

1 **APENDIXES**2 Supplemental Table 1. Characteristics of participants and non-participants at **baseline**

	Non-participants	Participants	P-value
N	200	52	-
Age, years	62, 56-68	65, 63-71	0.002
Male, %	42.0	36.5	0.477
Height, m	158, 151-164	156, 149-165	0.207
Body mass index, kg/m <sup>2</sup>	24.1, 21.2-26.5	24.1, 21.1-25.9	0.966
Job, %			
No job	18.5	30.7	0.053
Homemaker	13.5	23.1	0.090
Farmer	15.0	21.2	0.286
Other office worker	53.0	25.0	<0.001
Depressive symptom, %	8.5	7.7	0.852
Pain duration, %			
3 months to 1 year	11.0	21.6	0.046
1 to 5 years	27.0	27.5	0.949
5 to 15 years	32.5	23.5	0.217
15 years or longer	29.5	27.5	0.775
Pain frequency, %			
3 days or less per week	49.0	35.3	0.080
4 days or more per week	51.0	64.7	0.080
Pain intensity (NRS)			
Rating, points	5.1, 4-6	5.7, 4-7	0.043
Severity, %			
Mild (0 to 3)	23.0	19.6	0.605
Medium (4 to 6)	52.5	37.3	0.052
Severe (7 to 10)	24.5	43.1	0.008

Proportions for category variables, and average, **lower and upper quartile** values for continuous variables; Statistical significance was set at P-value < 0.05.  
NRS, numeric rating scale.

4 Supplemental Table 2. Mixed-effect model of additional effects of brief self-exercise education (brief-See) on 4-, 12-, and 24-week changes in  
 5 **pain-related outcomes** from baseline compared to material-based education

	<b>Averages, lower-upper quartiles</b>		<b>Estimated mean changes from baseline within group</b>				<b>Additional effects of brief-See</b>	
	Material-based	brief-See	Material-based		brief-See		Values [95% CI]	P-value
			Values [95% CI]	P-value	Values [95% CI]	P-value		
<b>NRS</b>								
Baseline	5.1, 4-6	5.3, 4-7	Reference (lower is better)		Reference		Reference	
4-week	4.0, 1-6	3.2, 2-4	-1.3 [-2.9, -1.4]	0.004	-2.1 [-2.9, -1.4]	<0.001	-1.0 [-1.5, 0.3]	0.079
