SUPPLEMENTARY INFORMATION

Interim results

Below are the interim results presented to the EMA to receive qualification advice. Differences in the numbers of participants can be attributed to various factors including updates to smart phones and operating systems, changes in RMT design, technical or software issues, acceptance of RMT by ethics committees and limitations in their use in advanced disease stages.[1]

Supplementary Table 1: Selected RMTs and Assessment of Functional Domains

RMT	RMT Assessment of Functional Domains
Altoida Neuro Motor Index Application Software (in-clinic assessment and remote measurements). Class 1 medical device CE marked EC Directive 93/42/EEC	Measures spatial navigation and motor function via simulation of a complex ADL exercise using augmented reality.
Physilog sensor (Gait Up) (in-clinic assessment)	Accelerometer and gyroscope-based measurement of various parameters of gait measured within a dual-tasking paradigm as well as timed up-and-go (TUG) functional mobility measurement.
Amsterdam-iADL ePRO (in-clinic assessment and remote measurements)	Online questionnaire that collects information from caregiver about difficulties at work, planning skills and memory, household management, use of technology, and difficulties driving from caregiver.
Mezurio app (remote assessment)	Active and passive measurement across a variety of domains including planning skills, new skill acquisition, speech, motivation.
Banking app (in-clinic assessment)	Measures ability to manage finances via a simulated bank withdrawal scenario.
RADAR-base (pRMT) app (remote assessment)	Measures mobility, displacement, and localization as well as communication and social functioning.
Axivity AX3 sensor (remote assessment)	Accelerometry-based measurement of sleep, physical activity, and circadian rhythms.

Fitbit Charge 3 sensor (remote assessment)	Measures heart rate and provides information about sleep and daytime activity.
Vicon Autographer (optional) (remote assessment)	Wearable camera to provide context to measurements from sensors, such as Fitbit and Axivity.

Adapted from Muurling M., et al.[13] RMT: Remote monitoring Technology, ePRO: Electronic patient-reported outcomes, iADL: Instrumental Activities of Daily Living, pRMT: RADAR-base passive RMT app

Established clinical measures for functional domains

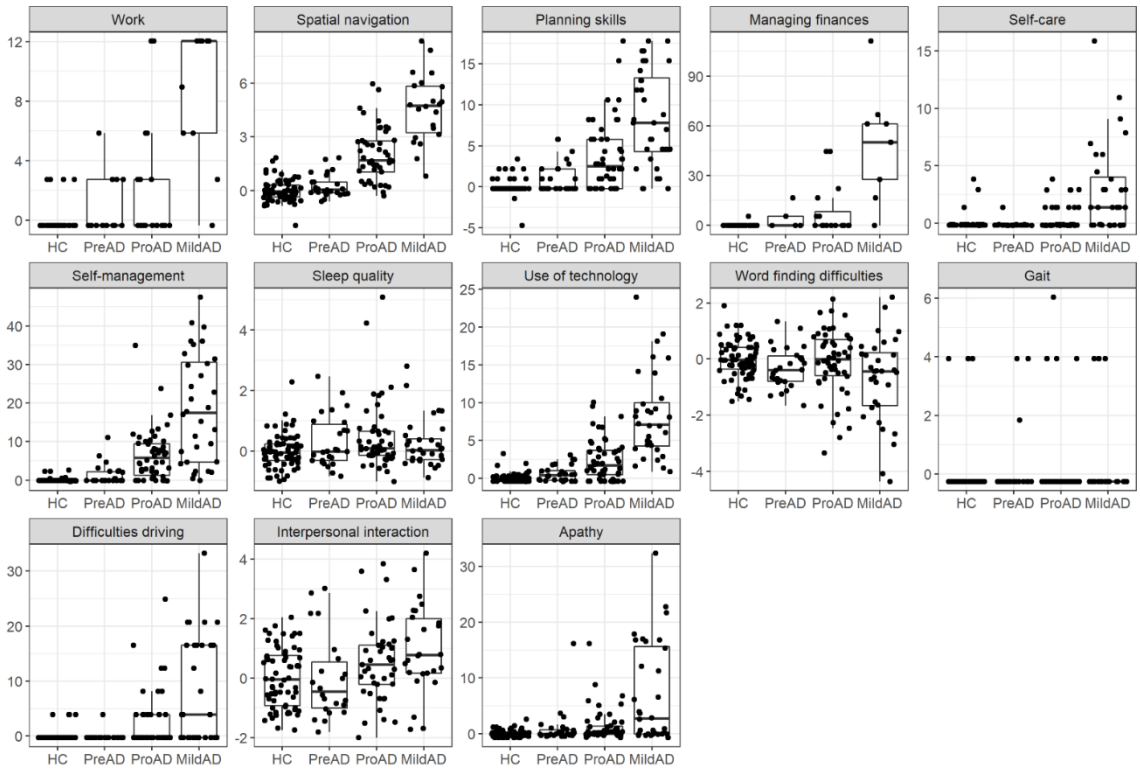
Supplementary Table 2: Functional domain composite scores

Functional Domain	Clinical Tests and Questionnaires	Sub-question
1. Difficulties at work	Amsterdam iADL[2]	Q20
2. Spatial navigation & memory	MMSE[3]	MMSE Q1, Q2
	Amsterdam iADL[2]	Q29
	Rey complex figure[4,5]	Recall score
	Ecog[6]	Memory
	Ecog[6]	Visual perception
3. Planning skills & memory required for task completion	Ecog[6]	Planning
4. Managing finances	Amsterdam iADL[2]	Q11, Q14-Q17
5. Self-care	EQ5D[7]	Q2
	Amsterdam iADL[2]	Q30 (medication)
	ADCS-ADL[8]	Q5, Q6A, Q6B
6. Self-management, eg, running errands & shopping	Amsterdam iADL[2]	R1-R6
	Ecog[6]	Organisation
7. Acquiring new skills	No questionnaire available	
8. Sleep quality & circadian rhythms	Pittsburgh Sleep Quality Index[9]	Sum of 7 component scores
	ESS[10]	Sum of 8 component scores
	NPI[11]	Q11 (sleep): frequency * severity
9. Use of technology/devices	Smartphone use	Total score task 1
	Amsterdam iADL[2]	Q7-Q10, Q22-Q26
	ADCS-ADL[8]	Q7, Q23
10. Dysnomia, word finding difficulties	Verbal fluency	Sum of 3 phonemic and 1 semantic (animals) fluency trials
	Boston naming test[12]	Total score/maximal score*100 (%)
11. Gait	EQ5D[7]	Q1
12. Difficulties driving	Amsterdam iADL[2]	R27, R28
13. Interpersonal interaction	Social Functioning Scale	Average score sections 1-3
14. Motivation, signs of apathy or withdrawal	Geriatric Depression Scale	GDS total score
	NPI[11]	Q7 (apathy): frequency * severity

	Social Functioning Scale	Score part 1 withdrawal

Adapted from Muurling M., et al. (2021)[13] Abbreviations: Ecog: Everyday Cognition Scale, ADCS-ADL: Alzheimer's Disease Cooperative Study Activities of Daily Living, EQ5D: European Quality of Life, 5-Dimension, ESS: Epworth Sleepiness scale, iADL: instrumental Activities of Daily Living, MMSE: Mini Mental State Examination, GDS: Geriatric Depression Scale, NPI: Neuro Psychiatric Inventory, Q: question.

Supplementary Figure 1: Functional domain scores per study group. Each dot represents one participant. The y-axis shows the average z-scores



PreAD: Preclinical AD, ProAD: Prodromal AD, MildAD: Mild-to-moderate AD dementia, HC: Age-matched healthy controls.

