * g / (\text{LN}(\text{time} + 1)) \quad \text{Eq. (S6)}$$

With $a = \text{LN}(53)$ and $\text{time} = \text{Duration in Weeks}$.

The standard error (SE), and thus the variance (by squaring the SE), of the transformed g was calculated with the same formula as transformed g , by replacing g by the SE.

**Supplementary Material S6
Study Characteristics of Included Studies**

Table S1. Characteristics and Demographics of all Included Studies

Author(s), year	Treatm ent	Countr y	N	Qual ity	Setting	Format	Tri al e	Me an Age	Me an Axi s I	Me an Axi s II	Pro p. es	Data analysis	Substan ce exclusio n	ISCE D level	Treatme nt Duration	
Amianto, 2011	TAU PDT	Italy	17 18	1.11 1.11	Outpat ient	Individ ual	RC T	40.1 39.2	0.63 0.63	- -	0.47 0.56	ITT ear	Uncl ence	Depend ence	3 3	52 weeks 48 weeks

Bales, 2012	MBT	Netherlands	45	1.43	Day trmt.	Combi ned	OT	30.1	1.90	0.62	0.30	ITTmod	None	3	78 weeks
Barnicot, 2019	DBT MBT	UK	58 32	0.89 0.89	Outpat ient	Combi ned	CT	29.3 34.3	2.17 2	- -	0.28 0.28	ITTmod ern	None	- -	52 weeks 52 weeks
Bateman, 1999	MBT TAU	UK	22 19	1.33 1.00	Day trmt.	Combi ned	RC T	30.3 33.3	2.67 2.47	- -	0.32 0.53	Comple ers	Abuse	3 2	78 weeks 78 weeks
Bateman, 2009	MBT SCM	UK	71 63	1.56 1.38	Outpat ient	Combi ned	RC T	31.3 30.9	3.03 3.08	1.39 1.23	0.20 0.22	ITTmod ern	Cl. Detox	4 4	78 weeks 78 weeks
Bellino, 2010	IPT	Italy	27	1.11	Outpat ient	Combi ned	RC T	26.2	-	-	0.30	Comple ers	Abuse	3	32 weeks
Ben-Porath, 2004	DBT	US	26	1.00	Day trmt.	Combi ned	OT	35.5	1.02	-	0.04	Comple ers	Abuse	3	26 weeks
Blum, 2008	TAU	US	59	0.80	Outpat ient	Individ ual	RC T	31.6	-	2.7	0.14	ITTmod ern	Abuse	3	20 weeks
Bohus, 2000	DBT	Germany	24	0.38	Inpatie nt	Combi ned	PS	28.3	-	-	0.00	ITTmod ern	Depend ence	-	12 weeks
Bohus, 2004	DBT TAU	Germany	40 20	0.88 0.50	Inpatie nt	Combi ned	CT	29.1 29.5	1.46 1.81	- -	0.00 0.00	Comple ers	Depend ence	- -	12 weeks 12 weeks
Borschman, 2013	TAU	UK	42	0.90	Outpat ient	Individ ual	RC T	36.1	-	-	0.17	ITTmod ern	None	-	26 weeks
Bos, 2010	TAU	Netherlands	37	0.60	Outpat ient	Individ ual	RC T	31.8	-	-	0.11	Comple ers	None	-	18 weeks
Brassington, 2006	DBT	NZ	10	1.25	Outpat ient	Combi ned	PS	34.3	-	-	0.00	ITTmod ern	None	-	26 weeks
Brown, 2004	DBT	US	32	1.50	Outpat ient	Individ ual	OT	29.0	2.71	0.72	0.12	ITT lofc	Cl. Detox	3	52 weeks
Carter, 2010	DBT TAU+ WL	Australia	38 35	1.33 0.89	Outpat ient	Combi ned	RC T	24.5 24.7	2.30 2.30	- -	0.00 0.00	Comple ers	Cl. Detox	3 3	24 weeks 24 weeks

Author(s), year	Treatm ent	Countr y	N	Qual ity	Setting	Format	Tri al Typ e	Me an Age	Me an Axi s I	Me an Axi s II	Pro p. es	Data analysis	Substan ce exclusio n	ISCE D level	Treatme nt duration
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Clarkin, 2001	TFP	US	23	1.25	Outpat ient ual	Individ OT	32.7	1.65	2.94	0.00	ITT lofc	None	-	52 weeks
Clarkin, 2007	TFP	US	30	1.44	Outpat ient ual	Individ RC	30.9	2.33	-	0.08	Completers	Dependence	4	52 weeks
	DBT		30	1.44	Outpat ient ual	Combi T	30.9	2.33	-	0.08			4	52 weeks
	PDT		30	1.44	Outpat ient ned	Combi Outpat Individ ient ual	30.9	2.33	-	0.08			4	52 weeks
Comtois, 2007	DBT	US	38	0.88	Outpat ient ned	Combi OT	34.0	2.55	-	0.04	Completers	Dependence	-	52 weeks
Cottraux, 2009	CBT	France	31	1.56	Outpat ient ual	Individ RC	34.3	3.09	1.12	0.28	Completers	Dependence	5	52 weeks
	CCT		31	1.56	Outpat ient ual	Individ T	32.6	3.09	1.27	0.18	Completers	Dependence	5	52 weeks
Davidson, 2006	DBT+T	UK	54	1.89	Outpat ient ual	Individ RC	32.4	-	-	0.17	ITT lofc	Dependence	3	52 weeks
	AU		52	1.22	Outpat ient ual	Individ T	31.4	-	-	0.15		Dependence	2	52 weeks
	TAU				Outpat ient ual	Individ								
Del Pozo, 2017	Mixed	German	269	0.86	Inpatie nt ned	Combi OT	35.0	3.00	0.39	0.16	ITTmod	Dependence	3	13 weeks
Dickhaut, 2014	ST	Netherl ands	18	1.29	Outpat ient ned	Combi PS	28.5	2.38	0.89	0.00	ITTmod	Cl. Detox	3	104 weeks
Doering, 2010	TFP	Austria	52	2.00	Outpat ient ual	Individ RC	27.5	1.60	-	0.00	ITT lofc	Dependence	-	52 weeks
	CTBE		52	1.67	Outpat ient ual	Individ T	27.2	1.50	-	0.00		Dependence	-	52 weeks
Farrell, 2009	ST	US	16	1.11	Outpat ient ned	Combi RC	35.3	-	-	0.00	Completers	None	3	30 weeks
	TAU		16	0.67	Outpat ient ual	Individ T	35.9	-	-	0.00		Dependence	3	30 weeks
Fassbinder, 2016	ST	German	10	1.25	Outpat ient	Group PS	35.0	5.1	1.80	0.00	ITTmod	Cl. Detox	-	52 weeks
Feigenbaum, 2012	DBT	UK	25	1.56	Outpat ient ned	Combi RC	35.4	2.00	1.20	0.28	ITTmod	Cl. Detox	2	52 weeks
	TAU		16	1.00	Outpat ient ual	Individ T	34.6	2.17	1.10	0.25	ITTmod	Detox	3	52 weeks
Friedrich, 2003	DBT	German	33	0.43	Outpat ient ned	Combi Nat	33.4	3.18	0.12	0.09	Completers	None	4	52 weeks
Giessen-Bloo, 2006	ST	Netherl ands	44	1.56	Outpat ient ual	Individ RC	31.7	2.95	2.14	0.09	ITT lofc	Cl. Detox	3	156 weeks
	TFP		42	1.56	Outpat ient ual	Individ T	29.5	2.40	2.05	0.05		Detox	3	156 weeks

Gratz, 2006	Mixed	US	36	0.63	Day trmt.	Combi ned	PS	28.6	-	-	0.22	Completers	Dependence	3	12 weeks
Gratz & Gunderson, 2006	TAU	US	14	1.25	Outpatient	Combi ned	PS	33.3	-	-	0.00	Completers	Dependence	4	14 weeks
Harley, 2007	DBTmi n + TAU	US	49	0.71	Outpatient	Combi ned	Nat .	39.1	2.05	-	0.08	Completers	None	4	30 weeks

Author(s), year	Treatm ent	Countr y	N	Qual ity	Setting	Format	Tri Me Typ e	Me Age	Me Axi s I	Me Axi s II	Pro p. es	Data analysis	Substan ce exclusio n	ISCE D level	Treatme nt duration
Höschel, 2006	DBT	German y	26	0.29	Inpatie nt	Combi ned	Nat .	28.3	-	-	0.13	Completers	Dependence	-	12 weeks
Jacob, 2018	ST	German y	13	0.50	Outpatient	Individ ual	Nat	28.4	4.08	1.08	0.15	ITT lofc	Cl.Detox	2	52 weeks
Jorgensen, 2012	MBT PDT	Denmar k	58	1.44	Outpatient	Combi ned	RC T	29.5	1.77	0.65	0.03	Completers	Cl. Detox	3	104 weeks
Kellet, 2013	CAT	US	19	1.13	Outpatient	Individ ual	OT	30.0	-	-	0.17	Completers	None	-	26 weeks
Koons, 2001	DBT TAU	US	14	1.56	Outpatient	Combi ned	RC T	34.5	-	-	0.00	Completers	Dependence	-	26 weeks
Korner, 2006	PDT TAU	Australi a	29	0.88	Outpatient	Individ ual	Nat .	27.9	-	-	0.48	Completers	Cl. Detox	-	52 weeks
Kröger, 2006	DBT	German y	50	0.88	Inpatie nt	Combi ned	OT	30.5	5.50	-	0.12	ITT lofc	Cl. Detox	-	13 weeks
Kröger, 2013	DBT	German y	142	1.25	Inpatie nt	Combi ned	OT	32.0	3.70	0.90	0.25	ITTmod ern	Cl. Detox	3	12 weeks
Kröger, 2015	PDT	German y	269	1.43	Inpatie nt	Combi ned	OT	35.0	3.01	0.26	0.16	ITTmod ern	Cl. Detox	3	12 weeks
Laurensen, 2018	MBT TAU	Netherl ands	54	1.33	Day trmt.	Combi ned	RC T	34.0	2.33	0.70	0.22	ITTmod ern	Cl. Detox	-	78 weeks
Leerer, 1997	DBTmi n	US	14	0.88	Inpatie nt	Group ned	OT	31.9	-	-	-	Completers	Cl. Detox	3	52 weeks

Leppänen, 2016	Mixed TAU	Finland	24	1.00	Outpat Combi RC	31.9	-	-	0.16	Completers	Abuse	-	52 weeks
			47	0.78	Outpat Individual	32.3	-	-	0.13	Completers		-	52 weeks
Linehan, 1991	DBT TAU	US	13	1.67	Outpat Combi RC	26.7	-	-	0.00	ITTlofc	Dependence	4	52 weeks
			13	1.11	Outpat Individual	26.7	-	-	0.00			4	52 weeks
Linehan, 2006	DBT CTBE	US	52	1.89	Outpat Combi RC	29.0	2.81	0.38	0.00	ITTmod	None	4	52 weeks
			49	1.56	Outpat Individual	29.6	3.20	0.41	0.00	ern		4	52 weeks
Linehan, 2008	DBT	US	12	1.67	Outpat Combi PS	36.8	2.50	1.17	0.00	ITTmod	Dependence	3	26 weeks

