

Supplemental Material for "The Effectiveness of Online Feldenkrais Lessons on Somatosensory Tinnitus - A Pilot Study"

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1 Description of Sample - Spearman Correlations of Initial Screening Measures

To describe the sample before the treatment, Spearman correlations (two-tailed) were performed on the data from the *Initial Screening* with a sample size of $N = 17$ participants. In the text we summarize the most important significant correlations related to the tinnitus and neck pain, as measured by the Tinnitus Quotient [TQ; Goebel and Hiller (1998); Hallam (1996)], the Tinnitus Functional Index [TFI; Brüggemann et al. (2017); Meikle et al. (2012)] and the Neck Bournemouth Questionnaire [NBQ; Soklic, Peterson, and B Kim Humphreys (2012); Bolton and B. K. Humphreys (2002)]. Correlation scores with all other Initial Screening measures, including their sub-scores can be found below in Figure S1.

The TQ and the TFI showed a very strong correlation ($r = .933, p < .001$), indicating that participants' subjective experience of tinnitus was consistent across both measures. Participants who reported a worse experience of tinnitus also report stronger neck complaints, $rs \geq .644, ps \leq .007$. Additionally, higher tinnitus scores were associated with lower interoceptive awareness (MAIA, Mehling et al. 2012), $rs \leq -.502, ps \leq .048$.

Further, higher tinnitus scores could be associated with lower physical and psychological health, and worse environmental conditions ($rs \leq -.642, ps \leq .006$) as captured with the short form of the WHO questionnaire (WHO-Bref, Skevington, Lotfy, and O'Connell 2004).

Regarding self-rated Big-Five personality traits (Rammstedt et al. 2018), higher tinnitus scores were correlated with higher neuroticism ($rs \geq .616, ps \leq .011$), and the TQ (and not the TFI) showed a strong correlation with higher autistic traits ($r = .523, p = .031$, and $r = .400, p = .125$, respectively), measured by the Autism Quotient [AQ; Baron-Cohen et al. (2001)].

Tinnitus Questionnaire (TQ)															
	N	Auditory		Cognitive Strain		Emotional Strain		Intrusive-ness		Sleep		Somatic Complaints		TQ Score	
		r	p	r	p	r	p	r	p	r	p	r	p		
TQ Score	17	.731	.001 ***	.880	.000 ***	.933	<.001 ***	.924	<.001 ***	.497	.043 *	.610	.009 **	1.000	<.001 ***
TFI Score	16	.535	.033 *	.905	.000 ***	.885	<.001 ***	.896	<.001 ***	.481	.059 °	.479	.060 °	.933	<.001 ***
NBQ Score	16	.224	.404	.669	.005 **	.572	.021 *	.585	.017 *	.346	.190	.233	.385	.644	.007 **

Tinnitus Functional Index (TFI)																			
	N	Auditory Difficulties		Cognitive Interference		Emotional Distres		Intrusive-ness		Reduced Quality of Life		Interference with Relaxation		Reduced Sense of Control		Sleep Disturbance		TFI Score	
		r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p
TQ Score	17	.737	.001 ***	.792	<.001 ***	.814	<.001 ***	.679	.004 **	.928	<.001 ***	.908	<.001 ***	.846	<.001 ***	.742	.001 ***	.933	<.001 ***
TFI Score	16	.665	.005 **	.930	<.001 ***	.876	<.001 ***	.839	<.001 ***	.915	<.001 ***	.943	<.001 ***	.974	<.001 ***	.854	<.001 ***	1.000	<.001 ***
NBQ Score	16	.356	.176	.580	.018 *	.652	.006 **	.561	.024 *	.582	.018 *	.586	.017 *	.669	.005 **	.641	.007 **	.690	.003 **

	N	NBQ Score	HMM				World Health Organisation (WHO)												
			Part 1		Part 2		Environ-ment		Health Overall		Physical Health		Psychol. Health		QoL Overall		Social Relationship		
			r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p	
TQ Score	17	.644	.007 **	.260	.330	.296	.248	-.773	<.001 ***	-.377	.136	-.642	.005 **	-.821	<.001 ***	-.433	.082 °	-.175	.503
TFI Score	16	.690	.003 **	.239	.373	.291	.274	-.711	.002 **	-.387	.139	-.654	.006 **	-.786	<.001 ***	-.353	.180	-.094	.730
NBQ Score	16	1.000	<.001 ***	.477	.062 °	.237	.378	-.410	.115	-.104	.702	-.334	.206	-.579	.019 *	-.019	.944	.091	.738

Multidimensional Assessment of Interoceptive Awareness (MAIA)																			
	N	Attention Regulation		Noticing		Emotional Awareness		Not Worrying		Listening Body		Non Distraction		Self-Regulation		Trust		MAIA Score	
		r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p
TQ Score	17	-.423	.090 °	-.450	.070 °	.151	.563	-.579	.015 *	-.319	.212	-.524	.031 *	-.619	.008 **	-.485	.048 *	-.700	.002 **
TFI Score	16	-.201	.456	-.194	.472	.374	.154	-.679	.004 **	-.186	.490	-.680	.004 **	-.432	.094 °	-.358	.174	-.502	.048 *
NBQ Score	16	-.413	.111	-.046	.866	.343	.193	-.744	<.001 ***	-.274	.305	-.626	.009 **	-.529	.035 *	-.382	.144	-.503	.047 *

	N	Age	Autism Quotient	Big-Five Personality Traits											
				Agree-ability		Conscientious-ness		Extra-version		Neuro-ticism		Openness			
				r	p	r	p	r	p	r	p	r	p		
TQ Score	17	-.229	.393	.523	.031 *	-.175	.501	-.108	.680	-.120	.647	.670	.003 **	-.360	.155
TFI Score	16	-.157	.561	.400	.125	-.024	.928	-.032	.906	-.027	.920	.616	.011 *	-.196	.467
NBQ Score	16	-.405	.120	.155	.567	.259	.333	-.093	.733	-.043	.874	.477	.061 °	-.200	.459

Figure S 1: Spearman correlation (two-tailed) results of the Initial Screening (captured before the intervention) measures: Tinnitus Questionnaire [TQ; Goebel and Hiller (1998); Hallam (1996)], Tinnitus-Functional-Index [TFI; Brüggemann et al. (2017); Meikle et al. (2012)], Neck Bournemouth Questionnaire [NBQ; Soklic, Peterson, and B Kim Humphreys (2012); Bolton and B. K. Humphreys (2002)], how strongly head movements modulate (HMM) the tinnitus (our own measure), the short WHO-health questionnaire [WHO; Skevington, Lotfy, and O'Connell (2004)], the Multidimensional Assessment of Interoceptive Awareness (MAIA) Questionnaire (Mehling et al. 2012), the Autism Quotient [AQ; Baron-Cohen et al. (2001)], and Big-Five Personality Traits (Rammstedt et al. 2018). Asterisks mark significant correlations, i.e. *** $p < .001$, ** $p < .01$, * $p < .05$, and a circle marks trends with $p < .1$.

3 Details of The Linear Mixed Model Analyses

We employed the `lmer()` function derived from the `lme4` package (Bates et al. 2015) to conduct our analyses. For each of the ensuing analyses, we present both the model specifications, the `summary()` output. Models were compared via analysis of variances (ANOVAS). Additionally, we provide graphical representations encompassing residual plots, residual histograms, and normal quantile-quantile plots.

3.1 Tinnitus Functional Index (TFI) over Time

Figure S3 shows the TFI measures over time for all 17 participants. To analyse the data, we compared two models, i.e., `TFI.Time` and `TFI.NoTime`, that are defined below via an ANVOVA. All outputs see below.

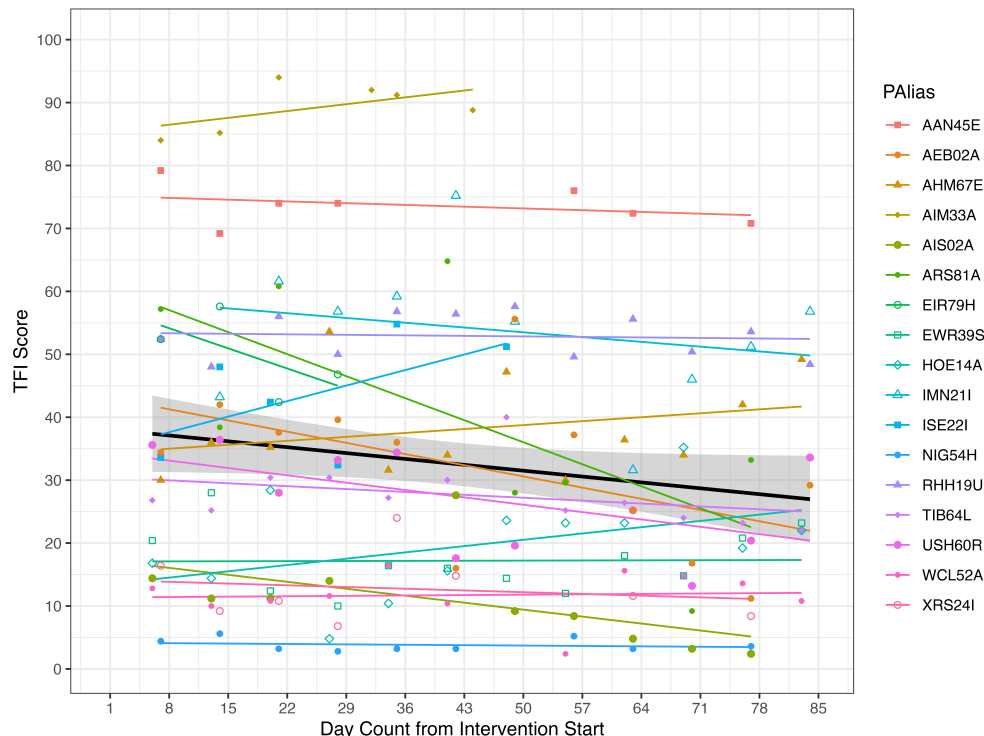


Figure S 3: Linear Fits (M and 95%-CI represented by black line and grey area, respectively) are shown for the weekly captured Tinnitus Functional Index (TFI) as a function of time (Day Count from Intervention Start) for a total of $N = 17$ participants (PAlias), with individual data points coded by color and shape. Participants exhibit varying intercepts and slopes.

