Adapted Langa-Weir *probable dementia* classification outperforms other algorithms in 26 European countries without clinical dementia assessments.

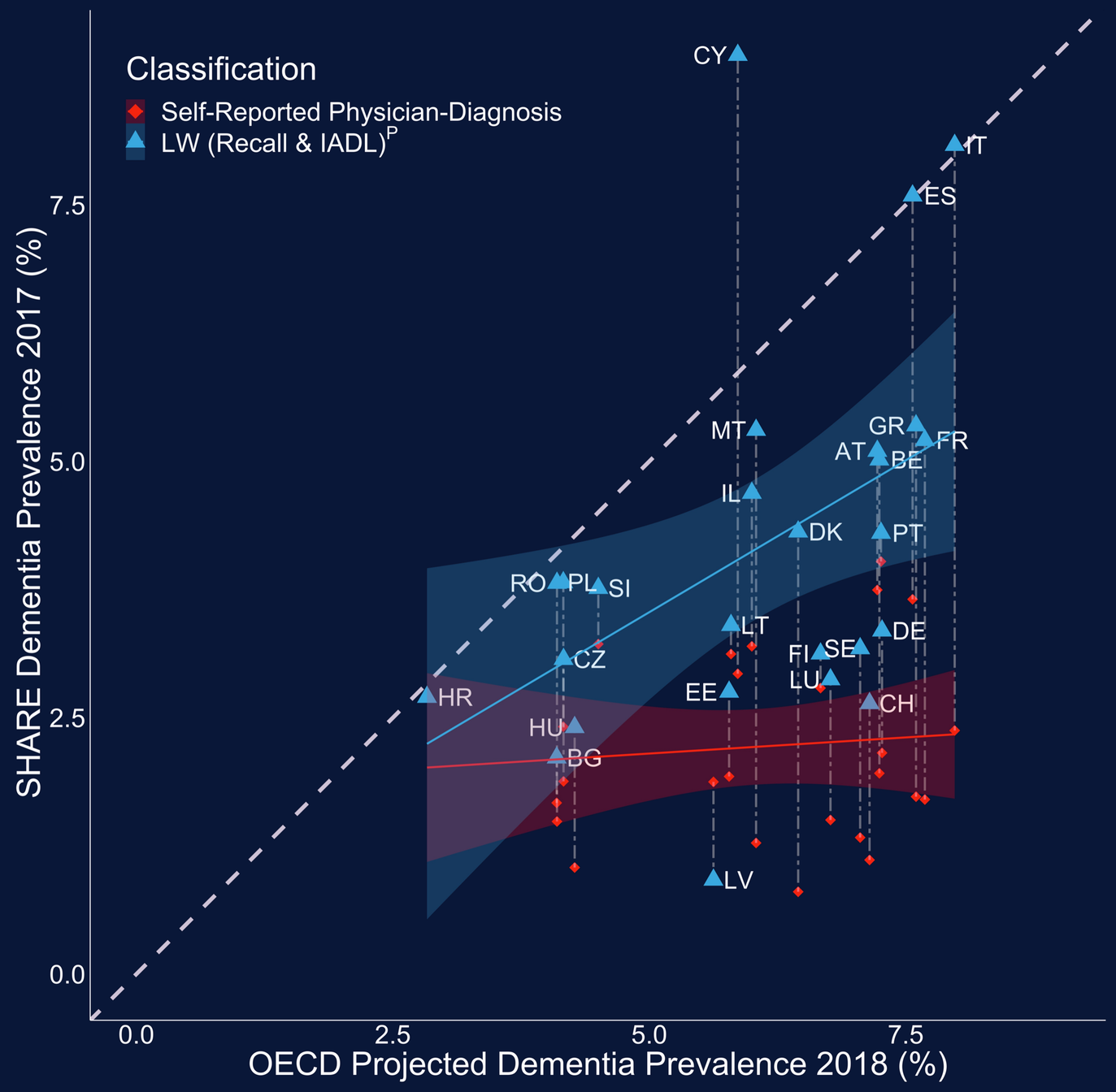

Figure 1. Dementia prevalence across countries. Y axis illustrates prevalence based on population-weighted SHARE data with self-reported physician-diagnosis of dementia (red rectangles) or Langa-Weir (LW [Recall & IADL]^{P}) 'probable dementia' (blue triangles), x axis illustrates prevalence based on OECD projections for 2018.[5,6]

Scan me for more detailed information

Dementia Classification in the European Context – Incorporating OECD Data to Adjust for Country-level Variation in Underdiagnosis

Matthias Klee, Kenneth M. Langa, Anja K. Leist

INTRO

- Classification algorithms for 'probable dementia' help to compensate for lacking validated cognitive assessments
- Algorithms, such as the Langa-Weir[1,2] classification (LW) from the Health and Retirement Study (HRS), have not been applied yet to the Survey of Health, Ageing and Retirement in Europe (SHARE, table 1)[3]

We sought to investigate the potential of the LW classification to detect 'probable dementia' in SHARE using a minimal predictor set, with the aim of compensating for underdiagnosis of dementia.

