Supplementary Material

1. Descriptive data

Table S1 **Descriptive data for the self-report outcomes on this study.**

	Control group			NF group		
Nb participants	23			25		
Gender	11 women/12 men			13 women/12 men		
	Mean	*SD*	*Min-Max*	*Mean*	*SD*	*Min-Max*
Age	32.9	10.7	18-56	33.6	10.9	20-60
***STAI-Y-A* score in PRE session phases**	33.26	10.27	20-63	31.48	9.49	20-71
***STAI-Y-A* score in POST session phases**	28.64	8.12	20-53	28.97	9.66	20-71
***relax-VAS* score in PRE session phases**	6.37	2.32	0.9-10	6.42	2.28	0.15-9.95
***relax-VAS* score in POST session phases**	7.54	1.75	1.4-10	7.27	1.91	0.1-10
***STAI-Y-A* score at the start of the program**	33.48	8.6	21-51	32.2	7.65	20-47
***STAI-Y-A* score at the end of the program**	27.17	8.33	20-49	26.48	7.06	20-45
***relax-VAS* score at the start of the program**	6.20	2.45	0.9-9.95	6.64	2.07	2.05-9.1
***relax-VAS* score at the end of the program**	7.84	1.65	3.2-10	7.48	1.91	2.2-10
Feeling of control at the start of the program	3.38	2.86	0-10	4.03	2.67	0-9.7
Feeling of control at the end of the program	5.16	2.98	0.2-10	5.55	2.57	0.1-10
Pre-program *STAI-Y-B*	41.09	9.28	25-62	39.6	8.19	25-56

Post-program *STAI-Y-B*	39.61	8.44	27-55	38.96	7.15	27-56
Pre-program positive affects (PANAS)	35.7	5.94	21-47	35.76	5.73	28-44
Post-program positive affects (PANAS)	35.65	7.77	17-50	33.54	7.06	18-48
Pre-program negative affects (PANAS)	18.48	6.24	11-30	18.36	5.98	10-32
Post-program negative affects (PANAS)	18.17	5.73	11-30	18.46	7.68	11-44
Pre-program PSS	37.57	7.07	26-54	37.08	6.47	22-49
Post-program PSS	35.87	8.06	18-53	37.04	7.24	24-52

2. Socio-demographic data

Table S2 **Education level at the first session for each group.** The numbers indicate how many participants were in each condition.

Groups	Cannot read or write	No formal education but can read	Primary education	Secondary education	University education
control	0	0	0	4	19
NF	0	0	0	3	22

Table S3 **Profession category at the first session for each group.** The profession categories were the following: A) Administration, B) Art and Culture, C) Business and Support, D) Finance, E) Management, F) Medical, G) Research and Data Analysis, H) Teacher, I) Technical and Engineering development, J) Student, K) Other. The numbers indicate how many participants were in each condition.

Groups	A	B	C	D	E	F	G	H	I	J	K
NF	2	4	2	0	5	0	4	1	4	3	0
control	0	2	3	1	0	3	2	2	7	2	1

Table S4 **Practice of sport reported at the first session by the participants of each group.** The numbers indicate how many participants were in each category of sport practice (from never practicing sport to practicing sport everyday).

Groups	Never	Rarely	Sometimes	Often	Everyday
NF	4	0	1	18	2
control	6	0	6	9	2

Table S5 **Practice of music reported at the first session by the participants of each group.** The numbers indicate how many participants were in each category of music practice (from never practicing music to practicing music everyday).

Groups	Never	Rarely	Sometimes	Often	Everyday
NF	12	0	2	10	1
control	14	0	3	5	0

Table S6 **Practice of meditation/sophrology/relaxation reported at the first session by the participants of each group.** The numbers indicate how many participants were in each category of meditation/sophrology/relaxation practice (from never practicing to practicing everyday).

Groups	Never	Rarely	Sometimes	Often	Everyday
NF	16	1	5	3	0
control	17	0	2	3	1

Table S7 **Practice of art reported at the first session by the participants of each group.** The numbers indicate how many participants were in each category of art practice (from never practicing art to practicing art everyday).

Groups	Never	Rarely	Sometimes	Often	Everyday
NF	17	0	2	2	4
control	16	0	3	1	2

3. Reported mental strategies

At the end of each session, participants had a debriefing questionnaire in which they were asking to report the strategies used during the entire session. We decomposed the strategies as the following:

- Projection in memories: the user thought about memories that arose from listening to the landscape sound proposed during the exercise
- Body awareness: the user was focused on part(s) of his/her body or on his/her breathing or did cardiac coherence
- Visualization/Attentional focus on sounds: the subject was focused on the landscape sound (the NF indexes or the environmental sound) proposed during exercise
- Attention defocusing: the user reported to have no specific strategy; he/she thought to nothing and cleared his/her head of any thought
- Body and mental relaxation: the subject tried to relax
- Several strategies: the user used several of the previous strategies during the NF session
- Others: counting, imagination of a story not related to the landscape sound, meditation, etc.

Here, we reported the proportion of each strategy (according to the previous categorization) in each group for the entire program (Supplementary Fig. S1). From Supplementary Fig. S1, it can be seen that for both groups, the most frequently used strategies were the focus on the landscape sound and the attention defocusing.

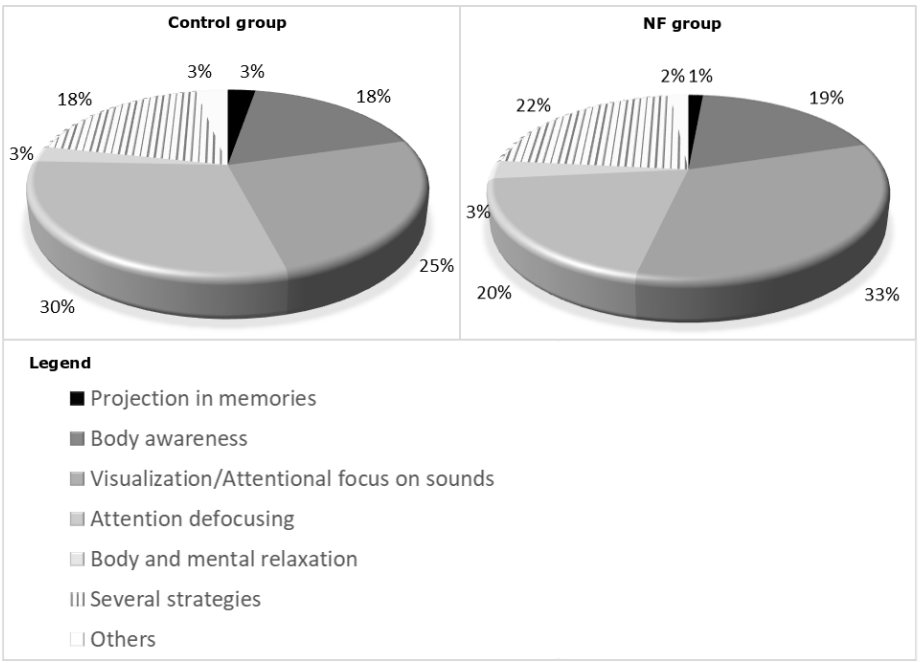

Fig. S1 **Strategies used in each group.**

4. Available data

Table S8 **Details of available data across subjects and the 12 NFT sessions for each group.** The number of participants in each group as well as the cumulative number of sessions are presented for the NF and control groups. The cumulative numbers of self-report questionnaires filled in across sessions and participants in each group are also presented. For each group, the percentage of achieved sessions and completed questionnaires is computed, based on the collected data and the theoretical cumulative numbers without missing data.

			Self-report questionnaires				
	nb of users	**nb of sessions**	***STAI-Y-A***	***relax-VAS***	***STAI-Y-B***	**PSS**	**PANAS**
NF group	25	298 (99.3%)	583 (97.17%)	596 (99.33%)	49 (98%)	49 (98%)	49 (98%)
Control group	23	275 (99.64%)	551 (99.8%)	552 (100%)	46 (100%)	46 (100%)	46 (100%)

5. NF index and feeling of control across exercises: U-curves

5.1. NF index

We first visualize, in each group, the NF index values across each session (Fig. S2 and S3). In both figures Fig. S2 and S3, we observed for most of the sessions, a quadratic progression of the NF index values across the 21-minute training drawing a U-curve.

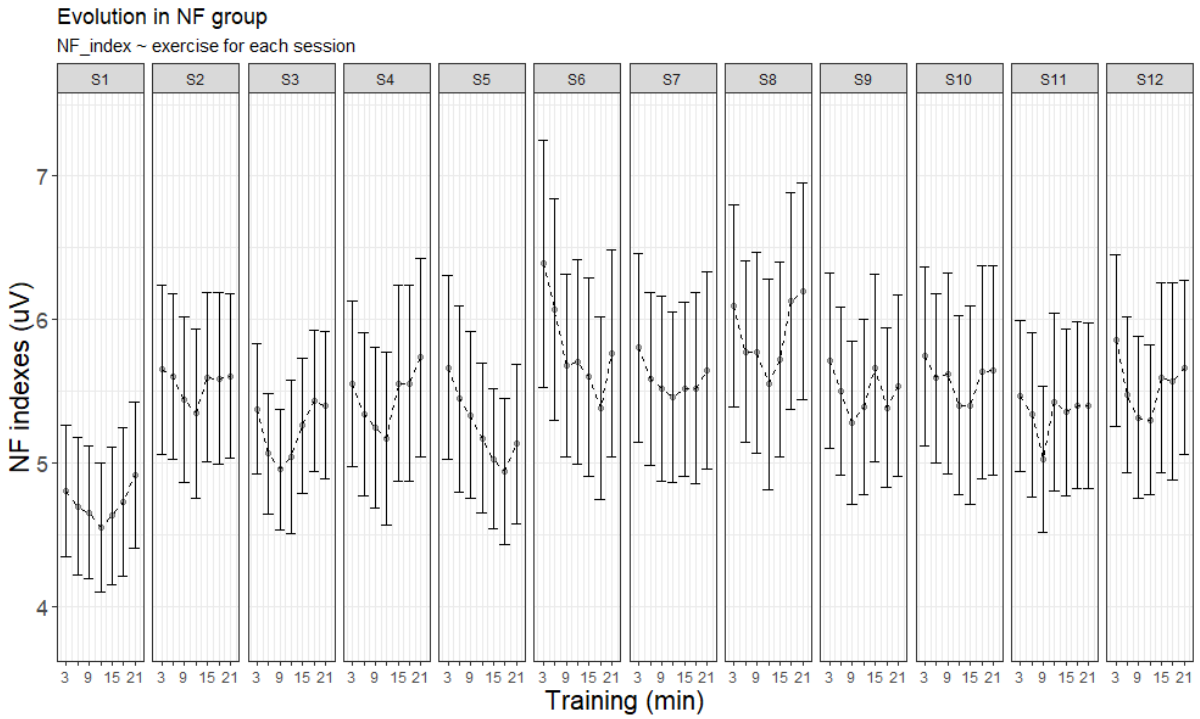

Fig. S2: **Evolution of NF index across the 21-minutes training for each session in the NF group.** The dot line represents the averaged progression of values across the 21-minute training. The error bars around the dot line is the standard error of values. Graphs were obtained with R software (v.4.0.2; R Core Team, 2020).