3.1.1 Model Definition 1 (TFI.Time)

`TFI.Time` includes time measured as the number of days from the start of the intervention (`DayFromStart`) as a predictor with correlated random intercepts and random slopes for the participants (PAlias) i.e.

```
dfTFI <- df %>% select(PAlias, DayFromStart, TFIScore)
```

```
TFI.Time = lmer(TFIScore ~ DayFromStart + (1+DayFromStart|PAlias),
               data = dfTFI, REML = FALSE, lmerControl(optimizer = 'bobyqa'))
```

This model can be summarized by:

```
summary(TFI.Time)
```

```

## Linear mixed model fit by maximum likelihood ['lmerMod']
## Formula: TFIScore ~ DayFromStart + (1 + DayFromStart | PAliaS)
## Data: dfTFI
## Control: lmerControl(optimizer = "bobyqa")
##
##      AIC      BIC   logLik deviance df.resid
## 1239.2 1257.8   -613.6  1227.2    159
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -3.4634 -0.4255 -0.0975  0.4699  3.1285
##
## Random effects:
## Groups   Name      Variance Std.Dev. Corr
## PAliaS   (Intercept) 5.220e+02 22.84727
##          DayFromStart 6.949e-03 0.08336 -0.24
## Residual                6.051e+01 7.77859
## Number of obs: 165, groups: PAliaS, 17
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept) 38.06386    5.67405   6.708
## DayFromStart -0.06487    0.03342  -1.941
##
## Correlation of Fixed Effects:
##              (Intr)
## DayFromStrt -0.285

```

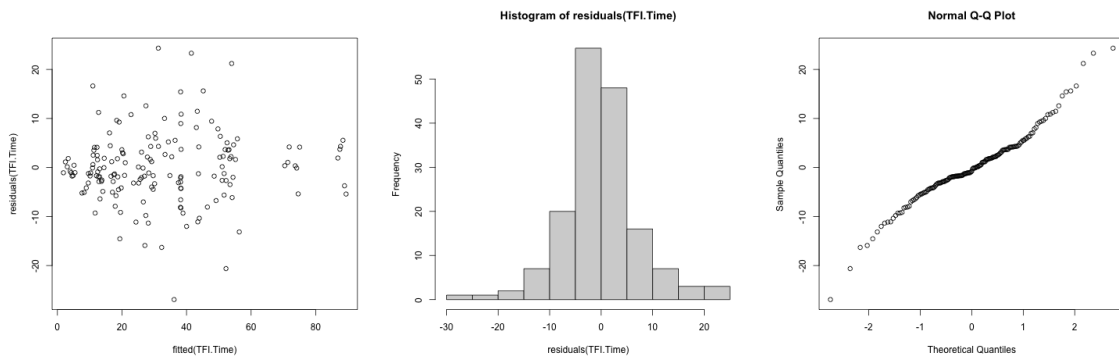


Figure S 4: TFI.Time model: Residual plot (left), histogram of the residuals (middle), Normal qqplot (right).

3.1.2 Model Definition 2 (TFI.NoTime)

TFI.NoTime only included random intercepts for each participant without considering the effect of time, i.e.,

```

TFI.noTime = lmer(TFIScore ~+ (1|PAliaS),
                 data = dfTFI, REML = FALSE, lmerControl(optimizer = 'bobyqa'))

```

This model can be summarized by:

```

summary(TFI.noTime)

```

```

## Linear mixed model fit by maximum likelihood ['lmerMod']
## Formula: TFIScore ~ +(1 | PAliaS)

```

```

## Data: dfTFI
## Control: lmerControl(optimizer = "bobyqa")
##
## AIC      BIC    logLik deviance df.resid
## 1241.5   1250.8  -617.7  1235.5    162
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -3.8014 -0.4854 -0.0859  0.4349  2.9697
##
## Random effects:
## Groups   Name      Variance Std.Dev.
## PAlias   (Intercept) 505.56   22.485
## Residual                67.43    8.211
## Number of obs: 165, groups: PAlias, 17
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)   35.402     5.494    6.443

```

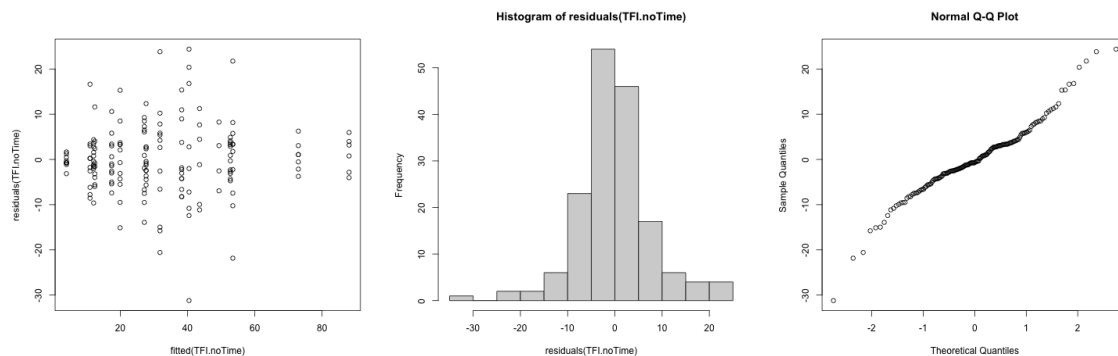


Figure S 5: TFI.noTime model: Residual plot (left), histogram of the residuals (middle), Normal qqplot (right).

3.1.3 Comparing TFI.noTime and TFI.Time via an ANOVA

To compare both models TFI.Time and TFI.NoTime, we calculated an ANOVA.

```
anova(TFI.noTime, TFI.Time)
```

```

## Data: dfTFI
## Models:
## TFI.noTime: TFIScore ~ +(1 | PAlias)
## TFI.Time: TFIScore ~ DayFromStart + (1 + DayFromStart | PAlias)
##
##      npar    AIC    BIC  logLik deviance  Chisq Df Pr(>Chisq)
## TFI.noTime    3 1241.5 1250.8 -617.75  1235.5
## TFI.Time      6 1239.2 1257.8 -613.58  1227.2 8.3363  3    0.03955 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

3.2 Neck Bournemouth Questionnaire (NBQ) over Time

Fig. S6 shows the NBQ measures over time for all 17 participants. To analyse the data, we compared two models, i.e. NBQ.Time and NBQ.NoTime, that are defined below via an ANVOVA. All outputs see below.

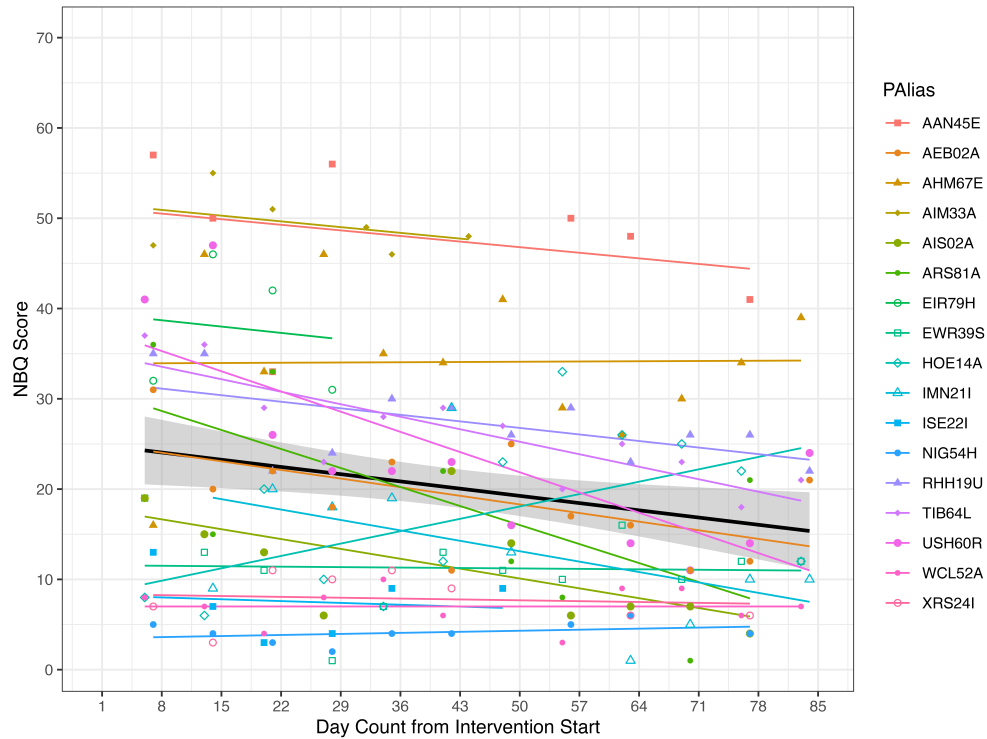


Figure S 6: Linear Fits (M and 95%-CI represented by black line and grey area, respectively) are shown for the weekly captured Neck Bournemouth Questionnaire (NBQ) as a function of time (Day Count from Intervention Start) for a total of $N = 17$ participants (PAliaS), with individual data points coded by color and shape. Participants exhibit varying intercepts and slopes.

3.2.1 Model Definition 1 (NBQ.Time)

NBQ.Time includes time measured as the number of days from the start of the intervention (DayFromStart) as a predictor with correlated random intercepts and random slopes for the participants (PAliaS) i.e.

```
dfNBQ <- df %>% select(PAliaS, DayFromStart, NBQScore)
```

```
NBQ.Time = lmer(NBQScore ~ DayFromStart + (1 + DayFromStart | PAliaS),
               data = dfNBQ, REML = FALSE, lmerControl(optimizer = 'bobyqa'))
```

This model can be summarized by:

```
summary(NBQ.Time)
```

```
## Linear mixed model fit by maximum likelihood ['lmerMod']
## Formula: NBQScore ~ DayFromStart + (1 + DayFromStart | PAliaS)
## Data: dfNBQ
## Control: lmerControl(optimizer = "bobyqa")
##
##      AIC      BIC    logLik deviance df.resid
## 1153.0  1171.7   -570.5  1141.0     159
```

```
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -3.2139 -0.5426 -0.0131  0.4590  2.6654
##
## Random effects:
##  Groups   Name            Variance Std.Dev. Corr
##  PAlias   (Intercept)  2.207e+02 14.85756
##           DayFromStart 9.109e-03  0.09544 -0.59
##  Residual                3.708e+01  6.08910
## Number of obs: 165, groups: PAlias, 17
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)  24.91218    3.72901   6.681
## DayFromStart -0.09157    0.03139  -2.917
##
## Correlation of Fixed Effects:
##              (Intr)
## DayFromStrt -0.568
```

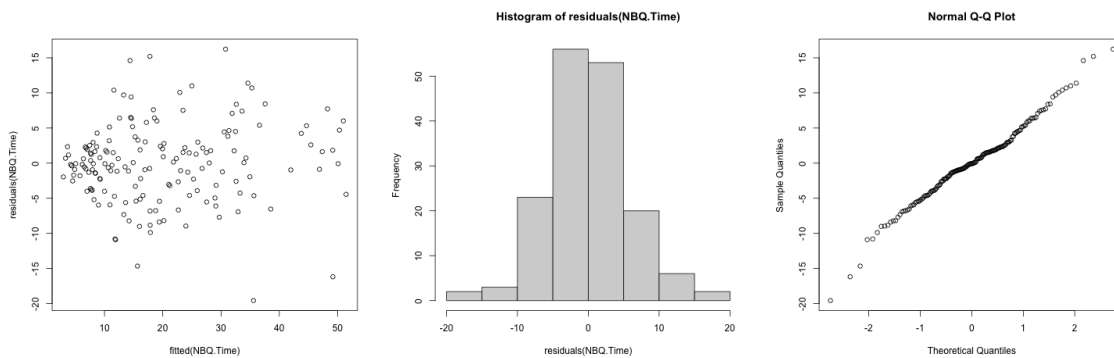


Figure S 7: NBQ.Time model: Residual plot (left), histogram of the residuals (middle), Normal qqplot (right).

3.2.2 Model Definition 2 (NBQ.NoTime)

NBQ.NoTime only included random intercepts for each participant without considering the effect of time, i.e.,

```
NBQ.noTime = lmer(NBQScore ~+ (1|PAlias),
                 data = dfNBQ, REML = FALSE, lmerControl(optimizer = 'bobyqa'))
```

This model can be summarized by:

```
summary(NBQ.noTime)
```

```
## Linear mixed model fit by maximum likelihood ['lmerMod']
## Formula: NBQScore ~ +(1 | PAlias)
## Data: dfNBQ
## Control: lmerControl(optimizer = "bobyqa")
##
##      AIC      BIC    logLik deviance df.resid
##  1171.2  1180.5   -582.6  1165.2     162
##
## Scaled residuals:
```

```

##      Min      1Q  Median      3Q      Max
## -2.6302 -0.6001 -0.0362  0.4273  3.4096
##
## Random effects:
## Groups   Name      Variance Std.Dev.
## PAliaS   (Intercept) 178.99   13.379
## Residual                47.17    6.868
## Number of obs: 165, groups: PAliaS, 17
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)   21.280      3.293   6.463

```

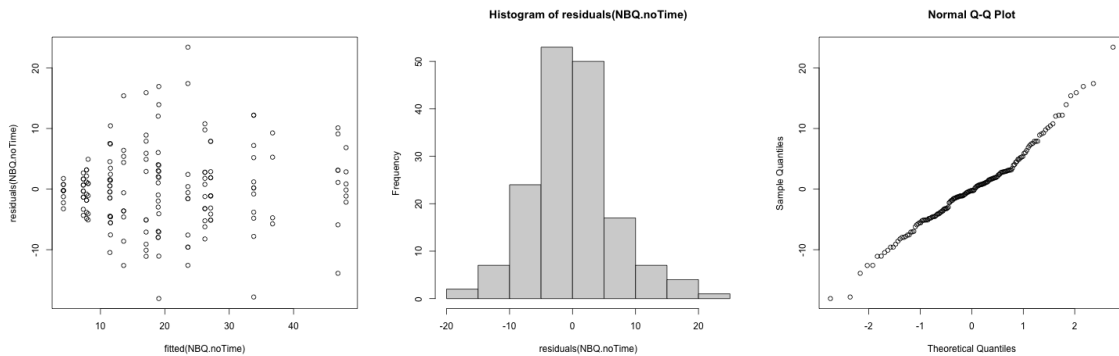


Figure S 8: NBQ.noTime model: Residual plot (left), histogram of the residuals (middle), Normal qqplot (right).

3.2.3 Comparing NBQ.noTime and NBQ.Time via an ANOVA

To compare both models, we calculated an ANOVA.

