Supplementary Materials for

Effectiveness of a Reablement Training Program for Homecare Staff on Older Adults’ Sedentary Behavior: A c-RCT

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Supplementary Text S1: Technical details of the model building strategy.

Model building strategy:
Linearity was checked for all continuous variables. Two variables (i.e., “duration of care” and “psychological functioning”) were log-transformed since they were skewed to the right. Because of many zeros, the ln(x+1) transformation was applied. Assumptions of normality and homoscedasticity of the residuals were checked and held.

Mixed linear regression models were applied for all outcomes to analyze the difference in changes between the study groups over time using REML estimation. Due to excessive zeros, data on falls were dichotomized and analyzed with logistic regression. Three models were run and compared: a three-level model with a time-dependent random team effect (random slope), a three-level model with a stable random team effect (random intercept), and a two-level model with working area as fixed effect (see SPSS syntaxes for the primary outcome measure below). The three-level time-dependent model had no better fit than the three-level stable model. The three-level stable model did not always converge as the small sample size of the third level led to instability of the random effect parameters. Therefore, results of the two-level model were presented.

An unstructured residual variance-covariance matrix was assumed for the repeated outcome measures, to allow change in outcome variance over time. Treatment (0 = control; 1 = treatment), time (0 = baseline; 1 = 12 months), and treatment * time interaction together with baseline covariates age (continuous), sex (0 = male; 1 = female), educational level (1 = low; 2 = intermediate; 3 = high), disability (continuous), and duration of care (log-transformed), and for the two-level model also working area (dummy coding), were included in the models, irrespective of their statistical significance. Their three-way interactions with treatment and time were also tested. A hierarchical approach to variables’ selection was applied. That is, for each covariate X, the terms X, X*time, X*treat, X*treat*time were included in the model (and treat, time, treat*time). If the three-way term was not significant, it was removed after which the two-way terms X*treat and X*time were tested and removed if not significant. If the three-way term was significant, the interaction pattern and strength were explored to decide if treat*time effects per covariate level needed to be reported on top of the treat*time effect that was always reported based on the model without the three-way term.

Three-level model with time-dependent random team effect (random slope model):

MIXED SedentaryTime BY WorkingArea Education Treatment Time_R1 WITH Time_R2 Age Sex DurationOfCare Disability /
CRITERIA=CIN(95) MXITER(100) MXSTEP(10) SCORING(1) SINGULAR(0.000000000001) HCONVERGE(0, ABSOLUTE) LCONVERGE(0, ABSOLUTE) PCONVERGE(0.000001, ABSOLUTE) /
FIXED= Treatment Time_R1 Treatment*Time_R1 WorkingArea Education Age Sex DurationOfCare Disability | SSTYPE(3)
/METHOD=REML
/PRINT=GEST SOLUTION TESTCOV
/RANDOM=Time_R1 Time_R2 | SUBJECT(NursingTeam) COVTYPE(UN)
/EMMEANS=TABLES(Treatment*Time_R1) COMPARE (Treatment) ADJ (LSD)
/REPEATED=Time | SUBJECT(Reg_client*NursingTeam) COVTYPE(UN).
* Notes: Time_R1 (0 = baseline; 1 = 12 months); Time_R2 (0 = 12 months; 1 = baseline).
Three-level model with stable random team effect (random intercept model):

MIXED SedentaryTime BY WorkingArea Education Treatment Time WITH Age Sex DurationOfCare Disability
/Criteria=CIN(95) MXITER(100) MXSTEP(10) SCORING(1) SINGULAR(0.000000000001) HCONVERGE(0, ABSOLUTE) LCONVERGE(0, ABSOLUTE) PCONVERGE(0.000000000001, ABSOLUTE)
/Fixed=Treatment Time Treatment*Time WorkingArea Education Age Sex DurationOfCare Disability | SSTYPE(3)
/Method=REML
/Print=G R SOLUTION TESTCOV
/Random=INTERCEPT | SUBJECT(NursingTeam) COVTYPE(ID)
/E MMMeans=TABLES(Treatment*Time) COMPARE (Treatment) ADJ (LSD)
/Repeated=Time | SUBJECT(ID*NursingTeam) COVTYPE(UN).