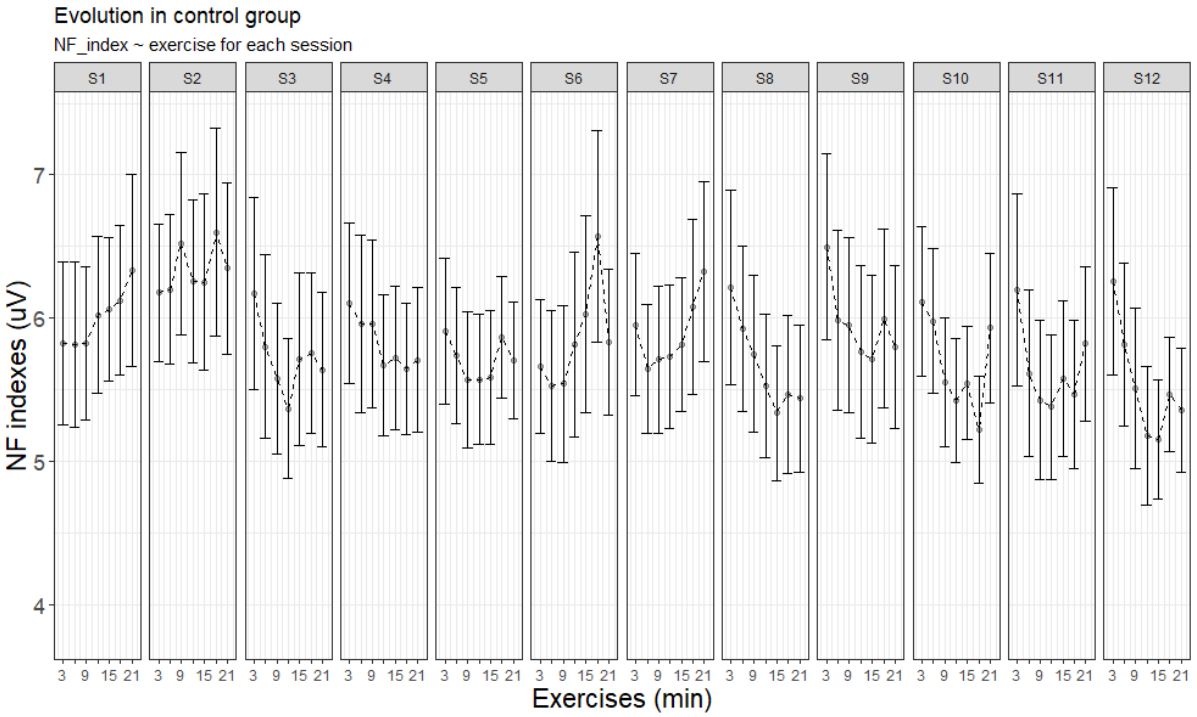

Fig. S3: **Evolution of NF index across the 21-minutes training for each session in the control group.** Same legend as in Supplementary Fig. S2. Graphs were obtained with R software (v.4.0.2; R Core Team, 2020).

To confirm this observation, we did two Linear Mixed Models (LMM):

- One model (M_{lin}) that tested the linear effect of exercises, with exercises 1 to 7 coded as 0, 1, 2, 3, 4, 5, 6
- One model (M_{quad}) that tested the quadratic effect of exercises, with exercises 1 to 7 coded as 9, 4, 1, 0, 1, 4, and 9.

The results obtained for each model are presented in Tables S9, S10, S11 and S12.

Table S9 **Results of M_{lin} for NF index analysis.** We used an LMM including a random effect structure with random intercept by participant and fixed effects for exercise (coded as a linear term), session, group, and the two-ways interactions between exercise and group and between session and group. The NF group at the first session was set as the level of reference in order to specifically estimate the effects of NFT in this group. Thus, the parameter estimates for the effect of exercise (resp. session) corresponded to the effect of these factors in the NF group, the group[control] effect denoted the overall difference between the control and the NF group, the exercise:group [control] and session:group [control] denoted the interaction between exercise and group and between session and group respectively, estimated as the difference in parameter estimates for the exercise effect (resp. the session effect) in the control relative to the NF group. The model was fit using the Maximum

Likelihood (ML) approach as we are interested in the legitimacy of a fixed effect (exercise) in the model. β is the parameter estimate for each of the described fixed effects; 95% CI is the 95% Confidence Interval. AIC is the Akaike Information Criterion; BIC is Bayesian Information Criterion; conditional R2 is the model's total explanatory power; marginal R2 is the part of the model's explanatory power related to the fixed effects alone; Std. Dev. for standard deviation.

Fixed effects	**Parameters**	β	**95% CI**	
	(Intercept) **exercise** session group [control] exercise:group [control] session:group [control]	5.25 **-9.92e-03** 0.04 0.85 -0.01 -0.08	[4.27, 6.24] **[-0.04, 0.02]** [0.03, 0.06] [-0.57, 2.28] [-0.05, 0.02] [-0.10, -0.06]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) residual	6.233 1.603	2.497 1.266	- -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	13559.45	**13609.82**	0.80	6.82e-03

Table S10 **Analysis of variance from the M_{lin} for NF index analysis**. We computed type III Analysis of Variance on the LMM of the Table S9 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	Sum Squares	NumDF	DenDF	Mean Square	F	p	Eta2 (partial)
exercise	4.82	1	3960.0	4.82	3.01	**0.083**	7.59e-04
session	0.22	1	3960.0	0.22	0.14	0.710	3.48e-05
group [control]	2.21	1	49.4	2.21	1.38	0.246	0.03
exercise:group [control]	0.89	1	3960.0	0.89	0.55	0.457	1.40e-04
session:group [control]	79.94	1	3960.0	79.94	49.86	< .001	0.01

Table S11 **Results of M_{quad} for NF index analysis.** The approach was identical to the one described in Table S9, except that the exercise fixed effect was coded as a quadratic term**.** See Supplementary Table S9 for table description.

	Parameters	β	**95% CI**	
Fixed effects	(Intercept) **exercise** session group [control] exercise:group [control] session:group [control]	5.09 **0.03** 0.04 0.81 -4.63e-04 -0.08	[4.10, 6.07] **[0.02, 0.05]** [0.03, 0.06] [-0.61, 2.24] [-0.02, 0.02] [-0.10, -0.06]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) residual	6.234 1.591	2.497 1.261	- -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	13529.18	**13579.55**	0.80	8.35e-03

Table S12 **Analysis of variance from the M_{quad} for NF index analysis**. We computed type III Analysis of Variance on the LMM of the Table S11 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	**Sum Squares**	**Num DF**	**DenDF**	**Mean Square**	**F**	**p**	**Eta2 (partial)**
exercise	53.78	1	3960.0	53.78	33.80	**< .001**	8.46e-03
session	0.22	1	3960.0	0.22	0.14	0.713	3.42e-05
group [control]	1.98	1	49.1	1.98	1.25	0.270	0.02
exercise:group [control]	2.58e-03	1	3960.0	2.58e-03	1.62e-03	0.968	4.09e-07
session:group [control]	79.93	1	3960.0	79.93	50.24	< .001	0.01

These analyses showed that the linear effect of exercise was not significant, as tested in M_{lin} ($F(1, 3960) = 3.01$, $p = 0.083$; Table S10), whereas there was a statistically significant quadratic effect for this factor, as tested in M_{quad} ($F(1, 3960) = 33.8$, $p < .001$; Table S12). Moreover, lower values of AIC and BIC were observed for M_{quad} than for M_{lin}, confirming that the M_{quad} model better fitted the observed NF index values than M_{lin}.

5.2. Feeling of control

The approach was identical to that for NF index analysis. The progression of feeling of control assessments across each session (see Fig. S4 and Fig. S5) seemed to follow the same dynamic (U-curve) as for the NF index values. To confirm this observation, we fitted the same M_{lin} and M_{quad} models as previously on the feeling of control values (see Tables S13, S14, S15 and S16). In Table S14, we observed that the linear effect of exercise was not significant, as tested in M_{lin} ($F(1, 3955) = 1.71e\text{-}03$, $p = 0.967$; Table S14), whereas there was a statistically significant quadratic effect of exercise, as tested in M_{quad} ($F(1, 3955) = 17.30$, $p < 0.001$; Table S16). Moreover, lower values of AIC and BIC were observed for M_{quad} than for M_{lin}, confirming that the M_{quad} model better fitted the observed NF index values than M_{lin}.

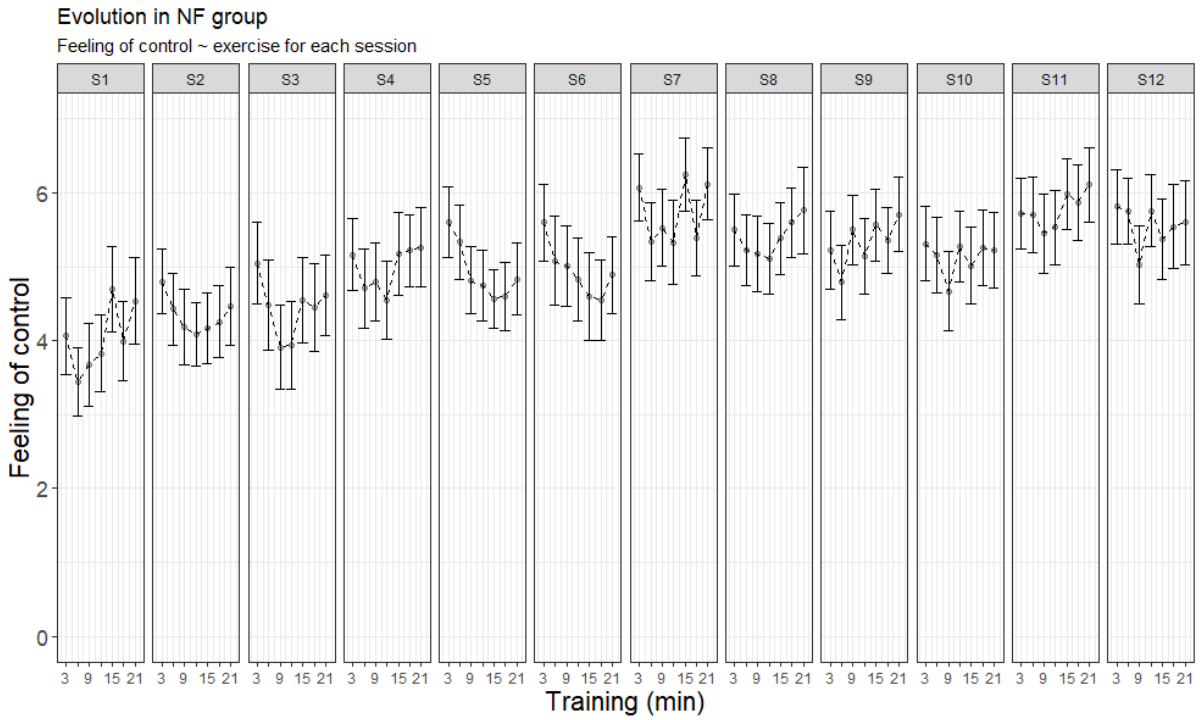

Fig. S4: **Evolution of feeling of control across the 21-minutes training for each session in the NF group.** Same legend as in Supplementary Fig. S2. Graphs were obtained with R software (v.4.0.2; R Core Team, 2020).

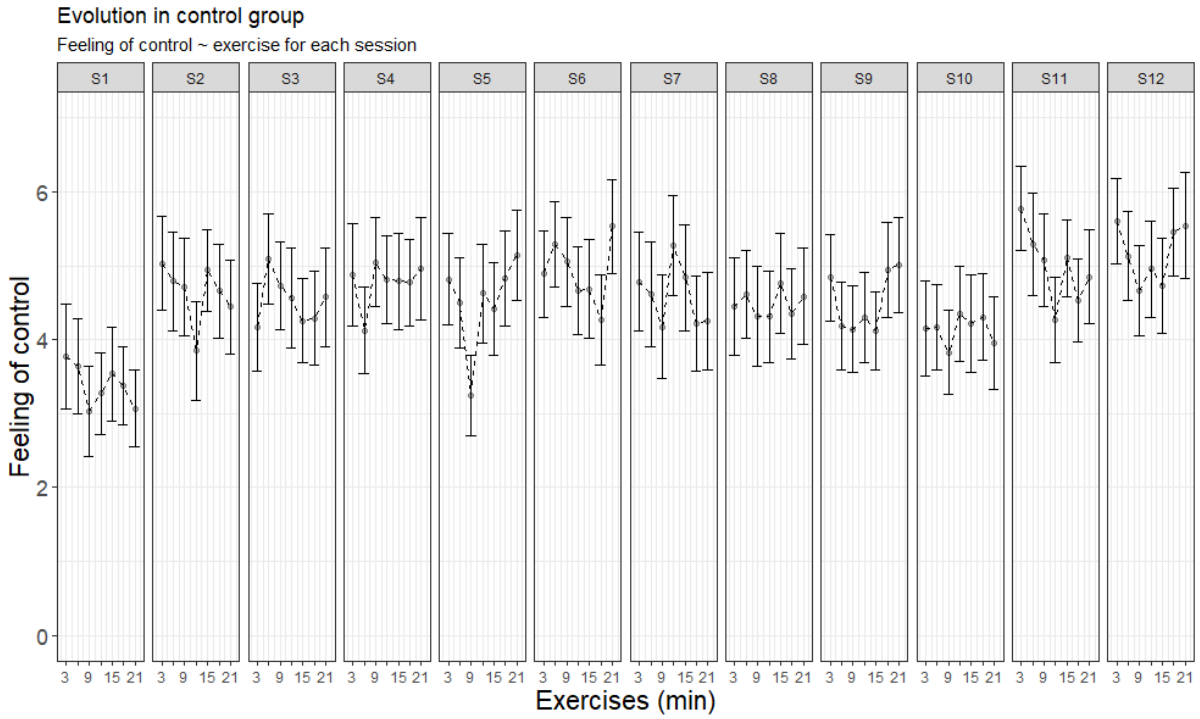

Fig. S5: **Evolution of feeling of control across the 21-minutes training for each session in the control group.** Same legend as in Supplementary Fig. S2. Graphs were obtained with R software (v.4.0.2; R Core Team, 2020).