```
anova(NBQ.noTime, NBQ.Time)
```

```

## Data: dfNBQ
## Models:
## NBQ.noTime: NBQScore ~ +(1 | PAliaS)
## NBQ.Time: NBQScore ~ DayFromStart + (1 + DayFromStart | PAliaS)
##          npar    AIC    BIC logLik deviance Chisq Df Pr(>Chisq)
## NBQ.noTime    3 1171.2 1180.5 -582.61  1165.2
## NBQ.Time      6 1153.0 1171.7 -570.52  1141.0 24.183  3 2.288e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

3.3 How strongly Head Movements Modulate (HMM) the Tinnitus over Time

Fig. S9 shows the HMM measures over time for all 17 participants. To analyse the data, we compared two, i.e. models HMM.Time and HMM.NoTime, that are defined below via an ANVOVA. All outputs see below.

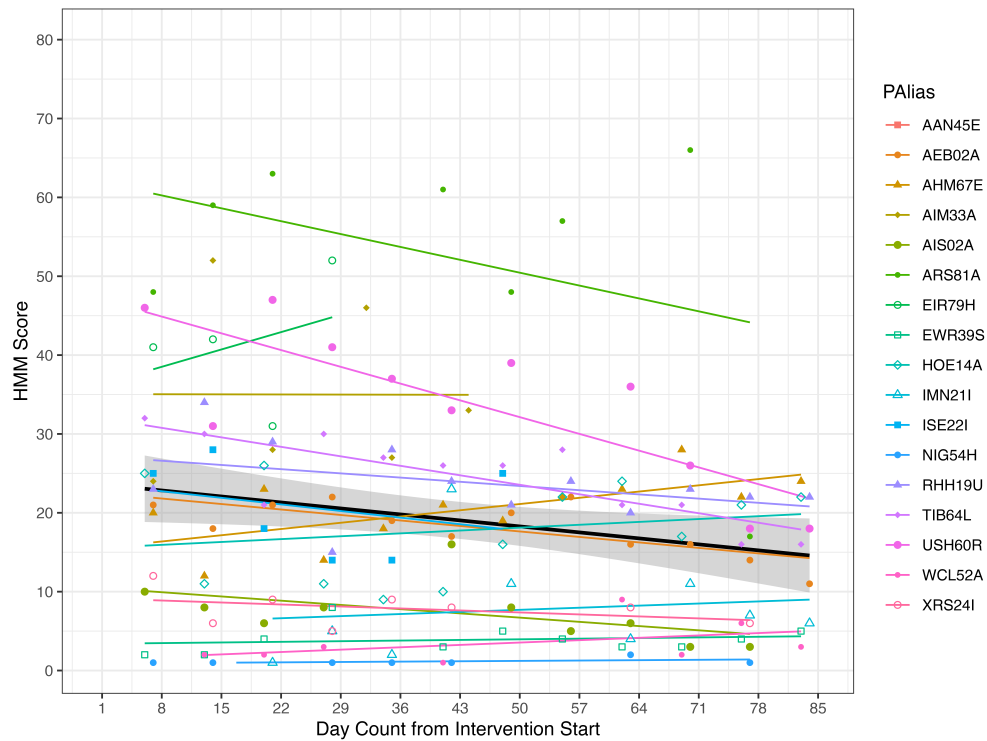


Figure S 9: Linear Fits (M and 95%-CI represented by black line and grey area, respectively) are shown for the weekly captured measure of how strongly Head Movements Modulate (HMM) the tinnitus as a function of time (Day Count from Intervention Start) for a total of $N = 17$ participants (PAlias), with individual data points coded by color and shape. Participants exhibit varying intercepts and slopes.

3.3.1 Model Definition 1 (HMM.Time)

HMM.Time includes time measured as the number of days from the start of the intervention (DayFromStart) as a predictor with correlated random intercepts and random slopes for the participants (PAlias) i.e.

```
dfHMM <- df %>% select(PAlias, DayFromStart, HMMScore)

HMM.Time = lmer(HMMScore ~ DayFromStart + (1 + DayFromStart | PAlias),
  data = dfHMM, REML = FALSE, lmerControl(optimizer = 'bobyqa'))
```

This model can be summarized by:

```
summary(HMM.Time)

## Linear mixed model fit by maximum likelihood ['lmerMod']
## Formula: HMMScore ~ DayFromStart + (1 + DayFromStart | PAlias)
## Data: dfHMM
## Control: lmerControl(optimizer = "bobyqa")
##
##      AIC      BIC    logLik deviance df.resid
##  1133.2   1151.9   -560.6   1121.2     159
```

```
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -4.2155 -0.3887 -0.0077  0.4049  3.9097
##
## Random effects:
##  Groups   Name            Variance Std.Dev. Corr
##  PAlia   (Intercept)  322.53388 17.95923
##          DayFromStart  0.00957  0.09783 -0.95
##  Residual                33.57520  5.79441
## Number of obs: 165, groups: PAlia, 17
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)  20.93032    4.44832   4.705
## DayFromStart -0.06586    0.03040  -2.166
##
## Correlation of Fixed Effects:
##              (Intr)
## DayFromStrt -0.830
```

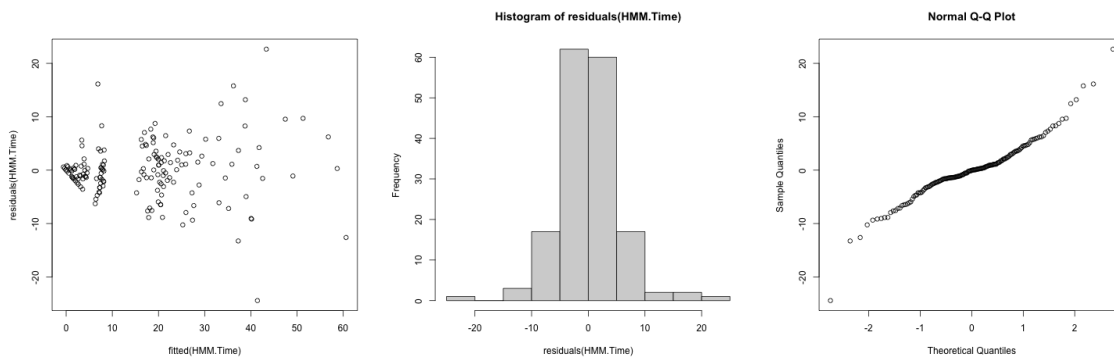


Figure S 10: HMM.Time model: Residual plot (left), histogram of the residuals (middle), Normal qqplot (right).

3.3.2 Model Definition 2 (HMM.NoTime)

HMM.NoTime only included random intercepts for each participant without considering the effect of time, i.e.,

```
HMM.noTime = lmer(HMMScore ~+ (1|PAlia),
                  data = dfHMM, REML = FALSE, lmerControl(optimizer = 'bobyqa'))
```

This model can be summarized by:

```
summary(HMM.noTime)
```

```
## Linear mixed model fit by maximum likelihood ['lmerMod']
## Formula: HMMScore ~ +(1 | PAlia)
## Data: dfHMM
## Control: lmerControl(optimizer = "bobyqa")
##
##      AIC      BIC    logLik deviance df.resid
## 1154.6 1163.9   -574.3  1148.6     162
```

```

##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -5.0682 -0.3911 -0.0725  0.4519  2.7223
##
## Random effects:
##   Groups   Name      Variance Std.Dev.
##   PAlias   (Intercept) 207.62   14.41
##   Residual                41.48    6.44
## Number of obs: 165, groups: PAlias, 17
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)  18.462      3.534    5.224

```

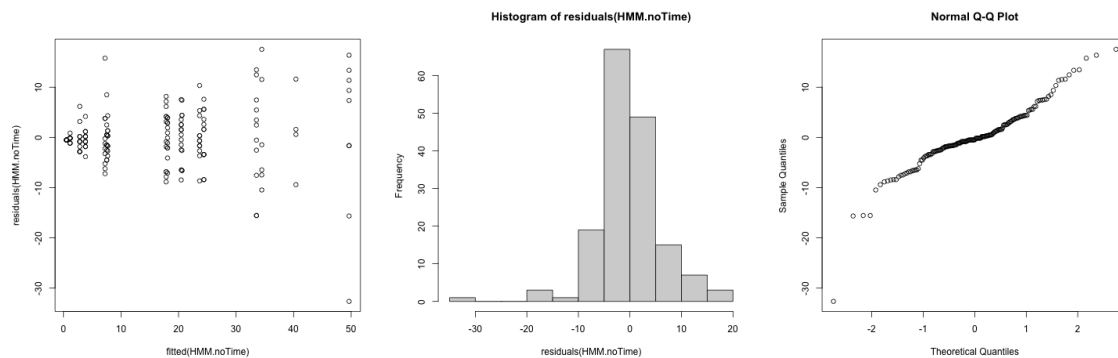


Figure S 11: HMM.noTime model: Residual plot (left), histogram of the residuals (middle), Normal qqplot (right).