12-week	3.5, 2-6	3.2, 2-4	-1.6 [-2.4, -0.9]	<0.001	-2.2 [-2.9, -1.4]	<0.001	-0.5 [-1.6, 0.6]	0.353
24-week	4.0, 2-5	4.0, 2-5	-1.2 [-1.9, -0.4]	0.004	-1.4 [-2.1, -0.6]	0.001	-0.2 [-1.3, 0.6]	0.702
Overall	-	-	-1.3 [-2.0, -0.4]	<0.001	-1.9 [-2.5, -1.2]	<0.001	-0.6 [-1.5, 0.3]	0.224
<b>RDQ</b>								
Baseline	5.1, 1-9	4.7, 1-7	Reference (lower is better)		Reference		Reference	
4-week	5.4, 2-8	2.4, 1-4	0.0 [-1.2, 1.2]	0.973	-2.3 [-3.5, -1.2]	<0.001	-2.3 [-4.0, -0.7]	0.007
12-week	4.5, 0-8	2.2, 0-3	-0.7 [-1.9, 0.6]	0.280	-2.5 [-3.7, -1.3]	<0.001	-1.8 [-3.5, -0.2]	0.033
24-week	5.1, 1-9	2.6, 0-4	-0.1 [-1.3, 1.1]	0.829	-2.2 [-3.3, -1.0]	<0.001	-2.0 [-3.7, -0.4]	0.018
Overall	-	-	-0.3 [-1.3, 0.8]	0.611	-2.3 [-3.3, -1.3]	<0.001	-2.1 [-3.5, -0.7]	0.005
<b>PSEQ</b>								
Baseline	44, 37-52	40, 31-50	Reference (higher is better)		Reference		Reference	
4-week	45, 38-50	48, 42-56	1.1 [-3.2, 5.4]	0.605	7.6 [3.5, 11.7]	<0.001	6.5 [0.5, 12.4]	0.033
12-week	47, 41-52	50, 47-58	3.1 [-1.2, 7.4]	0.161	10.3 [6.2, 14.4]	<0.001	7.2 [1.2, 13.2]	0.018
24-week	43, 32-52	47, 40-57	-0.2 [-4.5, 4.0]	0.917	6.9 [2.7, 11.0]	<0.001	7.1 [1.2, 13.0]	0.020
Overall	-	-	1.3 [-2.4, 5.0]	0.479	8.2 [4.6, 11.8]	<0.001	6.9 [1.7, 12.1]	0.010
<b>EQ-5D</b>								
Baseline	0.83, 0.71-0.90	0.79, 0.76-0.90	Reference (higher is better)		Reference		Reference	
4-week	0.82, 0.73-0.90	0.87, 0.83-0.90	0.01 [-0.04, 0.05]	0.804	0.08 [0.04, 0.12]	<0.001	0.07 [0.01, 0.13]	0.016
12-week	0.84, 0.76-0.90	0.88, 0.87-0.90	0.02 [-0.03, 0.06]	0.421	0.09 [0.05, 0.13]	<0.001	0.07 [0.01, 0.13]	0.022
24-week	0.81, 0.74-0.90	0.86, 0.83-0.90	-0.01 [-0.05, 0.04]	0.804	0.07 [0.02, 0.11]	0.003	0.07 [0.01, 0.13]	0.022
Overall	-	-	0.01 [-0.03, 0.04]	0.736	0.08 [0.04, 0.11]	<0.001	0.07 [0.02, 0.12]	0.004

