

**Mediators of Change in Imagery Rescripting and Imaginal Exposure for Nightmares:
Evidence from a Randomized Wait-list Controlled Trial**

SUPPLEMENTARY MATERIAL

Anna E. Kunze^{a,b*}, Jaap Lancee^a, Nexhmedin Morina^c, Merel Kindt^a, and Arnoud Arntz^a

^aUniversity of Amsterdam, PO Box 15933, 1001 NK Amsterdam, Netherlands

^bLMU Munich, Leopoldstraße 13, 80802 Munich, Germany

^cUniversity of Münster, Fliednerstraße 21, 48149 Münster, Germany

*Correspondence concerning this article should be addressed to Anna E. Kunze, Ludwig-Maximilians-University Munich, Department of Clinical Psychology and Psychotherapy, Leopoldstr. 13, 80802 Munich, Germany, anna.kunze@psy.lmu.de

Supplementary Material: MEDIATORS OF CHANGE IN IR AND IE FOR NIGHTMARES

Table A. *Observed values for all variables*

	Group	Pre-assessment (T0)		Week 1 (T1)		Week 2 (T2)		Week 3 (T3)		Post-assessment (T4)	
		<i>n</i>	<i>M (SD)</i>	<i>n</i>	<i>M (SD)</i>	<i>n</i>	<i>M (SD)</i>	<i>n</i>	<i>M (SD)</i>	<i>n</i>	<i>M (SD)</i>
Outcomes											
Nightmare Frequency	IR	31	5.19 (6.14)	30	4.60 (5.78)	28	4.39 (5.85)	27	3.67 (5.05)	29	3.95 (6.56)
	IE	29	3.98 (3.47)	30	3.10 (2.70)	28	2.95 (3.40)	28	2.96 (3.24)	28	2.71 (2.96)
	WL	35	4.00 (2.86)	-	-	-	-	-	-	35	4.13 (3.17)
Nightmare Distress	IR	31	20.02 (6.09)	31	17.02 (5.13)	28	13.85 (7.91)	27	12.93 (8.64)	29	13.02 (8.03)
	IE	30	21.33 (4.97)	29	18.72 (5.20)	28	14.04 (8.02)	28	12.11 (8.40)	28	12.68 (7.66)
	WL	35	19.47 (5.39)	-	-	-	-	-	-	34	18.09 (6.57)
Mediators											
Mastery	IR	31	19.74 (24.73)	30	34.50 (21.94)	29	43.90 (25.34)	26	43.50 (28.81)	24	43.75 (24.98)
	IE	29	11.83 (13.31)	30	21.53 (17.44)	25	30.64 (25.65)	25	34.88 (26.89)	22	34.91 (22.53)
	WL	31	10.68 (18.03)	27	19.56 (22.33)	26	16.77 (17.73)	25	16.44 (14.64)	29	17.97 (12.93)
Valence	IR	31	50.42 (26.14)	30	46.97 (21.40)	29	41.00 (27.03)	26	40.54 (28.48)	24	39.83 (25.61)
	IE	29	48.66 (21.35)	30	51.50 (22.35)	25	50.72 (25.16)	25	34.00 (21.15)	22	28.82 (22.61)
	WL	31	49.87 (29.44)	27	51.56 (22.94)	26	53.85 (27.66)	25	58.04 (25.14)	29	56.90 (28.01)
Tolerability	IR	31	56.52 (26.67)	30	60.80 (19.25)	29	63.48 (22.54)	26	63.54 (23.50)	24	66.46 (17.34)
	IE	29	50.90 (23.40)	30	53.63 (25.09)	25	59.00 (20.34)	25	71.40 (15.56)	22	72.59 (18.74)
	WL	31	51.52 (27.75)	27	46.89 (25.91)	26	41.88 (26.60)	25	43.28 (26.29)	29	47.28 (26.32)
SUD	IR	30	6.78 (2.14)	31	6.81 (1.99)	28	5.71 (2.14)	27	5.04 (2.79)	27	5.02 (2.60)
	IE	30	6.78 (2.10)	30	7.10 (1.77)	28	5.86 (1.76)	28	4.61 (1.95)	28	4.82 (2.11)
	WL	34	6.65 (2.03)	-	-	-	-	-	-	32	6.19 (2.84)
Predictability	IR	31	56.29 (25.69)	30	59.73 (20.22)	29	66.66 (22.44)	26	66.58 (15.49)	24	58.42 (21.35)
	IE	29	52.86 (23.44)	30	60.27 (24.90)	25	58.36 (25.08)	25	58.52 (28.93)	22	60.36 (24.82)
	WL	31	62.84 (20.29)	27	58.78 (23.34)	26	56.35 (21.86)	25	62.56 (18.77)	29	61.31 (20.11)
Controllability	IR	31	48.32 (27.45)	30	51.80 (23.26)	29	64.48 (22.23)	26	59.73 (23.27)	24	62.33 (16.10)
	IE	29	47.55 (25.02)	30	45.83 (26.36)	25	51.48 (26.39)	25	61.04 (22.35)	22	64.86 (22.98)
	WL	31	50.90 (28.89)	27	40.78 (24.59)	26	42.81 (26.50)	25	46.60 (24.63)	29	44.52 (24.76)
Negative consequences	IR	31	55.97 (23.78)	30	54.50 (21.45)	29	52.21 (22.77)	26	50.27 (23.21)	24	42.83 (24.00)
	IE	29	58.62 (23.09)	30	54.53 (22.72)	25	56.56 (23.73)	25	48.08 (23.74)	22	43.32 (22.85)
	WL	31	49.87 (30.08)	27	51.26 (26.20)	26	53.96 (25.63)	25	59.80 (28.92)	29	60.76 (23.79)
Sleep quality	IR	31	40.68 (22.76)	29	45.03 (21.79)	29	56.62 (17.60)	26	49.38 (25.29)	24	55.63 (22.23)
	IE	29	43.17 (24.11)	29	43.41 (27.30)	25	55.64 (28.14)	25	56.24 (29.49)	22	53.82 (27.97)
	WL	31	42.39 (25.72)	26	40.65 (22.12)	25	43.88 (25.89)	24	42.75 (28.79)	29	44.72 (23.72)