Table S13 **Results of M_{lin} for feeling of control analysis.** The approach was identical to the one described in Table S9**.** See Supplementary Table S9 for table description.

Fixed effects	**Parameters**	β	**95% CI**	
	(Intercept)	4.32	[3.57, 5.07]	
	exercise	0.01	[-0.03, 0.06]	
	session	0.12	[0.10, 0.15]	
	group [control]	-0.08	[-1.16, 1.00]	
	exercise:group [control]	-0.02	[-0.09, 0.04]	
	session:group [control]	-0.06	[-0.10, -0.02]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept)	3.349	1.830	-
	residual	4.353	2.086	-
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	17464.54	**17514.89**	0.45	0.02

Table S14 **Analysis of variance from the M_{lin} for feeling of control analysis**. We computed type III Analysis of Variance on the LMM of the Table S13 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	Sum Squares	Num DF	DenDF	Mean Square	F	p	Eta2 (partial)
exercise	7.44e-03	1	3955.0	7.44e-03	1.71e-03	**0.967**	4.32e-07
session	417.72	1	3955.2	417.72	95.96	< .001	0.02
group [control]	0.09	1	55.3	0.09	0.02	0.883	3.92e-04
exercise:group [control]	2.33	1	3955.0	2.33	0.54	0.464	1.36e-04
session:group [control]	41.71	1	3955.2	41.71	9.58	0.002	2.42e-03

Table S15 **Results of M_{quad} for feeling of control analysis.** The approach was identical to the one described in Table S9**.** See Supplementary Table S9 for table description.

	Parameters	β	**95% CI**	
Fixed effects	(Intercept)	4.17	[3.42, 4.91]	
	exercise	**0.05**	**[0.02, 0.07]**	
	session	0.12	[0.10, 0.15]	
	group [control]	-0.10	[-1.17, 0.98]	
	exercise:group [control]	-0.01	[-0.05, 0.02]	
	session:group [control]	-0.06	[-0.10, -0.02]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept)	3.349	1.830	-
	residual	4.334	2.082	-
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	17447.05	**17497.41**	0.45	0.02

Table S16 **Analysis of variance from the M_{quad} for feeling of control analysis**. We computed type III Analysis of Variance on the LMM of the Table S15 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	Sum Squares	Num DF	DenDF	Mean Square	F	p	Eta2 (partial)
exercise	74.98	1	3955.0	74.98	17.30	**< .001**	4.36e-03
session	417.41	1	3955.2	417.41	96.31	< .001	0.02
group [control]	0.14	1	53.8	0.14	0.03	0.858	6.02e-04
exercise:group [control]	2.25	1	3955.0	2.25	0.52	0.472	1.31e-04
session:group [control]	41.80	1	3955.2	41.80	9.64	0.002	2.43e-03

6. Choice of the random effects structure for the LMMs

We tried to find a compromise between parsimonious modelling of the data according to our hypotheses and the inclusion of maximal random effect structure to reduce the incidence of type I and II errors and reduce the chance of overconfident estimates (Schielzeth and Forstmeier, 2009, Barr et al., 2013; Heisig & Schäffer, 2018). Therefore, for each outcome variable, we adopted a step-wise approach to test the interest of the different random factors in the models in terms of fit to the data. As these tests concerned the random effects, we performed linear mixed models (LMM) using the Restricted Maximum Likelihood (REML) approach. Fitting random slopes in addition to a random intercept sometimes induced convergence problems because models with more complex structures need large sample sizes. When such convergence issue arises, fitting only a random intercept is better than not including random variables at all (Grueber et al. 2011). Therefore, in our approach, only models that converged were selected and they were compared to each other according to the Akaike Information Criterion (AIC) criterion (Wagenmakers & Farrell, 2004), Bayesian Information Criterion (BIC), log-likelihood comparison (logLik) and by running analysis of variance (anova) between them. For each outcome variable, we tested different random structures in this way, as detailed in each of the following subsections.

When we observed—in the final selected model—a significant or marginal interaction between fixed factors including the group term, we ran additional LMM in each group separately. This time, we only included a random intercept to account for repeated measures across sessions, because more complex model structure generally failed to converge for at least one group (Grueber et al. 2011). This procedure was applied for all the outcome variables.

6.1. NF index

For NF index, we tested and compared four models with different random structures (indicated between brackets in the following formulas):

M1: Y ~ 1 + exercise + session + group + exercise:group + session:group + (1|subject_id)

M2: Y ~ 1 + exercise + session + group + exercise:group + session:group + (1+session|subject_id)

M3: Y ~ 1 + exercise + session + group + exercise:group + session:group + (1+exercise|subject_id)

M4: Y ~ 1 + exercise + session + group + exercise:group + session:group + (1+session+exercise|subject_id)

The four models converged. Thus, their goodness of fit was compared based on AIC, BIC and logLik criteria and by running the anova between models, as summarized in Table S17.

Table S17 **Comparison of models with different random structures to fit the NF index data**. npar is the number of parameters; AIC is the Akaike Information Criterion; BIC is the Bayesian Information Criterion; logLik is the log-likelihood value; P-values (Pr) were estimated via Chi-square tests (Chisq); Df are degrees of freedom of the Chi-square distribution.

Models	npar	AIC	BIC	logLik	Chisq	Df	Pr(>Chisq)
M1	8	13529	13580	-6756.6			
M2	10	13214	13276	-6596.8	319.63	2	**< 0.001**
M3	10	13526	13589	-6753.2	0.00	0	
M4	13	13208	13290	-6591.1	324.34	3	**< 0.001**

Thus, the M2 and M4 models statistically fitted the data better than the other models. Based on AIC and logLik criteria, the model with the maximal random effect structure was chosen (M4). Thus, the final model used for NF index analysis was the following:

Y ~ 1 + exercise + session + group + exercise:group + session:group + (1+session+exercise|subject_id)

The same procedure was applied for the other outcome variables as described in the next subsections.

6.2. NF learning score

For NF learning score, we tested and compared two models with different random structures as indicated between brackets:

M1: Y ~ 1 + session + group + session:group + (1|subject_id)

M2: Y ~ 1 + session + group + session:group + (1+session|subject_id)

The two models converged and their goodness of fit was compared based on AIC, BIC and logLik criteria and by running the anova between models. Table S18 shows the results of this comparison.

Table S18 **Comparison of models with different random structures to fit the NF learning score data**. See Supplementary Table S17 for table description.

Models	npar	AIC	BIC	logLik	Chisq	Df	Pr(>Chisq)
M1	6	5561.4	5587.5	-2774.7			
M2	8	5553.1	5587.9	-2768.6	12.293	2	**0.002141**

The M2 model statistically fitted the data better than the M1 model. Thus, the final model used for the NF learning score analysis was the following:

Y ~ 1 + session + group + session:group + (1+session|subject_id)

6.3. Theta activity

For the theta activity, we tested and compared two models with different random structures as indicated between brackets:

M1: Y ~ 1 + session + group + session:group + (1|subject_id)

M2: Y ~ 1 + session + group + session:group + (1+session|subject_id)

The M2 model did not converge. Therefore, we kept the M1 model. Thus, the final model used for the theta activity analysis was the following:

Y ~ 1 + session + group + session:group + (1|subject_id)

6.4. Low beta activity

For low beta activity, we tested and compared two models with different random structures as indicated between brackets:

M1: Y ~ 1 + session + group + session:group + (1|subject_id)

M2: Y ~ 1 + session + group + session:group + (1+session|subject_id)

The two models converged and their goodness of fit was compared based on AIC, BIC and logLik criteria and by running the anova between models. Table S19 shows the results of this comparison.

Table S19 **Comparison of models with different random structures to fit the low beta data**. See Supplementary Table S17 for table description.

Models	npar	AIC	BIC	logLik	Chisq	Df	Pr(>Chisq)
M1	6	1167.4	1193.5	-577.70			
M2	8	1171.3	1206.2	-577.68	0.0444	2	0.978

The M2 model did not fit the data better than the more parsimonious M1 model. Thus, the final model used for the low beta activity analysis was the following (M1):

Y ~ 1 + session + group + session:group + (1|subject_id)

6.5. Quality index

For the quality index, we tested and compared two models with different random structures as indicated between brackets:

M1: Y ~ 1 + session + group + session:group + (1|subject_id)

M2: Y ~ 1 + session + group + session:group + (1+session|subject_id)

The two models converged and their goodness of fit was compared based on AIC, BIC and logLik criteria and by running the anova between models. Table S20 shows the results of this comparison.

Table S20 **Comparison of models with different random structures to fit the quality index data**. See Supplementary Table S17 for table description.

Models	npar	AIC	BIC	logLik	Chisq	Df	Pr(>Chisq)
M1	6	-5551.5	-5513.7	2781.8			
M2	8	-5697.9	-5647.5	2856.9	150.38	2	**< 0.001**

The M2 model statistically fitted the data better than the M1 model. Thus, the final model used for the quality index analysis was the following:

Y ~ 1 + session + group + session:group + (1+session|subject_id)

6.6. Timeline

To test for the effect of the time of day (timeline) at which the participants had their sessions, and to test if any difference existed between NF and control groups, we analysed the hour of the timestamp of each recording just before the beginning of the NF session.

We tested and compared two models with different random structures as indicated between brackets:

M1: Y ~ 1 + session + group + session:group + (1|subject_id)

M2: Y ~ 1 + session + group + session:group + (1+session|subject_id)

The two models converged and their goodness of fit was compared based on AIC, BIC and logLik criteria and by running the anova between models. Table S21 shows the results of this comparison.

Table S21 **Comparison of models with different random structures to fit the timeline data**. See Supplementary Table S17 for table description.

Models	npar	AIC	BIC	logLik	Chisq	Df	Pr(>Chisq)
M1	6	2681.3	2707.4	-1334.7			
M2	8	2683.7	2718.6	-1333.9	1.6075	2	0.4476

The M2 model did not statistically fit the data better than the more parsimonious M1 model. Thus, the final model retained for the timeline analysis was the following:

Y ~ 1 + session + group + session:group + (1|subject_id)

6.7. Feeling of control

For the feeling of control, we tested and compared four models with different random structures as indicated between brackets:

M1: Y ~ 1 + exercise + session + group + exercise:group + session:group + (1|subject_id)

M2: Y ~ 1 + exercise + session + group + exercise:group + session:group + (1+session|subject_id)

M3: Y ~ 1 + exercise + session + group + exercise:group + session:group + (1+exercise|subject_id)

M4: Y ~ 1 + exercise + session + group + exercise:group + session:group + (1+session+exercise|subject_id)

M3 and M4 did not converge. Thus, we only compared M1 and M2 based on AIC, BIC and logLik criteria and by running an anova between these models. Table S22 shows the results of this comparison.

Table S22 **Comparison of models with different random structures to fit the feeling of control data**. See Supplementary Table S17 for table description.

Models	npar	AIC	BIC	logLik	Chisq	Df	Pr(>Chisq)
M1	8	17447	17497	-8715.5			
M2	10	17285	17348	-8632.3	166.51	2	**< 0.001**

The M2 model statistically fitted the data better than the M1 model. Thus, the final model used for the feeling of control analysis was the following:

Y ~ 1 + exercise + session + group + exercise:group + session:group + (1+session|subject_id)

6.8. STAI-Y-A

For STAI-Y-A, we tested and compared four models with different random structures as indicated between brackets:

M1: Y ~ 1 + session + phase + group + session:group + phase:group + (1|subject_id)

M2: Y ~ 1 + session + phase + group + session:group + phase:group + (1+session|subject_id)

M3: Y ~ 1 + session + phase + group + session:group + phase:group + (1+phase|subject_id)

M4: Y ~ 1 + session + phase + group + session:group + phase:group + (1+session+phase|subject_id)

The four models converged and were compared based on AIC, BIC and logLik criteria and by running anovas between the models. Table S23 shows the results of these comparisons.

Table S23 **Comparison of models with different random structures to fit the STAI-Y-A data**. See Supplementary Table S17 for table description.

