The Effect of Different Cultural and Life Experiences on the Aging Brain and Dementia Diagnosis

- **Simge Celik, Neuropsychologist, M.Sc.**

Netzwerk Alternsforschung, Universität Heidelberg

Abschlusskongress des Graduiertenkollegs "Menschen mit Demenz im Akutkrankenhaus",
16.04.2021, online

Supervisors:

- Prof. Dr. Lutz Frölich (Zentralinstitut für Seelische Gesundheit, ZI)
- Prof. Dr. Patric Meyer (SRH Hochschule Heidelberg)
- Dr. Birgit Teichmann (Netzwerk Alternsforschung)

Cultural diversity in Germany

Citizenship	Total	Percentage
European States	4,789,755	43.9
EU-candidate countries (Turkey, Serbia)	1,946,235	17.8
EEA -States/Switzerland	48,240	0.4
Rest of Europe (Russia, Kosova, Bosnia and Herzegovina, Ukraine)	852,390	7.8
Africa	570,115	5.2
America	283,585	2.6
Asia (Syria, Afghanistan, Iraq, China)	745,645	6.8
Australia and Oceania	17,795	0.2

Retrieved from Deutsche Statische Bundesamt (as of 2018)

The challenges to clinical practice in the current shifting environment of population trends and demographic characteristics

Language Barrier

Patients' language proficiency in languages other than German

Testing individuals not proficient in German

Test related issues

Appropriate translation and validation of tests

Interpretation of the test scores of ethnic/racial minorities by utilizing cultural-based norms

The lack of cross-cultural cognitive assessment tools and dementia rating scales

Clinicians' competence

Clinicians' awareness and competence in providing culture sensitive dementia services

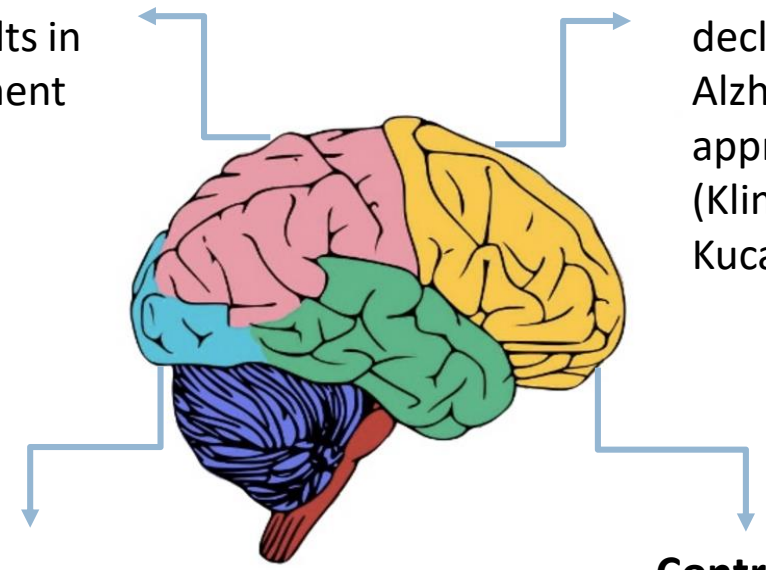
Elbulok-Charcape et al. (2014) and Nielsen et al. (2011)

Influencing cognitive skills

Managing and resolving competition between the two languages results in cognitive improvement (Antoniou, 2018).

Reducing the impact of dementia

Bilingualism might delay the onset of cognitive decline, specifically in Alzheimer´s disease, by approximately 4.5 years (Klimova, Valis, & Kamil Kuca, 2017).



Different patterns in brain networks

Bilingualism is associated with enhanced structural and functional connectivity (Luk et al., 2011).

Contributing to cognitive reserve

Bilingualism may enable to maintain people´s normal cognitive function in the presence of brain pathology (Schweizer et al., 2012).

The debate regarding the advantages and disadvantages of bilingualism

- One of the most controversial issues in neuroscience and psychology.
- Research presents a mixed picture about the impact of bilingualism on brain functions with some studies detecting a bilingual advantage and with others showing no advantage.

4

If bilingualism influences brain functions, how can we accurately measure those functions with the neuropsychological tests used in clinical practice in order to improve diagnostic accuracy in dementia?

Study 1: A systematic review
(Summary of the extant literature)

AIM

Critically examines for and against the bilingual advantage in neuropsychological tests which are commonly used in clinical practice

Addresses whether 1) bilingual older adults display advantages or disadvantages in neuropsychological test performance, 2)the advantage/ disadvantage is found in specific cognitive domains

METHOD

- Articles identified through electronic database searching
- 27 articles examining the effect of bilingualism on test performance were included in the systematic review and the findings of them were summarized.

Study 1: Results and Major Findings

Cross-sectional Studies

(The participants were tested at one particular time)

Bilingual Advantage

- **Inhibition**
- **Management of response conflict**

Suppression on behavioural responses that is inappropriate or no longer required for a goal-directed behavior.

Bilingual disadvantage

- **Vocabulary knowledge**
- **Category fluency**

Access to semantic information (meaning) in words.

Celik et al. 2020, “Applied Neuropsychology: Adult”.