Known group validity

1. Banking application

Supplementary Table 3: The Banking App metrics for each group

Features	HC N=60	PreAD N=23	ProAD N=44	MildAD N=29	p-value	Group differences
Correct attempts	1 [1-1]	1 [1-1]	1 [1-1]	1 [1-1]	P=0.185	-
Correct PIN attempts	1 [1-1]	1 [1-1]	1 [1-1]	1 [1-1]	P=0.325	-
Correct amount attempts	1 [1-1]	1 [1-1]	1 [1-1]	1 [1-1]	P=0.367	-
Total correct steps duration [s]	56.48 (62.83)	46.60 (25.66)	75.83 (62.75)	92.56 (58.22)	P<0.001	MildAD>HC, 0.49 [0.12, 0.87] MildAD>PreAD 0.6 [0.15, 1.05]
Total correct PIN duration [s]	39.33 (62.14)	29.61 (24.58)	47.33 (52.80)	50.78 (36.91)	P=0.101	
Total correct amount duration [s]	11.93 (8.22)	10.25 (5.98)	17.17 (11.75)	28.58 (29.95)	P<0.001	ProAD>HC, 0.35 [0.02, 0.69] MildAD>HC, 0.64 [0.25, 1.03] ProAD>PreAD, 0.45 [0.02, 0.88] MildAD>PreAD 0.74 [0.27, 1.21]

Numbers are displayed as median [Q1-Q3] for the Attempts features and mean (SD) for Duration features. The p-values are from ANCOVA's (for the Duration features), corrected for age, sex, and years of education. If ANCOVA showed significant differences, post-hoc Tukey HSD tests were done. The last column shows the statistically significant group differences as Group 1 > Group 2 with adjusted estimates and confidence intervals in brackets. For the Attempt features Mann-Whitney was performed, where no group differences could be found. PreAD: Preclinical AD, ProAD: Prodromal AD, MildAD: Mild-to-moderate AD dementia, HC: Age-matched healthy controls.

2. Fitbit

Supplementary Table 4: Descriptive Fitbit statistics for each study group.

Features	HC N=53	PreAD N=19	ProAD N=29	MildAD N=20	p-value	Group differences
Mean heart rate	71.06 (6.93)	71.41 (7.48)	68.39 (7.4)	68.75 (5.77)	P=0.116	-
Minimal heart rate	52.78 (5.92)	54.28 (6.01)	51.71 (6.52)	51.06 (5.58)	P=0.160	-
Maximal heart rate	121.32 (8.42)	120.35 (9.44)	118.96 (10.32)	117.4 (8.7)	P=0.380	-
Mean number of steps	7458.48 (3392.54)	6980.76 (3100.37)	6708.39 (4034.63)	6478.2 (4262.62)	P=0.804	-
Hours asleep	6.46 (1.43)	6.36 (1.74)	5.88 (1.44)	6.03 (1.83)	P=0.669	-
Hours awake during night	0.64 (0.2)	0.75 (0.24)	0.66 (0.25)	0.64 (0.2)	P=0.331	-

Numbers are displayed as mean (SD). Heart rate is in beats per minute. The p-values are from ANCOVA's, corrected for age, sex and years of education. No group difference post hoc Tukey HSD test was performed due to non-significant results from ANCOVA. PreAD: Preclinical AD, ProAD: Prodromal AD, MildAD: Mild-to-moderate AD dementia, HC: Age-matched healthy controls.

3. Axivity

Supplementary Table 5: Descriptive Axivity statistics for each study group

Features	HC N=49	PreAD N=18	ProAD N=30	MildAD N=20	p-value	Group differences
Acceleration magnitude	24.31 (5.48)	20.19 (5.77)	22.17 (7.18)	22.78 (8.63)	P=0.110	-
Time sedentary [h]	7.59 (1.64)	8.42 (1.38)	8.34 (2.27)	8.19 (2.18)	P=0.267	-
Light activity [h]	7.04 (1.46)	6.14 (1.51)	6.27 (2.13)	5.88 (2.29)	P=0.092	-
MVPA [h]	0.43 (0.33)	0.3 (0.23)	0.45 (0.42)	0.41 (0.33)	P=0.269	-
Sleep [h]	8.94 (1.25)	9.14 (1.1)	8.94 (1.28)	9.52 (1.28)	P=0.194	-

Numbers are displayed as mean (SD). The p-values are from ANCOVA, corrected for age, sex, and years of education. MVPA = Moderate to vigorous physical activity. No post hoc Tukey HSD test was performed due to non-significant ANCOVA test. MVPA: Moderate-to-vigorous physical activity per day. PreAD: Preclinical AD, ProAD: Prodromal AD, MildAD: Mild-to-moderate AD dementia, HC: Age-matched healthy controls.

4. Physilog (Dual Task)

Supplementary Table 6: Descriptive Physilog statistics of DTE (Dual Task Effect)

Features [DTE - %]	HC N=47	PreAD N=23	ProAD N=36	MildAD N=21	p-value	Group differences
AVG - Cadence	-3.30 [-6.85 - 1.24]	-4.05 [-6.14 - 2.16]	-6.69 [-14.03 - 3.22]	-8.68 [-19.93 - 2.51]	P=0.297	
SD - Cadence	12.53 [-23.45 38.78]	6.24 [-15.77 39.67]	9.24 [-6.91 56.47]	34.29 [3.20 86.95]	P=0.190	
AVG - Double support	0.72 [-1.98 8.99]	2.91 [-2.75 5.50]	6.28 [2.30 15.38]	3.64 [-4.99 23.99]	P=0.618	
SD - Double support	2.14 [-18.89 33.19]	-7.10 [-21.65 17.43]	-7.61 [-24.25 115.53]	23.46 [-15.59 53.26]	P=0.057	
AVG - Foot flat rate	2.43 [0.23 5.86]	2.87 [1.03 6.38]	5.60 [2.23 11.85]	10.20 [1.86 14.82]	P=0.062	
SD - Foot flat rate	-7.52 [-30.50 13.16]	-6.14 [-17.79 1.86]	5.38 [-16.73 16.82]	17.62 [-3.71 32.71]	P=0.002	ProAD > PreAD * 1.55 [0.42, 2.69] MildAD > PreAD * 1.78 [0.65, 2.92]
AVG - Gait speed	-3.86 [-10.14 -0.65]	-5.50 [-8.82 - 2.19]	-9.42 [-17.60 - 5.12]	-14.81 [-25.06 - 4.06]	P=0.027	
SD - Gait speed	-2.02 [-15.00 15.16]	-6.97 [-18.48 7.44]	-3.35 [-14.11 15.73]	13.98 [-9.88 50.37]	P=0.014	
AVG - Gait cycle time	3.43 [1.05 7.55]	4.23 [2.22 6.63]	8.03 [3.12 17.34]	11.32 [2.29 31.25]	P=0.032	
SD - Gait cycle time	18.18 [-24.64 82.85]	25.63 [-9.09 56.32]	37.80 [3.39 142.78]	91.00 [3.43 315.13]	P=0.135	
AVG - Path length	0.16 [-0.14 0.52]	0.04 [-0.33 0.37]	0.23 [-0.31 0.78]	0.03 [-0.73 0.61]	P=0.133	
SD - Path length	0.72 [-13.47 40.50]	-6.24 [-15.43 7.40]	3.47 [-19.71 61.22]	-6.72 [-36.56 37.37]	P=0.361	

AVG - Stance	0.34 [-0.56 1.33]	0.56 [-0.35 0.99]	1.42 [0.07 2.35]	0.98 [-0.25 3.50]	P=0.127	
SD - Stance	0.74 [-16.76 25.03]	-2.29 [-24.81 6.12]	1.13 [-15.96 51.31]	32.93 [12.93 83.65]	P=0.017	MildAD > PreAD * 1.96 [0.33, 3.59]

Numbers are displayed as median and inter-quartile distance. The p-values are from ANCOVAs, corrected for age, sex, years of education, BMI, GDSS score, and presence of diabetes diagnosis. P-values rounded up to the third digit after comma. If ANCOVA showed significant differences, post-hoc Tukey HSD tests were done. The last column show*s* the significant group differences as group 1 > group 2 with adjusted estimates and confidence intervals in brackets. For foot flat, age factor was also significant. For gait speed, gait cycle time, and path length the overall ANCOVA tests was statistically significant while no significant pair-wise comparisons using Tukey HSD were found. Highlighted table rows represent significant features.