Models	npar	AIC	BIC	logLik	Chisq	Df	Pr(>Chisq)
M1	8	7495.8	7536.1	-3739.9			
M2	10	7427.9	7478.3	-3704.0	0.000	0	
M3	10	7424.1	7474.4	-3702.1	75.731	2	**< 0.001**
M4	13	7329.9	7395.3	-3652.0	104.027	3	**< 0.001**

The M3 and M4 models statistically fitted the data better than the M1 and M2 models. We kept the maximal random effect structure (M4) that fitted the data best. Thus, the final model used for STAI-Y-A analysis was the following:

Y ~ 1 + session + phase + group + session:group + phase:group + (1+session+phase|subject_id)

6.9. relax-VAS

For relax-VAS, we tested and compared four models with different random structures as indicated between brackets:

M1: Y ~ 1 + session + phase + group + session:group + phase:group + (1|subject_id)

M2: Y ~ 1 + session + phase + group + session:group + phase:group + (1+session|subject_id)

M3: Y ~ 1 + session + phase + group + session:group + phase:group + (1+phase|subject_id)

M4: Y ~ 1 + session + phase + group + session:group + phase:group + (1+session+phase|subject_id)

M4 did not converge. Thus, only M1, M2 and M3 were compared based on AIC, BIC and logLik criteria and by running anova between these models. Table S24 shows the results of these comparisons.

Table S24 **Comparison of models with different random structures to fit the relax-VAS data**. See Supplementary Table S17 for table description.

Models	npar	AIC	BIC	logLik	Chisq	Df	Pr(>Chisq)
M1	8	4385.7	4426.0	-2184.8			
M2	10	4373.5	4423.9	-2176.7	0.000	0	
M3	10	4314.9	4365.3	-2147.4	74.782	2	**< 0.001**

The M3 model statistically fitted the data better than M1 and M2 models. Thus, the final model used for relax-VAS analysis was the following:

Y ~ 1 + session + phase + group + session:group + phase:group + (1+phase|subject_id)

6.10. STAI-Y-B, PANAS and PSS

For STAI-Y-B, PANAS and PSS scores, we tested and compared two models with different random structures as indicated between brackets:

M1: Y ~ 1 + phase + group + phase:group + (1|subject_id)

M2: Y ~ 1 + phase + group + phase:group + (1+phase|subject_id)

However, M2 model encountered a problem of calculation because of the number of observations (=95) that was lower than the number of random effects (=96) for the random term (1+phase|subject_id). Thus, the random-effects parameters and the residual variance were unidentifiable. For all these variables, we kept the M1 model.

7. Neurophysiological modulation analysis

7.1. NF index

Based on the choice of the random structure, detailed in the "Choice of the random effects structure for the LMMs" section above, the following model was chosen:

Y ~ 1 + exercise + session + group + exercise:group + session:group + (1+session+exercise|subject_id)

The following table S25 presents the results of this model.

Table S25 **Results of the Linear Mixed Model (LMM) for NF index analysis.** We used the LMM described in Eq. (3) of the main text. See Supplementary Table S9 for table description.

	Parameters	β	**95% CI**	
Fixed effects	(Intercept) exercise session group [control] exercise:group [control] session:group [control]	5.09 0.03 0.04 0.81 -5.47e-04 -0.08	[4.12, 6.06] [0.02, 0.05] [-0.01, 0.09] [-0.59, 2.21] [-0.03, 0.03] [-0.15, -0.01]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) session exercise residual	6.0178081 0.0142493 0.0006175 1.4203476	2.45312 0.11937 0.02485 1.19178	- -0.07 (intercept) [0.68 (intercept), -0.33 (session)] -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	13233.64	13315.49	0.83	8.04e-03

Table S26 **Analysis of variance from the LMM of NF index**. We computed type III Analysis of Variance on the LMM of the Table S25 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	Sum Squares	NumDF	DenDF	Mean Square	F	p	Eta2 (partial)
exercise	37.71	1	45.940	37.71	26.55	**< .001**	0.37
session	9.10e-03	1	46.049	9.10e-03	6.41e-03	0.937	1.39e-04
group	1.82	1	46.004	1.82	1.28	0.264	0.03
exercise:group	2.50e-03	1	45.940	2.50e-03	1.76e-03	0.967	3.84e-05
session:group	7.12	1	46.049	7.12	5.01	**0.030**	0.10

Table S26 shows a significant interaction between group and session. Then, to examine the effect of the session within each group, we ran additional LMM in each group separately.

Table S27 **Results of the Linear Mixed Model (LMM) for NF index analysis of the NF group.** We used an LMM including a random effect structure with random intercept by participant and fixed effects for exercise and session. The model was fit using the Restricted Maximum Likelihood (REML) approach. See Supplementary Table S9 for table description.

Fixed effects	**Parameters**	β	**95% CI**	
	(Intercept) exercise session	5.09 0.03 0.04	[3.99, 6.19] [0.02, 0.05] [0.03, 0.06]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) residual	7.817 1.412	2.796 1.188	- -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	6808.70	6836.91	0.85	3.85e-03

Table S28 **Analysis of variance from the LMM of NF index of the NF group**. We computed type III Analysis of Variance on the LMM of the Table S27 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	Sum Squares	NumDF	DenDF	Mean Square	F	p	Eta2 (partial)
exercise	28.40	1	2057	28.40	20.12	**< .001**	9.68e-03
session	45.79	1	2057	45.79	32.43	**< .001**	0.02

Table S29 **Results of the Linear Mixed Model (LMM) for NF index analysis of the control group.** We used the same LMM as for Table S27 but the data were those of the control group. The model was fit using the Restricted Maximum Likelihood (REML) approach. See Supplementary Table S9 for table description.

Fixed effects	**Parameters**	β	**95% CI**	
	(Intercept) exercise session	5.90 0.03 -0.04	[4.97, 6.83] [0.02, 0.05] [-0.06, -0.02]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) residual	5.075 1.788	2.253 1.337	- -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	6725.97	6753.78	0.74	4.54e-03

Table S30 **Analysis of variance from the LMM of NF index of the control group**. We computed type III Analysis of Variance on the LMM of the Table S29 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	Sum Squares	NumDF	DenDF	Mean Square	F	p	Eta2 (partial)
exercise	25.49	1	1899	25.49	14.26	**< .001**	7.45e-03
session	34.74	1	1899	34.74	19.43	**< .001**	0.01

Additional individual linear regressions of the NF index (see Supplementary Fig. S6 and Fig. S7) showed that 68% (17/25) of the participants from the NF group had a positive regression slope across the 12 sessions, while the slope was positive for 34.8% (8/23) of the participants from the control group.

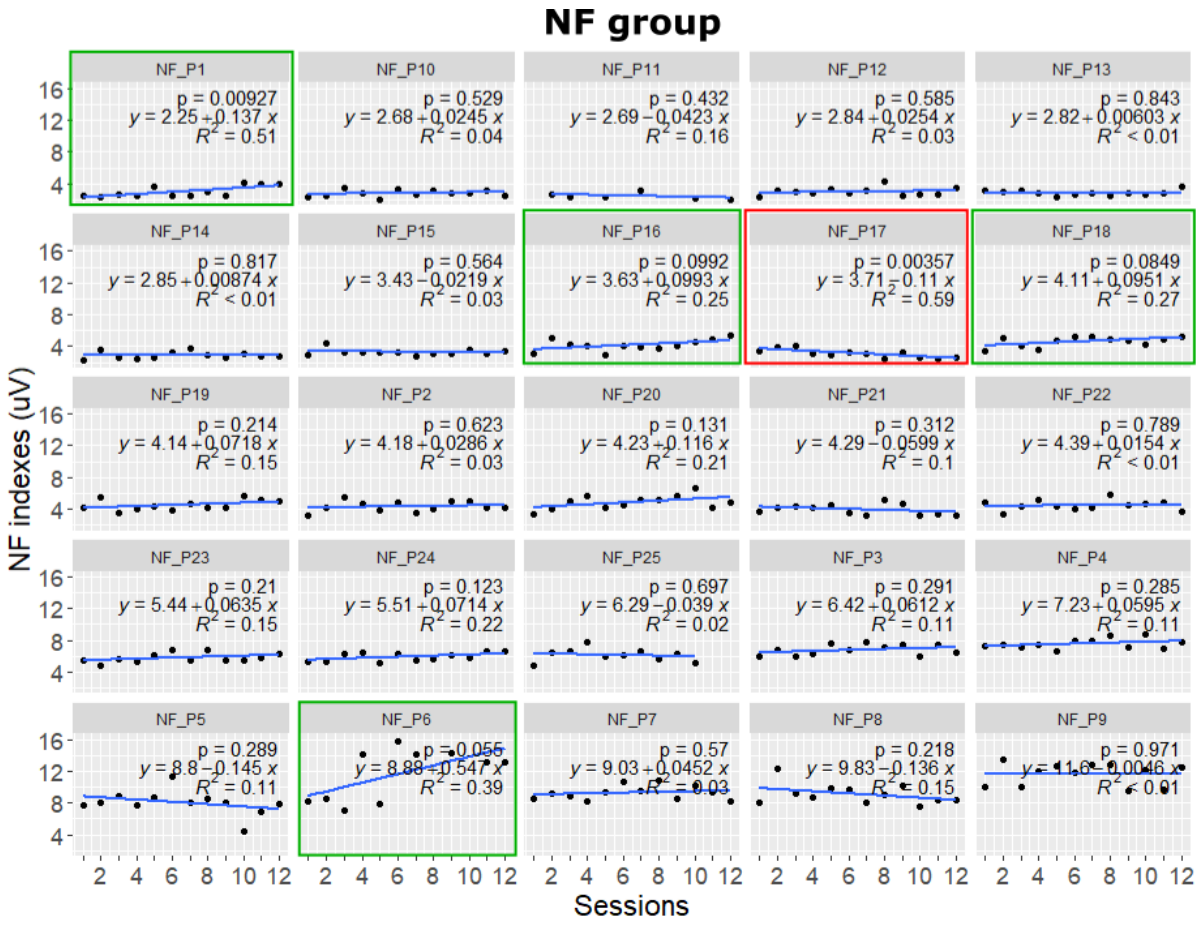

Fig. S6 **Evolution of NF index across the 12 training sessions for each participant of the NF group.** Plots of NF index values (black dots) across sessions are represented for each participant (sorted in ascending order according to the NF index value at the first session). The blue line represents the linear regression of individual NF index values across sessions of individual NF index values across sessions. The grey shaded area around the blue line is the standard error of the regression. When there is a significant or marginal increase (or decrease), the plot is framed in green (respectively, in red). Graphs were obtained with R software (v.4.0.2; R Core Team, 2020).