Note. Controllability = “I think that I can control the emotions elicited by my nightmares.”; IE = imaginal exposure; IR = imagery rescripting; Mastery = “I think that I am in control of the content of my nightmares.”; Negative consequences = “Nightmares have a negative influence on my daily functioning.”; Predictability = “I think that I can predict the emotions elicited by my nightmares.”; Sleep quality = “How would you evaluate the quality of last night’s sleep?”; SUD = Subjective Unit of Distress, “How distressed do you feel right now?”; Tolerability = “I think that I can tolerate the emotions elicited by my nightmares.”; Valence = “When I think about my nightmares, I get emotional.”; WL = wait-list

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Table B. Correlations between the eight proposed mediators at T0 based on observed values

Measure	1	2	3	4	5	6	7	8
1. Mastery	-							
2. Tolerability	.281**	-						
3. Negative consequences	-.235*	-.442***	-					
4. Controllability	.201	.600***	-.321**	-				
5. Predictability	.067	.189	-.135	.288**	-			
6. Valence	-.117	-.375***	.375***	-.285**	-.087	-		
7. Sleep quality	.122	.222*	-.268*	.145	.162	-.241*	-	
8. SUD	.137	-.041	.159	-.032	-.079	.314**	-.153	-

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

Table C. Correlations between the eight proposed mediators at T1 based on observed values

Measure	1	2	3	4	5	6	7	8
1. Mastery	-							
2. Tolerability	.186	-						
3. Negative consequences	-.149	.061	-					
4. Controllability	.154	.668***	-.245*	-				
5. Predictability	-.179	.035	.032	.104	-			
6. Valence	-.158	-.316**	.269*	-.373***	.066	-		
7. Sleep quality	.350**	.055	-.096	.185	-.036	-.064	-	
8. SUD	.140	-.296	.023	-.088	.136	.479***	.021	-

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

Table D. Correlations between the eight proposed mediators at T2 based on observed values