5. Physilog (Timed up-and-go, TUG)

Supplementary Table 7: Descriptive Physilog statistics of TUG features

Features	HC N=49	PreAD N=23	ProAD N=42	MildAD N=26	p-value	Group differences
Cadence [step/min]	113.21 [105.77 126.08]	111.40 [107.65 118.68]	118.30 [104.07 127.00]	104.77 [94.22 109.16]	P=0.004	ProAD>MildAD * 8.18 [-2.69, 19.06] HC>MildAD* 11.77 [2.76, 20.78]
Gait speed [m/s]	1.06 [0.97 1.21]	1.11 [0.95 1.17]	1.12 [0.90 1.28]	0.89 [0.68 1.05]	P=0.005	HC>MildAD * 0.17 [0.04, 0.30] ProAD>MildAD* 0.15 [0.01, 0.28]
N. Gait Cycles [#]	6.00 [5.00 7.00]	5.00 [5.00 7.00]	6.00 [5.00 7.00]	7.00 [6.00 8.00]	P=0.154	
Sit to stand angle [deg]	37.99 [31.30 43.50]	44.26 [37.40 51.92]	38.61 [28.84 47.09]	37.97 [34.78 41.57]	P=0.302	
Sit to stand duration [s]	1.08 [0.93 1.19]	1.14 [1.00 1.35]	1.02 [0.95 1.22]	1.22 [1.03 1.40]	P=0.011	MildAD>HC * 0.11 [0.02, 0.19]
Total time [s]	8.74 [7.67 9.58]	8.40 [7.38 10.31]	8.50 [7.26 9.43]	9.76 [8.53 11.69]	P=0.048	Mild AD>HC * 0.14 [0.007, 0.27]
Turn duration [s]	2.31 [2.07 2.52]	2.46 [2.09 2.83]	2.31 [1.98 2.69]	2.56 [2.23 3.14]	P=0.485	
Turn to sit duration [s]	2.41 [2.17 2.69]	2.43 [2.15 2.69]	2.33 [2.10 2.73]	2.66 [2.24 3.21]	P=0.193	

Numbers are displayed as median and interquartile distance. Given that the distributions are skewed, medians and interquartile ranges have been provided for description instead of means and standard deviations. The p-value of ANCOVA overall group differences corrected for age, sex, years of education, BMI, GDSS score, and presence of diabetes diagnosis. P-values rounded up to third digit after comma. If ANCOVA showed significant differences, post-hoc Tukey HSD tests were done. The last column shows the significant group differences as group 1 > group 2 with adjusted estimates and confidence intervals in brackets. PreAD: Preclinical AD, ProAD: Prodromal AD, MildAD: Mild-to-moderate AD dementia, HC: Age-matched healthy controls.

6. Altoida

Supplementary Table 8: Descriptive Altoida statistics for each study group

Features	HC N=49	PreAD N=18	ProAD N=29	MildAD N=8	p-value	Group differences
DNS	69.18 (22.19)	62.27 (23.05)	42.66 (25.63)	24.57 (23.35)	P<0.001	HC>ProAD -0.62 [-0.97, -0.27] HC>MildAD -1.39[-1.95, -0.83] PreAD>ProAD -0.5[-0.95, -0.06] PreAD>MildAD -1.27 [-1.9, -0.64] ProAD>MildAD -0.77 [-1.36, -0.18]
DNS-Amyloid	30.41 (23.69)	32.48 (21.05)	24.42 (24.51)	5.65 (0.81)	P<0.001	HC>MildAD -1.35 [-2.2, -0.49] PreAD>MildAD -1.52[-2.47, -0.56] ProAD>MildAD -1 [-1.9, -0.1]
Perceptual Motor Coordination	49.39 (5.99)	48.53 (5.29)	43.56 (6.13)	35.19 (5.44)	P<0.001	HC>ProAD -5.82 [-9.42, -2.22] HC>MildAD -14.2[-20.06, -8.34] PreAD>ProAD -4.97[-9.58, -0.36] PreAD>MildAD -13.35[-19.87, -6.82] ProAD>MildAD -8.38 [-14.51, -2.24]
Complex Attention	48.56 (11.84)	48.77 (8.56)	38.90 (7.87)	35.37 (9.51)	P<0.001	HC>ProAD -0.21 [-0.35, -0.08] HC>MildAD -0.32 [-0.54, -0.09] PreAD>ProAD -0.23 [-0.41, -0.06] PreAD>MildAD -0.34 [-0.59, -0.09]
Cognitive Processing Speed	48.67 (10.50)	47.34 (8.62)	38.09 (7.30)	34.07 (6.34)	P<0.001	HC>ProAD -0.24 [-0.36, -0.12] HC>MildAD -0.35 [-0.55, -0.15] PreAD>ProAD -0.22 [-0.38--0.06]

						PreAD>MildAD -0.33 [-0.55, -0.11]
Inhibition	47.89 (12.07	49.34 (10.06	39.47 (11.05)	36.04 (14.10)	P<0.001	HC>ProAD -0.2 [-0.36, -0.04] HC>MildAD -0.31 [-0.57, -0.05] PreAD>ProAD -0.24 [-0.44, -0.03] PreAD>MildAD -0.35 [-0.64, -0.06]
Flexibility	39.02 (11.58)	38.19 (10.21)	39.41 (11.19)	43.18 (11.11)	P=0.738	
Visual Perception	46.98 (11.74)	46.94 (9.17)	36.30 (8.69)	33.84 (9.47)	P<0.001	HC>ProAD -0.26 [-0.4, -0.11] HC>MildAD -0.33 [-0.57, -0.09] PreAD>ProAD -0.27 [-0.46, -0.08] PreAD>MildAD -0.34 [-0.61, -0.08]
Planning	47.00 (13.99)	46.39 (9.60)	36.49 (8.69)	33.79 (10.63)	P<0.001	HC>ProAD -0.24 [-0.4, -0.07] HC>MildAD -0.32 [-0.59, -0.05] PreAD>ProAD -0.25 [-0.46, -0.03] PreAD>MildAD -0.33 [-0.64, -0.03]
Prospective Memory	53.07 (11.71	53.05 (9.35)	50.88 (13.50)	45.39 (16.20)	P=0.354	
Spatial Memory	49.30 (10.17	47.50 (7.75)	40.61 (7.99)	32.83 (7.90)	P<0.001	HC>ProAD -8.68 [-14.23, -3.14] HC>MildAD -16.46 [-25.49, -7.44] PreAD>MildAD -14.67 [-24.73, -4.61]
Fine Motor Skills	51.63 (11.33)	53.29 (9.09)	51.14 (12.12)	53.78 (4.37)	P=0.872	
Gait	48.20 (11.27)	45.05 (9.45)	40.86 (10.56)	37.56 (11.59)	P=0.009	HC>ProAD -7.34 [-13.96, -0.72]

The numbers are displayed as mean (SD). All scores are probability scores. The p-values are from ANCOVA analyses, corrected for age, sex and years of education. If ANCOVA showed significant differences, post-hoc Tukey HSD tests were done. The last column shows the significant group differences as group 1 > group 2 as well as adjusted estimates and confidence intervals in brackets.

DNS: Digital Neuro Signature, PreAD: Preclinical AD, ProAD: Prodromal AD, MildAD: Mild-to-moderate AD dementia, HC: Age-matched healthy controls.

7. Mezurio

Supplementary Table 9: Characteristics of Mezurio Story Time features stratified by the disease group stages.

