

Effect of defense mechanisms on the longitudinal development of interpersonal problems during outpatient therapy

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SUPPLEMENTARY MATERIAL

Supplementary Table 1. Correlation between baseline defence measure and interpersonal problems at each measurement occasion.

Baseline Defence (prior to therapy)

	Maladaptive Defence Style	Intermediate Defence Style	Adaptive Defence Style	Autistic Fantasy (Mechanism)	Splitting (Mechanism)
Interpersonal Problems t_0	$r = .50, p < .01$	$r = .42, p < .01$	$r = -.01, p = .81$	$r = .32, p < .01$	$r = .33, p < .01$
Interpersonal Problems t_1	$r = .40, p < .01$	$r = .29, p < .01$	$r = -.11, p = .07$	$r = .29, p < .01$	$r = .24, p < .01$
Interpersonal Problems t_2	$r = .39, p < .01$	$r = .34, p < .01$	$r = .03, p = .75$	$r = .37, p < .01$	$r = .17, p = .04$
	Projection (Mechanism)	Pas. Aggression (Mechanism)	Idealization (Mechanism)	Somatization (Mechanism)	Isolation (Mechanism)
Interpersonal Problems t_0	$r = .46, p < .01$	$r = .34, p < .01$	$r = .27, p < .01$	$r = .29, p < .01$	$r = .26, p < .01$
Interpersonal Problems t_1	$r = .32, p < .01$	$r = .29, p < .01$	$r = .17, p < .01$	$r = .20, p < .01$	$r = .27, p < .01$
Interpersonal Problems t_2	$r = .22, p = .01$	$r = .38, p < .01$	$r = .25, p < .01$	$r = .29, p < .01$	$r = .32, p < .01$
	Pseudo Altruism (Mechanism)	Undoing (Mechanism)	Acting out (Mechanism)	Reaction formation (Mechanism)	Suppression (Mechanism)
Interpersonal Problems t_0	$r = .23, p < .01$	$r = .34, p < .01$	$r = .28, p < .01$	$r = .25, p < .01$	$r = .02, p = .75$
Interpersonal Problems t_1	$r = .15, p = .01$	$r = .20, p < .01$	$r = .17, p < .01$	$r = .24, p < .01$	$r = -.01, p = .85$
Interpersonal Problems t_2	$r = .09, p = .28$	$r = .28, p < .01$	$r = .19, p = .03$	$r = .32, p < .01$	$r = .05, p = .56$
	Anticipation (Mechanism)	Humour (Mechanism)	Sublimation (Mechanism)	Rationalization (Mechanism)	Denial (Mechanism)
Interpersonal Problems t_0	$r = -.02, p = .80$	$r = -.13, p = .03$	$r = .09, p = .14$	$r = .15, p = .01$	$r = .08, p = .19$
Interpersonal Problems t_1	$r = -.11, p = .05$	$r = -.14, p = .02$	$r = -.03, p = .67$	$r = .12, p = .05$	$r = .03, p = .67$
Interpersonal Problems t_2	$r = .04, p = .64$	$r = -.09, p = .29$	$r = .07, p = .41$	$r = .28, p < .01$	$r = .05, p = .60$

r , Pearson's correlation coefficient.

Supplementary Table 2. Fixed effects for the model specification using defense mechanisms as predictors.