Measure	1	2	3	4	5	6	7	8
1. Mastery	-							
2. Tolerability	.239*	-						
3. Negative consequences	-.273*	-.302**	-					
4. Controllability	.427***	.542***	-.370**	-				
5. Predictability	-.009	.320**	-.076	.109	-			
6. Valence	-.190	-.270*	.366**	-.390***	.200	-		
7. Sleep quality	.297**	.303**	-.198	.430***	.071	-.103	-	
8. SUD	.023	-.139	.103	-.140	.037	.426**	.152	-

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

Table E. Correlations between the eight proposed mediators at T3 based on observed values

Measure	1	2	3	4	5	6	7	8
1. Mastery	-							
2. Tolerability	.432***	-						
3. Negative consequences	-.423***	-.586***	-					
4. Controllability	.484***	.691***	-.669***	-				
5. Predictability	.153	.128	-.130	.170	-			
6. Valence	-.252*	-.566***	.507***	-.525***	-.130	-		
7. Sleep quality	.374**	.452***	-.377**	.416***	.188	-.263*	-	
8. SUD	.036	-.271	.149	-.273	-.084	.246	-.144	-

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

Table F. Correlations between the eight proposed mediators at T4 based on observed values

Measure	1	2	3	4	5	6	7	8
1. Mastery	-							
2. Tolerability	.269*	-						
3. Negative consequences	-.259*	-.537***	-					
4. Controllability	.400***	.676***	-.543***	-				
5. Predictability	-.088	.051	.114	.009	-			
6. Valence	-.170	-.635***	.466***	-.441***	.077	-		
7. Sleep quality	.203	.351**	-.221	.285*	.132	-.206	-	
8. SUD	-.184	-.394***	.212	-.385**	.029	.434***	-.107	-

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

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Table G.
Predictive effects of proposed mediators on nightmare distress based on observed values

Mediator	Model Term	<i>b</i> (<i>SE</i>)	<i>t</i>
Mastery	IE vs. IR	-1.20 (1.30)	-0.93 (ns.)
	Time	-1.68 (0.48)	-3.52**
	Mastery	-0.08 (0.02)	-3.45**
	Time × Mastery	0.02 (0.01)	1.70 (ns.)
	Education	-0.21 (0.97)	-0.22 (ns.)
	Pre_Nightmare Frequency	0.49 (1.07)	0.45 (ns.)
Controllability	IE vs. IR	-2.85 (0.81)	-3.54**
	Time	-2.60 (0.57)	-4.56***
	Controllability	-0.05 (0.01)	-5.02***
	Time × Controllability	0.02 (0.01)	2.08*
	Education	-1.04 (0.61)	-1.70 (ns.)
	Pre_Nightmare Frequency	0.73 (0.67)	1.08 (ns.)
Tolerability	IE vs. IR	-1.36 (1.33)	-1.02 (ns.)
	Time	-1.48 (0.85)	-1.75 (ns.)
	Tolerability	-0.05 (0.02)	-2.72**
	Time × Tolerability	< 0.01 (0.01)	0.32 (ns.)
	Education	0.12 (1.01)	0.12 (ns.)
	Pre_Nightmare Frequency	0.52 (1.11)	0.47 (ns.)
Sleep quality	IE vs. IR	-1.61 (1.34)	-1.20 (ns.)
	Time	-0.46 (0.59)	-0.79 (ns.)
	Sleep quality	-0.03 (0.02)	-1.39 (ns.)
	Time × Sleep quality	-0.02 (0.01)	-1.71 (ns.)
	Education	0.04 (1.02)	0.04 (ns.)
	Pre_Nightmare Frequency	0.98 (1.12)	0.88 (ns.)
SUD	IE vs. IR	-1.52 (1.41)	-1.08 (ns.)
	Time	-0.79 (0.75)	-1.06 (ns.)
	SUD	0.27 (0.24)	1.10 (ns.)
	Time × SUD	-0.12 (0.12)	-1.04 (ns.)
	Education	0.36 (1.10)	0.33 (ns.)
	Pre_Nightmare Frequency	1.04 (1.19)	0.88 (ns.)
Valence	IE vs. IR	-1.77 (1.35)	-1.31 (ns.)
	Time	-1.11 (0.58)	-1.92 (ns.)
	Valence	0.03 (0.02)	1.53 (ns.)
	Time × Valence	< -0.01 (0.01)	-0.66 (ns.)
	Education	0.03 (1.03)	0.03 (ns.)
	Pre_Nightmare Frequency	0.81 (1.13)	0.72 (ns.)