Two-level model with working area as fixed effect:

MIXED SedentaryTime BY WorkingArea Education Treatment Time WITH Age Sex DurationOfCare Disability
/Criteria=CIN(95) MXITER(100) MXSTEP(10) SCORING(1) SINGULAR(0.000000000001) HCONVERGE(0, ABSOLUTE) LCONVERGE(0, ABSOLUTE) PCONVERGE(0.000001, ABSOLUTE)
/Fixed=Treatment Time Treatment*Time WorkingArea Education Age Sex DurationOfCare Disability | SSTYPE(3)
/Method=REML
/Print=G R SOLUTION TESTCOV
/EMMEANS=TABLES(Treatment*Time) COMPARE (Treatment) ADJ (LSD)
/Repeated=Time | SUBJECT(ID) COVTYPE(UN).
Supplementary Table S1: Homecare staff’s average compliance with the program components stratified by working area.

| Working Area | Program meetings (%)<sup>a</sup> | Practical assignments (%) | Weekly newsletters (%)<sup>b</sup> |
|--------------|----------------------------------|---------------------------|-----------------------------------|
|              | Median  | IQR         | Mean  | SD        | Median  | IQR        |
| Working Area 1 (Heerlen) | 80.0     | (57.1–100) | 63.7   | (29.3) | 60.0     | (5.0–95.0) |
| Working Area 2 (Brunssum) | 85.7     | (80.0–100.0) | 59.1   | (28.4) | 95.0     | (60.0–100.0) |
| Working Area 3 (Kerkrade) | 80.0     | (57.1–85.7) | 29.0   | (50.3) | 70.0     | (5.0–95.0) |
| Working Area 4 (Bocholtz) | 85.7     | (80.0–96.4) | 59.4   | (31.8) | 70.0     | (25.0–100.0) |
| Working Area 5 (Nuth/Hulsberg) | 60.0   | (41.4–100.0) | 51.2   | (39.2) | 55.0     | (7.5–90.0) |

*Note.* IQR (interquartile range); SD (standard deviation).

<sup>a</sup>Working areas 1, 2, and 4 had a significantly higher compliance with attending program meetings than working area 5 (<i>P</i> = 0.035, <i>P</i> = 0.002 and <i>P</i> = 0.006, respectively).<br>

<sup>b</sup>Working area 2 had a significantly higher compliance with consulting the weekly newsletters than working areas 1 and 5 (<i>P</i> = 0.029, <i>P</i> = 0.008, respectively).
**Supplementary Table S2: Baseline characteristics of study completers and dropouts (N = 264).**