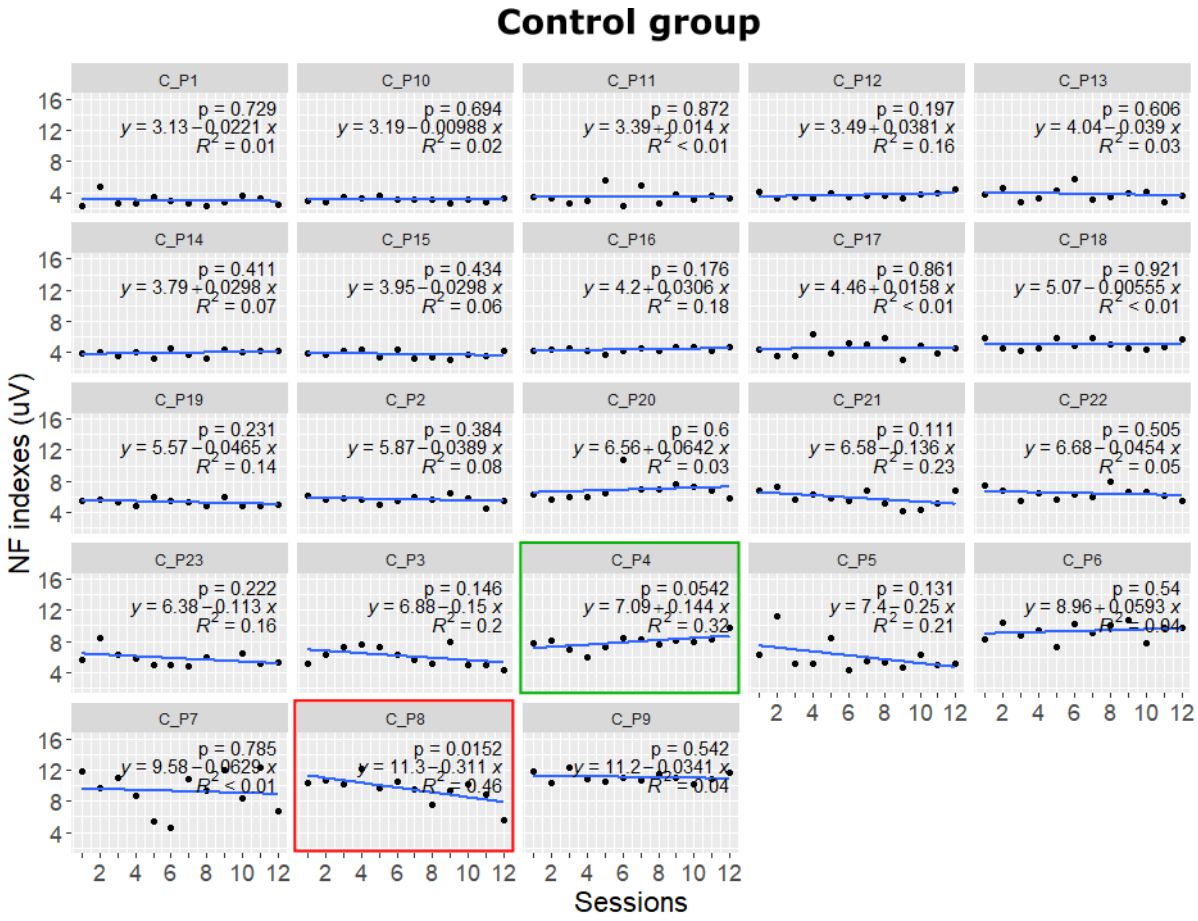

Fig. S7 **Evolution of NF index across the 12 training sessions for each participant of the control group.** Same legend as in Supplementary Fig. S6. Graphs were obtained with R software (v.4.0.2; R Core Team, 2020).

7.2. NF learning score

Table S31 **Results of the LMM for NF learning score analysis.** We used the LMM described in Eq. (4) of the main text. The approach was identical to that for NF index analysis (described in Table S25), except that the fixed effects only included session, group and interaction between session and group**.** See Supplementary Table S9 for table description.

	Parameters	β	**95% CI**	
Fixed effects	(Intercept) session group [control] session:group [control]	17.10 1.15 -18.29 -1.50	[8.61, 25.59] [0.02, 2.28] [-30.55, -6.04] [-3.13, 0.13]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) session residual	242.510 2.882 763.885	15.573 1.698 27.638	- 0.39 -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	5542.25	5577.06	0.46	0.13

Table S32 **Analysis of variance from the LMM of NF learning score**. We computed type III Analysis of Variance on the LMM of the Table S31 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	**Sum Squares**	**NumDF**	**DenDF**	**Mean Square**	**F**	**p**	**Eta2 (partial)**
session	710.16	1	46.325	710.16	0.93	0.340	0.02
group	6538.35	1	45.866	6538.35	8.56	**0.005**	0.16
session:group	2494.13	1	46.325	2494.13	3.27	**0.077**	0.07

Table S32 shows a marginal interaction between group and session. Considering our a priori hypothesis, we performed additional LMM in each group separately.

Table S33 **Results of the Linear Mixed Model (LMM) for NF learning score analysis of the NF group.** We used an LMM including a random effect structure with random intercept by participant and fixed effects for session. The model was fit using the Restricted Maximum Likelihood (REML) approach. See Supplementary Table S9 for table description.

Fixed effects	**Parameters**	β	**95% CI**	
	(Intercept) session	17.14 1.14	[6.68, 27.60] [0.20, 2.08]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) residual	474.0 804.6	21.77 28.37	- -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	2892.19	2906.98	0.38	0.01

Table S34 **Analysis of variance from the LMM of NF learning score of the NF group**. We computed type III Analysis of Variance on the LMM of the Table S33 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	**Sum Squares**	**NumDF**	**DenDF**	**Mean Square**	**F**	**p**	**Eta2 (partial)**
session	4566.24	1	272.19	4566.24	5.67	**0.018**	0.02

Table S35 **Results of the Linear Mixed Model (LMM) for NF learning score analysis of the control group.** We used the same LMM as for Table S33 but the data were those of the control group. The model was fit using the Restricted Maximum Likelihood (REML) approach. See Supplementary Table S9 for table description.

Fixed effects	**Parameters**	β	**95% CI**	
	(Intercept) session	-1.19 -0.35	[-11.52, 9.14] [-1.32, 0.61]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) residual	404.1 794.7	20.10 28.19	- -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	2662.60	2677.06	0.34	1.23e-03

Table S36 **Analysis of variance from the LMM of NF learning score of the control group**. We computed type III Analysis of Variance on the LMM of the Table S35 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	**Sum Squares**	**NumDF**	**DenDF**	**Mean Square**	**F**	**p**	**Eta2 (partial)**
session	404.35	1	251.03	404.35	0.51	0.476	2.02e-03

Additional individual linear regressions of the NF learning score (see Supplementary Fig. S8 and S9) showed that 80% (20/25) of the participants from the NF group had a positive regression slope across the 12 sessions, while the slope was positive for 48% (11/23) of the participants from the control group.

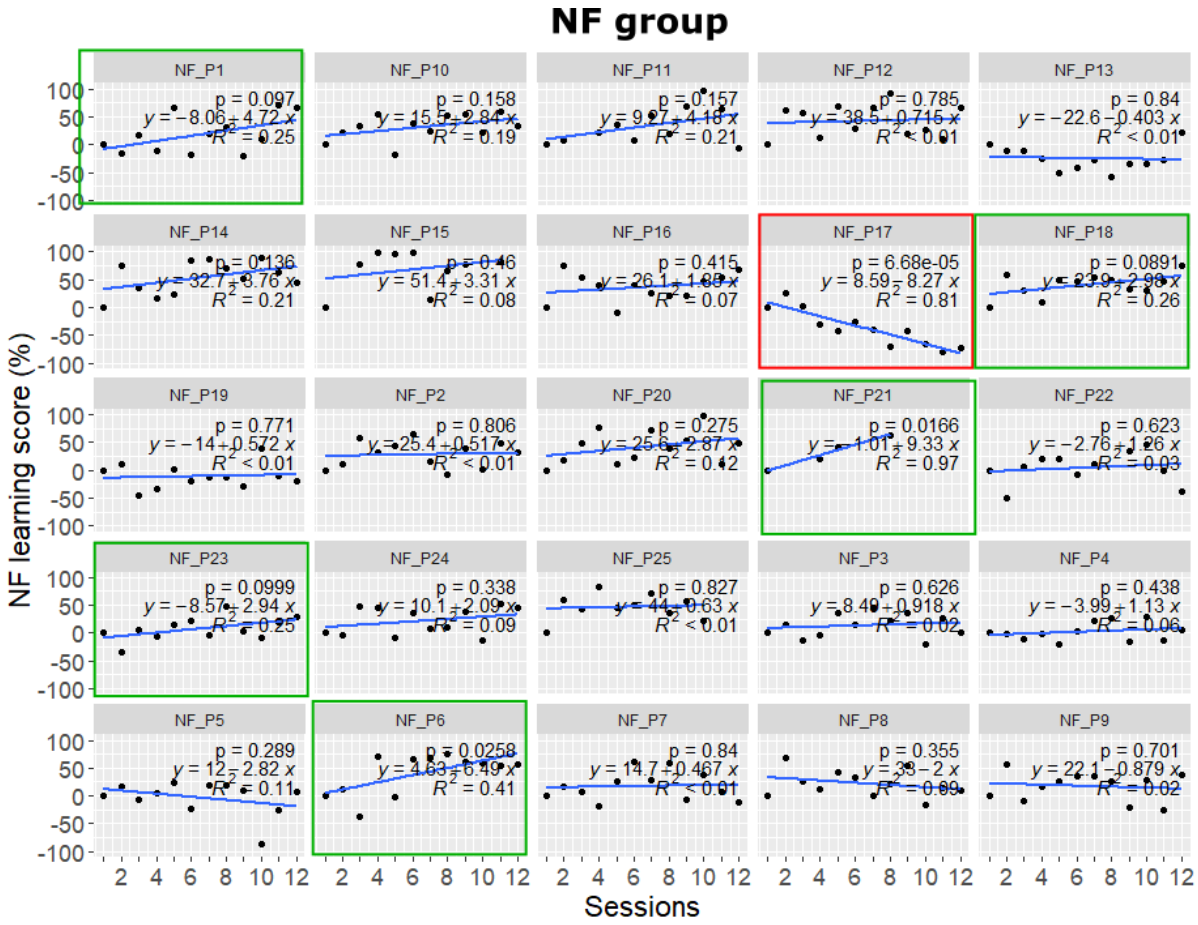

Fig. S8 **Evolution of the NF learning score across the 12 training sessions for every participant of the NF group.** Same legend as in Supplementary Fig. S6. Graphs were obtained with R software (v.4.0.2; R Core Team, 2020).

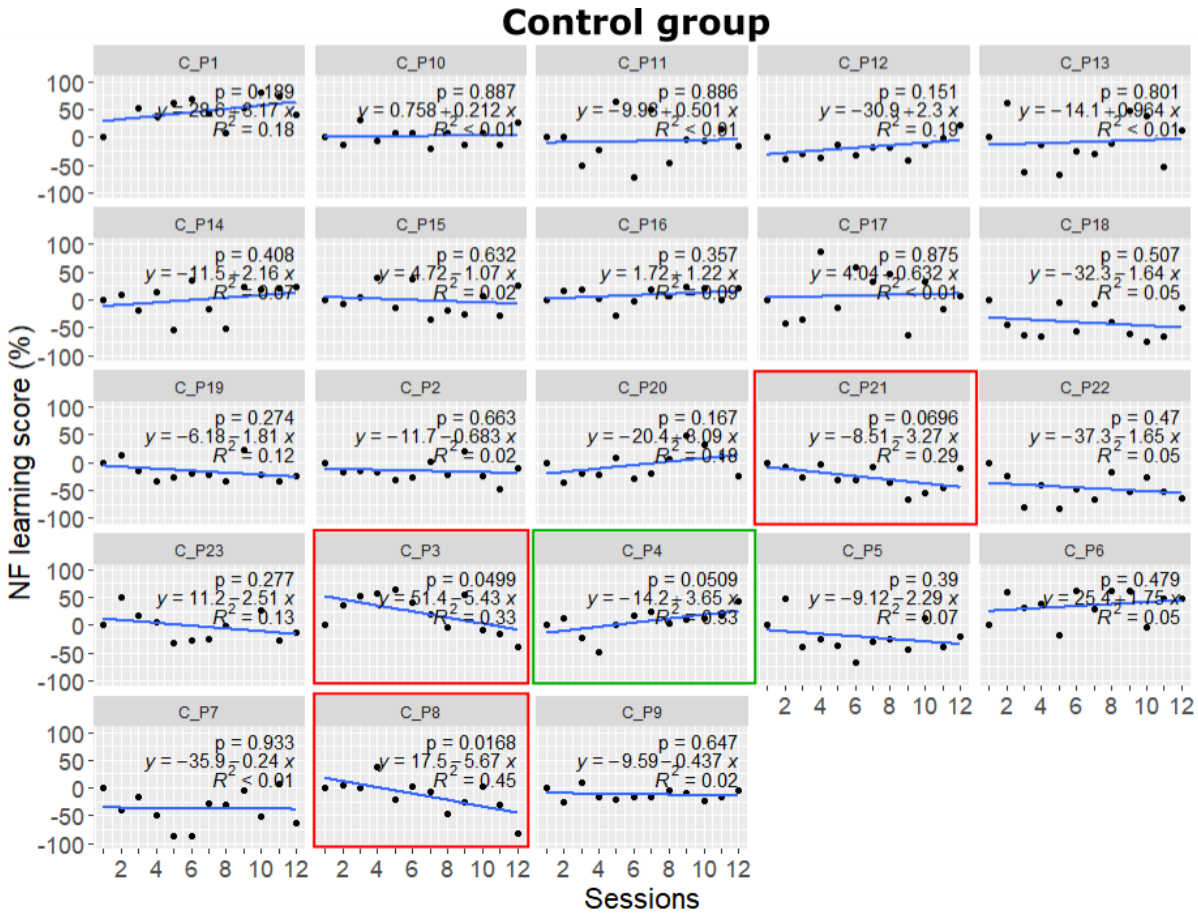

Fig. S9 **Evolution of the NF learning score across the 12 training sessions for every participant of the control group.** Same legend as in Supplementary Fig. S7. Graphs were obtained with R software (v.4.0.2; R Core Team, 2020).