3.3.3 Comparing HMM.noTime and HMM.Time via an ANOVA

To compare both models, we calculated an ANOVA.

```
anova(HMM.noTime, HMM.Time)
```

```

## Data: dfHMM
## Models:
## HMM.noTime: HMMScore ~ +(1 | PAlias)
## HMM.Time: HMMScore ~ DayFromStart + (1 + DayFromStart | PAlias)
##              npar    AIC    BIC  logLik deviance  Chisq Df Pr(>Chisq)
## HMM.noTime    3 1154.6 1163.9 -574.29  1148.6
## HMM.Time      6 1133.2 1151.9 -560.61  1121.2 27.361  3 4.947e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

3.4 Analysis of Pre-Post ATM effect on STAI

From a visual examination of Figure S12, it is evident that there are substantial individual differences in the immediate effect of the ATMs on participants' well-being, as measured by state anxiety (STAI) directly before (pre), and after (post) the lesson.

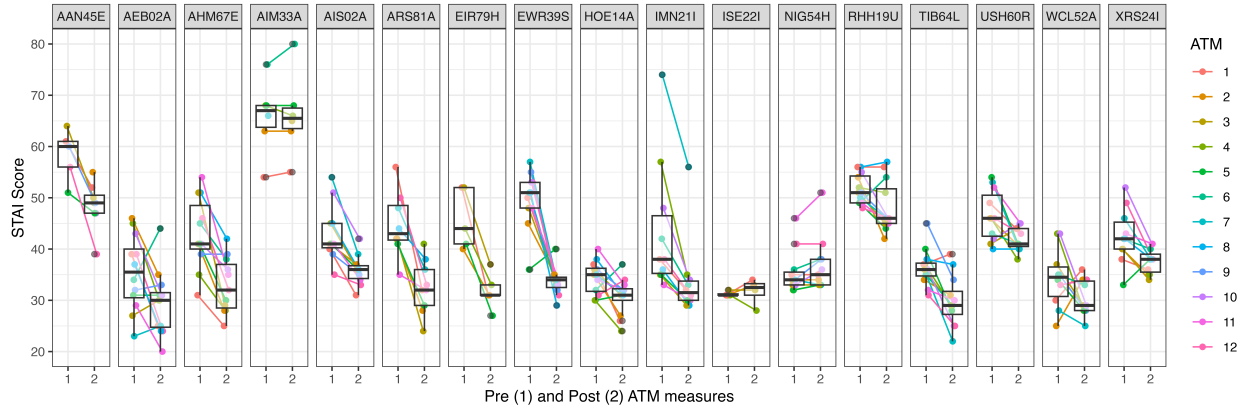


Figure S 12: Considerable individual differences in the effects of the weekly Awareness Through Movement (ATM) lessons were found for state anxiety (STAI) that was gathered immediately before (Pre - 1) and after (Post - 2) each weekly lesson. Linear mixed modeling revealed a significant decrease of both measures, when comparing pre- and post measures. More details are given in the main manuscript.

To analyze the impact of the weekly ATM lessons on the STAI, we compared two models using ANOVA. The first model STAI.PrePost incorporated random intercept and random slope for participants (PAliaS), random intercept for each ATM, and a fixed effect of PrePost, which represents the state anxiety before and after each lesson. In contrast, the second model STAI.noPP excluded the fixed effect of PrePost.

3.4.1 Model Definition 1 (STAI.PrePost)

```
STAI.PrePost = lmer(STAIScore ~ PrePost + (1|ATM) + (1+PrePost|PAliaS),
                    data= dfSTAI, REML = FALSE, lmerControl(optimizer = 'bobyqa'))
```

This model can be summarized by:

```
summary(STAI.PrePost)
```

```
## Linear mixed model fit by maximum likelihood ['lmerMod']
## Formula: STAIScore ~ PrePost + (1 | ATM) + (1 + PrePost | PAliaS)
## Data: dfSTAI
## Control: lmerControl(optimizer = "bobyqa")
##
##      AIC      BIC   logLik deviance df.resid
## 2129.1  2155.5 -1057.5  2115.1     318
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.4366 -0.5224 -0.1445  0.4806  5.5512
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## PAliaS   (Intercept)  99.3516   9.9675
##          PrePost      15.4623   3.9322  -0.52
```

```

## ATM      (Intercept)  0.7126  0.8442
## Residual                29.6302  5.4434
## Number of obs: 325, groups:  PAlias, 17; ATM, 12
##
## Fixed effects:
##           Estimate Std. Error t value
## (Intercept)  50.247      2.627  19.129
## PrePost      -6.505      1.140  -5.704
##
## Correlation of Fixed Effects:
##           (Intr)
## PrePost -0.595

```

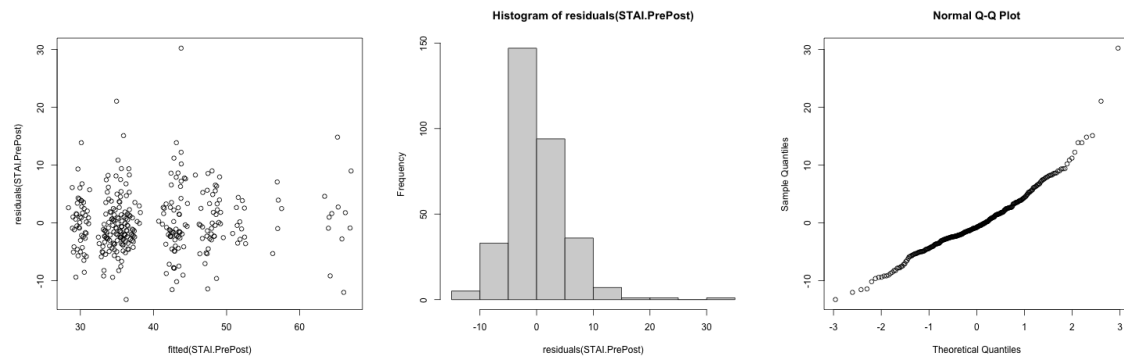


Figure S 13: STAI.PrePost model: Residual plot (left), histogram of the residuals (middle), Normal qqplot (right).

3.4.2 Model Description 2 (STAI.noPP)

```

STAI.noPP = lmer(STAIScore ~ + (1|ATM)+ (1|PAlias),
                data= dfSTAI, REML = FALSE, lmerControl(optimizer = 'bobyqa'))

```

This model can be summarized by:

```
summary(STAI.noPP)
```

```

## Linear mixed model fit by maximum likelihood ['lmerMod']
## Formula: STAIScore ~ +(1 | ATM) + (1 | PAlias)
## Data: dfSTAI
## Control: lmerControl(optimizer = "bobyqa")
##
##           AIC      BIC   logLik deviance df.resid
##  2226.9    2242.0  -1109.5   2218.9     321
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.1340 -0.6236 -0.1143  0.4918  5.2263
##
## Random effects:
## Groups   Name                Variance Std.Dev.
## PAlias   (Intercept)  70.24431  8.3812
## ATM      (Intercept)   0.06737  0.2596
## Residual                    45.20976  6.7238

```

```
## Number of obs: 325, groups: PAlias, 17; ATM, 12
##
## Fixed effects:
##           Estimate Std. Error t value
## (Intercept)  40.320      2.072   19.46
```

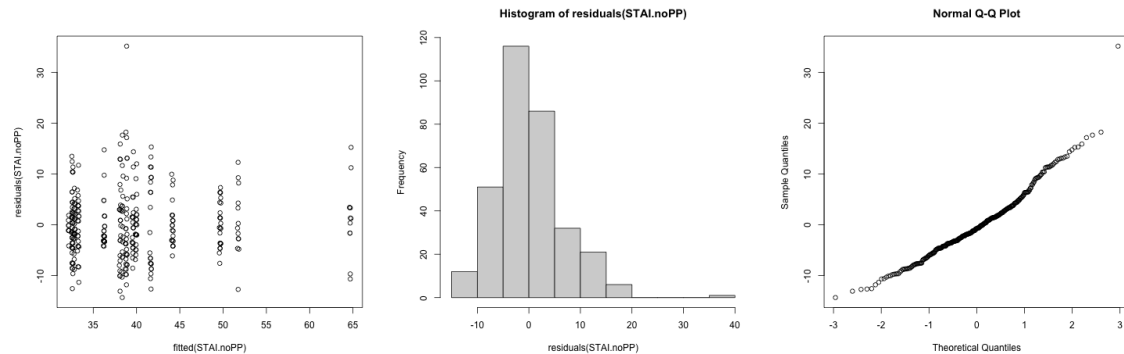


Figure S 14: STAI.noPP model: Residual plot (left), histogram of the residuals (middle), Normal qqplot (right).

3.4.3 Comparing STAI.PrePost and STAI.noPP via an ANOVA

To compare both models, we calculated an ANOVA.

```
anova(STAI.PrePost, STAI.noPP)
```

```
## Data: dfSTAI
## Models:
## STAI.noPP: STAIScore ~ +(1 | ATM) + (1 | PAlias)
## STAI.PrePost: STAIScore ~ PrePost + (1 | ATM) + (1 + PrePost | PAlias)
##           npar    AIC    BIC logLik deviance Chisq Df Pr(>Chisq)
## STAI.noPP      4 2226.9 2242.0 -1109.5  2218.9
## STAI.PrePost   7 2129.1 2155.5 -1057.5  2115.1 103.85  3 < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

3.5 Mean STAI (meanSTAI) over Time

We calculated the mean across the pre and post measures of the STAI Score for each participant and measurement timepoint.

```
dfSTAI <- df %>% select(PAlias, PrePost, DayFromStart, STAIScore)
##calculate the means of pre- and post STAI-scores:
dfSTAI <- dfSTAI %>% dplyr::group_by(PAlias, DayFromStart) %>%
  dplyr::summarize(STAIScore = mean(STAIScore, na.rm = TRUE))
```

```
## `summarise()` has grouped output by 'PAlias'. You can override using the
## `.groups` argument.
```

Fig. S15 shows the mean STAI measures over time for all 17 participants. To analyze the impact of the weekly ATM lessons on the STAI, we compared two models using ANOVA. The first model incorporated random intercept and random slope for participants (PAlias), random intercepts for each ATM, and a fixed effect of PrePost, as depicted by the formula

$$STAI.PrePost = STAI \sim PrePost + (1|ATM) + (1 + PrePost|PAlias)$$

In contrast, the second model excluded the effects of PrePost, resulting in the formula

$$STAI.noPP = STAI \sim +(1|ATM) + (1|PAlias)$$

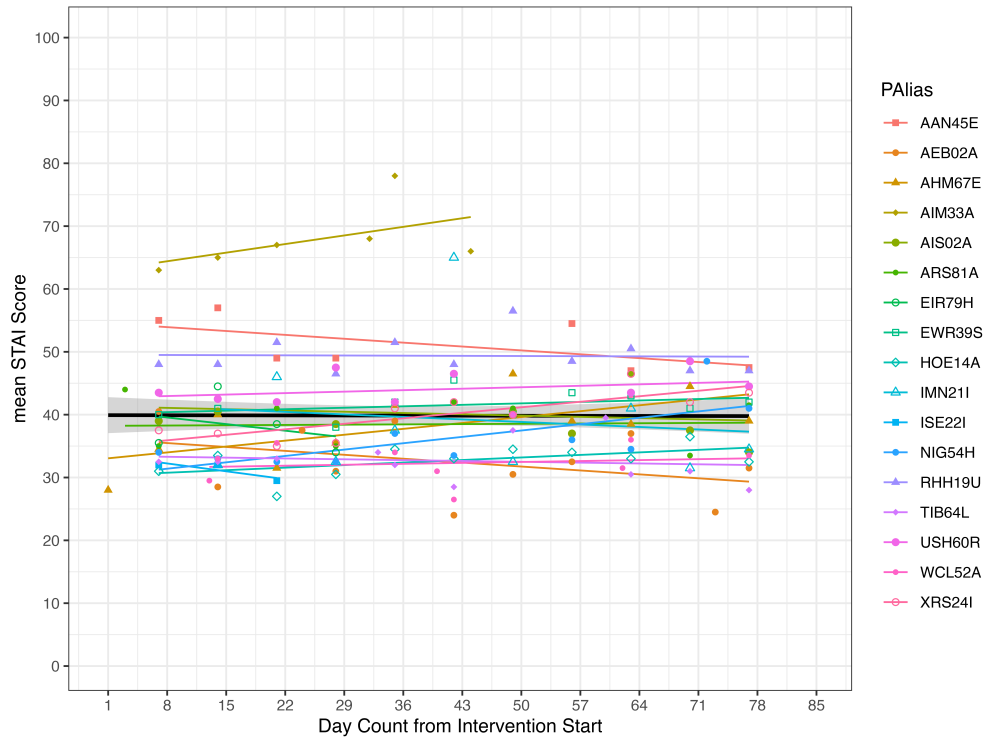


Figure S 15: Linear Fits (M and 95%-CI represented by black line and grey area, respectively) are shown for the mean of the weekly captured pre-and post measure of the STAI Score as a function of time (Day Count from Intervention Start) for a total of $N = 17$ participants (PALias), with individual data points coded by color and shape. Participants exhibit varying intercepts and slopes.

