

PREVENTION (NONPHARMACOLOGICAL)

Development of a Multidomain Composite Intervention Engagement Score in the U.S. POINTER Trial

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Abstract

Background: Multidomain lifestyle interventions have shown promise to slow cognitive decline and possibly prevent dementia. However, challenges arise in analyzing and interpreting treatment response when participants vary in their adherence to intervention components. The U.S. POINTER trial, a phase 3, multicenter, randomized 2-year clinical trial, is investigating the impact of lifestyle interventions on cognition in older adults at risk of cognitive decline.

Methods: Four composite scores are proposed to assess engagement in the POINTER multidomain intervention.

Results: Composite score one was based on the **U.S. POINTER Prescription** adherence goals for three intervention domains (physical activity, diet, brain training). For this composite score, values range from 0 to 1.25, where "1" signifies the adherence goal was met, and "1.25" indicates the goal was exceeded (Table 1). The composite score is the sum of values across domains.

Composite score two was constructed using **Consistent Intervals**, maintaining consistent scaling between the measurement of intervention domains and the values. The composite score is the sum of the values across the three domains, each ranging 0 to 1 (Table 1).

Composite score three employed a **Proportional Approach**, measuring engagement in the three intervention domains as a proportion of achieved U.S. POINTER prescription goals. The composite score is the sum of values across domains.

Composite score four utilized **Exploratory Factor Analysis** to identify optimal weighting for each domain's adherence scores, aiming for a comprehensive assessment of participants' behavior.

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Missing data are examined in two ways: (a) assume missing data indicates no adherence and assign zero, and (b) multiple imputation to predict missing values before composite calculation. Properties of the four composites are examined using simulated datasets in preparation for later use in U.S. POINTER. Distributions, central tendency, and variability of adherence values for each composite score will be presented.

Conclusion: Four possible multidomain adherence composite scores are proposed, reflecting intervention engagement in U.S. POINTER. In the future, we will explore sensitivity of each composite score to detect treatment-related change in cognition. This study will lay the foundation for broader applications in other multidomain trials with quantifiable adherence metrics, such as FINGER and LatAm-FINGERS.

Table 1. Breakdown of the scoring system for Composite scores one and two.

Composite Score	Intervention Domain	Cutoffs	Values
Composite score one: U.S. POINTER Prescription	Physical Activity	VAM >120	1.25
		VAM 90-120	1
		VAM 60-89	0.75
		VAM 30-59	0.5
		VAM 0-29	0.25
		VAM missing data	0
	MIND Diet	MIND > 12	1.25
		MIND 9.5-12	1
		MIND 8.5-9.4	0.75
		MIND 7.5-8.4	0.5
		MIND 0-7.4	0.25
		MIND missing data	0
	Brain HQ	BHQ > 48	1.25
		BHQ 30-48	1
		BHQ 20-29	0.75
		BHQ 10-19	0.5
		BHQ 0-9	0.25
		BHQ missing data	0
Composite score two: Consistent Intervals	Physical Activity	VAM ≥ 90	1
		VAM 67.5-89.5	0.8
		VAM 45-67	0.6
		VAM 22.5-44.5	0.4
		VAM 0-22	0.2
		VAM missing data	0
	MIND Diet	MIND ≥ 9.5	1
		MIND 7.15-9.49	0.8
		MIND 4.8-7.14	0.6
		MIND 2.45-4.79	0.4
		MIND 0-2.44	0.2
		MIND missing data	0
	Brain HQ	BHQ ≥ 30	1
		BHQ 22.5-29.9	0.8
		BHQ 15-22.4	0.6
		BHQ 7.5-14.9	0.4
		BHQ 0-7.4	0.2
		BHQ missing data	0

VAM, median weekly very active minutes; MIND, median weekly MIND Diet score; BHQ, median weekly levels completed Brain HQ.