Note. IE = imaginal exposure; IR = imagery rescripting; SUD = Subjective units of distress; WL = wait-list; Significant effects relevant for the interpretation of the results are marked bold.
 * $p < .05$, ** $p < .01$, *** $p < .001$

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Table H.

Predictive effects of proposed mediators on nightmare frequency based on observed values

Mediator	Model Term	<i>b</i> (<i>SE</i>)	<i>t</i>
Mastery	IE vs. IR	0.20 (0.16)	1.28 (ns.)
	Time	-0.06 (0.04)	-1.46 (ns.)
	Mastery	-0.01 (< 0.01)	-2.19*
	Time × Mastery	< 0.01 (< 0.01)	0.67 (ns.)
	Education	< -0.01 (0.12)	-0.02 (ns.)
Controllability	IE vs. IR	0.17 (0.16)	1.05 (ns.)
	Time	-0.06 (0.07)	-0.80 (ns.)
	Controllability	< -0.01 (< 0.01)	-1.19 (ns.)
	Time × Controllability	< -0.01 (< 0.01)	-0.12 (ns.)
	Education	0.01 (0.12)	0.10 (ns.)
Tolerability	IE vs. IR	0.19 (0.26)	1.20 (ns.)
	Time	-0.12 (0.08)	-1.54 (ns.)
	Tolerability	-0.01 (< 0.01)	-2.27*
	Time × Tolerability	< 0.01 (< 0.01)	0.89 (ns.)
	Education	0.03 (0.12)	0.23 (ns.)
Sleep quality	IE vs. IR	0.15 (0.16)	0.96 (ns.)
	Time	0.02 (0.06)	0.27 (ns.)
	Sleep quality	< -0.01 (< 0.01)	-0.34 (ns.)
	Time × Sleep quality	< -0.01 (< 0.01)	-1.61 (ns.)
	Education	0.01 (0.12)	0.11 (ns.)
SUD	IE vs. IR	0.18 (0.16)	1.10 (ns.)
	Time	-0.01 (0.07)	-0.06 (ns.)
	SUD	0.05 (0.03)	1.96 (<i>p</i> = .05)
	Time × SUD	-0.01 (0.01)	-0.63 (ns.)
	Education	0.05 (0.12)	0.37 (ns.)
Valence	IE vs. IR	0.16 (0.16)	1.02 (ns.)
	Time	-0.03 (0.06)	-0.49 (ns.)
	Valence	< 0.01 (< 0.01)	1.48 (ns.)
	Time × Valence	< -0.01 (< 0.01)	-0.82 (ns.)
	Education	0.02 (0.12)	0.19 (ns.)
Neg. consequences	IE vs. IR	0.18 (0.15)	1.19 (ns.)
	Time	0.03 (0.07)	0.48 (ns.)
	Neg. consequences	0.01 (< 0.01)	2.16*
	Time × Neg. consequences	< -0.01 (< 0.01)	-1.66 (ns.)
	Education	0.04 (0.12)	0.31 (ns.)