Story Time Features	Overall N=153	HC N=65	PreAD N=25	ProAD N=38	MildAD N=25	p-value
Speech Timing Features						
Articulation Rate	4.04 (0.68)	4.20 (0.54)	4.18 (0.63)	3.89 (0.70)	3.72 (0.87)	0.007[a]
Speaking Rate	2.40 (0.69)	2.62 (0.61)	2.63 (0.57)	2.23 (0.66)	1.89 (0.71)	<0.001[b]
Recording Duration	79.71 (33.86)	73.50 (30.54)	86.22 (36.10)	86.62 (34.57)	78.36 (37.26)	0.198
Number of Syllables	177.56 (95.63)	176.95 (80.45)	216.25 (125.69)	183.78 (94.83)	130.97 (83.00)	0.016[c]
Number of Pauses	26.07 (13.30)	24.57 (13.23)	29.63 (14.32)	26.56 (12.81)	25.56 (13.26)	0.447
Average Syllable Duration	0.38 (0.57)	0.29 (0.26)	0.29 (0.18)	0.55 (1.00)	0.45 (0.50)	0.17
Hesitation Ratio	0.45 (0.14)	0.43 (0.13)	0.42 (0.11)	0.47 (0.13)	0.54 (0.16)	0.001[d]
Prosodic and Voice Quality Features						
Loudness (Mean)	0.19 (0.13)	0.20 (0.11)	0.21 (0.13)	0.19 (0.14)	0.16 (0.13)	0.557
HNR (Mean)	6.48 (1.89)	6.39 (1.80)	6.50 (1.46)	6.29 (2.08)	7.00 (2.18)	0.49
Jitter (Mean)	0.03 (0.01)	0.03 (0.01)	0.03 (0.01)	0.03 (0.01)	0.03 (0.01)	0.733
Shimmer (Mean)	1.19 (0.20)	1.21 (0.15)	1.16 (0.20)	1.17 (0.25)	1.15 (0.22)	0.524
Articulatory Features						
F1 Frequency (Mean)	630.91 (96.70)	637.51 (74.78)	618.36 (91.86)	618.93 (122.27)	645.04 (108.61)	0.612
F1 Frequency (Std. Dev.)	0.31 (0.06)	0.31 (0.05)	0.31 (0.05)	0.31 (0.07)	0.30 (0.06)	0.877
F1 Bandwidth (Mean)	1318.28 (158.06)	1334.80 (98.83)	1303.87 (150.35)	1308.59 (225.02)	1305.81 (170.30)	0.758
F1 Bandwidth (Std. Dev.)	0.16 (0.03)	0.16 (0.02)	0.16 (0.03)	0.15 (0.03)	0.16 (0.03)	0.811
F2 Frequency (Mean)	1667.26 (205.50)	1689.64 (135.81)	1642.40 (201.31)	1646.01 (282.54)	1668.05 (223.68)	0.682
F2 Frequency (Std. Dev.)	0.14 (0.02)	0.14 (0.02)	0.14 (0.02)	0.14 (0.03)	0.14 (0.03)	0.623
F2 Bandwidth (Mean)	1053.66 (134.93)	1058.96 (91.15)	1028.31 (129.50)	1052.00 (188.38)	1068.16 (140.98)	0.739
F2 Bandwidth (Std. Dev.)	0.28 (0.05)	0.29 (0.04)	0.29 (0.04)	0.27 (0.06)	0.27 (0.05)	0.11

Values are represented as Mean (SD). The p-values are from Likelihood Ratio (LR) tests. If the LR test showed a significant difference, then a linear mixed effect model was performed to evaluate the group differences.

[a] HC > Mild AD; [b] HC > Mild AD ProAD > Mild AD; [c] PreAD > MildAD; [d] MildAD > HC; HNR: Harmonics to Noise Ratio, ProAD: Prodromal AD, PreAD: Preclinical AD, ProAD: Prodromal AD, MildAD: Mild-to-moderate AD dementia, HC: Age-matched healthy controls.

Convergent validity

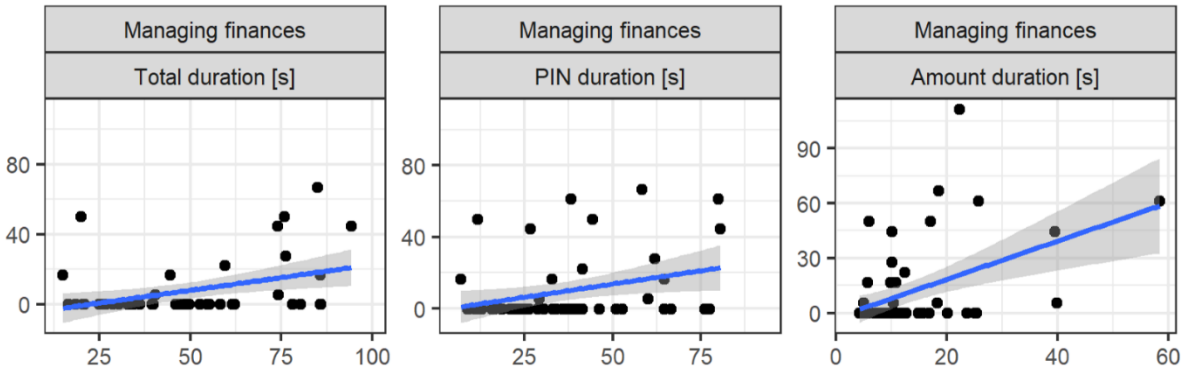
1. Banking Application

Supplementary Table 10: Relationship between Banking App Features and "Managing Finances" Functional Domain Score

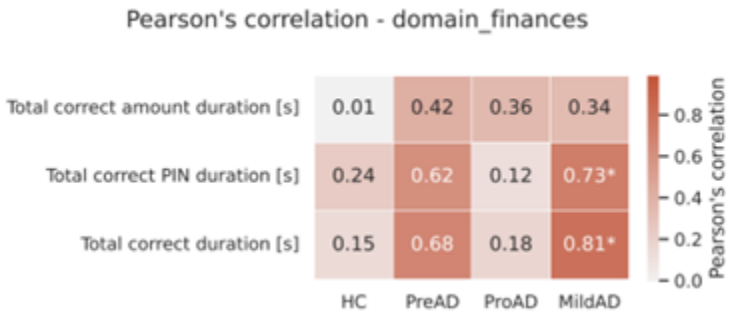
Features	Managing finances
Correct attempts	-0.06 (0.12), p=0.599
Correct PIN attempts	-0.05 (0.12), p=0.674
Correct amount attempts	-0.04 (0.08), p=0.564
Total correct duration [s]	0.55 (0.19), p<0.01
Total correct PIN duration [s]	0.41 (0.16), p=0.014
Total correct amount duration [s]	0.45 (0.12), p<0.001

The estimates (SE) and p-values are from linear regression analyses.

Supplementary Figure 2: Associations between Banking App Features and "Managing Finances" Functional Domain Score



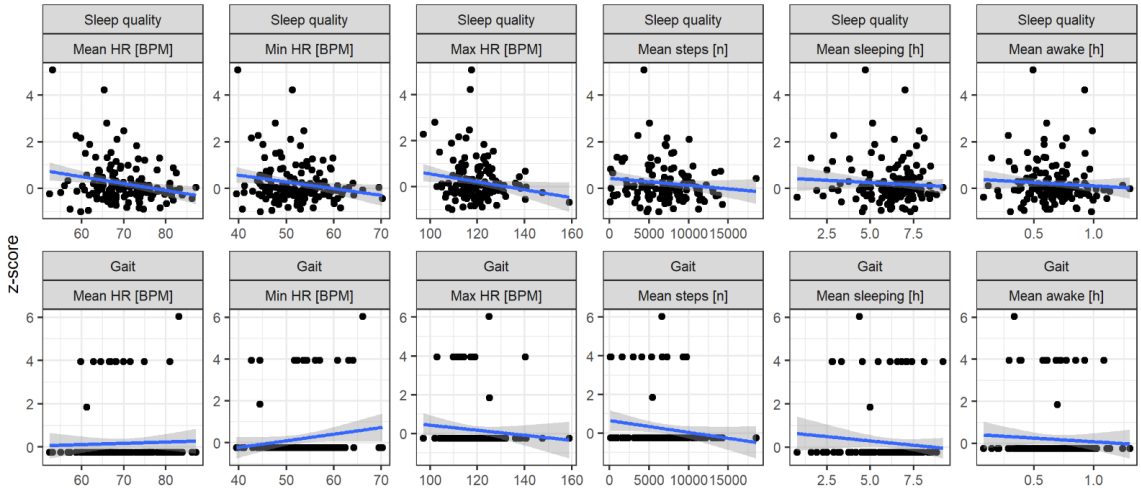
Supplementary Figure 3: Correlation matrix showing Pearson correlation coefficient for Banking App features with statistical significance



*:p<0.05. The association might not be linear, and the p-value is indicative only. PreAD: Preclinical AD, ProAD: Prodromal AD, MildAD: Mild-to-moderate AD dementia, HC: Age-matched healthy controls.