Author(s), year	Treatment	Country	N	Quality	Setting	Format	Trials	Mean Age	Mean Axis I	Mean Axis II	Proportion Mal	Data analysis	Substance exclusion	ISCE level	Treatment duration
Linehan, 2015	DBT	US	33	1.89	Outpat Combi	RC	31.2	2.12	0.97	0.00	ITTmod	None	3	52 weeks	
	DBTmi		33	1.89	Outpat Combi	T	30.1	2.06	0.76	0.00	ern		3	52 weeks	
	n + TAU		33	1.89	Outpat Combi		29.8	1.97	0.49	0.00			3	52 weeks	
	DBTmi				Outpat Combi										
	n + TAU				Outpat Combi										
Löf, 2018	MBT	Sweden	75	1.29	Outpat Combi	Nat	30.4	3.10	1.21	0.11	ITTmod	Cl. Detox	5	78 weeks	
Löffler-Stastka 2006	PDT	Austria	20	0.57	Inpatient Combi	PS	38.2	-	-	0.50	Completers	Cl. Detox	3	6 weeks	
Lyng, 2019	DBT	Ireland	19	0.63	Outpat Combi	CT	20.5	0.83	-	0.17	Completers	Dependence	3	52 weeks	
	uth		11	0.63	Outpat Combi		21.5	1.08		0.31	ers		3	52 weeks	
Markowitz, 2007	IPT	US	8	1.00	Outpat Group	PS	34.0	2.05	0-	0.13	Completers	None	-	34 weeks	

Reiss, 2014-1	ST	US	42	1.14	Inpatient	Combi	PS	36.4	-	-	0.03	Completers	None	3	18 weeks
Reiss, 2014-2	ST	US	37	1.14	Inpatient	Combi	PS	31.6	-	-	0.11	Completers	None	3	12 weeks
Reiss, 2014-3	ST	Germany	15	1.00	Inpatient	Combi	PS	25.5	-	-	0.00	Completers	None	3	10 weeks
Rizvi, 2017	DBT	US	50	1.13	Outpatient	Combi	OT	29.5	2.84	0.88	0.20	ITTmod	None	4	26 weeks
Ryle, 2000	CAT	UK	27	1.00	Outpatient	Individual	CS	34.3	0.98	-	0.41	Completers	None	3	24 weeks
Sachdeva, 2013	DBT	US	25	1.13	Outpatient	Combi	CT	36.6	4.44	-	0.16	ITTlofc	None	-	52 weeks
	DDP		27	1.00	Outpatient	Combi		28.0	4.28	-	0.15			-	52 weeks
	TAU		16	0.33	Outpatient	Individual		29.3	5.13	-	0.31			-	52 weeks
Sachse, 2011	CBT	UK	22	1.00	Outpatient	Group	PS	39.0	1.86	0.27	0.14	ITTuncl	CL. Detox	3	8 weeks
Simpson, 2004	DBT	US	13	1.33	Outpatient	Combi	RC	32.7	0.91	-	0.00	Completers	Dependence	3	12 weeks
Sinnaeve, 2018	DBT	Netherlands	42	1.56	Outpatient	Combi	RC	25.6	1.35	-	0.05	Completers	CL.	-	52 weeks
	DBT	Netherlands	42	1.56	Inpatient	Combi	T	26.2	1.35	-	0.05	Completers	Detox	-	39 weeks
Smits, 2019	MBT	Netherlands	44	1.50	Outpatient	Combi	RC	29.9	2.60	1.50	0.20	ITTmod	None	3	78 weeks
	MBT	Netherlands	47	1.50	Outpatient	Combi	T	31.4	2.60	1.30	0.16	ITTmod	None	3	78 weeks
Soler, 2005	DBTmi	Spain	39	1.00	Outpatient	Group	RC	26.3	-	-	0.10	ITT lofc	Dependence	-	12 weeks
Soler, 2009	DBTmi	Spain	29	1.44	Outpatient	Group	RC	28.5	-	-	0.21	ITTmod	Dependence	-	13 weeks
	TAU		30	1.00	Outpatient	Group	T	30.0	-	-	0.13	ITTmod	Dependence	-	13 weeks
Sollberger, 2014	TAU	Switzerland	21	0.43	Inpatient	Combi	OT	29.4	2.42	0.50	0.25	Completers	Abuse	-	12 weeks
	Mixed	and	34	1.00	Inpatient	Combi		26.7	2.42	0.88	0.19	Completers		-	12 weeks
Stanley, 2007	DBT	US	20	0.75	Outpatient	Combi	PS	32.2	-	-	0.15	Completers	None	-	26 weeks
Stiglmayer, 2014	DBT	Germany	70	1.50	Outpatient	Combi	Nat	30.1	2.04	0.68	0.09	Completers	Dependence	3	52 weeks

Turner, 2000	DBT	mi US	12	1.67	Outpat	Combi	RC	22.0	2.54	1.21	0.21	ITT	Uncl	Cl.	3	52 weeks
	n		12	1.67	ient	ned	T	22.0	2.54	1.21	0.21	ear		Detox	3	52 weeks
	CCT				Outpat	Combi										
					ient	ned										
Author(s), year	Treatm ent	Countr y	N	Qual ity	Setting	Format	Tri al	Me an Age	Me an Ax is I	Me an Ax is II	Pro p. Mal	Data analysis	Substan ce	ISCE D level	Treatme nt duration	
Vaillancourt, 2017	DBT	US	29	0.75	Outpat ient	Combi ned	Nat	35.9	2.48	0.14	0.04	Comple ters	Depend ence	5	59 weeks	
Van den Bosch, 2013	DBT	Netherl ands	39	1.13	Day trmt.	Combi ned	PS	26.0	-	-	0.00	ITT lofc	Cl. Detox	3	14 weeks	
Verheul, 2003	DBT TAU	Netherl ands	27 31	1.44 0.89	Outpat ient	Combi ned	RC T	35.1 34.7	- -	- -	0.00 0.00	ITTmod ern	None 4	3 4	52 weeks 52 weeks	
Weinberg, 2006	TAU	US	15	0.80	Outpat ient	Combi ned	RC T	26.3	-	-	0.00	ITTmod ern	Depend ence	4	14 weeks	
Wilberg, 1998	Th. Com Th. Com	Norway	31 12	0.50 0.50	Day trmt.	Combi ned	Nat	32.0 27.0	1.10 0.75	- -	0.29 0.08	Comple ters	None -	- -	82 weeks 104 weeks	
Wildgoose, 2001	CAT	UK	5	1.14	Outpat ient	Group	PS	39.4	-	-	0.40	Comple ters	Abuse -	-	16 weeks	

Notes. WL = Wait list, US = United States of America, UK = United Kingdom, Day trmt = Day treatment, OT = Open Trial, PS = Pilot Study, Nat = Naturalistic study, CS = Case series, CT = Controlled trial, Cl. Detox = Exclusion of Clinical Detox.

Supplementary Material S7

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Supplementary Material S8

Funnel plots for the Final Models of the Transformed Effect Sizes

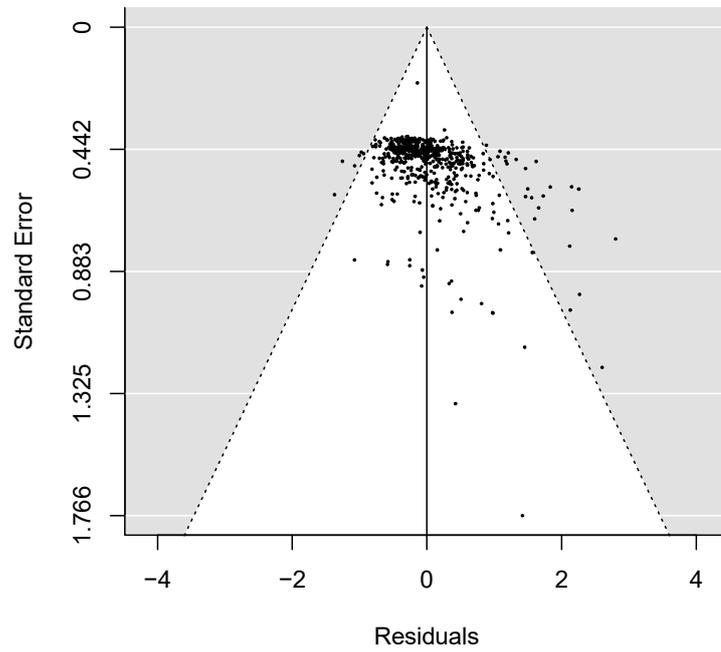


Figure S1. Funnel plot of the transformed effect sizes.

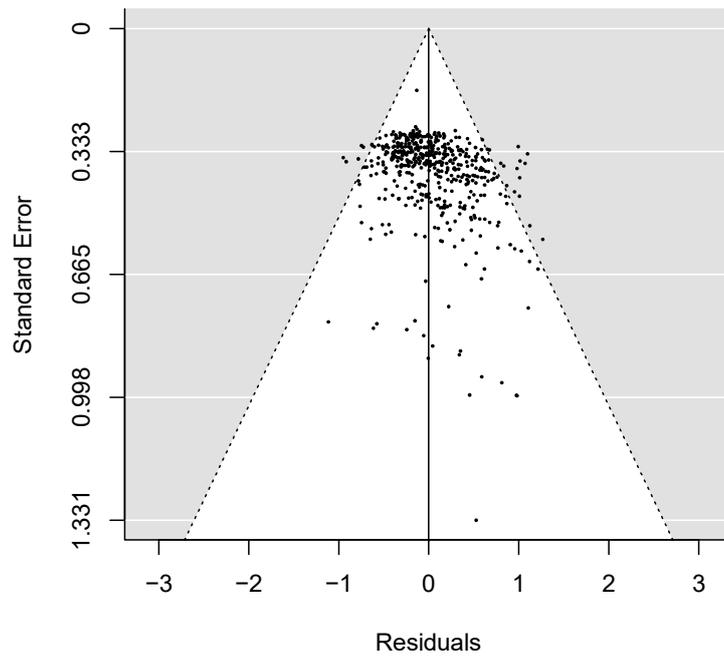


Figure S2. Funnel plot of the transformed effect sizes after the removal of outliers.