TESTED ALGORITHMS

- LW (Recall)$^{(P)}$: based on recall (Table 2)
- LW (Recall & IADL)$^{(P)}$: based on recall and outlying IADL (Instrumental Activities of Daily Living) sum (Table 2)
- Logistic Regression, Random Forest and XGBoost[4] based on recall, IADLs, interviewer & sociodemographic variables

^{P} recall cutoffs used for classification based on 2.5th percentile / percentile reflecting OECD (Organisation for Economic Co-operation and Development) projected dementia prevalence in 2018[5,6]

RESULTS

- LW (Recall & IADL)^{P} with best performance (Sensitivity = .43, Specificity = .97)
- AUC better in machine learning based classifiers (AUC = .87-.89) compared with LW adaptations (AUC = .63-.73)

DISCUSSION

- LW (Recall & IADL)^{P} identified 'probable dementia' and reduced underdiagnosis in SHARE (figure 1)
- Participants classified 'probable dementia' have similar cognitive and health profiles as participants with self-reported physician-diagnosis of dementia (figure 2)
- Performance is in line with findings in HRS[7] but varies by country

Table 1. Descriptive Characteristics.

	Test Set (*N* = 28,312)	**Training Set** (*N* = 28,310)
Age M (SD)	71.7 (8.05)	71.7 (8.08)
Gender		
Female	15,937 (56.3%)	15,931 (56.3%)
Male	12,375 (43.7%)	12,379 (43.7%)
Education		
Lower 2nd	11,418 (40.3%)	11,376 (40.2%)
Upper 2nd	9,563 (33.8%)	9,512 (33.6%)
Tertiary	7,331 (25.9%)	7,422 (26.2%)
Dementia		
Yes	591 (2.1%)	585 (2.1%)
No	27,721 (97.9%)	27,725 (97.9%)

Note. Participants in SHARE wave 7 age 60 and older with complete data on self-reported dementia status, recall, IADLs, age, sex and education.

Table 2. Comparison of LW Adaptations.

Characteristics	**HRS**	**(Recall)**	**(Recall & IADL)**
Cognitive Function			
Immediate Recall	SR	SR	SR
Delayed Recall	SR	SR	SR
Serial 7's	SR	-	-
Backward Counting	SR	-	-
IADL			
Preparing Meals	Proxy	-	SR
Shopping Groceries	Proxy	-	SR
Making Phone Calls	Proxy	-	SR
Taking Medication	Proxy	-	SR
Managing Money	Proxy	-	SR
Using a Map	-	-	SR
Doing Housework	-	-	SR
Independent Mobility	-	-	SR
Doing Laundry	-	-	SR

Note. Proxy = Proxy respondent. SR = Self-reported.

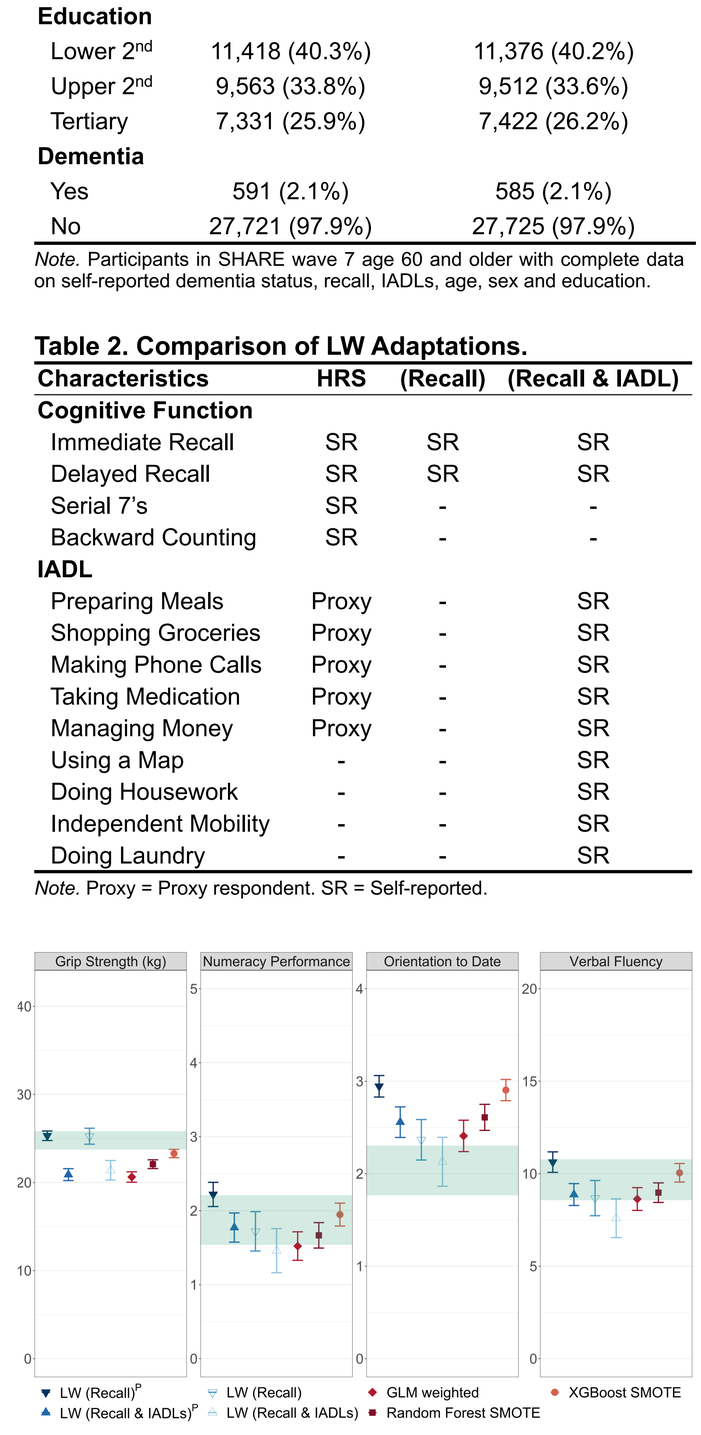

Figure 2. Further domains of health and cognitive function. Green fill indicates M, 95%CI for participants with self-reported physician-diagnosis.

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