| Baseline characteristics                              | Study completers (n = 201) | Dropouts (n = 63) |
|--------------------------------------------------------|----------------------------|------------------|
| Age (years), mean (SD)                                 | 81.8 (6.7)                 | 83.0 (7.4)       |
| Sex (male), n (%)                                      | 61 (30.3)                  | 24 (38.1)        |
| BMI (kg/m²), mean (SD)a                                | 29.3 (5.9)                 | 27.6 (6.1)       |
| Country of origin (Netherlands), n (%)                 | 195 (97.0)                 | 61 (96.8)        |
| Educational level, n (%)b                              |                            |                  |
| Low                                                    | 136 (67.7)                 | 42 (66.7)        |
| Intermediate                                            | 51 (25.4)                  | 13 (20.6)        |
| High                                                   | 14 (7.0)                   | 8 (12.7)         |
| Marital status, n (%)                                  |                            |                  |
| Single                                                 | 11 (5.5)                   | 4 (4.8)          |
| Married                                                | 53 (26.4)                  | 17 (27.0)        |
| Divorced                                               | 18 (9.0)                   | 3 (61.9)         |
| Widowed                                                | 119 (59.2)                 | 39 (6.3)         |
| Living situation (living alone), n (%)                 | 138 (68.7)                 | 45 (71.4)        |
| Disability (18–72), mean (SD)c                         | 40.2 (10.2)                | 46.3 (10.5)**    |
| Duration of care (years), mean (SD)                    | 5.5 (5.3)                  | 5.9 (5.7)        |
| Types of homecare received, n (%)                      |                            |                  |
| Personal care                                          | 175 (87.1)                 | 57 (90.5)        |
| Nursing care                                           | 96 (47.8)                  | 39 (61.9)*       |
| Domestic support                                       | 118 (58.7)                 | 33 (52.4)        |
| Baseline scores                                        |                            |                  |
| Sedentary time (daily minutes), mean (SD)d             | 782.8 (165.1)              | 853.3 (186.5)**  |
| Sedentary time (proportion of wake/wear time), mean (SD)d | 73.8 (10.7)                | 80.6 (9.3)**      |
| Vector Magnitude (counts.min⁻¹), mean (SD)d            | 1265.9 (487.7)             | 947.0 (355.8)*** |
| GARS (18–72), mean (SD)d                              | 40.2 (10.2)                | 46.3 (10.5)**     |
| SPPB (0–12), mean (SD)                                 | 4.6 (2.7)                  | 3.3 (2.6)**       |
| PHQ-9 (0–27), mean (SD)                                | 5.3 (4.2)                  | 7.6 (5.5)**       |
| ≥1 fall in the past 6 months, n (%)                    | 73 (36.3)                  | 34 (54.0)**       |

*Note. n (sample size); SD (standard deviation); BMI (body mass index); kg/m² (kilogram per square meter); GARS (Groningen Activity Restriction Scale); ADL (Activities of Daily Living); IADL (Instrumental Activities of Daily Living); PHQ-9 (Patient Health Questionnaire-9); SPPB (Short Physical Performance Battery). Underlined score indicates the most favorable score.

aCompleters n = 194, dropouts n = 58. bLow: low vocational or advanced elementary education; Intermediate: intermediate vocational or higher secondary education; High: higher vocational education, university. cCompleters n = 200, dropouts n = 62.

dCompleters n = 193, dropouts n = 52.

* P ≤ .05, ** P ≤ .01, *** P ≤ .001.
Supplementary Table S3: Estimated fixed effect parameters and residual variance-covariance matrices of the multivariable two-level models for the primary outcomes.

|                              | Sedentary time (daily minutes) | Sedentary time (proportion of wake/wear time) | Vector Magnitude (counts.min⁻¹)² |
|------------------------------|--------------------------------|-----------------------------------------------|---------------------------------|
|                              | β (95% CI)                     | β (95% CI)                                    | β (95% CI)                      |
| Intercept                    | 789.9 (506.9, 1073.0)***       | 64.6 (48.1, 81.0)***                          | 1892.2 (1164.8, 2619.7)***      |
| Treatment                    | -37.5 (-79.9, 4.9)             | -2.0 (-4.4, 0.4)                              | -160.3 (-383.6, 62.9)          |
| Time                         | -9.0 (-37.7, 19.7)             | 1.4 (-0.0, 2.8)                               | -279.2 (-541.6, -16.8)*        |
| Age (years)                  | -0.8 (-3.9, 2.3)               | -0.1 (-0.3, 0.1)                              | 2.8 (-5.2, 10.7)               |
| [Sex = female]               | 78.9 (33.4, 124.5)**           | 6.6 (3.9, 9.2)***                             | -302.3 (-419.1, -185.5)***     |
| [Education = low]            | -93.0 (-170.7, -15.2)*         | -3.3 (-7.8, 1.2)                              | 142.8 (-56.3, 341.8)           |
| [Education = intermediate]   | -143.1 (-225.9, -60.3)**       | -7.7 (-12.5, -2.8)**                          | 301.9 (89.9, 513.9)**          |
| Duration of care (years)ᵇ    | 8.8 (-16.7, 34.3)              | -0.2 (-1.7, 1.3)                              | -68.5 (-156.2, 19.2)           |
| Disability (18–72)           | 1.2 (-0.8, 3.3)                | 0.4 (0.3, 0.5)**                              | -16.6 (-21.9, -11.3)**         |
| [Working Area = 1]           | 24.9 (-36.8, 86.6)             | -0.9 (-4.5, 2.7)                              | 75.8 (-83.1, 234.6)            |
| [Working Area = 2]           | -4.2 (-75.3, 67.0)             | -3.7 (-7.8, 0.5)                              | 116.3 (-66.8, 299.5)           |
| [Working Area = 3]           | 70.6 (2.5, 138.7)*             | -1.9 (-5.8, 2.1)                              | 94.6 (-80.3, 269.4)            |
| [Working Area = 4]           | 8.7 (-44.9, 62.2)              | -2.8 (-5.9, 0.4)                              | 123.0 (-114.7, 260.7)          |
| Treatment * Time             | 18.5 (-22.4, 59.3)             | 0.6 (-1.5, 2.6)                               | -62.1 (-186.1, 61.9)           |