Supplementary Material S9

Deviation Contrasts of the Transformed Effect Sizes with the Outliers Removed

Table S2. Results of all Deviation Contrasts of the Transformed Effect Sizes after the Removal of Outliers

Contrast	Mean	95% CI	Δg	Δg (se)	Δg (t)	Δg (p)	Δg (p')
Average Age	(B) -0.019	[-0.032, -0.005]		(se) 0.007	(t) -2.731	.007**	
Treatment							
DBT	0.811	[0.693, 0.928]	-0.016	0.047	-0.346	.365	1.000
DBTmin	0.968	[0.791, 1.144]	0.140	0.078	1.799	.036*	.254
ST	0.995	[0.819, 1.172]	0.168	0.080	2.099	.018*	.164
TFP	0.801	[0.624, 0.978]	-0.026	0.075	-0.348	.364	1.000
MBT	0.984	[0.807, 1.160]	0.157	0.080	1.964	.025*	.200
TAU	0.537	[0.418, 0.655]	-0.291	0.051	-5.752	<.001***	<.001***
PDT	0.910	[0.740, 1.080]	0.083	0.074	1.125	.131	.653
CTBE	0.591	[0.355, 0.827]	-0.236	0.103	-2.286	.011*	.113
Spec. Other	0.833	[0.696, 0.970]	0.006	0.061	0.092	.463	1.000
CBT	0.998	[0.774, 1.222]	0.171	0.105	1.624	.052	.315
Th. Com	0.672	[0.114, 1.230]	-0.155	0.264	-0.588	.278	1.000
Grand Mean	0.827						
BPD Domain							
General severity	1.236	[1.112, 1.360]	0.409	0.049	8.272	<.001***	<.001***
Abandonment	0.745	[0.521, 0.968]	-0.083	0.093	-0.885	.188	.416
Interpersonal	0.784	[0.593, 0.975]	-0.043	0.078	-0.554	.290	.416
Identity	1.012	[0.800, 1.224]	0.185	0.088	2.098	.018*	.073
Disturbance							
Impulsivity	0.624	[0.486, 0.761]	-0.203	0.053	-3.862	<.001***	<.001***
Suicidality/Self-injury	0.623	[0.529, 0.717]	-0.204	0.039	-5.242	<.001***	<.001***
Affective Instability	1.097	[0.930, 1.265]	0.270	0.067	4.050	<.001***	<.001***
Emptiness	0.926	[0.708, 1.144]	0.099	0.091	1.088	.139	.416
Anger	0.627	[0.507, 0.747]	-0.200	0.044	-4.531	<.001***	<.001***
Dissociation	0.599	[0.434, 0.763]	-0.228	0.066	3.484	<.001***	.001**
Grand Mean	0.827						
Outcome Type							
Continuous	0.681	[0.594, 0.767]	-0.147	0.041	-3.562	<.001***	<.001***
Dichotomous	0.974	[0.811, 1.137]	0.147	0.041	3.562	<.001***	<.001***
Grand Mean	0.827						

Notes. * $p < .05$. ** $p < .01$. *** $p < .001$.

Supplementary Material S10

Chi-Square Test of the Predictors and Deviation Contrasts of the Transformed Effect Sizes for the Priority to Total Scale Sensitivity Analysis

Table S3. Chi Tests of all the Predictors in the Full and Final Models of the Transformed Effect Sizes for the Total Scale Sensitivity Analysis

Variable	χ^2	<i>df</i>	Loglikelihood	<i>p</i>
Full Model		92	-191.780	
Treatment	119.750	34	-251.655	<.001***
BPD Domain	230.128	35	-306.844	<.001***
Treatment * BPD domain	86.670	44	-235.115	.001**
Setting	2.271	90	-192.915	.321
Format	1.730	90	-192.645	.421
Quality	0.085	91	-191.822	.771
Trial type	1.174	90	-192.467	.503
Publication year	0.168	91	-191.864	.682
Country of testing	0.273	90	-191.916	.873
Male proportion	0.411	91	-192.985	.522
Analysis type	18.151	89	-200.856	<.001***
Mean age	11.518	91	-197.539	.001**
Medication policy	1.615	91	-192.588	.204
Substance use exclusion	2.927	90	-193.243	.232
Assessment type	3.209	89	-193.384	.361
Outcome type	7.245	91	-195.402	.007**
Final Model		24	-248.487	
Treatment	70.353	14	-283.664	<.001***
BPD Domain	145.335	15	-321.155	<.001***
Outcome type	10.982	23	-253.978	.002**
Mean age	7.640	23	-252.307	.006**

Note. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table S4. Results of all Deviation Contrasts of the Transformed Effect Sizes for the Priority to Total Scale Sensitivity Analysis

Contrast	Mean (<i>g</i>)	95% CI	Δg	Δg (<i>se</i>)	Δg (<i>t</i>)	Δg (<i>p</i>)	Δg (<i>p'</i>)
Average Age	(<i>B</i>) -0.026	[-0.046, -0.007]		0.001	-2.703	.007**	
Treatment							
DBT	0.854	[0.695, 1.013]	-0.021	0.060	-0.351	.363	1.000
DBTmin	1.060	[0.831, 1.288]	0.184	0.099	1.864	.031*	.283
ST	1.273	[0.976, 1.569]	0.398	0.138	2.881	.002**	.021*

TFP	0.896	[0.649, 1.143]	0.021	0.102	0.204	.419	1.000
MBT	1.002	[0.772, 1.232]	0.127	0.101	1.252	.106	.739
TAU	0.545	[0.386, 0.705]	-0.330	0.062	-5.297	<.001***	<.001***
PDT	0.909	[0.700, 1.118]	0.034	0.086	0.397	.346	1.000
CTBE	0.670	[0.393, 0.947]	-0.205	0.117	-1.752	.040*	.322
Spec. Other	0.851	[0.668, 1.034]	-0.025	0.076	-0.322	.374	1.000
CBT	0.962	[0.671, 1.254]	0.087	0.133	0.657	.256	1.000
Th. Com	0.605	[-0.189, 1.399]	-0.270	0.372	-0.725	.234	1.000
<i>Grand Mean</i>	<i>0.875</i>						
BPD Domain							
General severity	1.337	[1.189, 1.485]	0.461	0.061	7.587	<.001***	<.001***
Abandonment	0.837	[0.485, 1.189]	-0.038	0.149	-0.256	.399	.556
Interpersonal	0.772	[0.426, 1.118]	-0.103	0.146	-0.706	.240	.556
Identity Disturbance	1.060	[0.726, 1.394]	0.185	0.141	1.310	.095	.382
Impulsivity	0.575	[0.391, 0.760]	-0.300	0.074	-4.052	<.001***	<.001***
Suicidality/Self-injury	0.716	[0.588, 0.843]	-0.160	0.054	-2.981	.002**	.011*
Affective Instability	1.119	[0.873, 1.366]	0.244	0.101	2.424	.008**	.047*
Emptiness	1.010	[0.654, 1.367]	0.135	0.151	0.896	.185	.556
Anger	0.648	[0.494, 0.803]	-0.227	0.056	-4.020	<.001***	<.001***
Dissociation	0.677	[0.469, 0.886]	-0.198	0.085	-2.342	.010*	.049*
<i>Grand Mean</i>	<i>0.875</i>						
Outcome Type							
Continuous	0.723	[0.584, 0.862]	-0.152	0.047	-3.232	.001**	.001**
Dichotomous	1.027	[0.821, 1.234]	0.152	0.047	3.232	.001**	.001**
<i>Grand Mean</i>	<i>0.875</i>						

Notes. * $p < .05$. ** $p < .01$. *** $p < .001$.

Supplementary Material S11

Graphs of the Transformed Effect Sizes and the Priority to Total Scale Sensitivity Analysis

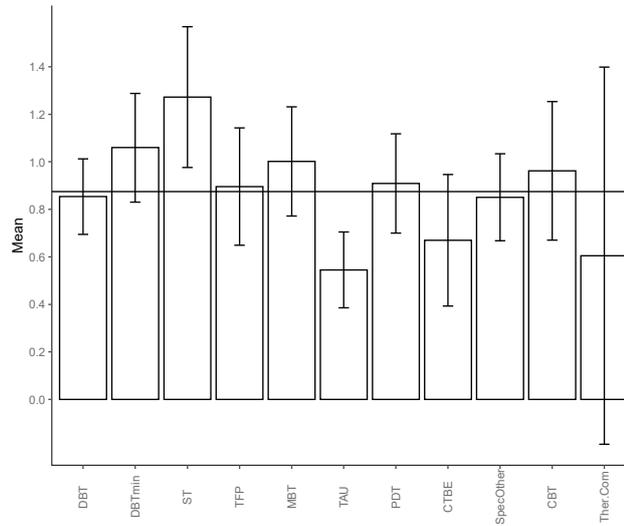


Figure S3. Bar graph of the estimated marginal means of the transformed effect sizes based on the log of time with 95% CIs estimated at one year of treatment for all treatments and the sensitivity analysis on the total scale results. The grand mean is depicted as a horizontal line at $g = 0.875$.

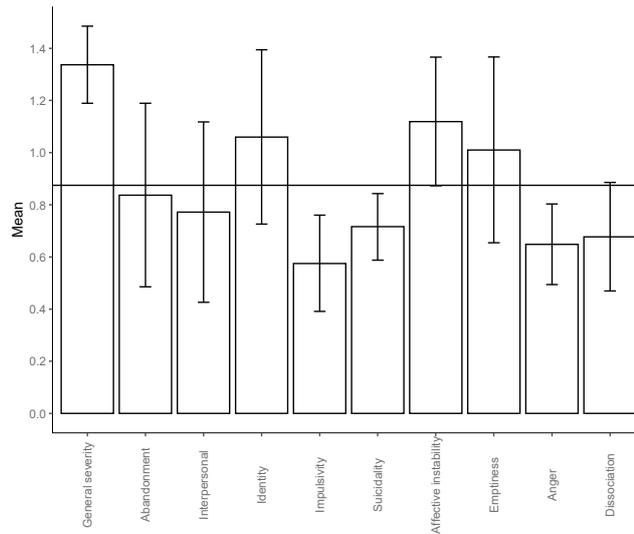


Figure S4. Bar graph of the estimated marginal means of the transformed effect sizes based on the log of time with 95% CIs estimated at one year of treatment for all BPD outcome domains and the sensitivity analysis on the total scale results. The grand mean is depicted as a horizontal line at $g = 0.875$.