Predictors	Model 3		Model 3a (Outlier Robust)		Model 3b (Cluster robust standard errors)	
	Estimates (SE)	<i>p</i>	Estimates (SE)	<i>p</i>	Estimates (SE)	<i>p</i>
Intercept	1.62 (0.02)	< .01	1.62 (0.02)	< .01	1.62 (0.02)	< .01
Structural Integration (OPD z-standardized)	0.17 (0.03)	< .01	0.17 (0.03)	< .01	0.17 (0.03)	< .01
Occasion (Months)	0.01 (0.00)	.06	0.01 (0.00)	.03	0.01 (0.01)	.07
Autistic Fantasy (z-standardized)	0.02 (0.03)	.50	0.01 (0.03)	.68	0.02 (0.02)	.44
Splitting (z-standardized)	-0.00 (0.03)	.98	-0.01 (0.03)	.82	0.00 (0.02)	.97
Projection (z-standardized)	0.07 (0.03)	.01	0.07 (0.03)	.01	0.07 (0.02)	< .01
Passive Aggression (z-standardized)	-0.00 (0.03)	.97	-0.00 (0.03)	.93	0.00 (0.02)	.97
Idealization (z-standardized)	0.00 (0.02)	.87	0.01 (0.02)	.60	0.00 (0.02)	.85
Somatization (z-standardized)	0.02 (0.02)	.48	0.01 (0.02)	.67	0.02 (0.02)	.44
Isolation (z-standardized)	0.04 (0.02)	.13	0.04 (0.02)	.15	0.04 (0.02)	.10
Pseudo Altruism (z-standardized)	0.02 (0.02)	.32	0.02 (0.02)	.34	0.02 (0.02)	.30
Undoing (z-standardized)	0.05 (0.03)	.06	0.05 (0.03)	.05	0.05 (0.03)	.05
Acting Out (z-standardized)	-0.02 (0.03)	.52	-0.01 (0.03)	.64	-0.02 (0.02)	.48
Reaction Formation (z-standardized)	0.06 (0.03)	.02	0.07 (0.03)	< .01	0.06 (0.02)	.02
Suppression (z-standardized)	0.01 (0.03)	.62	0.01 (0.03)	.73	0.01 (0.02)	.60
Anticipation (z-standardized)	-0.05 (0.02)	.05	-0.05 (0.02)	.03	-0.05 (0.02)	.02
Humour (z-standardized)	-0.03 (0.02)	.26	-0.02 (0.02)	.31	-0.03 (0.02)	.21
Sublimation (z-standardized)	-0.01 (0.03)	.57	-0.02 (0.03)	.39	-0.01 (0.02)	.54
Rationalization (z-standardized)	0.01 (0.02)	.53	0.02 (0.02)	.40	0.01 (0.02)	.50
Denial (z-standardized)	0.00 (0.02)	.95	0.00 (0.02)	.85	0.00 (0.02)	.94
Total Difficulties in Emotion Regulation (z-standardized)	0.07 (0.03)	.03	0.07 (0.03)	.05	0.07 (0.03)	.02
Therapy duration (Months)	-0.00 (0.01)	.63	-0.01 (0.01)	.47	0.00 (0.01)	.62
Age (years)	0.03 (0.02)	.13	0.03 (0.02)	.14	0.03 (0.02)	.12

Sex (1: male, 0: female)	-0.00 (0.05)	.10	-0.01 (0.05)	.89	0.00 (0.05)	1
Structural Integration x Occasion	-0.00 (0.00)	.39	-0.00 (0.00)	.17	0.00 (0.00)	.41
Autistic Fantasy x Occasion	0.00 (0.00)	.31	0.00 (0.00)	.24	0.00 (0.00)	.27
Splitting x Occasion	-0.00 (0.00)	.96	0.00 (0.00)	.85	0.00 (0.00)	.96
Projection x Occasion	-0.01 (0.00)	< .01	-0.01 (0.00)	< .01	-0.01 (0.00)	< .01
Passive Aggression x Occasion	0.00 (0.00)	.11	0.01 (0.00)	.04	0.00 (0.00)	.08
Idealization x Occasion	-0.00 (0.00)	.83	-0.00 (0.00)	.59	0.00 (0.00)	.80
Somatization x Occasion	0.00 (0.00)	.58	0.00 (0.00)	.37	0.00 (0.00)	.56
Isolation x Occasion	0.00 (0.00)	.48	0.00 (0.00)	.45	0.00 (0.00)	.51
Pseudo Altruism x Occasion	-0.00 (0.00)	.07	-0.00 (0.00)	.16	0.00 (0.00)	.06
Undoing x Occasion	-0.00 (0.00)	.18	-0.00 (0.00)	.13	0.00 (0.00)	.17
Acting Out x Occasion	-0.00 (0.00)	.65	-0.00 (0.00)	.46	0.00 (0.00)	.64
Reaction Formation x Occasion	0.01 (0.00)	.02	0.01 (0.00)	.04	0.01 (0.00)	.01
Passive Aggression x Occasion	-0.00 (0.00)	.40	-0.00 (0.00)	.51	0.00 (0.00)	.43
Anticipation x Occasion	-0.00 (0.00)	.38	-0.00 (0.00)	.38	0.00 (0.00)	.36
Humour x Occasion	0.00 (0.00)	.42	0.00 (0.00)	.31	0.00 (0.00)	.35
Sublimation x Occasion	-0.00 (0.00)	.40	-0.00 (0.00)	.56	0.00 (0.00)	.37
Rationalization x Occasion	0.00 (0.00)	.42	0.00 (0.00)	.61	0.00 (0.00)	.42
Denial x Occasion	-0.00 (0.00)	.93	0.00 (0.00)	.96	0.00 (0.00)	.92
DEERS x Occasion	-0.00 (0.00)	.86	0.00 (0.00)	.80	0.00 (0.00)	.85