7.3. Theta and low beta band activities

7.3.1. Theta band activity

Table S37 **Results of the LMM for the theta band (4-7Hz) activity analysis.** We used the LMM described in Eq. (4) of the main text with a random effects structure only composed of a random intercept. The approach was identical to that for NF learning score (described in Supplementary Table S31). See Supplementary Table S9 for table description.

Fixed effects	**Parameters**	β	**95% CI**	
	(Intercept) session group [control] session:group [control]	4.71 0.06 0.18 -0.04	[3.88, 5.54] [0.02, 0.10] [-1.03, 1.38] [-0.10, 0.01]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) residual	4.066 1.466	2.016 1.211	- -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	2034.25	2060.36	0.74	4.25e-03

Table S38 **Analysis of variance from the LMM of theta band activity**. We computed type III Analysis of Variance on the LMM of the Table S37 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	**Sum Squares**	**NumDF**	**DenDF**	**Mean Square**	**F**	**p**	**Eta2 (partial)**
session	9.52 0.12	1	523.07	9.52	6.50	**0.011**	0.01
group	3.10	1	53.06	0.12	0.08	0.775	1.55e-03
session:group		1	523.07	3.10	2.11	0.147	4.02e-03

7.3.2. Low beta band activity

Table S39 **Results of the LMM for the low beta band (13-18Hz) activity analysis.** We used the LMM described in Eq. (4) of the main text with a random effects structure only composed of a random intercept. The approach was identical to that for NF learning score (described in Supplementary Table S31). See Supplementary Table S9 for table description.

Fixed effects	**Parameters**	β	**95% CI**	
	(Intercept) session group [control] session:group [control]	3.56 0.01 0.19 -0.03	[3.14, 3.97] [-0.01, 0.03] [-0.40, 0.79] [-0.05, 0.00]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) residual	1.0146 0.3265	1.0073 0.5714	- -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	1184.86	1210.97	0.76	2.01e-03

Table S40 **Analysis of variance from the LMM of low beta band activity**. We computed type III Analysis of Variance on the LMM of the Table S39 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	**Sum Squares**	**NumDF**	**DenDF**	**Mean Square**	**F**	**p**	**Eta2 (partial)**
session	0.05 0.13	1	523.04	0.05	0.15	0.694	2.95e-04
group	1.21	1	52.28	0.13	0.40	0.531	7.57e-03
session:group		1	523.04	1.21	3.70	0.055	7.03e-03

Table S40 shows a marginal interaction between group and session. Then, to examine the effect of the session within each group, we ran additional LMM in each group separately.

Table S41 **Results of the Linear Mixed Model (LMM) for beta low band activity analysis of the NF group.** We used an LMM including a random effect structure with random intercept by participant and fixed effects for exercise and session. The model was fit using the Restricted Maximum Likelihood (REML) approach. See Supplementary Table S9 for table description.

Fixed effects	**Parameters**	β	**95% CI**	
	(Intercept) session	3.55 0.01	[3.10, 4.01] [-0.01, 0.03]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) residual	1.2758 0.2861	1.1295 0.5349	- -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	587.24	602.03	0.82	8.62e-04

Table S42 **Analysis of variance from the LMM of beta low band activity of the NF group**. We computed type III Analysis of Variance on the LMM of the Table S41 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	**Sum Squares**	**NumDF**	**DenDF**	**Mean Square**	**F**	**p**	**Eta2 (partial)**
session	0.40	1	272.03	0.40	1.40	0.239	5.10e-03

Table S43 **Results of the Linear Mixed Model (LMM) for the beta low band activity analysis of the control group.** We used the same LMM as for Table S41 but the data were those of the control group. The model was fit using the Restricted Maximum Likelihood (REML) approach. See Supplementary Table S9 for table description.

Fixed effects	**Parameters**	β	**95% CI**	
	(Intercept) session	3.75 -0.02	[3.37, 4.12] [-0.04, 0.00]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) residual	0.7300 0.3703	0.8544 0.6085	- -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	595.66	610.13	0.66	2.80e-03

Table S44 **Analysis of variance from the LMM of the beta low band activity of the control group**. We computed type III Analysis of Variance on the LMM of the Table S43 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	**Sum Squares**	**NumDF**	**DenDF**	**Mean Square**	**F**	**p**	**Eta2 (partial)**
session	0.85	1	205.01	0.85	2.29	0.132	9.03e-03

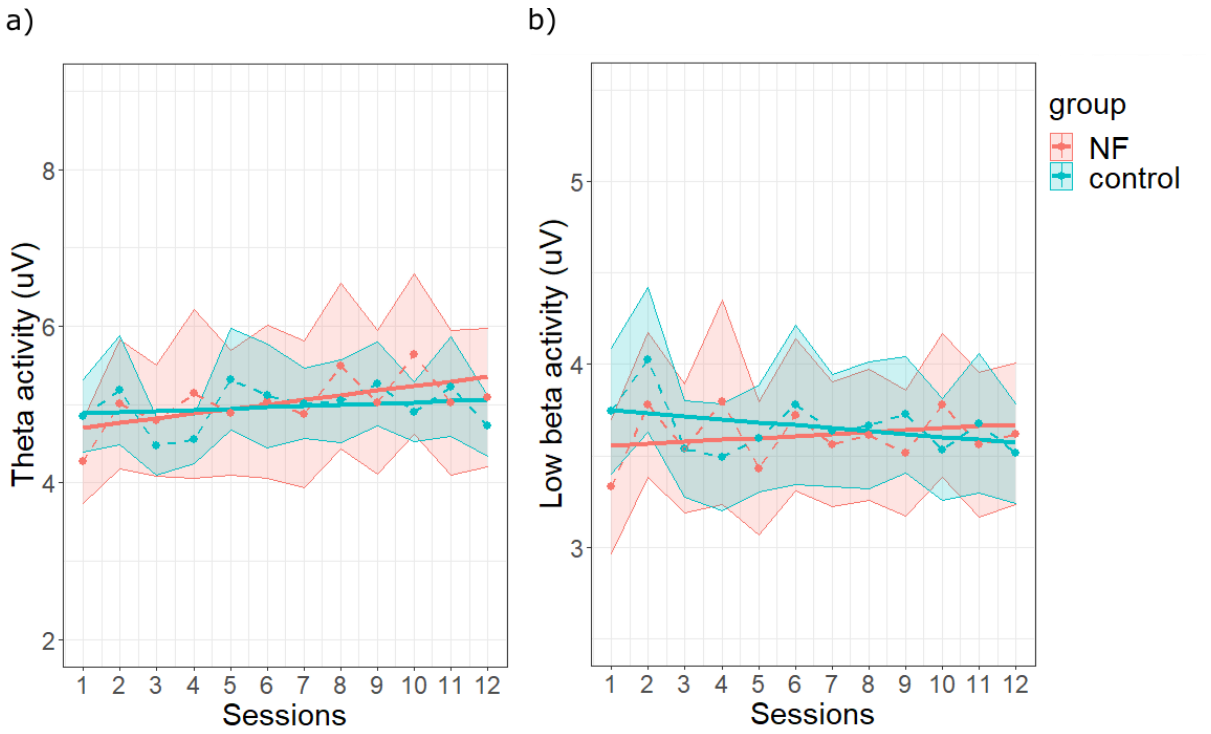

Fig. S10 **Evolution of a) theta and b) low beta band activities across sessions in the NF (in red) and the control (in blue) group.** See Fig. 3 in the main text for legend. Graphs were obtained with R software (v.4.0.2; R Core Team, 2020).

8. Quality index analysis

Table S45 **Results of the LMM for the quality index Q analysis.** We used the LMM described in Eq. (4) of the main text. The approach was identical to that for NF learning score (described in Supplementary Table S31). See Supplementary Table S9 for table description.

Fixed effects	**Parameters**	β	**95% CI**	
	(Intercept) session group [control] session:group [control]	0.90 -2.02e-03 0.02 -1.06e-03	[0.86, 0.93] [-0.01, 0.00] [-0.03, 0.06] [-0.01, 0.00]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) session residual	5.977e-03 7.044e-05 1.323e-02	0.077314 0.008393 0.115016	- -0.42 (intercept) -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	-5663.13	-5612.76	0.31	5.18e-03

Table S46 **Analysis of variance from the LMM of the quality index Q**. We computed type III Analysis of Variance on the LMM of the Table S45 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	Sum Squares	NumDF	DenDF	Mean Square	F	p	Eta2 (partial)
session	0.05	1	46.130	0.05	3.70	0.061	0.07
group	5.46e-03	1	46.019	5.46e-03	0.41	0.524	8.89e-03
session:group	2.11e-03	1	46.130	2.11e-03	0.16	0.691	3.45e-03

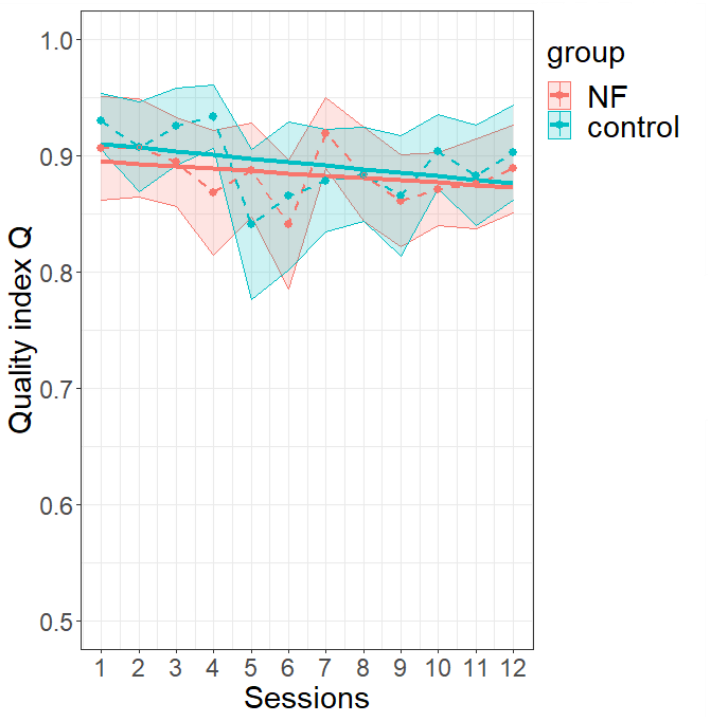

Fig. S11 **Evolution of the quality index Q across sessions in the NF (in red) and the control (in blue) groups.** See Fig. 3 in the main text for legend. Graph was obtained with R software (v.4.0.2; R Core Team, 2020).

9. Timeline analysis

Table S47 **Results of the LMM for the timeline analysis.** We used the LMM described in Eq. (4) of the main text. The approach was identical to that for NF learning score (described in Supplementary Table S31). See Supplementary Table S9 for table description.

Fixed effects	**Parameters**	β	**95% CI**	
	(Intercept) session group [control] session:group [control]	14.16 -0.05 0.44 0.07	[12.95, 15.37] [-0.12, 0.02] [-1.31, 2.19] [-0.04, 0.17]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) residual	8.126 4.776	2.851 2.185	- -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	2689.23	2715.35	0.63	0.01

Table S48 **Analysis of variance from the LMM of the timeline**. We computed type III Analysis of Variance on the LMM of the Table S47 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	Sum Squares	NumDF	DenDF	Mean Square	F	p	Eta2 (partial)
session	1.48 1.16	1	524.08	1.48	0.31	0.579	5.89e-04
group	7.32	1	57.50	1.16	0.24	0.624	4.20e-03
session:group		1	524.08	7.32	1.53	0.216	2.92e-03

10. Self-report outcome analysis

10.1. Subjective feeling of control

Table S49 **Results of the LMM for the feeling of control analysis.** We used the LMM described in Eq. (3) of the main text with 1+session|subject_id as random effects structure. The approach was identical to that for NF index analysis. See Supplementary Table S9 for table description.