Estimated mean changes from baseline, 95% confidential intervals (CI), and P-values were shown; Pain intensity, pain disability, self-efficacy, and quality of life were evaluated by using numeric rating scale (NRS), Roland-Morris disability questionnaire (RDQ), pain self-efficacy questionnaire (PSEQ), and Euro quality of life 5 dimensions (EQ-5D) score, respectively; Statistical significance was set at P-value < 0.05.

8 Supplemental Table 3. Mixed-effect model of additional effects of brief self-exercise education (brief-See) on 4-, 12-, and 24-week changes in  
 9 pain-related outcomes from baseline compared to material-based education (only for participants with 1 time or more frequency of self-exercise)  
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	Averages, lower-upper quartiles		Estimated mean changes from baseline within group				Additional effects of brief-See	
	Material-based	brief-See	Material-based		brief-See		Values [95% CI]	P-value
			Values [95% CI]	P-value	Values [95% CI]	P-value		
<b>NRS</b>								
Baseline	5.1, 4-6	5.3, 4-7	Reference (lower is better)		Reference		Reference	
4-week	3.7, 1-6	3.0, 2-4	-1.1 [-1.9, -0.3]	0.010	-2.2 [-2.9, -1.4]	<0.001	-1.1 [-2.2, 0.1]	0.062
12-week	3.5, 2-6	3.0, 2-4	-1.5 [-2.3, -0.6]	0.001	-2.2 [-2.9, -1.4]	<0.001	-0.8 [-1.9, 0.3]	0.297
24-week	3.9, 2-5	4.0, 2-6	-1.2 [-2.0, -0.4]	0.005	-1.3 [-2.1, -0.6]	<0.001	-0.1 [-1.2, 1.0]	0.827
Overall	-	-	-1.3 [-2.0, -0.6]	0.007	-1.9 [-2.5, -1.3]	<0.001	-0.7 [-1.6, 0.3]	0.159
<b>RDQ</b>								
Baseline	4.4, 1-9	4.7, 1-8	Reference (lower is better)		Reference		Reference	
4-week	4.4, 2-7	2.4, 1-4	-0.2 [-1.5, 1.2]	0.816	-2.4 [-3.6, -1.2]	<0.001	-2.2 [-4.0, -0.5]	0.014
12-week	4.1, 0-8	2.2, 0-3	-0.7 [-2.0, 0.7]	0.336	-2.5 [-3.7, -1.3]	<0.001	-1.9 [-3.7, -0.1]	0.044
24-week	4.2, 1-7	2.6, 0-5	-0.5 [-1.9, 0.8]	0.440	-2.1 [-3.3, -0.9]	<0.001	-1.6 [-3.3, -0.2]	0.009
Overall	-	-	-0.5 [-1.6, 0.7]	0.429	-2.3 [-3.3, -1.3]	<0.001	-1.9 [-3.4, -0.4]	0.015
<b>PSEQ</b>								
Baseline	42, 34-48	40, 31-50	Reference (higher is better)		Reference		Reference	
4-week	43, 39-49	47, 42-57	0.6 [-4.3, 5.6]	0.800	7.5 [3.2, 11.8]	<0.001	6.9 [0.3, 13.4]	0.040
12-week	44, 39-51	51, 48-58	2.8 [-2.2, 7.8]	0.264	10.2 [5.9, 14.5]	<0.001	7.4 [0.8, 14.0]	0.029
24-week	42, 30-49	47, 40-59	-0.2 [-5.1, 4.8]	0.950	6.7 [2.4, 11.1]	0.003	7.9 [0.3, 13.5]	0.041
Overall	-	-	1.1 [-3.3, 5.5]	0.616	8.2 [4.3, 12.0]	<0.001	7.0 [1.2, 12.9]	0.018
<b>EQ-5D</b>								
Baseline	0.82, 0.71-0.90	0.79, 0.73-0.90	Reference (higher is better)		Reference		Reference	
4-week	0.83, 0.74-0.90	0.87, 0.83-0.90	0.00 [-0.05, 0.05]	0.877	0.08 [0.04, 0.12]	<0.001	0.08 [0.01, 0.14]	0.021
12-week	0.84, 0.77-0.90	0.88, 0.87-0.90	0.03 [-0.02, 0.08]	0.270	0.09 [0.05, 0.14]	<0.001	0.07 [0.00, 0.13]	0.051
24-week	0.80, 0.74-0.90	0.86, 0.83-0.90	-0.02 [-0.07, 0.03]	0.484	0.07 [0.02, 0.11]	0.004	0.08 [0.02, 0.15]	0.014
Overall	-	-	0.00 [-0.04, 0.05]	0.814	0.08 [0.04, 0.12]	<0.001	0.08 [0.02, 0.13]	0.006

Estimated mean changes from baseline, 95% confidential intervals (CI), and P-values were shown; Pain intensity, pain disability, self-efficacy, and quality of life were evaluated by using numeric rating scale (NRS), Roland-Morris disability questionnaire (RDQ), pain self-efficacy questionnaire (PSEQ), and Euro quality of life 5 dimensions (EQ-5D) score, respectively; Statistical significance was set at P-value < 0.05.