Note. IE = imaginal exposure; IR = imagery rescripting; SUD = Subjective units of distress; WL = wait-list; Significant effects relevant for the interpretation of the results are marked bold.

p* < .05, *p* < .01, ****p* < .001

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Table J. Multiple mediation analyses based on imputed values

Condition	Dependent Variable	Mediator	Effect of IV on M (a) <i>b</i> (SE), <i>t</i>	Effect of M on DV (b) <i>b</i> (SE), <i>t</i>	Indirect effect (ab) <i>b</i> [95% BC CI]	Direct effect (c') <i>b</i> (SE), <i>t</i>	Total effect (c) <i>b</i> (SE), <i>t</i>
IR vs. WL							
Nightmare Distress		Mastery	-8.65 (2.07), -4.19***	-0.11 (0.05), -2.10*	0.92 [0.13, 2.07]	1.22 (0.92), 1.32	2.41 (0.81), 2.98**
		Tolerability	-8.23 (3.71), -2.22*	-0.03 (0.03), -1.06	0.25 [-0.13, 0.92]	1.22 (0.92), 1.32	2.41 (0.81), 2.98**
		Controllability	-11.50 (3.82), -3.01**	0.00 (0.03), -0.03	0.01 [-0.63, 0.61]	1.22 (0.92), 1.32	2.41 (0.81), 2.98**
Nightmare Frequency		Mastery	-8.45 (2.12), -3.98***	-0.04 (0.04), -1.51	0.32 [-0.02, 0.84]^a	0.36 (0.47), 0.79	0.64 (0.40), 1.66 (<i>p</i> = .13)
		Tolerability	-8.29 (3.68), -2.23*	0.01 (0.01), 0.71	-0.09 [-0.38, 0.18]	0.36 (0.47), 0.79	0.64 (0.40), 1.66 (<i>p</i> = .13)
		Neg. consequ.	1.36 (3.07), 0.44	0.01 (0.01), 0.10	0.01 [-0.12, 0.17]	0.36 (0.47), 0.79	0.64 (0.40), 1.66 (<i>p</i> = .13)
		SUD	0.70 (0.32), 2.21*	0.08 (0.16), 0.50	0.06 [-0.16, 0.55]	0.36 (0.47), 0.79	0.64 (0.40), 1.66 (<i>p</i> = .13)
IE vs. WL							
Nightmare Distress		Mastery	-13.09 (4.28), -3.01**	0.08 (0.05), 1.66	-1.06 [-3.07, 0.30]	6.27 (1.64), 3.83***	7.17 (1.60), 4.48***
		Tolerability	-17.68 (6.10), -2.90**	-0.08 (0.04), -1.97*	1.33 [0.08, 3.41]	6.27 (1.64), 3.83***	7.17 (1.60), 4.48***
		Controllability	-12.12 (7.48), -1.62	-0.05 (0.03), -1.74	0.62 [-0.14, 2.65]	6.27 (1.64), 3.83***	7.17 (1.60), 4.48***
Nightmare Frequency		Mastery	-13.06 (4.25), -3.06*	-0.01 (0.02), 0.60	0.18 [-0.33, 0.94]	1.34 (0.80), 1.68	1.39 (0.72), 1.93 (<i>p</i> = .06)
		Tolerability	-17.69 (6.06), -2.87*	-0.02 (0.01), -1.18	0.36 [-0.10, 1.06]^b	1.34 (0.80), 1.68	1.39 (0.72), 1.93 (<i>p</i> = .06)
		Neg. consequ.	5.93 (6.74), 0.88	0.00 (0.01), -0.35	-0.03 [-0.45, 0.17]	1.34 (0.80), 1.68	1.39 (0.72), 1.93 (<i>p</i> = .06)
		SUD	1.47 (0.66), 2.25*	-0.30 (0.14), -2.18*	-0.46 [-1.25, -0.05]	1.34 (0.80), 1.68	1.39 (0.72), 1.93 (<i>p</i> = .06)

Note. a = effect of group on mediator; b = effect of mediator on outcome; BC CI = Bootstrap-corrected confidence interval (based on 50,000 samples); c = total effect of group on outcome (without the influence of the mediators in the model); c' = effect of group on outcome when controlled for all mediators in the multiple mediation model; DV = dependent variable; IE = imaginal exposure; IR = imagery rescripting; IV = independent variable; M = mediator; WL = wait-list. Significant indirect effects relevant for the interpretation of the results are marked bold.

p* < .05, *p* < .01, ****p* < .001

^a*b* = 0.32, 90% BC CI [0.03, 0.75]

^b*b* = 0.36, 90% BC CI [-0.01, 0.93]