Supplementary Material S12

Plots for the Final models of the Total Sensitivity Analysis on the Transformed Effect Sizes

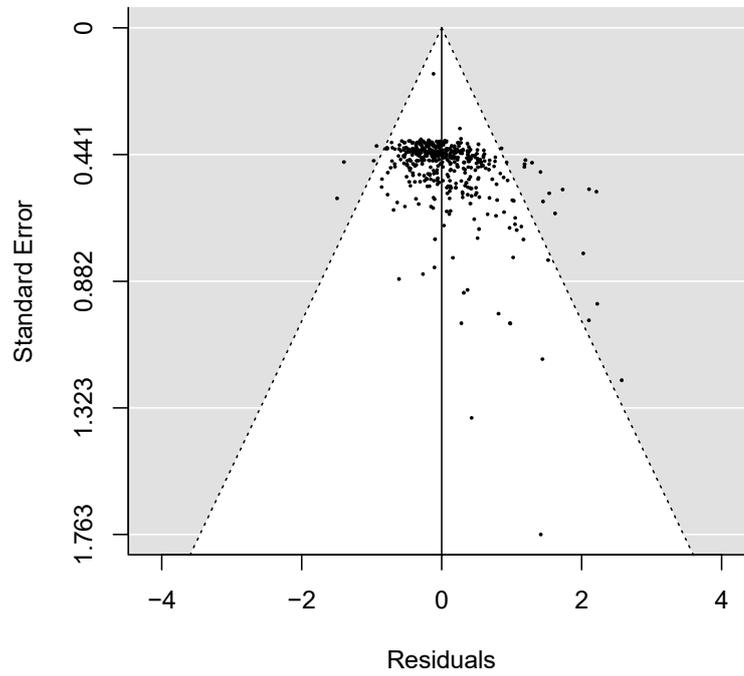


Figure S5. Funnel plot of the sensitivity analysis on the transformed effects sizes.

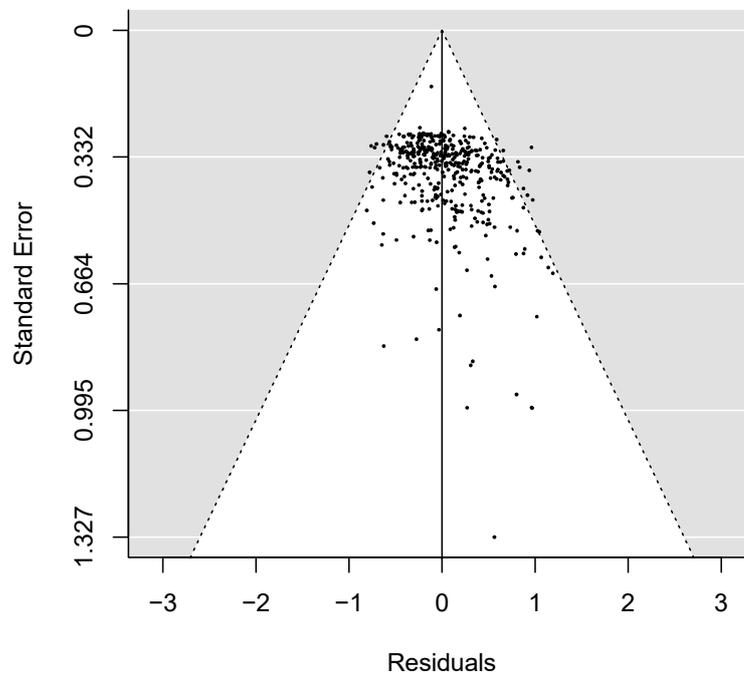


Figure S6. Funnel plot of the sensitivity analysis on the transformed effects sizes with the outliers removed.

Supplementary Material S13

**Deviation Contrasts Transformed Effect Sizes Priority to Total Scale
Sensitivity Analysis with the Outliers Removed**

Table S5. Results of all Deviation Contrasts of the Transformed Effect Sizes for the Priority to Total Scale Sensitivity Analysis with Outliers Excluded

Contrast	Mean	95% CI	Δg	Δg (<i>se</i>)	Δg (<i>t</i>)	Δg (<i>p</i>)	Δg (<i>p'</i>)
Average Age	(<i>B</i>)			(<i>se</i>)	(<i>t</i>)	(<i>p</i>)	
	-0.025	[-0.040, -0.011]		0.007	-3.483	.001**	
Treatment							
DBT	0.800	[0.668, 0.931]	-0.015	0.048	-0.321	.374	1.000
DBTmin	0.922	[0.730, 1.114]	0.107	0.082	1.310	.096	.573
ST	1.053	[0.808, 1.297]	0.238	0.111	2.142	.016*	.148
TFP	0.792	[0.586, 0.999]	-0.023	0.084	-0.272	.393	1.000
MBT	0.953	[0.770, 1.135]	0.138	0.078	1.758	.040*	.318
TAU	0.513	[0.382, 0.644]	-0.302	0.050	-5.986	<.001***	<.001***
PDT	0.885	[0.707, 1.062]	0.070	0.073	0.959	.169	.845
CTBE	0.577	[0.342, 0.812]	-0.238	0.099	-2.418	.008**	.080
Spec. Other	0.849	[0.699, 0.998]	0.034	0.062	0.541	.295	1.000
CBT	0.983	[0.747, 1.219]	0.168	0.107	1.570	.059	.410
Th. Com	0.640	[0.088, 1.192]	-0.175	0.260	-0.674	.250	1.000
<i>Grand Mean</i>	<i>0.815</i>						
BPD Domain							
General severity	1.254	[1.136, 1.372]	0.439	0.055	7.996	<.001***	<.001***
Abandonment	0.777	[0.452, 1.102]	-0.038	0.142	-0.268	.394	.496
Interpersonal	0.718	[0.399, 1.037]	-0.097	0.139	-0.697	.243	.496
Identity Disturbance	0.980	[0.676, 1.284]	0.165	0.133	1.240	.108	.432
Impulsivity	0.556	[0.402, 0.710]	-0.259	0.068	-3.792	<.001***	.001**
Suicidality/Self-injury	0.629	[0.533, 0.724]	-0.186	0.049	-3.803	<.001***	.001**
Affective Instability	1.050	[0.831, 1.269]	0.235	0.095	2.480	.007**	.041*
Emptiness	0.956	[0.626, 1.286]	0.141	0.144	0.974	.165	.496
Anger	0.603	[0.480, 0.727]	-0.212	0.053	-4.021	<.001***	<.001***
Dissociation	0.628	[0.448, 0.808]	-0.187	0.078	-2.400	.008**	.042*
<i>Grand Mean</i>	<i>0.815</i>						
Outcome Type							
Continuous	0.677	[0.571, 0.784]	-0.138	0.040	-3.424	<.001***	.001**
Dichotomous	0.953	[0.781, 1.125]	0.138	0.040	3.424	<.001***	.001**
<i>Grand Mean</i>	<i>0.815</i>						

Notes. * $p < .05$. ** $p < .01$. *** $p < .001$.

Supplementary Material S14

Sensitivity Analysis Repeating the Complete Main Analysis on Untransformed Effect Sizes

N.1.1 Main analysis

Model fit did not significantly improve when the number of Axis I and II disorders and ISCED level were added to the model, $Dm(3, 153.63) = 0.07, p = .977$, so we decided to exclude these variables and to continue with a complete dataset. Both the within-study variance ($\sigma_u^2 = 0.123, \chi^2(1) = 557.83, p < .001$), and the between-study variance ($\sigma_u^2 = 0.132, \chi^2(1) = 82.02, p < .001$), were significant. The percentage of sampling variance was 12.20%, the within-study variance was 42.25% and the between-study variance was 45.55%.

According to our model selection procedure, there were three equivalent models. The final model of the untransformed effect sizes consisted of the following predictors: 1) Treatment, 2) BPD outcome domain, 3) the log transformed treatment duration in weeks, 4) analysis type, 5) the mean age of the sample and 6) outcome type. Our other two models excluded either analysis type or mean age. The final model we chose was the model with the highest significant log-likelihood ratio test statistic. Table S6 shows the tests for the predictors in the full model and the final model. For our final model, the within-study variance ($\sigma_u^2 = 0.076, \chi^2(1) = 248.414, p < .001$), and the between-study variance ($\sigma_u^2 = 0.039, \chi^2(1) = 21.620, p < .001$), were significant. Sampling variance was 23.56%, within-study variance was 50.49% and between-study variance was 25.95%. Thus, the final model explained part of the heterogeneity between and within studies, although there was still considerable heterogeneity between and within studies.

Table S6. Chi-Square Tests of all the Predictors in the Full and Final Models of the Untransformed Effect Sizes

Variable	χ^2	df	Loglikelihood	p
Full Model		107	-220.338	
Weeks of Treatment	1.907	106	-223.335	.167
Treatment	165.598	35	-303.137	<.001***
BPD Domain	259.315	36	-349.995	<.001***
Treatment * BPD domain	122.987	45	-281.831	<.001***
Setting	2.347	105	-221.511	.309
Format	2.963	105	-221.819	.227
Quality	0.055	106	-220.366	.814
Trial type	0.802	105	-220.739	.670
Publication year	0.127	106	-220.401	.721
Country of testing	0.624	105	-220.650	.732
Male proportion	0.151	106	-220.414	.697
Analysis type	23.106	104	-231.891	<.001***
Mean age	12.855	106	-226.765	<.001***
Medication policy	0.105	106	-220.390	.746
Substance use exclusion	0.132	105	-220.404	.936
Assessment type	1.959	104	-221.317	.581

Outcome type	10.627	106	-225.651	.001**
Final Model		28	-286.633	
Weeks of Treatment	6.494	27	-289.878	.011*
Treatment	79.179	18	-326.222	< .001***
BPD Domain	140.511	19	-356.888	< .001***
Mean age	13.871	27	-293.568	< .001***
Analysis type	17.844	25	-295.555	< .001***
Outcome type	15.657	27	-204.456	< .001***

Note. * $p < .05$. ** $p < .01$. *** $p < .001$.

N.1.2 Deviation contrasts

The average grand mean was large ($g = 0.926$).

Treatment. All treatments appeared effective in reducing BPD symptomatology, with effect sizes ranging from medium to large. At one year, ST ($g = 1.276$), followed by MBT ($g = 1.113$), was related to treatment effects compared to the grand mean. TAU ($g = 0.607$) was less effective in reducing BPD symptoms compared to the average, but still had an average effect. All results are shown in Table S7 and the graph is shown in Figure S7.

BPD outcomes. At one year, the largest improvement compared to the average improvement over all domains was found for overall general severity ($g = 1.309$), followed by affective instability ($g = 1.235$). The least improvement was found for dissociation ($g = 0.680$), impulsive behaviors ($g = 0.726$), anger ($g = 0.728$) and suicidality/self-injury ($g = 0.750$). The estimated marginal means were medium to large; see Figure S8.

Analysis type. Compared to the average at 52 weeks of treatment, LOCF analysis ($g = 0.633$) was related to the smallest improvement in BPD outcomes, whereas ITT techniques from which the exact method was unclear ($g = 1.230$), was related to the highest effects. The estimated marginal means ranged from $g = 0.633$ to $g = 1.230$.

Outcome type. Continuous outcomes ($g = 0.760$) were related to smaller effects compared to the average, whereas dichotomous outcomes ($g = 1.091$) were related to larger effects. The estimated means were medium to large.