12 Supplemental Table 4. Group differences between brief self-exercise education (brief-See) and material-based education in frequency of self-  
 13 exercise, global improvement and satisfaction at 4-, 12-, and 24-week after the initial **intervention**  
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		Proportions		Additional effects of brief-See	
		Material-based	brief-See	Values [95% CI]	P-value
Frequency of self-exercise					
4 days or more per week, %	4-week	30.4	73.1	42.9 [15.9, 69.9]	0.002
	12-week	36.4	42.3	7.0 [-20.3, 34.2]	0.613
	24-week	34.8	32.0	-1.7 [-28.9, 25.5]	0.904
1 day or more per week, %	4-week	73.9	92.3	17.5 [-4.1, 39.1]	0.112
	12-week	86.4	88.5	5.3 [-16.5, 27.1]	0.631
	24-week	78.3	76.0	-2.1 [-23.9, 19.7]	0.849
Global improvement for back pain					
Improved or more, %	4-week	34.8	76.9	41.9 [16.4, 67.5]	0.002
	12-week	54.5	84.6	30.4 [4.7, 56.2]	0.021
	24-week	52.2	80.0	30.4 [4.6, 56.1]	0.021
Global satisfaction for the education					
Satisfied or more, %	4-week	56.5	96.2	43.4 [21.7, 65.1]	<0.001
	12-week	68.2	96.2	29.4 [7.6, 51.2]	<0.001
	24-week	47.8	92.0	47.6 [25.8, 69.4]	<0.001
Change of NRS from baseline					
30% improvement, %	4-week	39.1	69.2	29.4 [1.4, 57.5]	0.040
	12-week	54.5	65.4	6.8 [-21.5, 35.1]	0.635
	24-week	43.5	48.0	3.5 [-24.8, 31.8]	0.806
Change of RDQ from baseline					
30% improvement, %	4-week	26.3	62.5	36.6 [8.3, 64.9]	0.012
	12-week	44.4	79.2	32.6 [3.9, 61.3]	0.026
	24-week	31.6	73.9	42.5 [13.9, 71.1]	0.004

Estimated mean group differences, 95% confidential intervals (CI), and P-values were shown; Pain intensity and functional limitation were evaluated by using numeric rating scale (NRS) and Roland-Morris disability questionnaire (RDQ), respectively; Statistical significance was set at P-value < 0.05.

16 Supplemental Table 5. Sensitivity analysis of participants' characteristics for 4-, 12-, and 24-week mean changes in pain intensity and functional  
 17 limitation from baseline

		NRS (lower is better)		RDQ (lower is better)	
		Within	Between	Within	Between
Age	40 to 64 years	-1.9 [-2.7, -1.1]	Reference	-2.4 [-3.6, -1.1]	Reference
	65 to 74 years	-1.5 [-2.0, -0.7]	0.4 [-0.5, 1.4]	-0.7 [-1.6, 0.2]	1.6 [0.1, 3.2]
Sex	Female	-1.2 [-1.8, -0.7]	Reference	-1.7 [-2.7, -0.8]	Reference
	Male	-2.3 [-3.1, -1.6]	-1.1 [-2.0, -0.2]	-0.7 [-2.0, 0.6]	1.0 [-0.6, 2.6]
Overweight	Absent	-1.5 [-2.1, -1.0]	Reference	-1.1 [-1.9, -0.2]	Reference
	Present	-1.9 [-2.7, -1.0]	-0.4 [-1.4, 0.6]	-1.8 [-3.2, -0.4]	-0.7 [-2.3, 1.0]
Pain frequency	3 days or less	-1.5 [-2.3, -0.7]	Reference	-1.3 [-2.6, 0.0]	Reference
	4 days or more	-1.6 [-2.3, -0.9]	-0.1 [-1.1, 0.8]	-1.3 [-2.3, -0.4]	0.0 [-1.6, 1.6]
Pain consultation	Non-user	-1.8 [-2.4, -1.2]	Reference	-1.8 [-2.8, -0.8]	Reference
	User	-1.3 [-2.0, -0.7]	0.5 [-0.4, 1.4]	-0.8 [-1.9, 0.3]	1.0 [-0.6, 2.5]
Pain medication	Non-user	-1.7 [-2.2, -1.2]	Reference	-1.4 [-2.2, -0.5]	Reference
	User	-1.4 [-2.2, -0.5]	0.3 [-0.7, 1.4]	-1.3 [-2.8, 0.2]	0.0 [-1.7, 1.8]
Psychometric factors	Low risk	-1.7 [-2.2, -1.1]	Reference	-1.2 [-2.2, -0.3]	Reference
	Medium to high risk	-1.5 [-2.3, -0.7]	0.1 [-0.8, 1.1]	-1.6 [-2.8, -0.3]	-0.3 [-1.9, 1.2]
Self-exercise frequency*	0 to 1 day	-0.8 [-2.0, 0.3]	Reference	-0.7 [-2.7, 1.2]	Reference
	1 to 4 days	-1.1 [-1.9, -0.3]	-0.3 [-1.6, 1.1]	-1.0 [-2.4, 0.4]	-0.3 [-2.7, 2.1]
	4 days or more	-2.1 [-2.7, -1.5]	-1.3 [-2.6, 0.0]	-1.8 [-2.8, -0.7]	-1.0 [-3.3, 1.2]