	Parameters	β	**95% CI**	
Fixed effects	(Intercept) exercise session group [control] exercise:group [control] session:group [control]	4.16 0.05 0.13 -0.09 -0.01 -0.06	[3.36, 4.96] [0.02, 0.07] [0.06, 0.19] [-1.25, 1.06] [-0.05, 0.02] [-0.16, 0.03]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) session residual	3.8976 0.02364 4.06498	1.9742 0.1538 2.0162	- -0.34 (intercept) -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	17308.34	17371.28	0.49	0.02

Table S50 **Analysis of variance from the LMM of the feeling of control.** We computed type III Analysis of Variance on the LMM of the Table S49 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	**Sum Squares**	**NumDF**	**DenDF**	**Mean Square**	**F**	**p**	**Eta2 (partial)**
exercise	74.74	1	3905.3	74.74	18.39	**< .001**	4.69e-03
session	62.59	1	46.1	62.59	15.40	**< .001**	0.25
group	0.10	1	47.4	0.10	0.03	0.874	5.36e-04
exercise:group	2.07	1	3905.3	2.07	0.51	0.475	1.31e-04
session:group	6.59	1	46.1	6.59	1.62	0.209	0.03

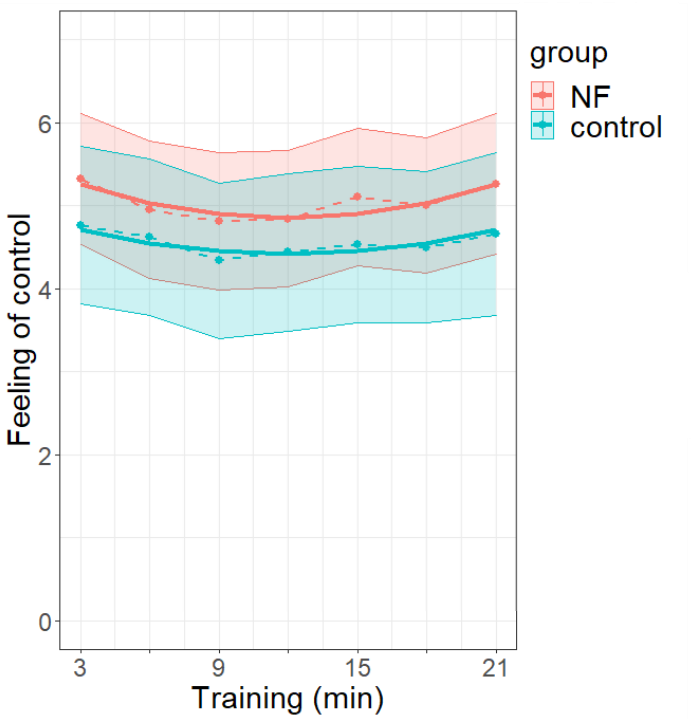

Fig. S12 **Within-session effect on the feeling of control in the NF (in red) and the control (in blue) groups.** See Fig. 4 in the main text for legend. Graph was obtained with R software (v.4.0.2; R Core Team, 2020).

10.2. *STAI-Y-A*

Table S51 **Results of the LMM for the *STAI-Y-A* analysis.** We used the LMM described in Eq. (5) of the main text. The approach was identical to that for NF index analysis (described in Table S25), except that the fixed effects included phase (pre-/post-session, with pre-session set as the reference phase), session, group and the two-way interactions between phase and group and between session and group. Phase [POST] denoted the overall effect of phase estimated in terms of the post- versus pre-session phase difference, phase [POST]:group [control] denoted the interaction between phase and group estimated as the difference for the control relative to the NF group in the parameter estimates of the post- versus pre-session phase effect. See Supplementary Table S9 for additional table description.

	Parameters	β	**95% CI**	
Fixed effects	(Intercept) session phase [POST] group [control] session:group [control] phase [POST]:group [control]	32.50 -0.20 -2.48 1.80 7.36e-03 -2.09	[29.16, 35.83] [-0.47, 0.08] [-4.41, -0.55] [-3.01, 6.62] [-0.39, 0.41] [-4.87, 0.69]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) session phase residual	67.0569 0.3964 19.3324 27.5924	8.1888 0.6296 4.3969 5.2528	- -0.21 (intercept) [-0.60 (intercept), 0.30 (session)] -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	7325.55	7390.98	0.71	0.04

Table S52 **Analysis of variance from the LMM of the *STAI-Y-A***. We computed type III Analysis of Variance on the LMM of the Table S51 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	Sum Squares	NumDF	DenDF	Mean Square	F	p	Eta2 (partial)
session	98.74	1	45.787	98.74	3.58	0.065	0.07
phase	683.57	1	46.137	683.57	24.77	**< .001**	0.35
group	3.49	1	46.017	3.49	0.13	0.724	2.74e-03
session:group	0.04	1	45.787	0.04	1.31e-03	0.971	2.86e-05
phase:group	60.17	1	46.137	60.17	2.18	0.147	0.05

10.3. *relax-VAS*

Table S53 **Results of the LMM for the *relax-VAS* analysis.** We used the LMM described in Eq. (5) of the main text with 1+phase|subject_id as random effects structure. The approach was identical to that for *STAI-Y-A* analysis. See Supplementary Table S9 for table description.

	Parameters	β	**95% CI**	
Fixed effects	(Intercept)	6.10	[5.38, 6.82]	
	session	0.06	[0.03, 0.10]	
	phase [POST]	0.84	[0.37, 1.31]	
	group [control]	0.04	[-1.00, 1.08]	
	session:group [control]	-0.02	[-0.07, 0.03]	
	phase [POST]:group [control]	0.33	[-0.34, 1.01]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept)	2.986	1.728	-
	phase	1.077	1.038	-0.66
	residual	2.055	1.434	-
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	4330.8	4381.35	0.56	0.06

Table S54 **Analysis of variance from the LMM of the *relax-VAS*.** We computed type III Analysis of Variance on the LMM of the Table S53 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	Sum Squares	NumDF	DenDF	Mean Square	F	p	Eta2 (partial)
session	38.13	1	1050.22	38.13	18.55	**< .001**	0.02
phase	70.48	1	46.01	70.48	34.29	**< .001**	0.43
group	0.42	1	55.69	0.42	0.20	0.653	3.66e-03
session:group	1.34	1	1050.22	1.34	0.65	0.420	6.20e-04
phase:group	1.91	1	46.01	1.91	0.93	0.340	0.02

10.4. *STAI-Y-B*

Table S55 **Results of the LMM for the *STAI-Y-B* analysis.** We used an LMM with phase, group and the interaction phase:group as fixed effects and 1|subject_id as random effects structure. See Supplementary Table S9 for table description.

Fixed effects	**Parameters**	β	**95% CI**	
	(Intercept) phase [POST] group [control] phase [POST]:group [control]	39.60 -0.85 1.49 -0.63	[36.36, 42.84] [-3.14, 1.44] [-3.20, 6.17] [-3.90, 2.65]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) residual	52.07 16.42	7.216 4.053	- -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	628.73	644.06	0.76	0.01

Table S56 **Analysis of variance from the LMM of the *STAI-Y-B*.** We computed type III Analysis of Variance on the LMM of the Table S55 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	Sum Squares	NumDF	DenDF	Mean Square	F	p	Eta2 (partial)
phase	31.93	1	45.273	31.93	1.94	0.170	0.04
group	4.48	1	46.039	4.48	0.27	0.604	5.89e-03
phase:group	2.32	1	45.273	2.32	0.14	0.709	3.11e-03

10.5. *PANAS - positive*

Table S57 **Results of the LMM for the positive items of *PANAS* analysis.** The approach was identical to that for *STAI-Y-B* analysis. See Supplementary Table S9 for table description.

Fixed effects	**Parameters**	β	**95% CI**	
	(Intercept) phase [POST] group [control] phase [POST]:group [control]	35.76 -2.18 -0.06 2.14	[33.16, 38.36] [-4.14, -0.22] [-3.83, 3.70] [-0.66, 4.94]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) residual	32.12 12.03	5.667 3.469	- -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	593.70	609.02	0.73	0.02

Table S58 **Analysis of variance from the LMM of the positive items of *PANAS* analysis.** We computed type III Analysis of Variance on the LMM of the Table S57 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	Sum Squares	NumDF	DenDF	Mean Square	F	p	Eta2 (partial)
phase	29.13	1	45.454	29.13	2.42	0.127	0.05
group	3.80	1	46.188	3.80	0.32	0.577	6.79e-03
phase:group	26.90	1	45.454	26.90	2.23	0.142	0.05

10.6. *PANAS - negative*

Table S59 **Results of the LMM for the negative items of *PANAS* analysis.** The approach was identical to that for *STAI-Y-B* analysis. See Supplementary Table S9 for table description.

Fixed effects	**Parameters**	β	**95% CI**	
	(Intercept) phase [POST] group [control] phase [POST]:group [control]	18.36 -0.02 0.12 -0.29	[15.83, 20.89] [-2.56, 2.53] [-3.54, 3.77] [-3.93, 3.35]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) residual	21.26 20.39	4.611 4.515	- -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	608.68	624.01	0.51	2.77e-04

Table S60 **Analysis of variance from the LMM of the negative items of *PANAS* analysis.** We computed type III Analysis of Variance on the LMM of the Table S59 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	Sum Squares	NumDF	DenDF	Mean Square	F	p	Eta2 (partial)
phase	0.60	1	45.494	0.60	0.03	0.864	6.51e-04
group	5.25e-03	1	46.012	5.25e-03	2.58e-04	0.987	5.60e-06
phase:group	0.49	1	45.494	0.49	0.02	0.877	5.30e-04

10.7. *PSS*

Table S61 **Results of the LMM for the *PSS* analysis.** The approach was identical to that for *STAI-Y-B* analysis. See Supplementary Table S9 for table description.

Fixed effects	**Parameters**	β	**95% CI**	
	(Intercept) phase [POST] group [control] phase [POST]:group [control]	37.08 -0.24 0.49 -1.46	[34.25, 39.91] [-2.57, 2.10] [-3.60, 4.57] [-4.80, 1.88]	
Random effects	**Parameters**	**Variance**	**Std. Dev.**	**Correlation**
	subject_id (intercept) residual	34.96 17.11	5.913 4.137	- -
Fit	**AIC**	**BIC**	**Conditional R2**	**Marginal R2**
	615.65	630.97	0.67	7.14e-03

Table S62 **Analysis of variance from the LMM of the *PSS* analysis.** We computed type III Analysis of Variance on the LMM of the Table S61 with Satterthwaite's method, using the *anova()* function of the *lmerTest* package of R.

Parameter	Sum Squares	NumDF	DenDF	Mean Square	F	p	Eta2 (partial)
phase	21.99	1	45.270	21.99	1.29	0.263	0.03
group	0.28	1	45.948	0.28	0.02	0.899	3.57e-04
phase:group	12.55	1	45.270	12.55	0.73	0.396	0.02

11. Group comparison at the first session

Based on Fig. 3, one could suspect a difference between groups at the first session for the NF index values. We first plotted the individual progressions in each group in order to visually assess if the significant difference between groups in the progression of NF index across sessions seemed due to lower values of the NF index at the first session in the NF versus the control group. For this, we displayed, for each user, the linear regression fits of NF index across the sessions with a color that coded the observed mean value of the NF index at the first session (S1):

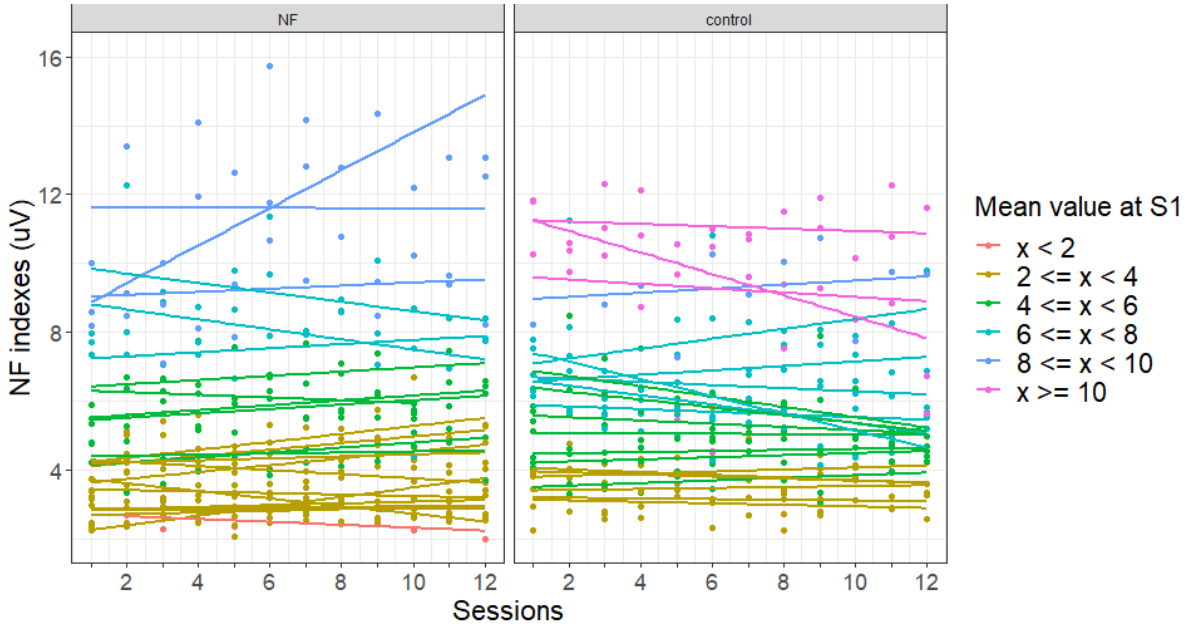

Fig. S13: **Individual linear fits of NF index values across sessions according to the mean value of NF index at the first session.** Points are the mean NF index value of each subject at each session. Graphs were obtained with R software (v.4.0.2; R Core Team, 2020).