Table S7. Effects of Continuous Predictors and Results of all Deviation Contrasts of the Untransformed Effect Sizes at 1 Year

Contrast	Mean (g)	95% CI	Δg	Δg (se)	Δg (t)	Δg (p)	Δg (p')
Average Age	(B)			(se)	(t)	<.001***	
	-0.029	[-0.044, -0.013]		0.008	-3.548		
Log(Weeks)	(B)			(se)	(t)	.019*	
	0.105	[0.018, 0.192]		0.044	2.362		
Treatment							
DBT	0.886	[0.734, 1.037]	-0.040	0.056	-0.715	.238	.949

DBTmin	1.021	[0.824, 1.218]	0.096	0.085	1.130	.130	.777
ST	1.276	[1.064, 1.487]	0.350	0.092	3.813	<.001***	.001**
TFP	0.992	[0.775, 1.210]	0.067	0.089	0.748	.228	.949
MBT	1.113	[0.882, 1.344]	0.187	0.100	1.871	.031*	.279
TAU	0.607	[0.460, 0.755]	-0.318	0.058	-5.520	<.001***	<.001**
PDT	0.955	[0.759, 1.151]	0.029	0.083	0.353	.362	.949
CTBE	0.730	[0.449, 1.012]	-0.195	0.121	-1.615	.053	.427
Spec. Other	0.871	[0.703, 1.039]	-0.055	0.071	-0.768	.221	.949
CBT	1.090	[0.843, 1.337]	0.165	0.119	1.387	.083	.581
Th. Com	0.639	[-0.056, 1.334]	-0.286	0.325	-0.880	.190	.949
<i>Grand Mean</i>	<i>0.926</i>						

BPD Domain

General severity	1.309	[1.153, 1.464]	0.383	0.051	7.450	<.001***	<.001***
Abandonment	0.830	[0.574, 1.086]	-0.096	0.102	-0.935	.175	.525
Interpersonal	0.962	[0.752, 1.171]	0.036	0.078	0.468	.320	.525
Identity Disturbance	1.044	[0.811, 1.277]	0.118	0.091	1.303	.097	.386
Impulsivity	0.726	[0.561, 0.891]	-0.199	0.056	-3.582	<.001***	.001**
Suicidality/Self-injury	0.750	[0.621, 0.879]	-0.175	0.041	-4.236	<.001***	<.001***
Affective Instability	1.235	[1.044, 1.425]	0.309	0.068	4.552	<.001***	<.001***
Emptiness	0.992	[0.748, 1.236]	0.066	0.096	0.692	.245	.525
Anger	0.728	[0.578, 0.877]	-0.198	0.046	-4.287	<.001***	<.001***
Dissociation	0.680	[0.491, 0.868]	-0.246	0.069	-3.537	<.001***	.001**
<i>Grand Mean</i>	<i>0.926</i>						

Analysis Type

ITT Modern	0.908	[0.765, 1.051]	-0.017	0.059	-0.296	.384	.768
ITT LOCF	0.633	[0.456, 0.810]	-0.293	0.072	-4.088	<.001***	<.001***
ITT Unclear	1.230	[0.911, 1.548]	0.304	0.118	2.578	.005**	.015*
Completer	0.931	[0.796, 1.066]	0.006	0.056	0.102	.460	.768
<i>Grand Mean</i>	<i>0.926</i>						

Outcome Type

Continuous	0.737	[0.642, 0.878]	-0.165	0.044	-3.748	.002**	.004**
Dichotomous	0.992	[0.898, 1.284]	0.165	0.044	3.748	.002**	.004**
<i>Grand Mean</i>	<i>0.864</i>						

Notes. * $p < .05$. ** $p < .01$. *** $p < .001$.

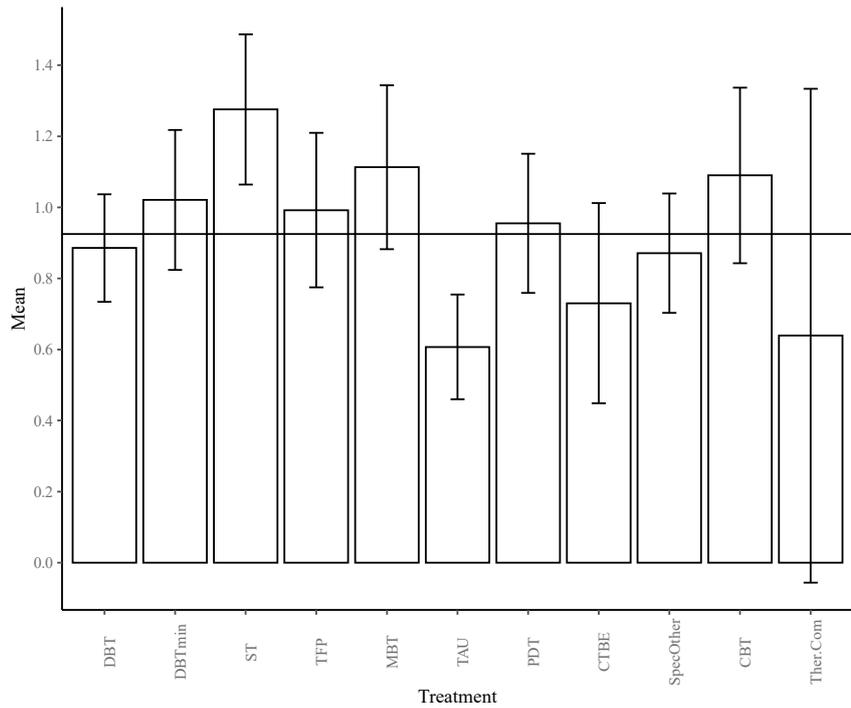


Figure S7. Bar graph of the estimated marginal means with 95% CI's at one year of treatment for all treatments for the untransformed effect sizes. The grand mean is depicted as a horizontal line at $g = 0.926$.

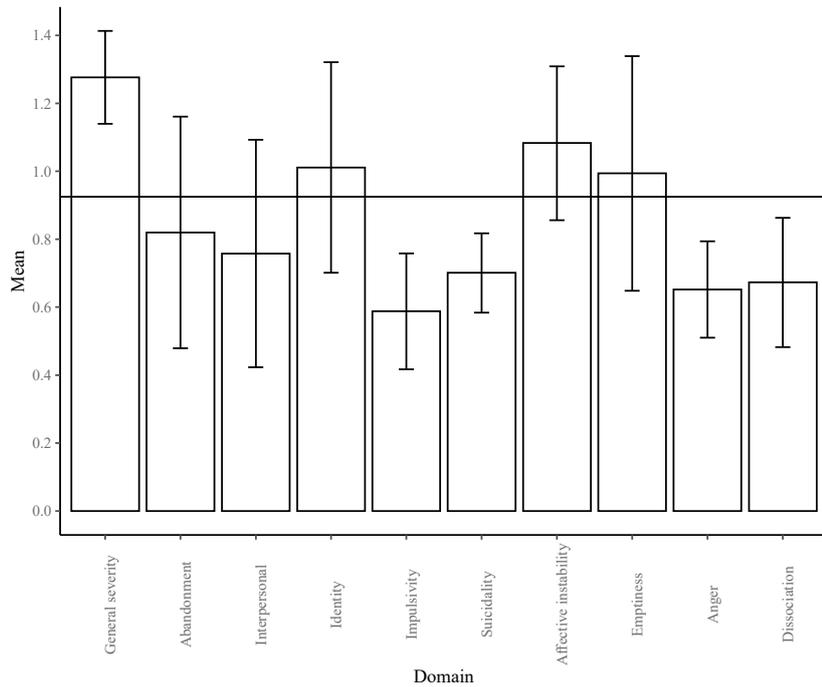


Figure S8. Bar graph of the estimated marginal means with 95% CI's at one year of treatment for all outcome domains for the untransformed effect sizes. The grand mean is depicted as a horizontal line at $g = 0.926$.

N.1.3 Treatment by domain interaction

We initially aimed to examine whether specific treatments are effective for particular BPD criteria, but this interaction was not included in our final model. We decided to explore these interactions (see Table S8), but we excluded treatments that did not contain at least

two effect sizes in a specific domain. At one year, TAU was associated with smaller effect sizes in improvement of general severity, impulsivity, suicidality, affective instability, anger and dissociation. ST was related to larger effect sizes for impulsivity, suicidality, anger, and dissociation. Lastly, compared to the average, DBT had smaller effect sizes for anger.

Table S8. Deviation Contrasts of the Interaction between Treatment and BPD Domain of the Untransformed Effect Sizes at 1 Year

Domain	Mean (g)	95% CI	Δg	Δg (se)	Δg (t)	Δg (p)	Δg (p')
General Severity (n = 82)							
DBT	1.232	[0.673, 1.792]	-0.095	0.169	-0.563	.288	1.000
DBTmin	1.463	[0.821, 2.105]	0.135	0.241	0.560	.289	1.000
ST	1.279	[0.742, 1.816]	-0.049	0.178	-0.273	.393	1.000
MBT	1.458	[0.779, 2.137]	0.130	0.218	0.597	.276	1.000
TAU	0.646	[0.132, 1.160]	-0.682	0.141	-4.836	<.001***	.001**
PDT	1.644	[1.031, 2.257]	0.316	0.223	1.415	.081	.566
Spec. Other	1.293	[0.814, 1.771]	-0.035	0.193	-0.182	.428	1.000
CBT	1.607	[0.940, 2.275]	0.280	0.285	0.979	.165	.993
<i>Grand Mean</i>	1.328						
Abandonment (n = 8)							
ST	0.768	[-8.147, 9.682]	0.212	0.586	0.362	.362	1.000
TAU	0.540	[-5.097, 6.176]	-0.016	0.405	-0.038	.488	1.000
Spec. Other	0.358	[-6.490, 7.207]	-0.197	0.529	-0.372	.387	1.000
<i>Grand Mean</i>	0.555						
Interpersonal (n = 17)							
DBT	0.488	[-0.767, 1.743]	-0.461	0.513	-0.898	.199	.798
ST	1.703	[0.224, 3.182]	0.754	0.518	1.457	.094	.471
TAU	0.726	[-0.134, 1.587]	-0.222	0.374	-0.595	.285	.809
Spec. Other	0.626	[-0.465, 1.717]	-0.323	0.500	-0.646	.270	.809
CBT	1.200	[-1.418, 3.819]	0.251	0.907	0.277	.395	.809
<i>Grand Mean</i>	0.949						
Identity (n = 14)							
ST	1.136	[-0.105, 2.377]	0.128	0.523	0.245	.408	1.000
TAU	0.420	[-0.839, 1.679]	-0.588	0.521	-1.127	.155	.622
Spec. Other	0.820	[-0.486, 2.126]	-0.187	0.591	-0.317	.382	1.000
CBT	1.654	[-2.781, 6.089]	0.646	1.478	0.437	.340	1.000
<i>Grand Mean</i>	1.008						
Impulsivity (n = 50)							