\*Frequency per week at 4 weeks after the initial intervention; Estimated mean differences, and 95% confidential intervals were shown; Overweight was defined as 25 kg/m<sup>2</sup> or greater in body mass index; Pain intensity and functional limitation were evaluated by using numeric rating scale (NRS) and Roland-Morris disability questionnaire (RDQ), respectively.

19 Supplemental Table 6. Sensitivity analysis of participants' characteristics for 4-, 12-, and 24-week mean change in self-efficacy and quality of  
 20 life from baseline

		PSEQ (higher is better)		EQ-5D (higher is better)	
		Within	Between	Within	Between
Age	40 to 64 years	7.8 [3.3, 12.3]	Reference	0.07 [0.03, 0.11]	Reference
	65 to 74 years	3.3 [0.0, 6.6]	-4.5 [-10.1, 1.1]	0.03 [-0.01, 0.06]	-0.05 [-0.10, 0.00]
Sex	Female	4.4 [1.1, 7.8]	Reference	0.04 [0.01, 0.07]	Reference
	Male	5.7 [1.2, 10.2]	1.2 [-4.4, 6.9]	0.05 [0.00, 0.11]	0.02 [-0.04, 0.07]
Overweight	Absent	4.5 [1.4, 7.5]	Reference	0.04 [0.01, 0.06]	Reference
	Present	5.8 [0.8, 10.8]	1.3 [-4.6, 7.2]	0.06 [0.01, 0.11]	0.02 [-0.04, 0.07]
Pain frequency	3 days or less	7.0 [2.5, 11.6]	Reference	0.05 [0.00, 0.09]	Reference
	4 days or more	3.7 [0.3, 7.1]	-3.3 [-9.0, 2.3]	0.04 [0.00, 0.07]	-0.01 [-0.06, 0.04]
Pain consultation	Non-user	7.6 [4.1, 11.0]	Reference	0.05 [0.01, 0.08]	Reference
	User	1.4 [-2.6, 5.3]	-6.2 [-11.4, -1.0]	0.04 [0.00, 0.08]	-0.01 [-0.06, 0.04]
Pain medication	Non-user	5.2 [2.1, 8.3]	Reference	0.03 [0.00, 0.06]	Reference
	User	3.9 [-1.3, 9.2]	-1.3 [-7.4, 4.8]	0.08 [0.03, 0.13]	0.04 [-0.01, 0.10]
Psychometric factors	Low risk	4.8 [1.5, 8.1]	Reference	0.03 [0.00, 0.06]	Reference
	Medium to high risk	5.1 [0.6, 9.6]	0.3 [-5.3, 5.8]	0.06 [0.02, 0.11]	0.04 [-0.02, 0.09]
Self-exercise frequency*	0 to 1 day	3.5 [-3.4, 10.4]	Reference	0.01 [-0.05, 0.08]	Reference
	1 to 4 days	2.7 [-2.3, 7.6]	-0.8 [-9.4, 7.7]	0.04 [-0.01, 0.08]	0.02 [-0.06, 0.11]
	4 days or more	7.0 [3.2, 10.7]	3.5 [-4.4, 11.4]	0.06 [0.03, 0.10]	0.05 [-0.03, 0.12]

\*Frequency per week at 4 weeks after the initial intervention; Estimated mean differences, and 95% confidential intervals were shown; Overweight was defined as 25 kg/m<sup>2</sup> or greater in body mass index; Self-efficacy and quality of life were evaluated by using pain self-efficacy questionnaire (PSEQ) and Euro quality of life 5 dimensions (EQ-5D) score, respectively.