$N=286$ with 705 observations. Estimation based on the restricted maximum likelihood method (REML). Bold indicates statistical significance ($p < .05$). z -standardization was carried out using the mean and standard deviation calculated at time point t_0 . Higher values reflect greater levels of the respective constructs. In Model 3a, an outlier-robust estimation was performed (Koller, 2016). In Model 3b, cluster-robust standard errors were applied and are reported accordingly (Pustejovsky & Tipton, 2018).

Supplementary Table 3. Fixed effects in the compared model specifications.

Predictor	Model 1		Model 2		Model 3		Model 4	
	Fixed Effect (SE)	p	Fixed Effect (SE)	p	Fixed Effect (SE)	p	Fixed Effect (SE)	p
Intercept	1.615 (0.025)	< 0.01	1.610 (0.023)	< 0.01	1.617 (0.025)	< 0.01	1.612 (0.024)	< 0.01
Structural Integration (OPD z-standardized)	0.155 (0.028)	< 0.01	0.160 (0.028)	< 0.01	0.170 (0.032)	< 0.01	0.172 (0.031)	< 0.01
Occasion (Months)	0.010 (0.005)	0.04	0.011 (0.005)	0.04	0.009 (0.005)	0.06	0.01 (0.005)	0.05
Autistic Fantasy (z-standardized)	0.030 (0.023)	0.19	0.025 (0.022)	0.26	0.017 (0.026)	0.50	0.016 (0.024)	0.51
Splitting (z-standardized)	0.000 (0.024)	0.99	-0.001 (0.024)	0.97	-0.001 (0.028)	0.98	-0.002 (0.026)	0.95
Projection (z-standardized)	0.034 (0.024)	0.15	0.044 (0.024)	0.06	0.069 (0.027)	0.01	0.069 (0.026)	< 0.01
Passive Aggression (z-standardized)	0.018 (0.023)	0.43	0.013 (0.023)	0.58	-0.001 (0.026)	0.97	0.000 (0.025)	0.99
Idealization (z-standardized)	0.002 (0.022)	0.94	0.002 (0.022)	0.91	0.004 (0.025)	0.87	0.004 (0.023)	0.85
Somatization (z-standardized)	0.024 (0.021)	0.25	0.023 (0.021)	0.27	0.017 (0.024)	0.48	0.019 (0.023)	0.42
Isolation (z-standardized)	0.045 (0.022)	0.04	0.041 (0.022)	0.06	0.037 (0.025)	0.13	0.035 (0.023)	0.14
Pseudo Altruism (z-standardized)	0.003 (0.021)	0.88	0.009 (0.021)	0.67	0.024 (0.024)	0.32	0.024 (0.022)	0.29
Undoing (z-standardized)	0.030 (0.023)	0.19	0.035 (0.023)	0.12	0.049 (0.026)	0.06	0.050 (0.025)	0.05
Acting Out (z-standardized)	-0.02 (0.023)	0.38	-0.019 (0.023)	0.41	-0.017 (0.026)	0.52	-0.017 (0.025)	0.50
Reaction Formation (z-standardized)	0.091 (0.022)	< 0.01	0.081 (0.022)	< 0.01	0.059 (0.025)	0.02	0.059 (0.024)	0.01
Suppression (z-standardized)	0.003 (0.022)	0.90	0.006 (0.022)	0.80	0.013 (0.026)	0.62	0.013 (0.024)	0.58
Anticipation (z-standardized)	-0.058 (0.021)	< 0.01	-0.054 (0.021)	< 0.01	-0.047 (0.024)	0.05	-0.046 (0.022)	0.04
Humour (z-standardized)	-0.021 (0.021)	0.33	-0.023 (0.021)	0.28	-0.027 (0.024)	0.26	-0.028 (0.023)	0.22
Sublimation (z-standardized)	-0.026 (0.023)	0.26	-0.023 (0.023)	0.32	-0.015 (0.026)	0.57	-0.016 (0.025)	0.52