3.5.1 Model Definition 1 (meanSTAI.Time)

meanSTAI.Time includes time measured as the number of days from the start of the intervention (DayFromStart) as a predictor with correlated random intercepts and random slopes for the participants (PALias) i.e.

```
meanSTAI.Time = lmer(STAIScore ~ DayFromStart + (1+DayFromStart|PALias),
  data = dfSTAI, REML = FALSE, lmerControl(optimizer = 'bobyqa'))
```

This model can be summarized by:

```
summary(meanSTAI.Time)
```

```
## Linear mixed model fit by maximum likelihood ['lmerMod']
## Formula: STAIScore ~ DayFromStart + (1 + DayFromStart | PALias)
## Data: dfSTAI
## Control: lmerControl(optimizer = "bobyqa")
##
##      AIC      BIC   logLik deviance df.resid
##  1049.8   1068.5   -518.9   1037.8     160
##
```

```

## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -1.9823 -0.5685 -0.1023  0.4624  5.8188
##
## Random effects:
##   Groups   Name      Variance Std.Dev. Corr
##   PAlia   (Intercept) 70.996372 8.42593
##           DayFromStart 0.001953 0.04419 -0.01
## Residual                20.267539 4.50195
## Number of obs: 166, groups: PAlia, 17
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept) 39.60723    2.13595  18.543
## DayFromStart 0.02100    0.01867   1.125
##
## Correlation of Fixed Effects:
##              (Intr)
## DayFromStrt -0.196

```

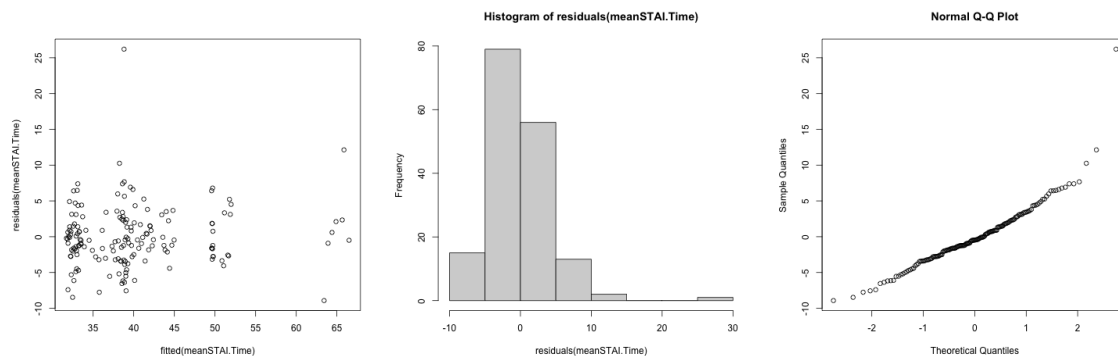


Figure S 16: meanSTAI.Time model: Residual plot (left), histogram of the residuals (middle), Normal qqplot (right).

3.5.2 Model Definition 2 (meanSTAI.noTime)

meanSTAI.noTime only included random intercepts for each participant without considering the effect of time, i.e.,

```

meanSTAI.noTime = lmer(STAIScore ~+ (1|PAlia),
                       data = dfSTAI, REML = FALSE, lmerControl(optimizer = 'bobyqa'))

```

This model can be summarized by:

```

summary(meanSTAI.noTime)

```

```

## Linear mixed model fit by maximum likelihood ['lmerMod']
## Formula: STAIScore ~ +(1 | PAlia)
## Data: dfSTAI
## Control: lmerControl(optimizer = "bobyqa")
##
##      AIC      BIC    logLik deviance df.resid
## 1047.0  1056.3   -520.5  1041.0     163
##

```

```

## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -2.2167 -0.5710 -0.0756  0.4838  5.6166
##
## Random effects:
##   Groups   Name      Variance Std.Dev.
##   PAlias   (Intercept) 70.20    8.378
##   Residual                21.77    4.665
## Number of obs: 166, groups: PAlias, 17
##
## Fixed effects:
##               Estimate Std. Error t value
## (Intercept)   40.298     2.067    19.5

```

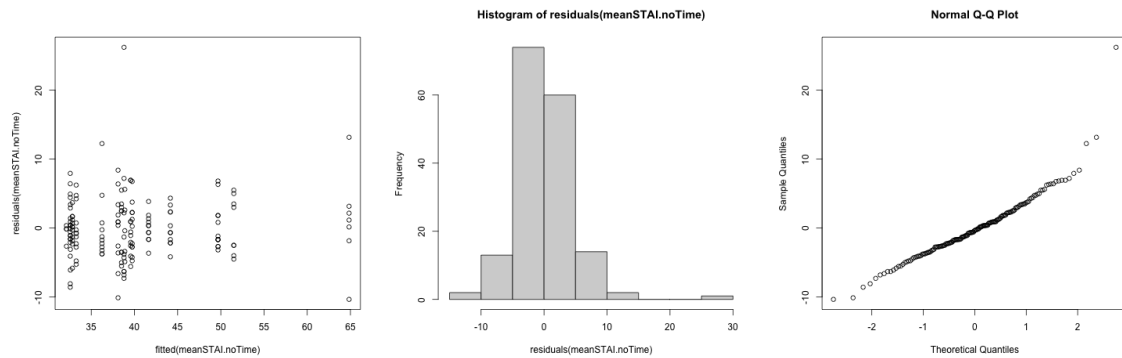


Figure S 17: meanSTAI.noTime model: Residual plot (left), histogram of the residuals (middle), Normal qqplot (right).

3.5.3 Comparing meanSTAI.noTime and meanSTAI.Time via an ANOVA

To compare both models, we calculated an ANOVA.

```
anova(meanSTAI.noTime, meanSTAI.Time)
```

```

## Data: dfSTAI
## Models:
## meanSTAI.noTime: STAIScore ~ +(1 | PAlias)
## meanSTAI.Time: STAIScore ~ DayFromStart + (1 + DayFromStart | PAlias)
##               npar    AIC    BIC  logLik deviance  Chisq Df Pr(>Chisq)
## meanSTAI.noTime    3 1047.0 1056.3 -520.48  1041.0
## meanSTAI.Time      6 1049.8 1068.5 -518.91  1037.8 3.1372 3    0.3709

```

3.6 Tinnitus Visual Analogue Scale (TVAS) Pre-Post ATM effect

From a visual examination of Figure 18, it is evident that there are substantial individual differences in the immediate effect of the ATMs on participants' perceived tinnitus loudness, as measured by the Tinnitus Visual Analogue Scale (TVAS) directly before (pre), and after (post) the lesson.

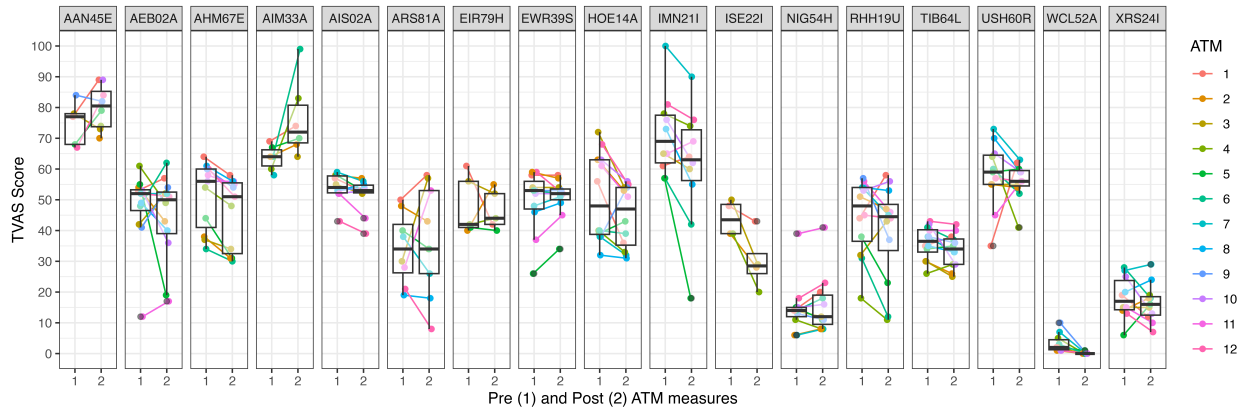


Figure S 18: Considerable individual differences in the effects of the weekly Awareness Through Movement (ATM) lessons were found for perceived tinnitus loudness (measured by the Tinnitus Visual Analogue Scale, TVAS) that was gathered immediately before (Pre - 1) and after (Post - 2) each weekly lesson. Linear mixed modeling revealed a small significant decrease of this measure, when comparing pre- and post measures. More details are given in the main manuscript.

To analyse these effects, we conducted an analogous analysis to the STAI. The first model incorporated random intercept and random slope for participants (P_{Alias}), random intercepts for each ATM, and a fixed effect of PrePost, as depicted by the formula

$$TVAS.PrePost1 = TVAS \sim PrePost + (1|ATM) + (1 + PrePost|P_{Alias})$$

. As the random effect structure of this model was too complex, resulting in a singular fit, we reduced the complexity of this model to

$$TVAS.PrePost2 = TVAS \sim PrePost + (1|ATM) + (1|P_{Alias})$$

and compared it to the model without the effect of PrePost, i.e.

$$TVAS.noPP = TVAS \sim +(1|ATM) + (1|P_{Alias})$$

3.6.1 Model Description 1 (TVAS.noPP)

```
TVAS.noPP = lmer(TVAS ~ + (1|ATM) + (1|P_{Alias}),
                 data= dfTVAS, REML = FALSE, lmerControl(optimizer = 'bobyqa'))
```

This model can be summarized by:

```
summary(TVAS.noPP)
```

```
## Linear mixed model fit by maximum likelihood ['lmerMod']
## Formula: TVAS ~ +(1 | ATM) + (1 | P_{Alias})
## Data: dfTVAS
## Control: lmerControl(optimizer = "bobyqa")
##
##          AIC          BIC    logLik deviance df.resid
```

```
## 2524.5 2539.7 -1258.3 2516.5 321
##
## Scaled residuals:
## Min 1Q Median 3Q Max
## -4.2584 -0.4868 0.0402 0.5600 3.1381
##
## Random effects:
## Groups Name Variance Std.Dev.
## PAlias (Intercept) 360.792 18.995
## ATM (Intercept) 6.321 2.514
## Residual 105.201 10.257
## Number of obs: 325, groups: PAlias, 17; ATM, 12
##
## Fixed effects:
## Estimate Std. Error t value
## (Intercept) 44.056 4.703 9.367
```

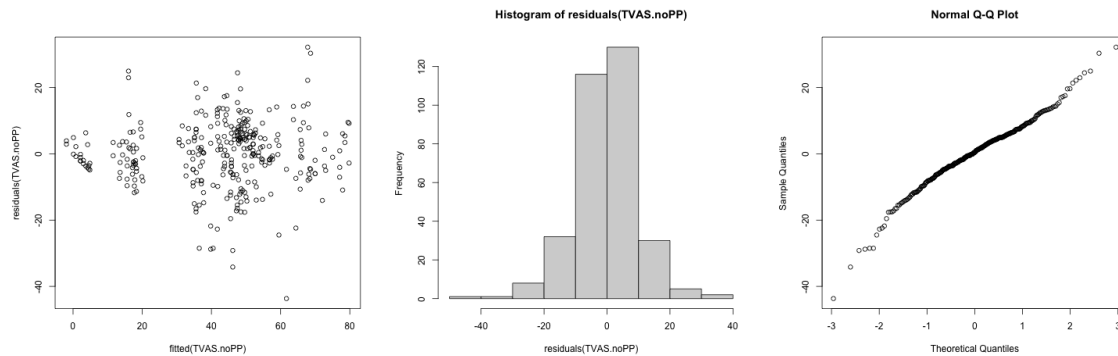


Figure S 19: TVAS.noPP model: Residual plot (left), histogram of the residuals (middle), Normal qqplot (right).