DBT	0.547	[0.082, 1.012]	0.011	0.103	0.104	.459	1.000
DBTmin	0.553	[-0.028, 1.133]	0.016	0.191	0.085	.466	1.000
ST	0.899	[0.340, 1.457]	0.362	0.205	1.764	.043*	.302
TFP	0.534	[0.004, 1.064]	-0.002	0.153	-0.016	.494	1.000
TAU	0.234	[-0.202, 0.669]	-0.303	0.110	-2.749	.005**	.037*
PDT	0.555	[0.009, 1.102]	0.019	0.159	0.118	.453	1.000
Spec. Other	0.579	[0.050, 1.107]	0.042	0.145	0.289	.387	1.000
CBT	0.392	[-0.315, 1.098]	-0.145	0.252	-0.576	.284	1.000
<i>Grand Mean</i>	<i>0.537</i>						

Suicidality (n = 184)

DBT	0.726	[0.554, 0.898]	-0.096	0.069	-1.404	.081	.568
DBTmin	0.798	[0.559, 1.036]	-0.025	0.109	-0.229	.409	.782
ST	1.447	[1.012, 1.882]	0.624	0.196	3.183	.001**	.009**
TFP	0.858	[0.549, 1.168]	0.036	0.129	0.277	.391	.782
MBT	1.032	[0.772, 1.291]	0.209	0.115	1.823	.035*	.316
TAU	0.559	[0.381, 0.737]	-0.264	0.078	-3.383	<.001***	.005**
PDT	0.638	[0.285, 0.990]	-0.185	0.164	-1.126	.131	.748
CTBE	0.670	[0.356, 0.984]	-0.153	0.132	-1.156	.125	.748
Spec. Other	0.721	[0.515, 0.926]	-0.102	0.090	-1.133	.129	.748
CBT	1.053	[0.754, 1.353]	0.231	0.139	1.663	.049*	.393
Th. Com	0.547	[-0.129, 1.223]	-0.275	0.315	-0.875	.191	.748
<i>Grand Mean</i>	<i>0.823</i>						

Affective Instability

(n = 27)

DBT	0.738	[0.119, 1.357]	-0.362	0.268	-1.352	.098	.526
DBTmin	1.679	[0.783, 2.576]	0.579	0.407	1.423	.088	.526
ST	1.599	[0.620, 2.577]	0.499	0.359	1.389	.093	.526
TFP	0.892	[-0.142, 1.926]	-0.208	0.420	-0.495	.314	.942
TAU	0.650	[0.031, 1.270]	-0.450	0.251	-1.791	.047*	.327
Spec. Other	0.996	[0.327, 1.665]	-0.104	0.298	-0.348	.366	.942
CBT	1.146	[-0.587, 2.879]	0.046	0.715	0.064	.475	.942
<i>Grand Mean</i>	<i>1.100</i>						

Emptiness (n = 9)

ST	1.639	[-5.453, 8.730]	1.135	0.568	2.000	.148	.329
TAU	-0.202	[-4.083, 3.680]	-0.705	0.253	-2.791	.110	.329
Spec. Other	0.073	[-5.989, 6.135]	-0.430	0.422	-1.020	.247	.329
<i>Grand Mean</i>	<i>0.503</i>						

Anger (n = 184)

DBT	0.536	[0.178, 0.893]	-0.108	0.063	-1.701	.046*	.235
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DBTmin	0.727	[0.328, 1.127]	0.084	0.112	0.748	.228	.457
ST	1.077	[0.562, 1.592]	0.433	0.185	2.344	.011*	.075
TFP	0.817	[0.383, 1.251]	0.174	0.126	1.384	.085	.340
TAU	0.353	[-0.011, 0.717]	-0.291	0.079	-3.683	<.001***	.002**
PDT	0.525	[0.138, 0.911]	-0.119	0.095	-1.245	.108	.340
CTBE	0.397	[-0.050, 0.845]	-0.246	0.138	-1.781	.039*	.235
Spec. Other	0.716	[0.375, 1.057]	0.072	0.133	0.545	.294	.457
<i>Grand Mean</i>	0.644						
Dissociation (n = 23)							
DBT	0.345	[0.138, 0.552]	-0.068	0.079	-0.861	.202	.202
ST	0.926	[0.462, 1.390]	0.514	0.169	3.040	.004**	.018*
TAU	0.118	[-0.148, 0.385]	-0.294	0.111	-2.657	.009**	.028*
Spec. Other	0.261	[0.000, 0.522]	-0.151	0.105	-1.441	.086	.172
<i>Grand Mean</i>	0.413						

Notes. * $p < .05$. ** $p < .01$. *** $p < .001$.

N.1.4 Outliers and bias

The final model identified 30 outliers based on the studentized values, which is near the expected 5% (5.61%). Most of these outliers had effect sizes of $g > 1.3$, although two effect sizes were small ($g = -0.037$, $g = 0.277$). Nineteen outliers came from RCT designs and most of them were based on continuous outcomes ($n = 26$). Important to note is that the ST studies with outliers made up most of the ST studies. Several of these studies or treatment arms contained only one outlying effect size, while multiple effect sizes were included. However, three treatment arms contained either one or more effect sizes that were all identified as outliers (Jacob et al., 2018; Nordahl et al., 2005; Reiss et al., 2014-1). One study (Reiss et al., 2014-1) reported very large effect sizes ($g \geq 2.36$), while there were two studies of which all effect sizes were identified as outliers (Jacob et al., 2018 & Nordahl et al., 2005). The outliers from these last two studies had relatively small effect sizes (0.28 and 0.64 respectively). Taken together, these outcomes might have inflated or otherwise influenced the estimated effect sizes for the ST category, although not all effect sizes were very large.

Egger's test was significant, indicating a relationship between stronger effects and lower precision, $F(1, 508) = 376.437$, $p < .001$, $B = 5.895$. The funnel plot (Supplementary Material S15) showed a similar pattern as compared to the analysis of the transformed effect sizes. The trim-and-fill procedure suggested that there were 51 residuals missing on the right side of the funnel plot, whereas there were no effect sizes missing on the left side of the funnel plot. This did not seem to correspond to Egger's test, although the indices of Egger's test and trim-and-fill procedures do not always indicate similar conclusions [33]. Simulating these additional effect sizes would lead to an increase of the average effect size of $g = 0.077$.

After we removed all outliers, Egger's test was still significant, $F(1, 478) = 133.295$, $p < .001$, $B = 3.270$. The funnel plot of the final model without outliers is shown in Supplementary Material S15. All tests for the predictors in the final model were significant. For each predictor, the grand mean was 0.831. Overall, effect sizes for treatments decreased,

except for Therapeutic Community. In addition to ST and MBT, CBT was related to larger effect sizes compared to the grand mean. Also, CTBE was, in addition to TAU, related to smaller effect. For BPD outcome domains, the pattern of results was similar, and no differences were observed. The same applied to analysis type and outcome type (see Supplementary Material S16).

Supplementary Material S15

Funnel plots for the final models of the untransformed effect sizes

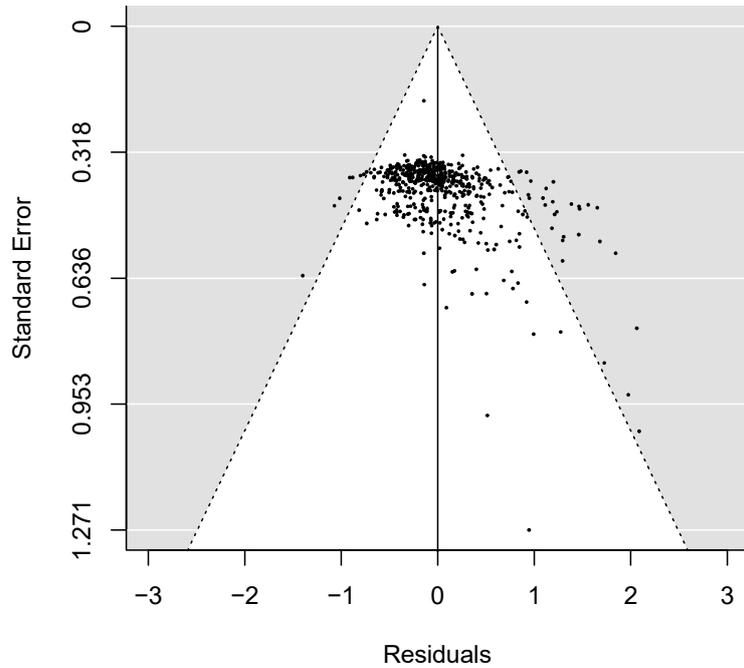


Figure S9. Funnel plot of the untransformed effect sizes.

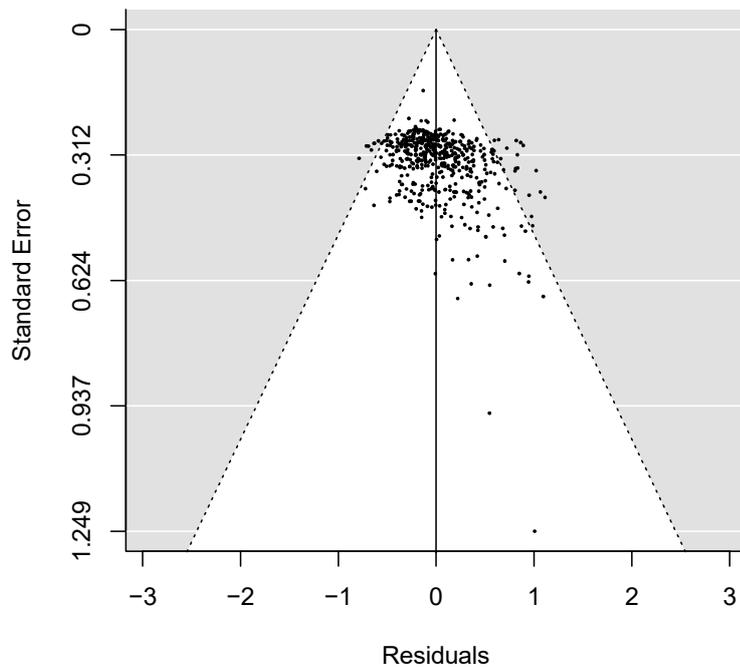


Figure S10. Funnel plot of the untransformed effect sizes with the outliers removed.