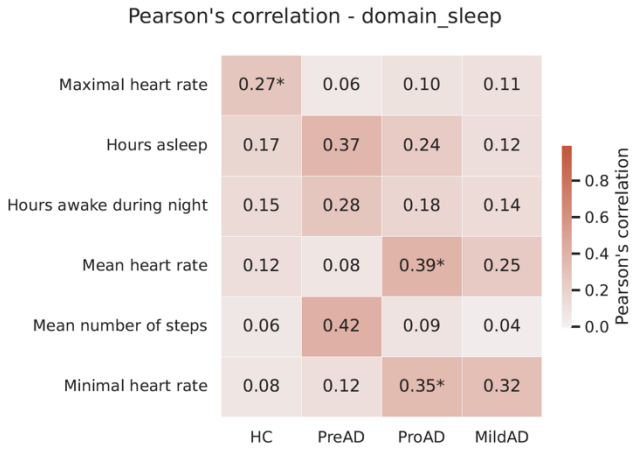
2. Fitbit

Supplementary Figure 4: Investigation of associations between Fitbit Features and "Sleep Quality", "Gait" Functional Domain Scores



HR: Heart Rate, BPM: Beat per minute

Supplementary Figure 5: Correlation matrix showing Pearson correlation coefficient for Fitbit features with statistical significance



*:p<0.05. The association might not be linear, and the p-value is indicative only. PreAD: Preclinical AD, ProAD: Prodromal AD, MildAD: Mild-to-moderate AD dementia, HC: Age-matched healthy controls.

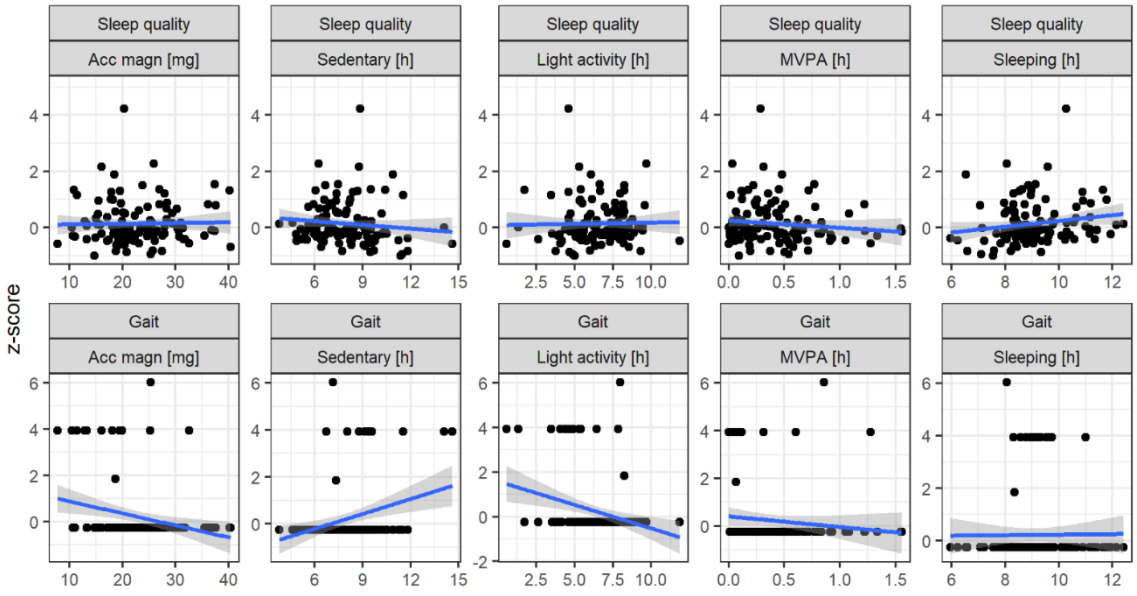
Supplementary Table 11: Investigation of relationships between Fitbit features and related Functional Domain Scores

Features	Sleep quality & circadian rhythms	Gait
Mean heart rate	-0.21 (0.07), p<0.01	0.03 (0.08), p=0.745
Minimal heart rate	-0.17 (0.08), p<0.05	0.12 (0.08), p=0.140
Maximal heart rate	-0.17 (0.08), p<0.05	-0.05 (0.08), p=0.560
Mean number of steps	-0.15 (0.09), p=0.095	-0.09 (0.09), p=0.312
Hours asleep	-0.08 (0.08), p=0.349	-0.05 (0.08), p=0.581
Hours awake during night	-0.07 (0.08), p=0.405	-0.04 (0.08), p=0.657

The estimates (SE) and p-values are from linear regression analyses.

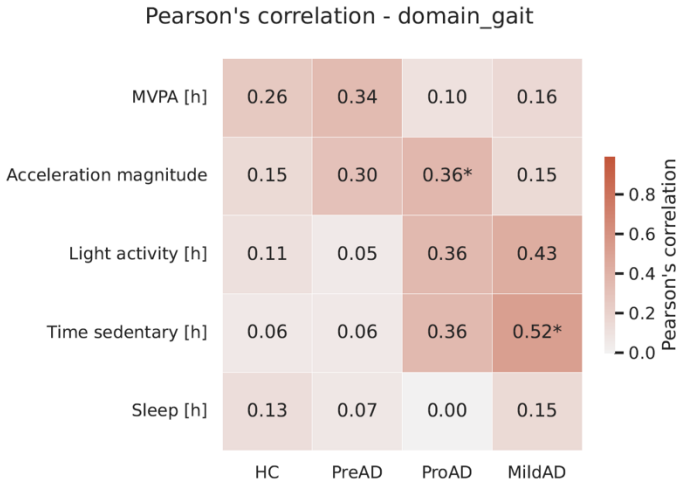
3. Axivity

Supplementary Figure 6: Investigation of associations between Axivity Features and "Sleep Quality", "Gait" Functional Domain Scores. Regression lines have been plotted for consistency with the analyses of the other device.



MVPA: Moderate-to-vigorous physical activity per day

Supplementary Figure 7: Correlation matrix showing Pearson correlation coefficient for Axivity features with significance



*:p<0.05. The association might not be linear, and the p-value is indicative only. PreAD: Preclinical AD, ProAD: Prodromal AD, MildAD: Mild-to-moderate AD dementia, HC: Age-matched healthy controls.

Supplementary Table 12: Investigation of relationships between Axivity features and related Functional Domain Score

Features	Sleep quality & circadian rhythms	Gait
Acceleration magnitude	-0.01 (0.1), p=0.940	-0.16 (0.08), p=0.051
Time sedentary [h]	-0.08 (0.1), p=0.387	0.2 (0.08), p=0.013
Light activity [h]	0.01 (0.1), p=0.905	-0.21 (0.08), p=0.012
MVPA [h]	-0.14 (0.1), p=0.189	-0.05 (0.09), p=0.588
Sleep [h]	0.15 (0.1), p=0.143	0.02 (0.09), p=0.797

MVPA: Moderate-to-vigorous physical activity per day.

The estimates (SE) and p-values are from linear regression analyses.