Vcov matrix²

\[
\begin{pmatrix}
267884.3 & 20601.3 & 87.8 \\
20601.3 & 333800.0 & 567.7 \\
87.8 & 567.7 & 171930.9
\end{pmatrix}
\begin{pmatrix}
270841.2 \\
134466.8 \\
171930.9
\end{pmatrix}
\]

Note. The estimated fixed effect regression coefficient (β) for the continuous variables represents average change in the outcome for a 1-unit increase in explanatory variable; for the categorical variables, β represents average change in the highlighted category with respect to the reference group (omitted). Treatment: control group is reference. Time: baseline is reference. 95% CI (95% Confidence Interval); Vcov (Variance-Covariance). Underlined score indicates the most favorable score.

²Two-way interactions “time * disability” and “treatment * duration of care” were statistically significant (P = 0.042 and P = 0.016, respectively). ᵃLn (x+1). ᶜInterpretation: Row 1 column 1, residual variance at baseline; Row 2 column 2, residual variance at 12 months; Row 1 column 2, covariance.

*P ≤ .05, **P ≤ .01, ***P ≤ .001.

Operationalization of sedentary time:

Sedentary time was defined in two ways: first, as the average daily minutes, and second, as the average proportion of wake/wear time (in both cases averaging across days within each participant). The first assumes that at least one of two conditions is met: (1) wearing time is the same for all participants and days, or (2) sedentary time never occurs without wearing. The second assumes that sedentary time is unrelated to wearing yes/no. By comparing the results of both definitions, robustness against assumptions is checked. Average vector magnitude counts.min⁻¹ were also obtained.
Supplementary Table S4: Estimated fixed effect parameters and residual variance-covariance matrices of the multivariable two-level models for the secondary outcomes.