Supplementary Material S16

Deviation Contrasts Untransformed Effect Sizes with the Outliers Removed

Table S9. Effects of Continuous Predictors and Results of all Deviation Contrasts of the Untransformed Effect Sizes with Outliers Removed

Contrast	Mean (g)	95% CI	Δg	Δg (se)	Δg (t)	Δg (p)	Δg (p')
Average Age	(B)			(se)	(t)	<.001***	
	-0.024	[-0.036, -0.013]		0.006	-4.131		
Log(Weeks)	(B)			(se)	(t)	.006**	
	0.085	[0.025, 0.115]		0.044	2.362		
Treatment							
DBT	0.791	[0.679, 0.903]	-0.040	0.043	-0.933	.176	1.000
DBTmin	0.889	[0.738, 1.040]	0.058	0.066	0.875	.191	1.000
ST	1.114	[0.944, 1.284]	0.283	0.075	3.789	<.001***	.001**
TFP	0.850	[0.679, 1.021]	0.019	0.071	0.264	.396	1.000
MBT	1.001	[0.829, 1.173]	0.170	0.075	2.268	.012*	.090
TAU	0.545	[0.437, 0.654]	-0.286	0.045	-6.319	<.001***	<.001**
PDT	0.821	[0.667, 0.976]	-0.010	0.069	-0.143	.443	1.000
CTBE	0.614	[0.401, 0.827]	-0.217	0.092	-2.366	.009**	.083
Spec. Other	0.798	[0.673, 0.922]	-0.034	0.055	-0.612	.270	1.000
CBT	1.036	[0.850, 1.221]	0.204	0.089	2.288	.011*	.090
Th. Com	0.684	[0.153, 1.215]	-0.147	0.249	-0.591	.277	1.000
Grand Mean	0.831						
BPD Domain							
General severity	1.203	[1.082, 1.324]	0.372	0.044	8.505	<.001***	<.001***
Abandonment	0.792	[0.580, 1.003]	-0.040	0.089	-0.446	.328	.755
Interpersonal	0.908	[0.735, 1.081]	0.077	0.069	1.110	.134	.755
Identity	0.818	[0.617, 1.020]	-0.013	0.084	-0.155	.438	.755
Disturbance							
Impulsivity	0.658	[0.529, 0.786]	-0.174	0.047	-3.666	.001**	.001**
Suicidality/Self-injury	0.674	[0.579, 0.768]	-0.158	0.034	-4.572	<.001***	<.001***
Affective Instability	1.080	[0.926, 1.234]	0.249	0.060	4.149	<.001***	<.001***
Emptiness	0.889	[0.684, 1.094]	0.057	0.086	0.670	.252	.755
Anger	0.660	[0.547, 0.773]	-0.171	0.039	-4.347	<.001***	<.001***
Dissociation	0.631	[0.482, 0.781]	-0.200	0.059	-3.409	<.001***	.002**
Grand Mean	0.831						
Analysis Type							
ITT Modern	0.855	[0.748, 0.962]	0.024	0.037	0.641	.261	.261
ITT LOCF	0.586	[0.463, 0.710]	-0.245	0.049	-5.035	<.001***	<.001***

ITT Unclear	1.097	[0.889, 1.305]	0.266	0.075	3.532	<.001***	.001**
Completer	0.787	[0.683, 0.89]	-0.045	0.037	-1.222	.111	.222
<i>Grand Mean</i>	<i>0.831</i>						
Outcome Type							
Continuous	0.682	[0.600, 0.764]	-0.149	0.036	-4.184	<.001***	<.001***
Dichotomous	0.980	[0.830, 1.130]	0.149	0.036	4.184	<.001***	<.001***
<i>Grand Mean</i>	<i>0.831</i>						

Notes. * $p < .05$. ** $p < .01$. *** $p < .001$.

N.2 Sensitivity analysis – untransformed effect sizes total scale results

N.2.1 Sensitivity analysis main model

This sensitivity analysis was conducted using the untransformed effect sizes on total scale results if included studies reported these in addition to subscale results. Model fit did not improve when we added the three imputed variables with missing data, $(Dm(3, 184.63) = 0.12, p = .949)$. Both the within-study variance ($\sigma_u^2 = 0.100, \chi^2(1) = 318.783, p < .001$) and the between-study variance ($\sigma_u^2 = 0.177, \chi^2(1) = 100.577, p < .001$) were significant. The percentage of sampling variance was 12.49%, the within-study variance was 31.56% and the between-study variance was 55.95%. Table S10 in Supplementary Material S17, upper part, shows the results for the full model.

For the untransformed effect sizes, the final model was almost equal to our first analysis. Apart from analysis type, all predictors were included. Our final model consisted of treatment, BPD domain, outcome type, mean age and the log transformed number of weeks. The chi-square tests for the final model are shown in Table S10, lower part. For the transformed effect sizes, the within-study variance ($\sigma_u^2 = 0.047, \chi^2(1) = 97.350, p < .001$), and the between-study variance ($\sigma_u^2 = 0.078, \chi^2(1) = 60.360, p < .001$) of the final model were also significant. The percentage of sampling variance was 24.00%, the within-study variance was 28.61% and the between-study variance was 47.39%.

N.2.2 Sensitivity analysis deviation contrasts

The average mean effect size was large; $g = 0.855$.

Treatment. At one year, ST ($g = 1.220$), followed by MBT ($g = 1.033$), was related to larger treatment effects compared to the grand mean. TAU ($g = 0.549$), followed by CTBE ($g = 0.646$), were related to smaller effects. All results are shown in Table S11. All estimated means were moderate to large. The graph can be found in Supplementary Material S18.

BPD outcomes. At one year, the highest improvement was found for general severity ($g = 1.276$), followed by affective instability ($g = 1.083$). The least improvement was found for impulsive behaviors ($g = 0.588$), followed by anger ($g = 0.652$), dissociation ($g = 0.673$) and suicidality ($g = 0.701$) (see Supplementary Material S17). The estimated marginal means ranged from medium to large.

Outcome type. Continuous outcomes ($g = 0.707$) were related to less improvement, compared to dichotomous outcomes ($g = 1.004$) at one year.

N.2.3 Sensitivity analysis outliers and bias

Egger's test was significant, $F(1, 420) = 166.537, p < .001, B = 3.963$. The trim-and-fill procedure indicated that 36 residuals were missing on the right side, whereas 0 were missing on the left side. This would increase the average effect size from 0.623 to 0.691. There were 24 outliers (5.4%). Thirteen outliers were from general severity, and 9 from suicidality. The funnel plots are shown in Supplementary Material S19.

After removing outliers, all predictors were significant according to the chi square tests. Egger's test was still significant, $F(1, 399) = 81.421, p < .001, B = 2.482$. The predictors had an estimated grand mean of 0.809. The deviation contrasts of treatment showed no differences compared to the analysis with outliers included, but the estimated means were generally smaller. The same applied to BPD domain and outcome type. Results and patterns were similar (see Supplementary Material S20).

Supplementary Material S17

Chi-Square Test of the Predictors and Deviation Contrasts of the Untransformed Effect Sizes for the Priority to Total Scale Sensitivity Analysis

Table S10. Chi-Square Tests of all the Predictors in the Full and Final Models of the Untransformed Effect Sizes

Variable	χ^2	df	Loglikelihood	p
Full Model		93	-152.460	
Weeks of Treatment	2.937	92	-153.929	.087
Treatment	124.120	35	-214.120	<.001***
BPD Domain	229.782	36	-267.351	<.001***
Treatment * BPD domain	88.518	45	-196.719	<.001***
Setting	3.062	91	-153.991	.216
Format	1.859	91	-153.390	.395
Quality	0.001	92	-152.461	.974
Trial type	1.467	91	-153.194	.480
Publication year	0.770	92	-152.846	.380
Country of testing	0.346	91	-152.633	.841
Male proportion	0.921	92	-152.921	.337
Analysis type	19.357	90	-162.139	<.001***
Mean age	11.388	92	-158.154	.001**
Medication policy	0.836	92	-152.878	.361
Substance use exclusion	0.782	91	-152.851	.676
Assessment type	3.837	90	-154.379	.280
Outcome type	8.960	92	-156.940	.003**
Final Model		25	-208.938	
Weeks of Treatment	5.255	24	-211.565	.022*
Treatment	70.338	15	-244.107	<.001***
BPD Domain	144.299	16	-281.087	<.001***

Outcome type	8.822	24	-213.348	.003**
Mean age	12.394	24	-215.134	<.001***

Note. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table S11. Effects of Continuous Predictors and Results of all Deviation Contrasts of the Untransformed Effect Sizes for the Priority to Total Scale Sensitivity Analysis

Contrast	Mean (g)	95% CI	Δg	Δg (se)	Δg (t)	Δg (p)	Δg (p')
Average Age	(B)			(se)	(t)	.003**	
	-0.025	[-0.042, -0.009]		0.009	-2.985		
Log(Weeks)	(B)			(se)	(t)	.020*	
	0.119	[0.019, 0.218]		0.051	2.334		
Treatment							
DBT	0.828	[0.680, 0.976]	-0.028	0.057	-0.486	.314	1.000
DBTmin	0.965	[0.758, 1.173]	0.110	0.090	1.222	.111	.778
ST	1.220	[0.951, 1.490]	0.365	0.126	2.900	.002**	.020*
TFP	0.876	[0.640, 1.111]	0.020	0.098	0.208	.418	1.000
MBT	1.033	[0.813, 1.252]	0.177	0.098	1.810	.035*	.284
TAU	0.549	[0.401, 0.697]	-0.306	0.059	-5.236	<.001***	<.001**
PDT	0.903	[0.706, 1.101]	0.048	0.082	0.583	.280	1.000
CTBE	0.646	[0.383, 0.909]	-0.209	0.112	-1.871	.031*	.279
Spec. Other	0.828	[0.658, 0.999]	-0.027	0.072	-0.377	.353	1.000
CBT	0.947	[0.680, 1.214]	0.091	0.122	0.750	.227	1.000
Th. Com	0.614	[-0.134, 1.363]	-0.241	0.351	-0.687	.246	1.000
Grand Mean	0.855						
BPD Domain							
General severity	1.276	[1.140, 1.413]	0.421	0.057	7.412	<.001***	<.001***
Abandonment	0.820	[0.479, 1.161]	-0.036	0.145	-0.245	.403	.524
Interpersonal	0.758	[0.423, 1.093]	-0.098	0.142	-0.686	.247	.524
Identity Disturbance	1.011	[0.701, 1.321]	0.156	0.132	1.181	.119	.476
Impulsivity	0.588	[0.417, 0.758]	-0.268	0.070	-3.845	<.001***	.001***
Suicidality/Self-injury	0.701	[0.584, 0.817]	-0.155	0.051	-3.057	.001**	.008**
Affective Instability	1.083	[0.856, 1.309]	0.227	0.094	2.426	.008**	.047*
Emptiness	0.994	[0.648, 1.339]	0.138	0.148	0.936	.175	.524
Anger	0.652	[0.510, 0.794]	-0.203	0.053	-3.848	<.001***	.001**
Dissociation	0.673	[0.482, 0.863]	-0.182	0.078	-2.336	.010*	.050
Grand Mean	0.855						
Outcome Type							
Continuous	0.707	[0.578, 0.835]	-0.149	0.044	-3.414	<.001***	.001**
Dichotomous	1.004	[0.813, 1.196]	0.149	0.044	3.414	<.001***	.001**

Notes. * $p < .05$. ** $p < .01$. *** $p < .001$.