4. Physilog (Dual Task)

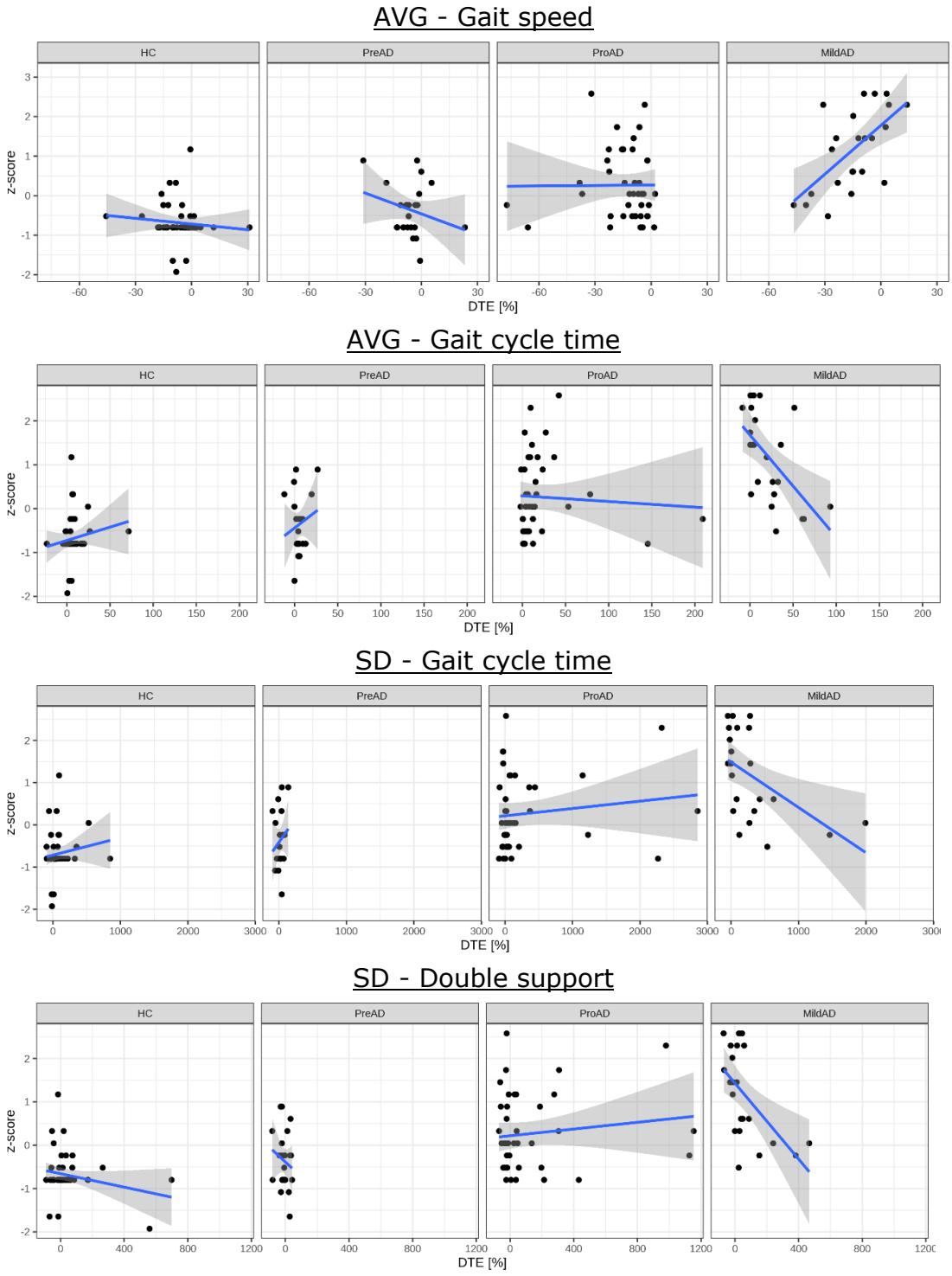
Supplementary Table 13: Relationship between DTE of various gait parameters and divided attention question from the ECog scale presented per cohort.

Executive functioning: divided attention				
Feature (DTE)	**Cohort**			
	HC	**PreAD**	**ProAD**	**MildAD**
AVG – Gait speed	-	-0.032 (0.069) p=0.6	-0.014 (0.050) p=0.7	0.163 (0.034) p=0.0001
AVG – Gait cycle time	0.009 (0.024) p=0.7	0.035 (0.114) p=0.8	-0.001 (0.025) p=0.9	-0.095 (0.022) p=0.001
SD – Gait speed	-0.012 (0.009) p=0.2	-0.009 (0.032) p=0.8	0.039 (0.017) p=0.028	-0.010 (0.016) p=0.5
SD – Gait cycle time	0.001 (0.002) p=0.3	0.013 (0.013) p=0.3	0.001 (0.001) p=0.3	-0.003 (0.001) p=0.013
SD - Stance	-	-0.012 (0.025) p=0.5	0.007 (0.005) p=0.2	-0.014 (0.005) p=0.016
SD – Double support	-0.002 (0.002) p=0.2	-0.021 (0.022) p=0.3	0.005 (0.003) p=0.09	-0.013 (0.005) p=0.013
SD – Foot flat rate	0.002 (0.008) p=0.8	-0.015 (0.022) p=0.5	0.005 (0.013) p=0.7	-0.030 (0.025) p=0.2

DTE: Dual Task Effect, Ecog: Everyday Cognition Scale, PreAD: Preclinical AD, ProAD: Prodromal AD, MildAD: Mild-to-moderate AD dementia, HC: Age-matched healthy controls.

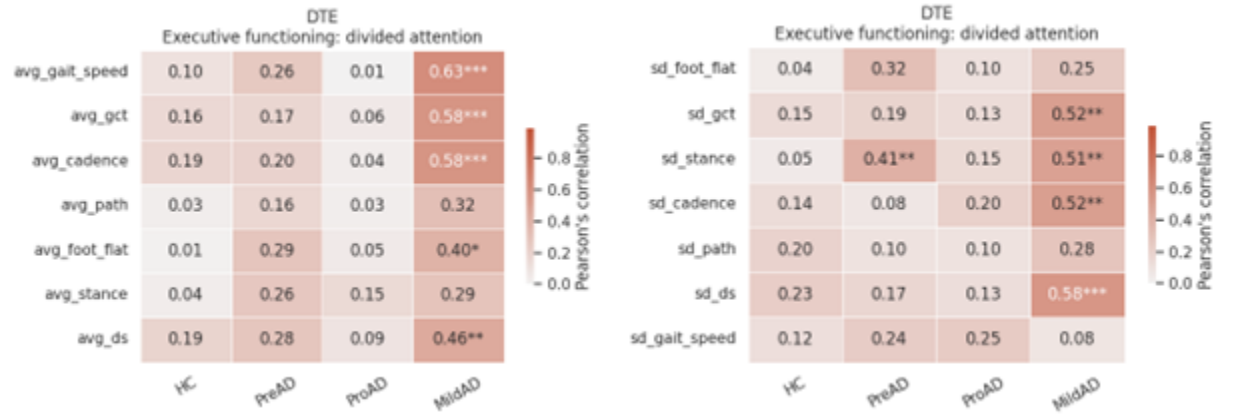
The estimates (SE) and p-values are from linear regression analyses.

Supplementary Figure 8: Relationship between DTE of various gait parameters and divided attention question from ECog scale presented per cohort.



DTE: Dual Task Effect, Ecog: Everyday Cognition Scale. PreAD: Preclinical AD, ProAD: Prodromal AD, MildAD: Mild-to-moderate AD dementia, HC: Age-matched healthy controls.

Supplementary Figure 9: Correlation matrix showing Pearson correlation coefficient for DTE features with significance of Ecog Divided Attention Domain Question and Motor-cognitive Dual Tasking Test Parameters.

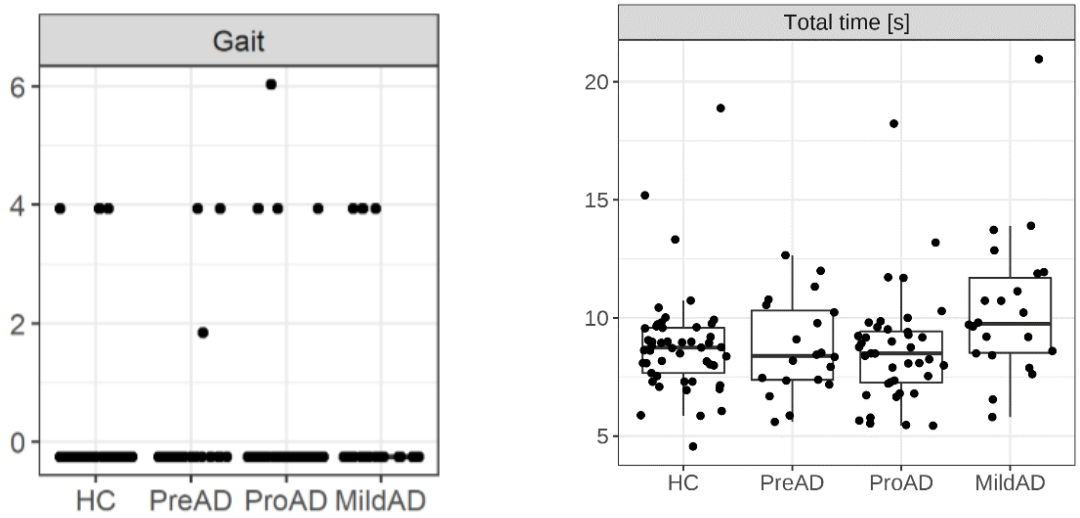


DTE: Dual Task Effect, Ecog: Everyday Cognition Scale. *:p<0.05; **: P<0.01;***:P<0.001. The association might not be linear, and the p-value is indicative only.