3.6.2 Model Definition 2 (TVAS.PrePost1)

```
TVAS.PrePost1 = lmer(TVAS ~ PrePost + (1|ATM)+ (1+PrePost|PAlias),
                    data= dfTVAS, REML = FALSE, lmerControl(optimizer = 'bobyqa'))
```

```
## boundary (singular) fit: see help('isSingular')
```

This model can be summarized by:

```
summary(TVAS.PrePost1)
```

```
## Linear mixed model fit by maximum likelihood ['lmerMod']
## Formula: TVAS ~ PrePost + (1 | ATM) + (1 + PrePost | PAlias)
## Data: dfTVAS
## Control: lmerControl(optimizer = "bobyqa")
##
## AIC BIC logLik deviance df.resid
## 2526.5 2552.9 -1256.2 2512.5 318
##
## Scaled residuals:
## Min 1Q Median 3Q Max
## -4.1987 -0.5228 0.0810 0.5979 3.0855
```

```
##
## Random effects:
## Groups Name Variance Std.Dev. Corr
## PAlias (Intercept) 334.0113 18.2760
## PrePost 0.2402 0.4901 1.00
## ATM (Intercept) 6.2936 2.5087
## Residual 103.7846 10.1875
## Number of obs: 325, groups: PAlias, 17; ATM, 12
##
## Fixed effects:
## Estimate Std. Error t value
## (Intercept) 47.387 4.843 9.785
## PrePost -2.209 1.138 -1.941
##
## Correlation of Fixed Effects:
## (Intr)
## PrePost -0.255
## optimizer (bobyqa) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

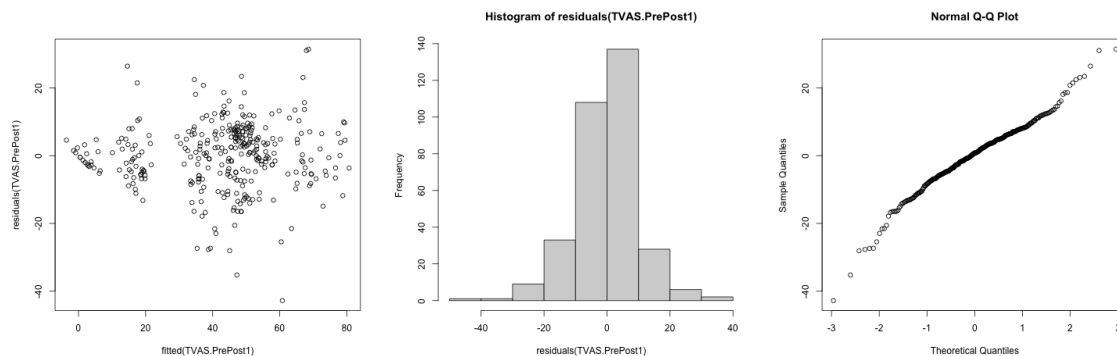


Figure S 20: TVAS.PrePost1 model: Residual plot (left), histogram of the residuals (middle), Normal qqplot (right).

3.6.3 Model Definition 3 (TVAS.PrePost2)

```
TVAS.PrePost2 = lmer(TVAS ~ PrePost + (1|ATM)+ (1|PAlias),
                    data= dfTVAS, REML = FALSE, lmerControl(optimizer = 'bobyqa'))
```

This model can be summarized by:

```
summary(TVAS.PrePost2)
```

```
## Linear mixed model fit by maximum likelihood ['lmerMod']
## Formula: TVAS ~ PrePost + (1 | ATM) + (1 | PAlias)
## Data: dfTVAS
## Control: lmerControl(optimizer = "bobyqa")
##
## AIC BIC logLik deviance df.resid
## 2522.6 2541.5 -1256.3 2512.6 320
##
## Scaled residuals:
## Min 1Q Median 3Q Max
```

```

## -4.1739 -0.5106 0.0745 0.6027 3.0885
##
## Random effects:
## Groups Name Variance Std.Dev.
## PAlia (Intercept) 361.667 19.018
## ATM (Intercept) 6.286 2.507
## Residual 103.848 10.191
## Number of obs: 325, groups: PAlia, 17; ATM, 12
##
## Fixed effects:
## Estimate Std. Error t value
## (Intercept) 47.443 5.009 9.472
## PrePost -2.244 1.132 -1.982
##
## Correlation of Fixed Effects:
## (Intr)
## PrePost -0.341

```

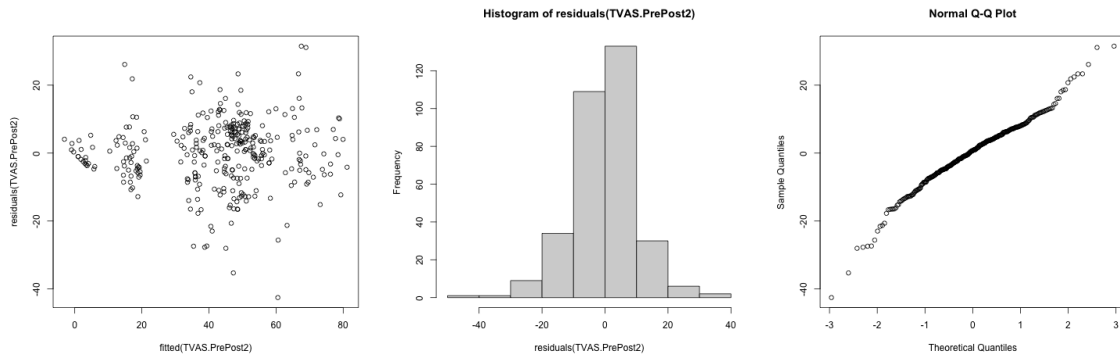


Figure S 21: TVAS.PrePost2 model: Residual plot (left), histogram of the residuals (middle), Normal qqplot (right).

3.6.4 Comparing TVAS.PrePost1 and TVAS.noPP via an ANOVA

To compare both models, we calculated an ANOVA.

```
anova(TVAS.PrePost1, TVAS.noPP)
```

```

## Data: dfTVAS
## Models:
## TVAS.noPP: TVAS ~ +(1 | ATM) + (1 | PAlia)
## TVAS.PrePost1: TVAS ~ PrePost + (1 | ATM) + (1 + PrePost | PAlia)
##          npar    AIC    BIC logLik deviance Chisq Df Pr(>Chisq)
## TVAS.noPP      4 2524.5 2539.7 -1258.3  2516.5
## TVAS.PrePost1  7 2526.4 2552.9 -1256.2  2512.4 4.0764 3    0.2533

```

3.6.5 Comparing TVAS.PrePost2 and TVAS.noPP via an ANOVA

To compare both models, we calculated an ANOVA.

```
anova(TVAS.PrePost2, TVAS.noPP)
```

```

## Data: dfTVAS
## Models:

```

```
## TVAS.noPP: TVAS ~ +(1 | ATM) + (1 | PAliaS)
## TVAS.PrePost2: TVAS ~ PrePost + (1 | ATM) + (1 | PAliaS)
##           npar      AIC      BIC logLik deviance Chisq Df Pr(>Chisq)
## TVAS.noPP      4 2524.5 2539.7 -1258.3  2516.5
## TVAS.PrePost2  5 2522.6 2541.6 -1256.3  2512.6 3.9024  1  0.04822 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

3.7 Mean Tinnitus Visual Analogue Scale (meanTVAS) over Time

We calculated the mean across the pre and post measures for each participant and measurement timepoint.

```
dfTVAS <- df %>% select(PAliaS, PrePost, DayFromStart, TVAS)
###calculate the mean across TVAS
dfTVAS <- dfTVAS %>% dplyr::group_by(PAliaS, DayFromStart) %>%
  dplyr::summarize(TVAS = mean(TVAS, na.rm = TRUE))
```

```
## `summarise()` has grouped output by 'PAliaS'. You can override using the
## `.groups` argument.
```

Fig. S22 shows the mean TVAS measures over time for all 17 participants. To analyse our data, we compared two models, i.e. meanTVAS.Time and meanTVAS.noTime, that are defined below via an ANVOVA. All outputs see below.

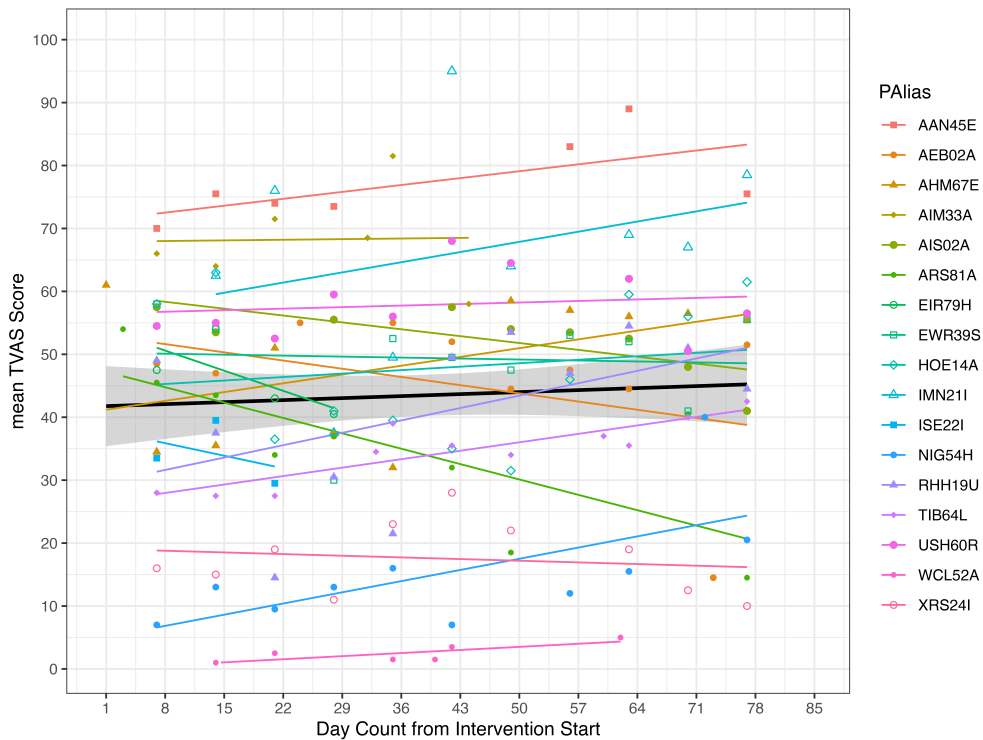


Figure S 22: Linear Fits (M and 95%-CI represented by black line and grey area, respectively) are shown for the mean of the weekly captured pre-and post measure of the Tinnitus Visual Analogue Scale (TVAS) as a function of time (Day Count from Intervention Start) for a total of $N = 17$ participants (PAliaS), with individual data points coded by color and shape. Participants exhibit varying intercepts and slopes.