|                    | Daily functioning | Physical functioning | Psychological functioning | Falls |
|--------------------|-------------------|----------------------|--------------------------|-------|
|                    | GARS              | GARS ADL             | GARS IADL                | SPPB  |
|                    | (18–72)           | (11–44)              | (7–28)                   | (Q–12) |
|                    | (8 (95% CI))      | (8 (95% CI))         | (8 (95% CI))             | (8 (95% CI)) |
| Intercept          | 20.4 (4.1, 36.7)  | 13.6 (4.4, 22.8)***  | 5.2 (-2.8, 13.1)         | 7.5 (5.7, 9.3)***  |
|                    | 8 (95% CI)        | 8 (95% CI)           | 8 (95% CI)               | 8 (95% CI)       |
| Treatment          | -0.4 (1.7, 8.8)   | 0.0 (-4.5, 2.6)      | -0.4 (-0.5, 2.0)         | 0.0 (-0.0, 0.0)  |
|                    | 5 (95% CI)        | 5 (95% CI)           | 5 (95% CI)               | 5 (95% CI)       |
| [Education = low]  | N/A               | N/A                  | N/A                      | N/A              |
| [Education = intermediate] | 8.0 (3.8, 5.3)  | 4.0 (-2.1, 3.0)      | 1.4 (0.2, 1.6)           | 1.4 (0.2, 1.6)   |
| [Time = T1]        | 1.2 (0.1, 0.4)    | 0.9 (0.2, 1.6)       | 0.9 (0.2, 1.6)           | 0.9 (0.2, 1.6)   |
| [Time = T2]        | 2.7 (1.3, 4.2)**  | 2.0 (1.1, 2.8)**     | 1.0 (3.1, 7.7)           | 1.0 (3.1, 7.7)   |
| Age (years)        | 0.2 (0.0, 0.4)    | 0.1 (-0.0, 0.2)**    | 0.1 (-0.0, 0.2)**        | 0.1 (-0.0, 0.2)** |
| [Sex = female]     | 1.4 (-1.3, 4.1)   | 1.3 (-1.0, 1.8)      | 0.2 (-0.8, 1.8)          | 0.2 (-0.8, 1.8)   |
| [Working Age = 1]  | 1.4 (0.5, 2.7)    | 1.0 (-0.5, 2.2)      | 0.0 (-0.1, 0.1)          | 0.0 (-0.1, 0.1)   |
| [Working Age = 2]  | 1.4 (-0.5, 2.7)   | 1.0 (-0.5, 2.2)      | 0.0 (-0.1, 0.1)          | 0.0 (-0.1, 0.1)   |
| [Working Age = 3]  | 1.4 (-0.5, 2.7)   | 1.0 (-0.5, 2.2)      | 0.0 (-0.1, 0.1)          | 0.0 (-0.1, 0.1)   |
| [Working Age = 4]  | 1.4 (-0.5, 2.7)   | 1.0 (-0.5, 2.2)      | 0.0 (-0.1, 0.1)          | 0.0 (-0.1, 0.1)   |
| Disability (18–72) | N/A               | N/A                  | N/A                      | N/A              |
|                    | 0.0 (-0.0, 0.0)   | 0.0 (-0.0, 0.0)      | 0.0 (-0.0, 0.0)          | 0.0 (-0.0, 0.0)   |
| [Time = T1]        | 1.2 (0.1, 0.4)    | 0.9 (0.2, 1.6)       | 0.9 (0.2, 1.6)           | 0.9 (0.2, 1.6)   |
| [Time = T2]        | 2.7 (1.3, 4.2)**  | 2.0 (1.1, 2.8)**     | 1.0 (3.1, 7.7)           | 1.0 (3.1, 7.7)   |
| Duration of care (years)   | 0.2 (0.0, 0.4)    | 0.1 (-0.0, 0.2)**    | 0.1 (-0.0, 0.2)**        | 0.1 (-0.0, 0.2)** |
| Vcov matrix?       | 0.1 (0.1, 0.1)**  | 0.1 (0.1, 0.1)**     | 0.1 (0.1, 0.1)**         | 0.1 (0.1, 0.1)** |

Note: The estimated fixed effect regression coefficient (ß) for the continuous variables represents average change in the outcome for a 1-unit increase in explanatory variable; for the categorical variables, ß represents average change in the highlighted category with respect to the reference group (omitted). Treatment: control group is reference. Time: baseline is reference. T1 (six months); T2 (12 months); 95% CI (95% Confidence Interval); GARS (Groningen Activity Restriction Scale); ADL (Activities of Daily Living); IADL (Instrumental Activities of Daily Living); PHQ-9 (Patient Health Questionnaire-9); SPPB (Short Physical Performance Battery); Vcov (Variance-Covariance). Underlined score indicates the most favorable score.

*Two-way interaction "time * duration in care" was significant (P = 0.040). †Two-way interaction "time * disability" was significant (P = 0.043). ‡Two-way interaction "time * age" was significant (P = 0.030). §Two-way interactions "time * duration in care" and "time * disability" were significant at T2 (P = 0.030, P = 0.012, respectively). ¶Ln (x+1). ††Interpretation: Row 1 column 1, residual variance at baseline; Row 2 column 2, residual variance at 12 months; Row 1 column 2, covariance.