5. Physilog (Timed up-and-go, TUG)

This is the example where it was not appropriate to correlate standard clinical outcome with RMT features; hence, no linear regression estimates nor pearson correlation coefficients were calculated. This is due to low granularity of established clinical meaure (EQ5D mobility question).

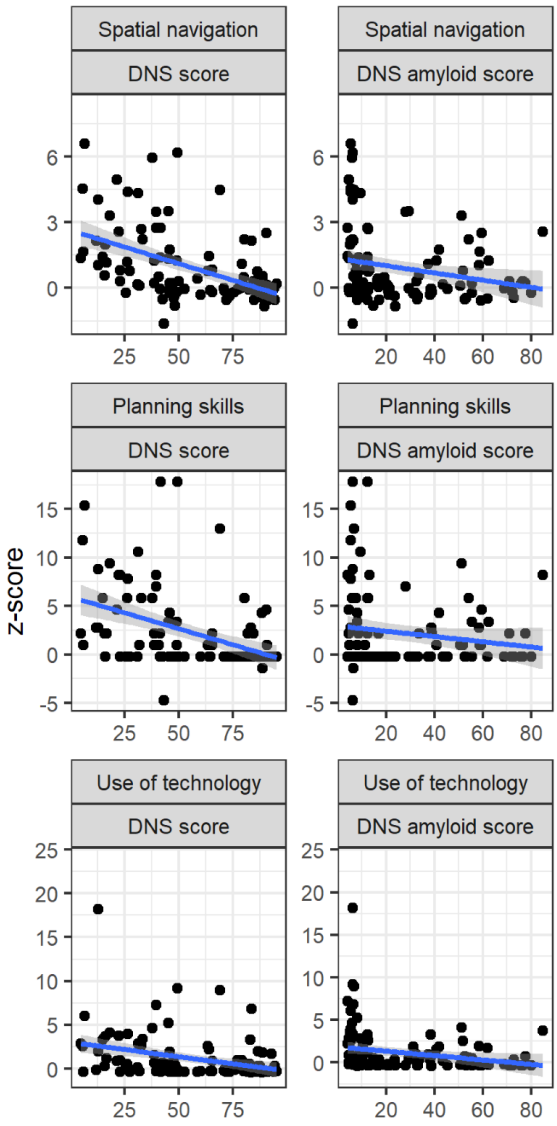
Supplementary Figure 10: Comparison between the EQ5D mobility question (left) and the TUG total time feature (right)



EQ5D: European Quality of Life, 5-Dimension, TUG: Timed up-and-go, PreAD: Preclinical AD, ProAD: Prodromal AD, MildAD: Mild-to-moderate AD dementia, HC: Age-matched healthy controls.

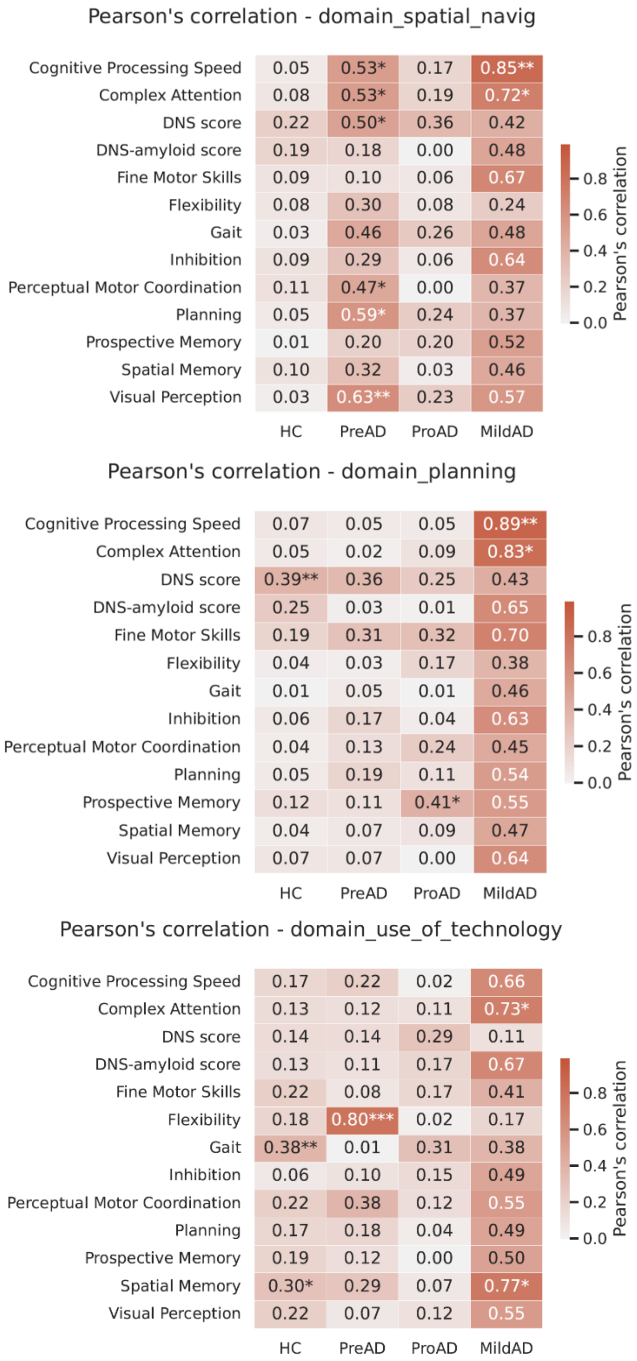
6. Altoida

Supplementary Figure 11: Associations between the Altoida Features DNS score (main feature) and DNS-amyloid score with the explored Functional Domain Score



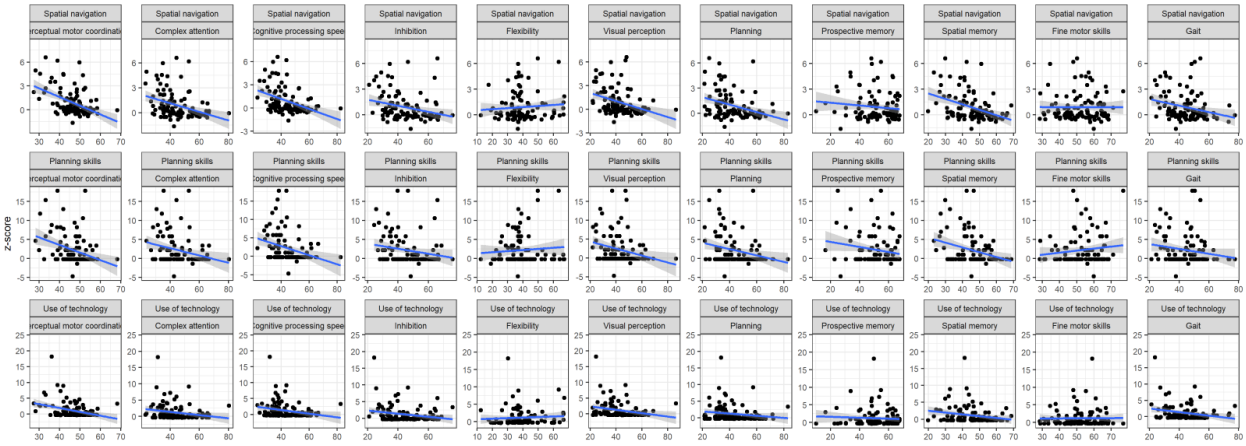
DNS: Digital Neuro Signature

Supplementary Figure 12: Correlation matrix showing Pearson correlation coefficient for Altoida features with significance



*:p<0.05; **:p<0.01;***:p<0.001. The association might not be linear, and the p-value is indicative only. PreAD: Preclinical AD, ProAD: Prodromal AD, MildAD: Mild-to-moderate AD dementia, HC: Age-matched healthy controls.