3.7.1 Model Definition 1 (meanTVAS.Time)

meanTVAS.Time includes time measured as the number of days from the start of the intervention (DayFromStart) as a predictor with correlated random intercepts and random slopes for the participants (PAlia) i.e.

```
meanTVAS.Time = lmer(TVAS ~ DayFromStart + (1+DayFromStart|PAlia),  
                    data = dfTVAS, REML = FALSE, lmerControl(optimizer = 'bobyqa'))
```

This model can be summarized by:

```
summary(meanTVAS.Time)
```

```
## Linear mixed model fit by maximum likelihood ['lmerMod']  
## Formula: TVAS ~ DayFromStart + (1 + DayFromStart | PAlia)  
## Data: dfTVAS  
## Control: lmerControl(optimizer = "bobyqa")  
##  
##      AIC      BIC    logLik deviance df.resid  
## 1283.7  1302.4   -635.8  1271.7     160  
##  
## Scaled residuals:  
##      Min       1Q   Median       3Q      Max  
## -3.1792 -0.4011  0.0101  0.5281  3.2517  
##  
## Random effects:  
## Groups   Name      Variance Std.Dev. Corr  
## PAlia    (Intercept) 354.0711 18.8168  
##          DayFromStart  0.0112  0.1058 -0.11  
## Residual                    80.0819  8.9489  
## Number of obs: 166, groups: PAlia, 17  
##  
## Fixed effects:  
##              Estimate Std. Error t value  
## (Intercept)  43.1581    4.7284   9.127  
## DayFromStart  0.0186    0.0401   0.464  
##  
## Correlation of Fixed Effects:  
##              (Intr)  
## DayFromStrt -0.227
```

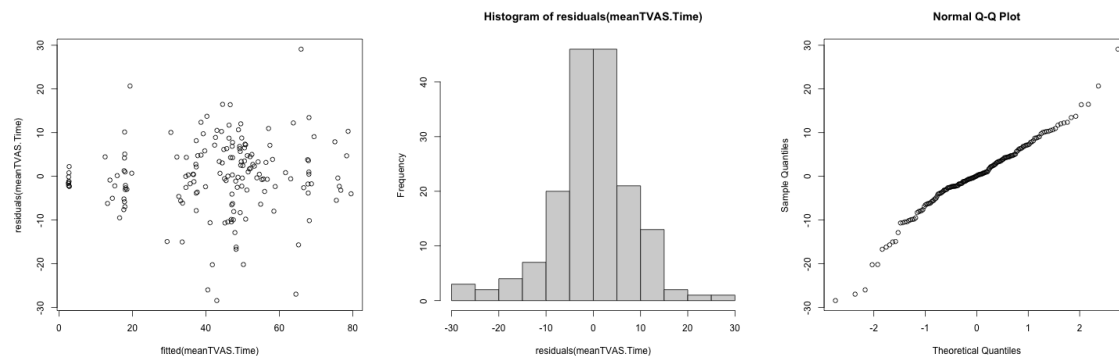


Figure S 23: meanTVAS.Time model: Residual plot (left), histogram of the residuals (middle), Normal qqplot (right).

3.7.2 Model Definition 2 (meanTVAS.noTime)

meanTVAS.noTime only included random intercepts for each participant without considering the effect of time, i.e.,

```
meanTVAS.noTime = lmer(TVAS ~+ (1|PAliaS),  
                        data = dfTVAS, REML = FALSE, lmerControl(optimizer = 'bobyqa'))
```

This model can be summarized by:

```
summary(meanTVAS.noTime)
```

```
## Linear mixed model fit by maximum likelihood ['lmerMod']  
## Formula: TVAS ~ +(1 | PAliaS)  
## Data: dfTVAS  
## Control: lmerControl(optimizer = "bobyqa")  
##  
##      AIC      BIC    logLik deviance df.resid  
## 1281.5 1290.8   -637.7  1275.5    163  
##  
## Scaled residuals:  
##      Min       1Q   Median       3Q      Max  
## -3.3632 -0.4162  0.0559  0.5847  3.1425  
##  
## Random effects:  
## Groups   Name      Variance Std.Dev.  
## PAliaS   (Intercept) 350.15  18.712  
## Residual                87.48   9.353  
## Number of obs: 166, groups: PAliaS, 17  
##  
## Fixed effects:  
##              Estimate Std. Error t value  
## (Intercept)    43.883     4.602    9.536
```

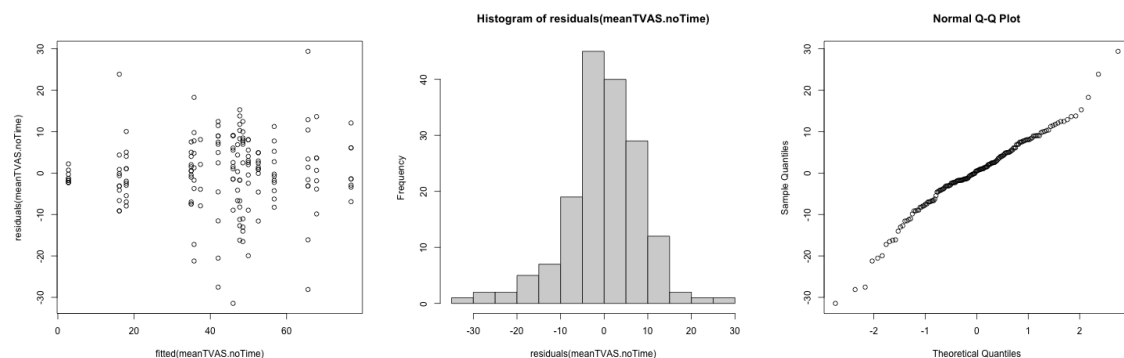


Figure S 24: meanTVAS.noTime model: Residual plot (left), histogram of the residuals (middle), Normal qqplot (right).

3.7.3 Comparing meanTVAS.noTime and meanTVAS.Time via an ANOVA

To compare both models, we calculated an ANOVA.

```
anova(meanTVAS.noTime, meanTVAS.Time)
```

```
## Data: dfTVAS
```

```
## Models:
## meanTVAS.noTime: TVAS ~ +(1 | PAlias)
## meanTVAS.Time: TVAS ~ DayFromStart + (1 + DayFromStart | PAlias)
##          npar    AIC    BIC  logLik deviance  Chisq Df Pr(>Chisq)
## meanTVAS.noTime    3 1281.5 1290.8 -637.73  1275.5
## meanTVAS.Time      6 1283.7 1302.3 -635.84  1271.7 3.7735 3    0.287
```

4 How Do Changes in Dependent Variables Relate to Each Other?

4.1 Calculation of Difference Scores

Notably, there were substantial individual differences between participants in reducing tinnitus and neck pain. To capture the magnitude of changes for each depending variable X , we calculated difference measures between the *End* and the *Initial Screening* for the TQ, HMM, MAIA, and WHO scores as

$$X_{diff} = X_{End} - X_{Initial}.$$

Analogously, we calculated differences measures between the last available and the first available weekly TFI, NBQ, and HMM screening. Finally, separately per participant and ATM, we calculated the mean STAI and the mean TVAS across the pre- and post-*ATM Screening* and then calculated the difference measure of the last and the first available mean score.

4.2 Correlations of Difference Scores

While we have chosen to report Spearman correlations on unmanipulated data in the main manuscript, some of the bivariate distributions subject to correlation analysis contain outliers in one or both of the dimensions to be correlated. This violation of the assumption of a univariate normal distribution significantly affects both the Pearson's correlation coefficient and the slope of the fitted line. For example, in Figure 4a of the main manuscript, the data point for AHM67E represents an extreme value in terms of the X-coordinate (NBQ_{diff}).

To address the influence of outliers, we standardized our data (z-scored) and identified outliers with z-scores greater than 2. The original values of outliers were then replaced with the next largest value along the dimension in which they exhibited extreme values. For example, in the case of AHM67E, the X-coordinate (22.5) was replaced with the X-coordinate of the element HOE14A (4), while the Y-coordinate (19, TFI_diff) remained unchanged.

Figure S25 illustrates the correlations among the difference measures TQ_{diff} , TFI_{diff} , and NBQ_{diff} with respect to all other difference measures and presents Spearman and Pearson correlations on the raw (uncorrected) data, as well as Pearson correlations on the outlier-corrected data. Note that the results reveal an almost identical pattern for all three analyses with only minor differences. Given the limited number of data points in these analyses, undue emphasis should not be placed on the exact values of the correlation coefficients.

Difference Scores of the ...	TQ_diff						
	Spearman		Pearson				N
	raw data		raw data		outlier corrected		
r	p	r	p	r	p	N	
... End and Initial Screening							
TQ_diff	1.000	.000 ***	1.000	.000 ***	1.000	.000 ***	12
PSTSum_diff	-.120	.709	-.074	.819	-.035	.913	12
MAIA_Total_diff	-.638	.025 *	-.403	.193	-.504	.095 °	12
WHO_QoLOverall_diff	-.310	.327	-.465	.127	-.305	.336	12
WHO_HealthOverall_diff	-.285	.369	-.439	.154	-.322	.307	12
WHO_PhysicalHealth_diff	-.203	.528	-.181	.574	-.181	.574	12
WHO_PsychologicalHealth_diff	-.680	.015 *	-.662	.019 *	-.629	.029 *	12
WHO_SocialRelationships_diff	-.363	.245	-.629	.028 *	-.281	.376	12
WHO_Environment_diff	-.594	.042 *	-.527	.078 °	-.527	.078 °	12
... Last and First Weekly Screening							
TFI_LastFirst_diff	.380	.223	.510	.091 °	.456	.137	12
NBQ_LastFirst_diff	.362	.247	.669	.017 *	.558	.059 °	12
PST_LastFirst_diff	.195	.544	.287	.366	.434	.159	12
STAI_LastFirst_diff	.500	.098 °	.588	.044 *	.588	.044 *	12
TVA_LastFirst_diff	-.021	.948	.051	.875	---	---	12

Difference Scores of the ...	TFI_LastFirst_diff						
	Spearman		Pearson				N
	raw data		raw data		outlier corrected		
r	p	r	p	r	p	N	
... End and Initial Screening							
TFI_LastFirst_diff	.380	.223	.510	.091 °	.456	.137	12
PSTSum_diff	.102	.753	.238	.456	.223	.487	12
MAIA_Total_diff	-.410	.186	-.160	.618	-.246	.441	12
WHO_QoLOverall_diff	-.158	.624	-.246	.441	-.191	.551	12
WHO_HealthOverall_diff	-.079	.806	-.245	.443	-.165	.608	12
WHO_PhysicalHealth_diff	-.002	.996	-.018	.955	.010	.976	12
WHO_PsychologicalHealth_diff	-.202	.529	-.363	.246	-.204	.524	12
WHO_SocialRelationships_diff	-.090	.781	-.182	.570	-.027	.933	12
WHO_Environment_diff	-.011	.974	.144	.655	.173	.592	12
... Last and First Weekly Screening							
TFI_LastFirst_diff	1.000	.000 ***	1.000	.000 ***	1.000	.000 ***	14
NBQ_LastFirst_diff	.602	.023 *	.797	.001 ***	.700	.005 **	14
PST_LastFirst_diff	.596	.024 *	.494	.073 °	.622	.017 *	14
STAI_LastFirst_diff	.440	.115	.439	.116	.386	.173	14
TVA_LastFirst_diff	.694	.006 **	.567	.035 *	.634	.015 *	14