Rationalization (z-standardized)	0.025 (0.021)	0.23	0.021 (0.021)	0.30	0.015 (0.024)	0.53	0.015 (0.023)	0.52
Denial (z-standardized)	-0.001 (0.021)	0.97	-0.001 (0.021)	0.98	0.001 (0.024)	0.95	0.000 (0.022)	1
Total Difficulties in Emotion Regulation (z-standardized)	0.069 (0.030)	0.02	0.069 (0.030)	0.02	0.075 (0.034)	0.03	0.074 (0.032)	0.02
Therapy duration (Months)	-0.004 (0.007)	0.61	-0.004 (0.007)	0.55	-0.004 (0.007)	0.63	-0.004 (0.008)	0.57
Age (years)	0.030 (0.020)	0.14	0.028 (0.020)	0.17	0.031 (0.020)	0.13	0.028 (0.02)	0.16
Sex (1: male, 0: female)	0.003 (0.048)	0.94	0.021 (0.048)	0.66	0.000 (0.048)	1	0.017 (0.048)	0.72
Structural Integration x Occasion	-	-	-	-	-0.003 (0.003)	0.39	-0.003 (0.003)	0.34
Autistic Fantasy x Occasion	-	-	-	-	0.003 (0.003)	0.31	0.003 (0.003)	0.34
Splitting x Occasion	-	-	-	-	0.000 (0.003)	0.96	0.000 (0.003)	0.97
Projection x Occasion	-	-	-	-	-0.008 (0.003)	< 0.01	-0.008 (0.003)	< 0.01
Passive Aggression x Occasion	-	-	-	-	0.004 (0.003)	0.11	0.004 (0.003)	0.14
Idealization x Occasion	-	-	-	-	-0.001 (0.003)	0.83	-0.001 (0.003)	0.84
Somatization x Occasion	-	-	-	-	0.001 (0.003)	0.57	0.001 (0.003)	0.66
Isolation x Occasion	-	-	-	-	0.002 (0.003)	0.48	0.002 (0.003)	0.47
Pseudo Altruism x Occasion	-	-	-	-	-0.005 (0.003)	0.07	-0.004 (0.003)	0.08
Undoing x Occasion	-	-	-	-	-0.004 (0.003)	0.18	-0.004 (0.003)	0.16
Acting Out x Occasion	-	-	-	-	-0.001 (0.003)	0.65	-0.001 (0.003)	0.72
Reaction Formation x Occasion	-	-	-	-	0.006 (0.003)	0.02	0.006 (0.003)	0.02
Passive Aggression x Occasion	-	-	-	-	-0.002 (0.003)	0.40	-0.002 (0.003)	0.36
Anticipation x Occasion	-	-	-	-	-0.002 (0.003)	0.38	-0.002 (0.003)	0.37
Humour x Occasion	-	-	-	-	0.002 (0.003)	0.42	0.002 (0.003)	0.42
Sublimation x Occasion	-	-	-	-	-0.002 (0.003)	0.40	-0.002 (0.003)	0.48
Rationalization x Occasion	-	-	-	-	0.002 (0.003)	0.42	0.002 (0.003)	0.47

Denial x Occasion	-	-	-	-	0.000 (0.003)	0.93	0.000 (0.003)	1
DERS x Occasion	-	-	-	-	-0.001 (0.003)	0.86	-0.001 (0.004)	0.79

$N=286$ with 705 observations. Estimation based on the restricted maximum likelihood method (REML). Bold indicates statistical significance ($p < .05$). z-standardization was carried out using the mean and standard deviation calculated at time point t_0 . Higher values reflect greater levels of the respective constructs. Model 1: Random Intercept Model, Model 2: Random Intercept Random Slope (Occasion) Model, Model 3: Random Intercept Model including Interactions, Model 4: Random Intercept Random Slope (Occasion) Model including Interactions.