Supplementary Figure 13: Visualization of the found associations between the Altoida Features and the Functional Domain Scores



Supplementary Table 14: Relationships between the Altoida Features and Functional Domain Scores

Features	Spatial navigation & memory	Planning skills	Use of technology
DNS score	-0.57 (0.11), p<0.001	-0.44 (0.1), p<0.001	-0.35 (0.16), p=0.03
DNS-amyloid score	-0.28 (0.13), p=0.03	-0.16 (0.12), p=0.19	-0.34 (0.17), p=0.049
Perceptual Motor Coordination	-0.6 (0.11), p<0.001	-0.37 (0.11), p <0.001	-0.52 (0.16), p<0.001
Complex Attention	-0.45 (0.12), p<0.001	-0.29 (0.11), p=0.01	-0.37 (0.17), p=0.03
Cognitive Processing Speed	-0.53 (0.11), p<0.001	-0.35 (0.11), p<0.001	-0.36 (0.17), p=0.03
Inhibition	-0.34 (0.12), p=0.01	-0.21 (0.11), p=0.06	-0.42 (0.16), p=0.01
Flexibility	0.1 (0.13), p=0.42	0.1 (0.12), p=0.41	0.09 (0.17), p=0.62
Visual Perception	-0.48 (0.12), p <0.001	-0.31 (0.11), p=0.01	-0.45 (0.17), p=0.01
Planning	-0.45 (0.12), p<0.001	-0.3 (0.12), p=0.01	-0.25 (0.17), p=0.15
Prospective Memory	-0.16 (0.13), p=0.22	-0.2 (0.11), p=0.08	-0.03 (0.18), p=0.85
Spatial Memory	-0.53 (0.12), p<0.001	-0.37 (0.11), p <0.001	-0.37 (0.17), p=0.03
Fine Motor Skills	0.01 (0.13), p=0.93	0.17 (0.12), p=0.15	0.05 (0.18), p=0.79
Gait	-0.39 (0.12), p<0.001	-0.25 (0.12), p=0.04	-0.49 (0.17), p<0.001

DNS: Digital Neuro Signature. The estimates (SE) and p-values are from linear regression analyses.

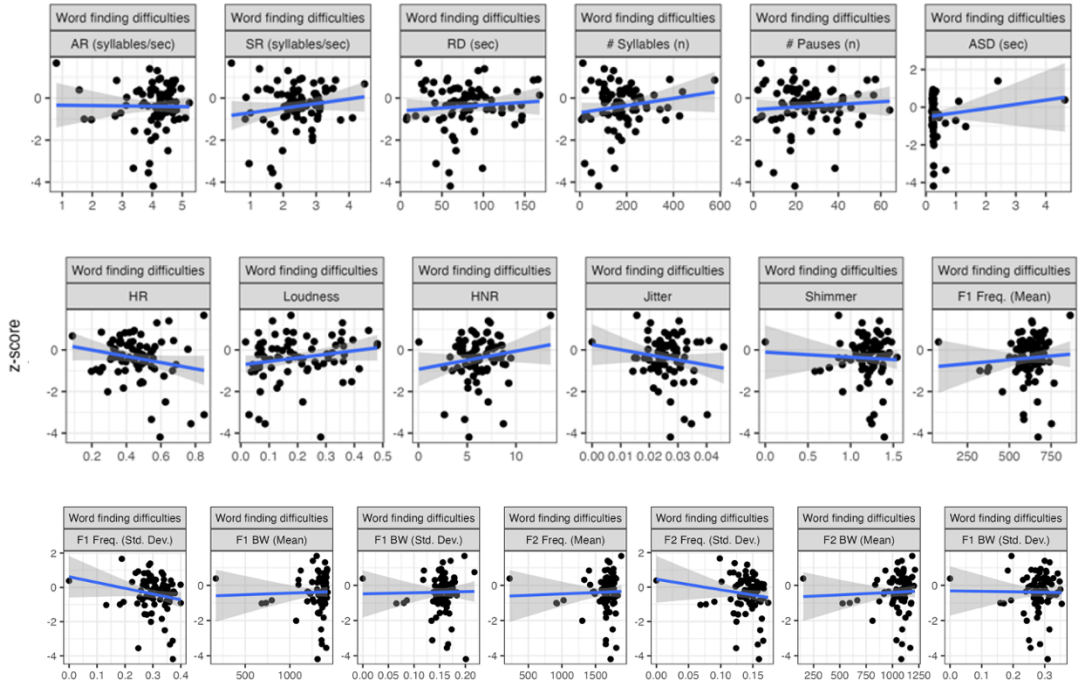
7. Mezurio

Supplementary Table 15: Association of Functional domain score, "Word finding difficulty" with Mezurio Story Time measures

Domain = Word Finding Difficulty	Estimate (SE)	p-value
Speech Timing Features		
Articulation Rate	0.08 (0.08)	0.34
Speaking Rate	0.12 (0.08)	0.15
Recording Duration	0.2 (0.08)	0.02
Number of Syllables	0.23 (0.08)	0.01
Number of Pauses	0.21 (0.08)	0.01
Average Syllable Duration	-0.09 (0.09)	0.36
Hesitation Ratio	-0.15 (0.08)	0.07
Prosodic and Voice Quality Features		
Loudness (Mean)	0.03 (0.08)	0.75
HNR (Mean)	-0.09 (0.07)	0.22
Jitter (Mean)	-0.03 (0.08)	0.7
Shimmer (Mean)	0.05 (0.08)	0.51
Articulatory Features		
F1 Frequency (Mean)	-0.09 (0.08)	0.24
F1 Frequency (Std. Dev.)	0.06 (0.08)	0.47
F1 Bandwidth (Mean)	-0.03 (0.08)	0.74
F1 Bandwidth (Std. Dev.)	0.02 (0.08)	0.77
F2 Frequency (Mean)	-0.04 (0.08)	0.65
F2 Frequency (Std. Dev.)	0.04 (0.08)	0.63
F2 Bandwidth (Mean)	-0.09 (0.08)	0.29
F2 Bandwidth (Std. Dev.)	0.07 (0.08)	0.42

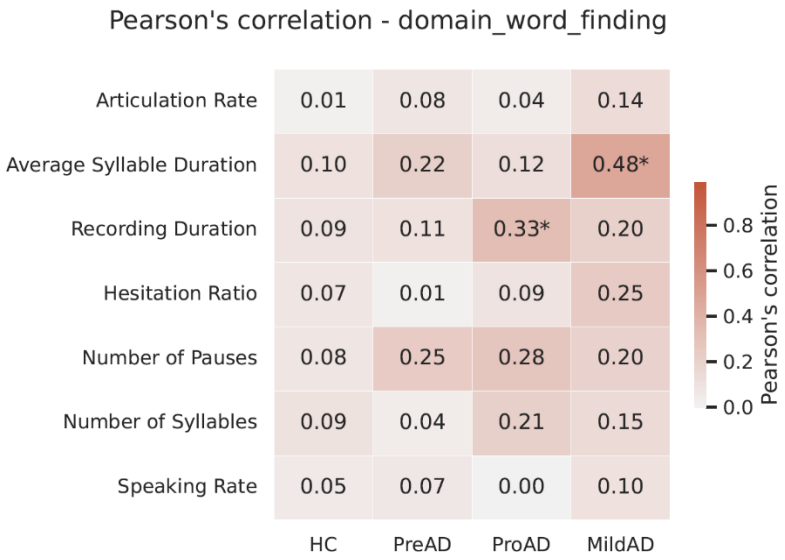
For this analysis, linear regression with averaged Story Time audio measures was used, and a complete analysis using the longitudinal information of this data will be performed at the time of study completion; HNR: Harmonics to Noise Ratio.

Supplementary Figure 14: Visualization of the found associations between the Mezurio Story Time Features and the Word Finding Difficulty as the functional domain score.



HNR: Harmonics to Noise Ratio.

Supplementary Figure 15: Correlation matrix showing Pearson correlation coefficient for Mezurio features with significance



*:p<0.05; **:p<0.01;***:p<0.001. The association might not be linear, and the p-value is indicative only. PreAD: Preclinical AD, ProAD: Prodromal AD, MildAD: Mild-to-moderate AD dementia, HC: Age-matched healthy controls.

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