Difference Scores of the ...	NBQ_LastFirst_diff						
	Spearman		Pearson				N
	raw data		raw data		outlier corrected		
r	p	r	p	r	p	N	
... End and Initial Screening							
TQ_diff	.362	.247	.669	.017 *	.558	.059 °	12
PSTSum_diff	.417	.178	.417	.178	.279	.379	12
MAIA_Total_diff	-.228	.477	-.160	.619	-.097	.765	12
WHO_QoLOverall_diff	.058	.858	-.090	.782	.124	.700	12
WHO_HealthOverall_diff	-.125	.700	-.242	.448	-.047	.884	12
WHO_PhysicalHealth_diff	-.117	.716	-.242	.593	-.146	.651	12
WHO_PsychologicalHealth_diff	-.232	.469	-.504	.095 °	-.227	.479	12
WHO_SocialRelationships_diff	-.005	.987	-.129	.689	.058	.858	12
WHO_Environment_diff	-.326	.301	-.251	.432	-.330	.295	12
... Last and First Weekly Screening							
TFI_LastFirst_diff	.602	.023 *	.797	<.001 ***	.700	.005 **	14
NBQ_LastFirst_diff	1.000	.000 ***	1.000	.000 ***	1.000	.000 ***	14
PST_LastFirst_diff	.639	.014 *	.579	.030 *	.644	.013 *	14
STAI_LastFirst_diff	.837	<.001 ***	.783	.001 ***	.738	.003 *	14
TVA_LastFirst_diff	.291	.313 **	.783	.396	.418	.137	14

Figure S 25: Spearman and Pearson correlations on the raw (uncorrected) data, as well as Pearson correlations on the outlier-corrected data. Correlations were calculated two-tailed for the difference measures related to the Initial and End Screenings of the Tinnitus Questionnaire (TQ diff), as well as for the last and first available Tinnitus Functional Index (TFI LastFirst diff) and Neck Bournemouth Questionnaire (NBQ LastFirst diff), combined with all other difference measures associated with the Initial and End Screenings (upper rows). These measures encompass the degree of head movement modulation of tinnitus (HMM), the score for interoceptive awareness (MAIA), the World Health Organization (WHO) scores. Additionally, correlations are examined with the difference measures from the last and first available Weekly Screening (lower rows), which include the TFI, the NBQ, the HMM score, the mean State-Trait Anxiety Inventory (STAI) score, and the mean perceived tinnitus loudness, as quantified through the tinnitus visual analogue scale (TVAS). Asterisks mark significant correlations, i.e. *** $p < .001$, ** $p < .01$, * $p < .05$, and a circle marks trends with $p < .1$.

4.3 Correlations of Difference Scores of with Initial Screening Measures

Analogously, Figure S26 illustrates the correlations among the difference measures TQ_{diff} , TFI_{diff} , and NBQ_{diff} with the *Initial Screening* measures and presents Spearman and Pearson correlations on the raw (uncorrected) data, as well as Pearson correlations on the outlier-corrected data. The results reveal an almost identical pattern for all three analyses with only minor differences. Given the limited number of data points in these analyses, undue emphasis should not be placed on the exact values of the correlation coefficients.

Initial Screening Scores	TQ_diff						
	Spearman		Pearson				
	raw data		raw data		outlier corrected		
	r	p	r	p	r	p	
IS_TQScore	-.306	.334	-.232	.468	-.232	.468	12
IS_PSTSum	-.143	.657	-.106	.744	-.106	.744	12
IS_MAIA_Total	.102	.752	-.067	.837	-.067	.837	12
IS_WHO_QoLOverall	.482	.112	.527	.078 °	.527	.078 °	12
IS_WHO_HealthOverall	.173	.591	.364	.245	.364	.245	12
IS_WHO_PhysicalHealth	.011	.974	.155	.630	.155	.630	12
IS_WHO_PsychologicalHealth	.294	.353	.200	.534	.200	.534	12
IS_WHO_SocialRelationships	.641	.025 *	.681	.015 *	.681	.015 *	12
IS_WHO_Environemnt	.122	.705	.162	.615	.162	.615	12
AQ_Total	.090	.781	-.014	.965	-.014	.965	12
Openness	.218	.496	.075	.816	.075	.816	12
Conscientiousness	-.018	.956	-.104	.748	-.104	.748	12
Extraversio	-.337	.283	-.365	.244	-.365	.244	12
Agreeableness	.621	.031 *	.473	.121	.473	.121	12
Neuroticism	-.046	.887	-.123	.703	-.123	.703	12

Initial Screening Scores	TFI_LastFirst_diff						
	Spearman		Pearson				
	raw data		raw data		outlier corrected		
	r	p	r	p	r	p	
IS_TQScore	-.115	.696	-.006	.983	.004	.988	14
IS_PSTSum	-.129	.661	-.175	.550	-.199	.496	14
IS_MAIA_Total	.257	.374	.040	.892	.108	.714	14
IS_WHO_QoLOverall	.092	.754	.160	.585	.112	.703	14
IS_WHO_HealthOverall	-.139	.636	.009	.976	-.080	.786	14
IS_WHO_PhysicalHealth	.104	.724	.088	.764	.075	.800	14
IS_WHO_PsychologicalHealth	-.013	.964	-.041	.890	-.058	.843	14
IS_WHO_SocialRelationships	.297	.303	.429	.126	.379	.181	14
IS_WHO_Environemnt	-.231	.426	-.290	.315	-.297	.303	14
AQ_Total	-.006	.985	-.067	.819	-.069	.814	14
Openness	.158	.590	.205	.482	.208	.475	14
Conscientiousness	.206	.479	.227	.435	.236	.417	14
Extraversio	-.350	.220	-.256	.377	-.263	.363	14
Agreeableness	.487	.078 °	.413	.142	.396	.160	14
Neuroticism	.070	.813	.154	.598	.135	.645	14

Initial Screening Scores	NBQ_LastFirst_diff						
	Spearman		Pearson				
	raw data		raw data		outlier corrected		
	r	p	r	p	r	p	
IS_TQScore	-.310	.281	-.275	.342	-.348	.223	14
IS_PSTSum	-.389	.169	-.300	.298	-.445	.111	14
IS_MAIA_Total	.284	.325	.076	.797	.344	.228	14
IS_WHO_QoLOverall	.261	.367	.379	.181	.295	.305	14
IS_WHO_HealthOverall	.173	.555	.332	.247	.134	.649	14
IS_WHO_PhysicalHealth	.348	.222	.343	.231	.399	.158	14
IS_WHO_PsychologicalHealth	.458	.099 °	.331	.247	.420	.135	14
IS_WHO_SocialRelationships	.226	.438	.447	.109	.278	.336	14
IS_WHO_Environemnt	.310	.280	.122	.679	.260	.370	14
AQ_Total	-.391	.166	-.277	.337	-.373	.189	14
Openness	.116	.693	.177	.545	.181	.535	14
Conscientiousness	.413	.142	.318	.268	.396	.161	14
Extraversio	.187	.521	-.030	.920	.031	.917	14
Agreeableness	.206	.481	.343	.230	.262	.365	14
Neuroticism	-.442	.113	-.207	.477	-.427	.128	14

Figure S 26: Spearman and Pearson correlations on the raw (uncorrected) data, as well as Pearson correlations on the outlier-corrected data. Correlations were calculated two-tailed for the difference measures pertaining to the Initial and End Screenings of the Tinnitus Questionnaire (TQ diff), as well as for the last and first available Tinnitus Functional Index (TFI LastFirst diff) and Neck Bournemouth Questionnaire (NBQ LastFirst diff) in conjunction with the Initial Screening (IS) measures, namely the TQ, the HMM (degree of head movement modulation of tinnitus) score, the Multidimensional Assessment of Interoceptive Awareness (MAIA) score, the World Health Organization (WHO) scores, the Autism Quotient (AQ), and the Big-Five personality traits: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Asterisks mark significant correlations, i.e. *** $p < .001$, ** $p < .01$, * $p < .05$, and a circle marks trends with $p < .1$.

References

- Baron-Cohen, Simon, Sally Wheelwright, Richard Skinner, Joanne Martin, and Emma Clubley (2001). “The autism-spectrum quotient (AQ): Evidence from asperger syndrome/high-functioning autism, males and females, scientists and mathematicians”. In: *Journal of autism and developmental disorders* 31.1, pp. 5–17.
- Bates, Douglas, Martin Mächler, Ben Bolker, and Steve Walker (2015). “Fitting Linear Mixed-Effects Models Using lme4”. In: *Journal of Statistical Software* 67.1, pp. 1–48. DOI: [10.18637/jss.v067.i01](https://doi.org/10.18637/jss.v067.i01).
- Bolton, J. E. and B. K. Humphreys (2002). “The Bournemouth Questionnaire: a short-form comprehensive outcome measure. II. Psychometric properties in neck pain patients”. In: *J Manipulative Physiol Ther* 25.3, pp. 141–8. ISSN: 0161-4754 (Print) 0161-4754 (Linking). DOI: [10.1067/mmt.2002.123333](https://doi.org/10.1067/mmt.2002.123333). URL: <https://www.ncbi.nlm.nih.gov/pubmed/11986574>.

- Brüggemann, Petra, Agnieszka J Szczeppek, Tobias Kleinjung, Michael Ojo, and Birgit Mazurek (2017). “Validierung der deutschen Version des Tinnitus Functional Index (TFI)”. In: *Laryngo-rhino-otologie* 96.09, pp. 615–619. ISSN: 0935-8943. DOI: [10.1055/s-0042-122342](https://doi.org/10.1055/s-0042-122342).
- Goebel, Gerhard and Wolfgang Hiller (1998). *Tinnitus-Fragebogen:(TF); ein Instrument zur Erfassung von Belastung und Schweregrad bei Tinnitus; Handanweisung*. Hogrefe, Verlag für Psychologie.
- Hallam, RS (1996). “Manual of the tinnitus questionnaire, The Psychological Corporation”. In: *Brace & Co, London*.
- Mehling, W. E., C. Price, Jennifer J. Daubenmier, M. Acree, E. Bartmess, and A. Stewart (2012). “The Multidimensional Assessment of Interoceptive Awareness (MAIA)”. In: *PLoS ONE* 7.11, e48230. DOI: [10.1371/journal.pone.0048230](https://doi.org/10.1371/journal.pone.0048230). URL: <http://dx.doi.org/10.1371%2Fjournal.pone.0048230>.
- Meikle, Mary B. et al. (2012). “The Tinnitus Functional Index: Development of a New Clinical Measure for Chronic, Intrusive Tinnitus”. In: *Ear and Hearing* 33.2. ISSN: 0196-0202. URL: https://journals.lww.com/ear-hearing/Fulltext/2012/03000/The_Tinnitus_Functional_Index___Development_of_a.2.aspx.
- Rammstedt, Beatrice, Daniel Danner, Christopher J Soto, and Oliver P John (2018). “Validation of the short and extra-short forms of the Big Five Inventory-2 (BFI-2) and their German adaptations”. In: *European Journal of Psychological Assessment*. ISSN: 2151-2426.
- Skevington, Suzanne M, Mahmoud Lotfy, and Kathryn A O’Connell (2004). “The World Health Organization’s WHOQOL-BREF quality of life assessment: Psychometric properties and results of the international field trial - A report from the WHOQOL group”. In: *Quality of Life Research* 13.2, pp. 299–310. ISSN: 0962-9343. DOI: [10.1023/b:Qure.0000018486.91360.00](https://doi.org/10.1023/b:Qure.0000018486.91360.00). URL: <http://www.ncbi.nlm.nih.gov/pubmed/15222000>.
- Soklic, Marina, Cynthia Peterson, and B Kim Humphreys (2012). “Translation and validation of the German version of the Bournemouth questionnaire for neck pain”. In: *Chiropractic & manual therapies* 20.1, pp. 1–8.