Supplementary Table 4. Fixed effects – Model 3 (reduced mechanisms + interactions, no random slope).

Predictors	<u>Modell 3 Mechanisms</u>		<u>Modell 3b Mechanisms (outlier robust)</u>		<u>Modell 3c Mechanisms (Cluster robust standard errors)</u>	
	HIP Total Score		HIP Total Score		HIP Total Score	
	<i>Estimates (SE)</i>	<i>p</i>	<i>Estimates (SE)</i>	<i>p</i>	<i>Estimates (SE)</i>	<i>p</i>
Intercept	1.61 (0.02)	<.01	1.62 (0.02)	<.01	1.61 (0.02)	<.01
Structural Integration (OPD z-standardized)	0.17 (0.03)	<.01	0.17 (0.03)	<.01	0.17 (0.03)	<.01
Occasion (Months)	0.01 (0.00)	.01	0.01 (0.00)	.01	0.01 (0.00)	0.02
Projection (z-standardized)	0.07 (0.02)	.01	0.07 (0.02)	.01	0.07 (0.02)	<.01
Isolation (z-standardized)	0.04 (0.02)	.07	0.04 (0.02)	.10	0.04 (0.02)	0.04
Undoing (z-standardized)	0.05 (0.02)	.04	0.05 (0.02)	.04	0.05 (0.02)	0.03
Reaction formation (z-standardized)	0.07 (0.02)	.01	0.08 (0.02)	<.01	0.07 (0.02)	<.01
Anticipation (z-standardized)	-0.06 (0.02)	.01	-0.07 (0.02)	<.01	-0.06 (0.02)	<.01
DERS total (z-standardized)	0.09 (0.03)	.01	0.08 (0.03)	.01	0.09 (0.03)	<.01
Therapy duration (Months)	-0.01 (0.01)	.32	-0.01 (0.01)	.23	-0.01 (0.01)	0.31
Age (years)	0.03 (0.02)	.11	0.03 (0.02)	.09	0.03 (0.02)	0.12
Sex (1: male, 0: female)	0.01 (0.05)	.84	0.01 (0.05)	.92	0.01 (0.04)	0.83
Structural Integration × Occasion	-0.00 (0.00)	.27	-0.01 (0.00)	.07	0.00 (0.00)	0.30
Projection x Occasion	-0.01 (0.00)	.03	-0.01 (0.00)	.02	-0.01 (0.00)	0.03
Isolation x Occasion	0.00 (0.00)	.17	0.00 (0.00)	.07	0.00 (0.00)	0.22
Undoing x Occasion	-0.00 (0.00)	.06	-0.01 (0.00)	.04	0.00 (0.00)	0.06
Reaction Formation x Occasion	0.01 (0.00)	.03	0.00 (0.00)	.06	0.01 (0.00)	0.02
Anticipation x Occasion	-0.00 (0.00)	.52	-0.00 (0.00)	.53	0.00 (0.00)	0.51
DERS x Occasion	0.00 (0.00)	.92	0.00 (0.00)	.52	0.00 (0.00)	0.92

$N=286$ with 705 observations. Estimation based on the restricted maximum likelihood method (REML). Bold indicates statistical significance ($p < .05$). z -standardization was carried out using the mean and standard deviation calculated at time point t_0 . Higher values reflect greater levels of the respective constructs. In Model 3b, an outlier-robust estimation was performed (Koller, 2016). In Model 3c, cluster-robust standard errors were applied and are reported accordingly (Pustejovsky & Tipton, 2018).

Supplementary Table 5. Fixed effects – Model 4 (reduced mechanisms + interactions and random slope), controlling for LPFS.