Fig. S13 indicated no clear difference between groups at the first session and the starting NF index value did not seem to systematically influence the progression of the NF index across sessions.

To test statistically the variability between groups at the first session, we performed, for each outcome variable of interest, an independent t-test between groups (Table S63). All these statistical tests were performed with the *t_test()* function of the *rstatix* package of R. Note that we did not correct for multiple comparisons here in order to set a non-conservative threshold for detecting such potential initial difference.

Table S63 **Independent t-tests between groups at the first session**. Std. Dev. is the standard deviation; *n* is the number of subjects; *p* is the p-value obtained with the t-test (t); df is the degrees of freedom; d is the Cohen's distance to assess the effect size.

Outcome variable	Groups	mean	Std. Dev.	n	t	df	p	d
NF index	NF	4.71	2.34	48	-1.8	46	0.0789	-0.519
	control	6	2.62					
Theta activity	NF	4.27	1.69	48	-1.27	46	0.212	-0.366
	control	4.85	1.47					
Low beta activity	NF	3.33	1.17	48	-1.27	46	0.212	-0.366
	control	3.74	1.09					
STAI-Y-A	NF	32.2	7.65	48	-0.545	46	0.588	-0.158
	control	33.5	8.6					
relax-VAS	NF	6.64	2.07	48	0.672	46	0.505	0.194
	control	6.2	2.4					
Quality index	NF	0.906	0.124	48	-0.828	46	0.412	-0.239
	control	0.93	0.058					
Feeling of control	NF	4.03	2.37	48	0.956	46	0.344	0.276
	control	3.38	2.32					
STAI-Y-B	NF	39.6	8.18	48	-0.590	46	0.588	-0.170
	control	41.1	9.28					
PANAS-positive	NF	35.8	5.73	48	0.0382	46	0.97	0.011
	control	35.7	5.94					
PANAS-negative	NF	18.4	5.98	48	-0.0671	46	0.947	-0.0194
	control	18.5	6.24					
PSS	NF	37.1	6.47	48	-0.248	46	0.805	-0.0718
	control	37.6	7.07					

Table S63 shows that there was not any significant difference between groups at the first session, for either studied variable (all uncorrected *p>0.05*).

12. Study of LOWq, MEDq and HIGHq proportions

To study the evolution of the LOWq, MEDq and HIGHq EEG segments between the first and last sessions, we did the cumulative sum of the number of segments in each category across both channels and all the subjects. Then, a proportion was obtained by dividing this cumulative sum by the total number of EEG segments for the first and the last session respectively (see Supplementary Table S64).

Table S64 **Proportion of LOWq, MEDq and HIGHq EEG segments in the first and last sessions across both channels and all the subjects**

	LOWq	**MEDq**	**HIGHq**
First session	0.0127	0.1229	0.8643
Last session	0.0187	0.1479	0.8333

A chi-squared goodness of fit analysis was performed with the *chisq.test()* function of the *stats* package of R to analyze the evolution of these proportions between the first and the last sessions. No significant change was observed (X^2 = 0.0090422, df = 2, p = 0.9955).

13. Correlations between NF index and self-report outcomes

For each participant, an NF index averaged value across exercises was obtained for each session. Similarly, the averaged value for each session was obtained for the feeling of control score. Concerning *STAI-Y-A* and *relax-VAS* scores, pre- and post-session scores were averaged for each participant on each session. Pearson's correlation coefficients were calculated between NF index averaged values and self-report outcome averaged values (*STAI-Y-A*, *relax-VAS* and feeling of control) for each session and each group.

In addition, for each participant, the slopes of the linear regressions across sessions were also computed from the above described averaged values, for NF index and self-report outcomes. Pearson's correlation coefficients were computed between the slopes of NF index outcome and the slopes of the self-report outcomes, in each group.

To adjust for multiple comparisons, an approximate multivariate permutation test was conducted. Sampling distribution was built to calculate the corrected p value as the proportion of values that were larger than the observed correlation coefficient value (Nichols et Holmes, 2002).

Table S65 **Pearson's correlation analyses between NF index outcome and *relax-VAS* outcome for each group.** The first 12 rows correspond to correlations between averaged values at each session and the 13th row corresponds to the correlation between the slopes. *r* is Pearson's correlation coefficient; *p_val* is the p-value obtained from Pearson's correlation analyses and *p_corr* is the corrected p-value after multiple comparisons adjustment.

	NF group			***control group***		
	r	***p_val***	***p_corr***	***r***	***p_val***	***p_corr***
S1	-0.399	**0.031**	0.272	0.01	0.481	0.944
S2	-0.028	0.445	1	0.233	0.145	0.86
S3	-0.167	0.211	1	0.064	0.383	0.936
S4	-0.298	0.078	0.592	0.066	0.38	0.912
S5	-0.132	0.26	0.978	0.02	0.462	0.972
S6	-0.092	0.326	0.986	-0.295	0.093	0.756
S7	-0.055	0.393	1	-0.061	0.389	1
S8	-0.022	0.457	1	-0.17	0.219	1
S9	0.031	0.439	0.942	0.229	0.147	0.858
S10	-0.12	0.28	1	-0.188	0.197	0.982
S11	-0.089	0.333	1	0.035	0.436	0.934
S12	-0.016	0.467	1	-0.108	0.306	1
Slope	0.045	0.412	0.976	0.107	0.312	1

Table S66 **Pearson's correlation analyses between NF index outcome and *STAI-Y-A* outcome for each group.** See Supplementary Table S65 for table description.

	NF group			***control group***		
	r	***p_val***	***p_corr***	***r***	***p_val***	***p_corr***
S1	0.378	**0.02**	0.364	-0.079	0.178	1
S2	0.068	0.185	0.97	-0.125	0.141	0.998
S3	0.021	0.229	0.932	-0.205	0.087	0.878
S4	0.15	0.118	0.996	-0.125	0.141	0.99
S5	0.049	0.202	0.966	-0.035	0.218	1
S6	-0.039	0.212	0.988	0.025	0.227	0.998
S7	-0.061	0.191	1	-0.019	0.231	0.99
S8	-0.083	0.172	1	0.103	0.159	1
S9	-0.001	0.248	1	-0.257	0.059	0.748
S10	-0.165	0.107	0.96	0.037	0.215	1
S11	-0.03	0.221	1	-0.135	0.134	0.998
S12	0.087	0.168	1	0.17	0.107	0.992
Slope	-0.069	0.185	0.94	-0.103	0.158	0.982

Table S67 **Pearson's correlation analyses between NF index outcome and feeling of control for each group.** See Supplementary Table S65 for table description.

	NF group			***control group***		
	r	***p_val***	***p_corr***	***r***	***p_val***	***p_corr***
S1	-0.038	0.213	1	-0.237	0.08	0.608
S2	0.125	0.135	0.996	-0.117	0.252	0.944
S3	0.298	**0.039**	0.692	-0.152	0.185	0.864
S4	-0.02	0.23	1	-0.239	0.081	0.624
S5	0.281	**0.045**	0.786	-0.102	0.277	1
S6	0.101	0.157	0.97	-0.113	0.257	1
S7	-0.013	0.237	0.986	-0.283	0.051	0.452
S8	0.062	0.191	0.982	-0.113	0.256	0.994
S9	0.251	0.059	0.798	-0.257	0.073	0.622
S10	-0.083	0.172	1	-0.289	**0.048**	0.424
S11	-0.086	0.17	0.95	-0.146	0.199	1
S12	-0.096	0.16	0.99	0.038	0.412	0.996
Slope	-0.198	0.086	1	0.092	0.292	1

14. Equivalence tests

Individual slope of the session effect was obtained for each participant in each group for theta and low beta activities using linear regression models with sessions (1 to 12) as fixed effect in each participant. Then, equivalence tests were run on these slope estimates with the TOST procedure (Lakens, 2017).

14.1. Theta activity

Table S68 **Equivalence test for the theta activity.** We report three tests. We ran a first traditional null-hypothesis test (between-group Student t-test) to check if the estimates of the individual slopes of the session effect were different between the NF and the control groups (H01 is the null hypothesis; H11 is the alternative hypothesis). The second and the third tests constituted the equivalence test (TOST procedure) to check if the slopes of the control group were equivalent to those of the NF group within an equivalence boundary of +/-5%. First, the slopes of the participants from the control group were compared to the lower bound b_l defined as the averaged slope from the NF group minus 5% (b_l = 0.055), using a between-group Student t-test (here, H02 was the null hypothesis that the mean parameter estimate β in the control group was inferior or equal to b_l, and H12 was the one-sided alternative hypothesis that β control was superior to b_l). Second, the slopes of the participants from the control group were compared to the upper bound b_u defined as the averaged slope from the NF group plus 5% (b_u = 0.060), again using a between-group Student t-test (here, H03 was the null hypothesis that the mean parameter estimate β in the control group was superior or equal to b_u, and H13 was the one-sided alternative hypothesis that β control was inferior to b_u). For the equivalence test to be statistically significant, both the lower and the upper bound tests need to be statistically significant. β denotes the individual parameter estimates of the slopes of the session effect.

				H01: β control = β NF H11: β control ≠ β NF		H02: β control <= b_l H12: β control > b_l		H03: β control >= b_u H13: β control < b_u	
group	mean β	sd β	nb	t	p	t	p	t	p
control	0.017	0.118	23	-1.1108	0.2724	-1.5414	0.9313	-1.7445	**0.04751**
NF	0.057	0.133	25						

H01 (null hypothesis) could not be rejected; that is, the slopes of theta activity across sessions were not significantly different between groups. This converged with the analyses presented in Supplementary Section 7.3.1.

The TOST procedure further allowed us to test if the individual parameter estimates of the slopes of the session effect were statistically equivalent between groups. H02 and H03 were tested, defining the mean slope of the session effect (mean β) of the NF group as the reference value and lower and

upper bounds of equivalence as +/-5 % around this value. This procedure did not allow to demonstrate equivalence, because H02 could not be rejected.

14.2. Low beta activity

Table S69 **Equivalence tests for the low beta activity.** Here, considering the results of our initial traditional null-hypothesis tests (using LMM, see above), we ran equivalence tests in order to examine if the slopes of the session effect on low beta activity were statistically equivalent to zero in each group. Thus, two TOST procedures were applied (one for each group). First, we tested if the individual parameter estimates of the slopes of the session effect on the low beta activity was equivalent to 0 within a 5% boundary (b_l = -0.05; b_u = 0.05) in the NF group. For this, we ran two between-group Student t-tests, first against b_l and then against b_u (H01 and H02 were the null hypotheses, and H11 and H12 were the one-sided alternative hypotheses for these tests, as explained in details above). The second TOST procedure was the same but in the control group (with H03 and H04 as the null hypotheses, and H13 and H14 as the one-sided alternative hypotheses). β denotes the individual parameter estimates for the slopes of the session effect.

				H01: β NF <= b_l H11: β NF > b_l		H02: β NF >= b_u H12: β NF < b_u		H03: β control <= b_l H13: β control > b_l		H04: β control >= b_u H14: β control < b_u	
group	mean β	sd β	nb	t	p	t	p	t	p	t	p
control	-0.016	0.048	23	6.4028	**<0.001**	-4.241	**<0.001**	3.4264	**0.0012**	-6.655	**<0.001**
NF	0.01	0.047	25								

In both groups, these TOST procedures demonstrated that the parameter estimates of the slopes of the session effect were significantly greater than -0.05 and lower than 0.05. This allowed concluding that the session effect was statistically equivalent to 0 at +/-5% in both the NF and the control groups.