Supplementary Material S18

Graphs of the Untransformed Effect Sizes and the Priority to Total Scale Sensitivity Analysis

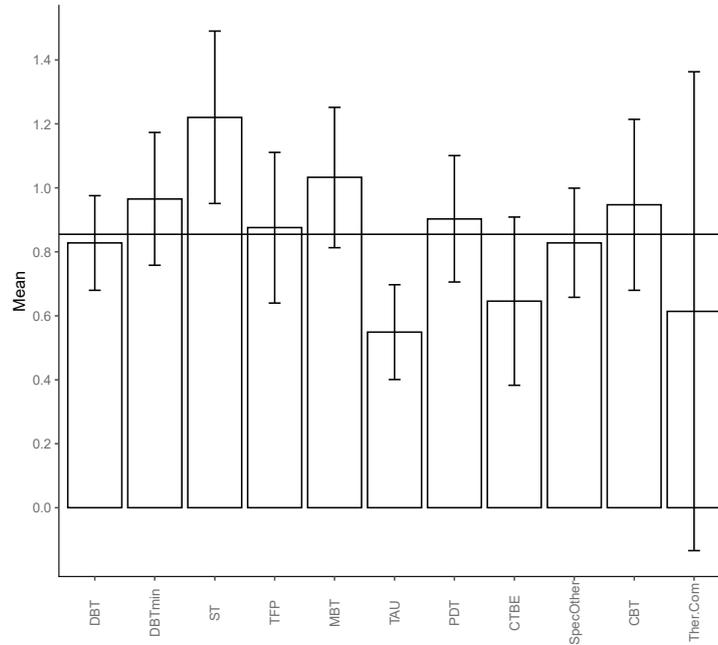


Figure S11. Bar graph of the estimated marginal means with 95% CI's at one year of treatment for all treatments for the untransformed effect sizes and the sensitivity analysis on the total scale results. The grand mean is depicted as a horizontal line at $g = 0.855$

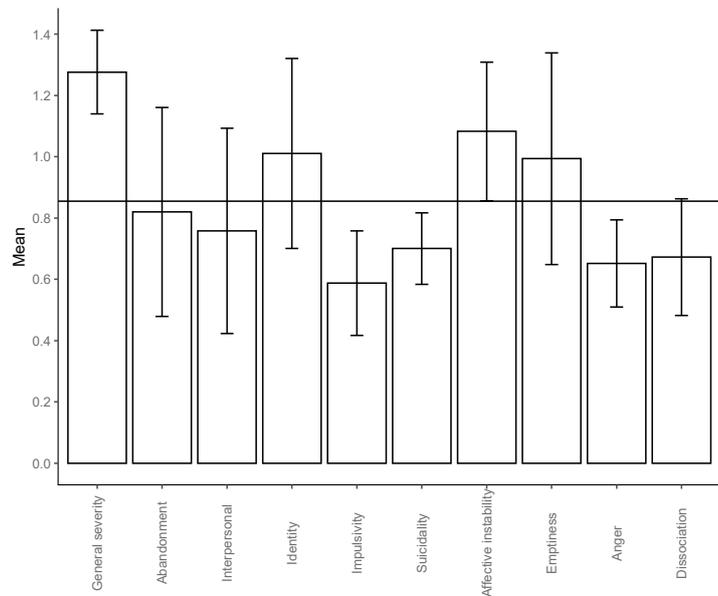


Figure S12. Bar graph of the estimated marginal means with 95% CI's at one year of treatment for all outcome domains for the untransformed effect sizes and the sensitivity analysis on the total scale results. The grand mean is depicted as a horizontal line at $g = 0.855$.

Supplementary Material S19

Funnel Plots for the Final models of the Total Sensitivity Analysis on the Untransformed Effect Sizes focused on Total Scale Results

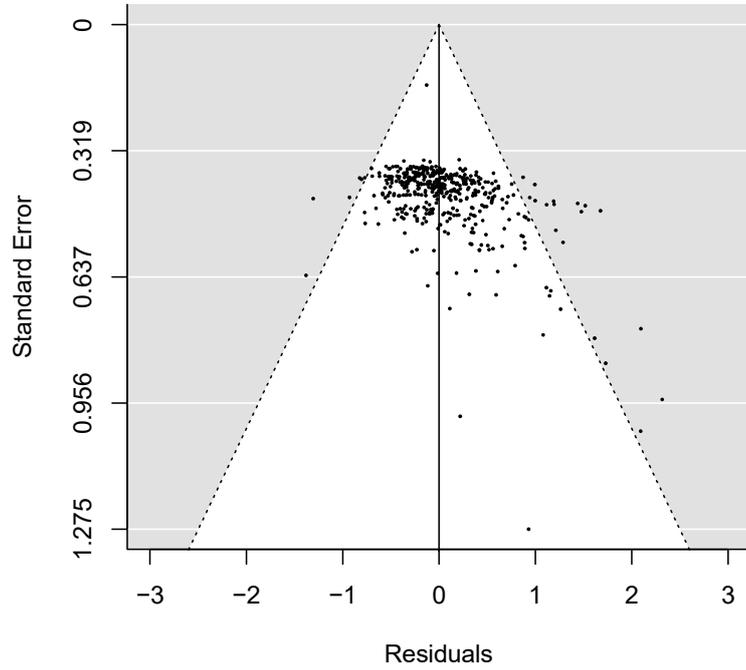


Figure S13. Funnel plot of the sensitivity analysis on the untransformed effects sizes focused on total scale results.

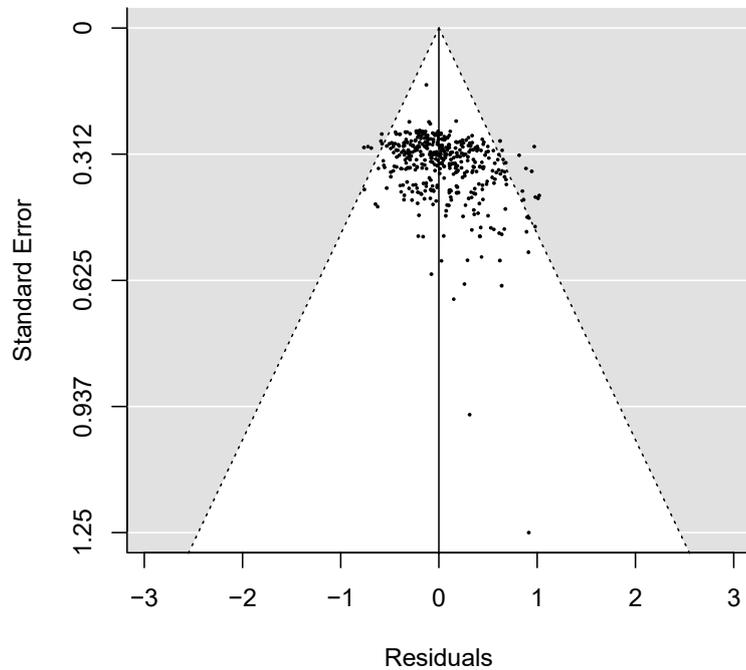


Figure S14. Funnel plot of the sensitivity analysis on the untransformed effect sizes focused on total scale results with outliers removed.

Supplementary Material S20

Deviation Contrasts Untransformed Effect Sizes Priority to Total Scale Sensitivity Analysis with the Outliers Removed

Table S12. Effects of Continuous Predictors and Results of all Deviation Contrasts of the Untransformed Effect Sizes for the Priority to Total Scale Sensitivity Analysis

Contrast	Mean (g)	95% CI	Δg	Δg (se)	Δg (t)	Δg (p)	Δg (p')
Average Age	(B) -0.021	[-0.034, - 0.008]		(se) 0.007	(t) -3.226	.001**	
Log(Weeks)	(B) 0.121	[0.047, 0.196]		(se) 0.038	(t) 3.195	.002**	
Treatment							
DBT	0.783	[0.660, 0.907]	-0.026	0.046	-0.563	.287	1.000
DBTmin	0.867	[0.693, 1.041]	0.058	0.074	0.780	.218	1.000
ST	1.101	[0.866, 1.335]	0.292	0.106	2.755	.003**	.031*
TFP	0.786	[0.587, 0.985]	-0.023	0.082	-0.284	.388	1.000
MBT	0.988	[0.810, 1.167]	0.179	0.077	2.324	.010*	.083
TAU	0.517	[0.395, 0.639]	-0.292	0.048	-6.069	<.001***	<.001**
PDT	0.851	[0.681, 1.021]	0.042	0.071	0.592	.277	1.000
CTBE	0.567	[0.344, 0.791]	-0.242	0.094	-2.566	.005**	.048*
Spec. Other	0.828	[0.689, 0.968]	0.019	0.059	0.323	.373	1.000
CBT	0.959	[0.747, 1.171]	0.150	0.096	1.557	.060	.421
Th. Com	0.652	[0.098, 1.206]	-0.157	0.260	-0.605	.273	1.000
<i>Grand Mean</i>	<i>0.809</i>						
BPD Domain							
General severity	1.194	[1.083, 1.306]	0.385	0.052	7.444	<.001***	<.001***
Abandonment	0.760	[0.444, 1.077]	-0.049	0.139	-0.352	.363	.725
Interpersonal	0.825	[0.491, 1.159]	0.016	0.147	0.106	.458	.725
Identity	0.928	[0.648, 1.208]	0.119	0.123	0.968	.167	.667
Disturbance							
Impulsivity	0.559	[0.415, 0.704]	-0.250	0.064	-3.880	<.001***	<.001***
Suicidality/Self-injury	0.628	[0.537, 0.718]	-0.182	0.047	-3.893	<.001***	<.001***

Affective Instability	1.018	[0.816, 1.220]	0.209	0.088	2.381	.009**	.044*
Emptiness	0.940	[0.619, 1.262]	0.131	0.141	0.929	.177	.667
Anger	0.610	[0.494, 0.725]	-0.200	0.049	-4.037	<.001***	<.001***
Dissociation	0.629	[0.465, 0.793]	-0.180	0.072	-2.509	.006**	.037*
<i>Grand Mean</i>	<i>0.809</i>						
Outcome Type							
Continuous	0.677	[0.576, 0.779]	-0.132	0.037	-3.533	<.001***	.001**
Dichotomous	0.941	[0.779, 1.103]	0.132	0.037	3.533	<.001***	.001**
<i>Grand Mean</i>	<i>0.809</i>						

Notes. * $p < .05$. ** $p < .01$. *** $p < .001$.