Predictors	<u>Modell 4 LPFS</u>		<u>Modell 4 LPFS (outlier robust)</u>		<u>Modell 4 LPFS (Cluster robust standard errors)</u>	
	IIP Total Score		IIP Total Score		IIP Total Score	
	<i>Estimates (SE)</i>	<i>p</i>	<i>Estimates (SE)</i>	<i>p</i>	<i>Estimates (SE)</i>	<i>p</i>
Intercept	1.62 (0.02)	<.01	1.62 (0.02)	<.01	1.62 (0.02)	<.01
Structural Integration (LPFS z-standardized)	0.15 (0.03)	<.01	0.16 (0.03)	<.01	0.15 (0.03)	<.01
Occasion (Months)	0.01 (0.00)	.01	0.01 (0.00)	.01	0.01 (0.00)	.01
Projection (z-standardized)	0.07 (0.02)	<.01	0.07 (0.02)	<.01	0.07 (0.02)	<.01
Isolation (z-standardized)	0.03 (0.02)	.14	0.03 (0.02)	.13	0.03 (0.02)	.12
Undoing (z-standardized)	0.04 (0.02)	.07	0.04 (0.02)	.10	0.04 (0.02)	.07
Reaction formation (z-standardized)	0.05 (0.02)	.02	0.06 (0.02)	<.01	0.05 (0.02)	.02
Anticipation (z-standardized)	-0.05 (0.02)	.02	-0.06 (0.02)	.01	-0.05 (0.02)	.01
DERS total (z-standardized)	0.11 (0.03)	<.01	0.09 (0.03)	<.01	0.11 (0.03)	<.01
Therapy duration (Months)	-0.01 (0.01)	.20	-0.01 (0.01)	.16	-0.01 (0.01)	.18
Age (years)	0.04 (0.02)	.03	0.04 (0.02)	.03	0.04 (0.02)	.03
Sex (1: male, 0: female)	0.01 (0.05)	.79	0.01 (0.05)	.89	0.01 (0.04)	.78
Structural Integration × Occasion	-0.00 (0.00)	.48	-0.00 (0.00)	.24	0.00 (0.00)	.45
Projection x Occasion	-0.01 (0.00)	.03	-0.01 (0.00)	.03	-0.01 (0.00)	.03
Isolation x Occasion	0.00 (0.00)	.18	0.00 (0.00)	.10	0.00 (0.00)	.23
Undoing x Occasion	-0.01 (0.00)	.06	-0.01 (0.00)	.05	-0.01 (0.00)	.06
Reaction Formation x Occasion	0.01 (0.00)	.03	0.00 (0.00)	.07	0.01 (0.00)	.02
Anticipation x Occasion	-0.00 (0.00)	.52	-0.00 (0.00)	.55	0.00 (0.00)	.50
DERS x Occasion	-0.00 (0.00)	.80	0.00 (0.00)	.86	0.00 (0.00)	.78

$N=286$ with 705 observations. Estimation based on the restricted maximum likelihood method (REML). Bold indicates statistical significance ($p < .05$). z -standardization was carried out using the mean and standard deviation calculated at time point t_0 . Higher values reflect greater levels of the respective constructs. In Model 3b, an outlier-robust estimation was performed (Koller, 2016). In Model 3c, cluster-robust standard errors were applied and are reported accordingly (Pustejovsky & Tipton, 2018).

Supplementary Table 6. Interpersonal problems in comparison to severity of depressive and somatoform symptoms.

	<u>Baseline Assessment</u> <u>(prior to therapy)</u>	<u>First Follow-up</u>	<u>Second Follow-up</u>
Interpersonal Problem (IIP total score)	$M = 1.62; SD = 0.48$	$M = 1.71; SD = 0.46$	$M = 1.66; SD = 0.50$
Depressive Symptoms (PHQ9)	$M = 12.07; SD = 5.69$	$M = 10.45; SD = 5.44$	$M = 9.33; SD = 5.39$
Somatoform Symptoms (PHQ15)	$M = 10.98; SD = 5.28$	$M = 10.43; SD = 5.11$	$M = 9.50; SD = 5.08$
Months in Therapy	$M = 0; SD = 0$	$M = 2.89; SD = 1.78$	$M = 7.63; SD = 2.95$
Time difference between Assessments (Months)	$M = 0; SD = 0$	$M = 6.16; SD = 0.84$	$M = 12.02; SD = 0.76$
<i>n</i>	286	286	133

M, Mean; SD, Standard Deviation; PHQ, Patient Health Questionnaire .