Study 1: Results and Major Findings

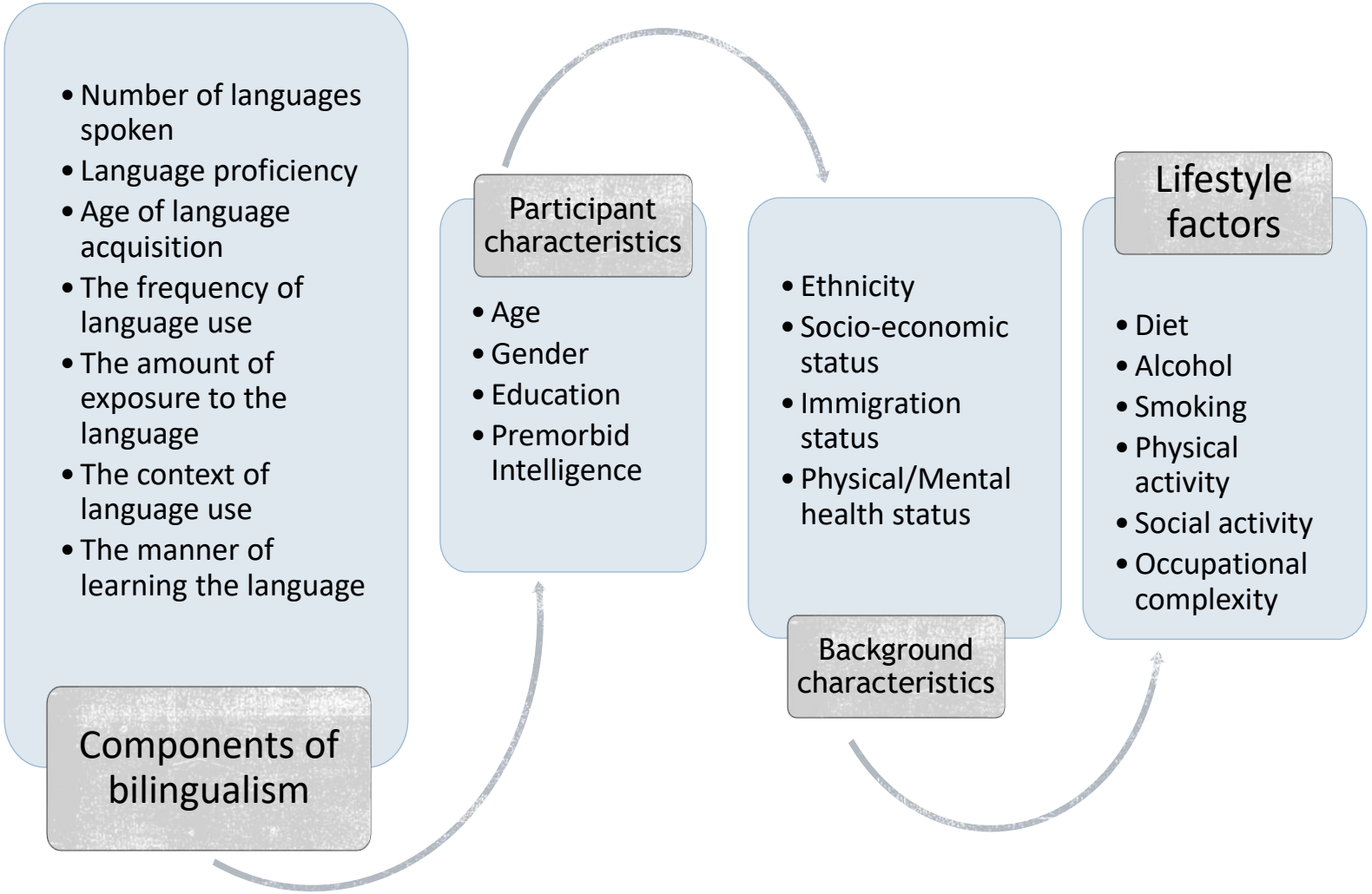
Longitudinal Studies

(The participants were tested repeatedly over a period of time)

- The longitudinal studies examining healthy older adults (Cox et al., 2016; Padilla et al., 2016) and conversion to dementia (Yeung et al., 2014; Zahodne et al., 2014) yield consistent pattern of findings showing no bilingualism advantage on test performance over time.

- The evidence in favor of the existence of a bilingual advantage is weak and observed more often in the cross-sectional studies using measures of inhibitory control or on baseline performance of bilinguals in the longitudinal studies, but the findings have lacked consistency.

Simge Celik, Eesha Kokje, Patric Meyer, Lutz Frölich & Birgit Teichmann (2020). Does bilingualism influence neuropsychological test performance in older adults? A systematic review. Applied Neuropsychology: Adult, DOI: 10.1080/23279095.2020.1788032



Variables which may affect the outcome in studies

Studies on the effects of bilingualism on test performance are prone to methodological inconsistencies that may obscure results. We may need to critically identify:

- The critical features of bilingual experience
- Immigration status of the participants : Acculturation
- Cultural background of the participants to eliminate cultural and language bias, particularly in bilingual groups

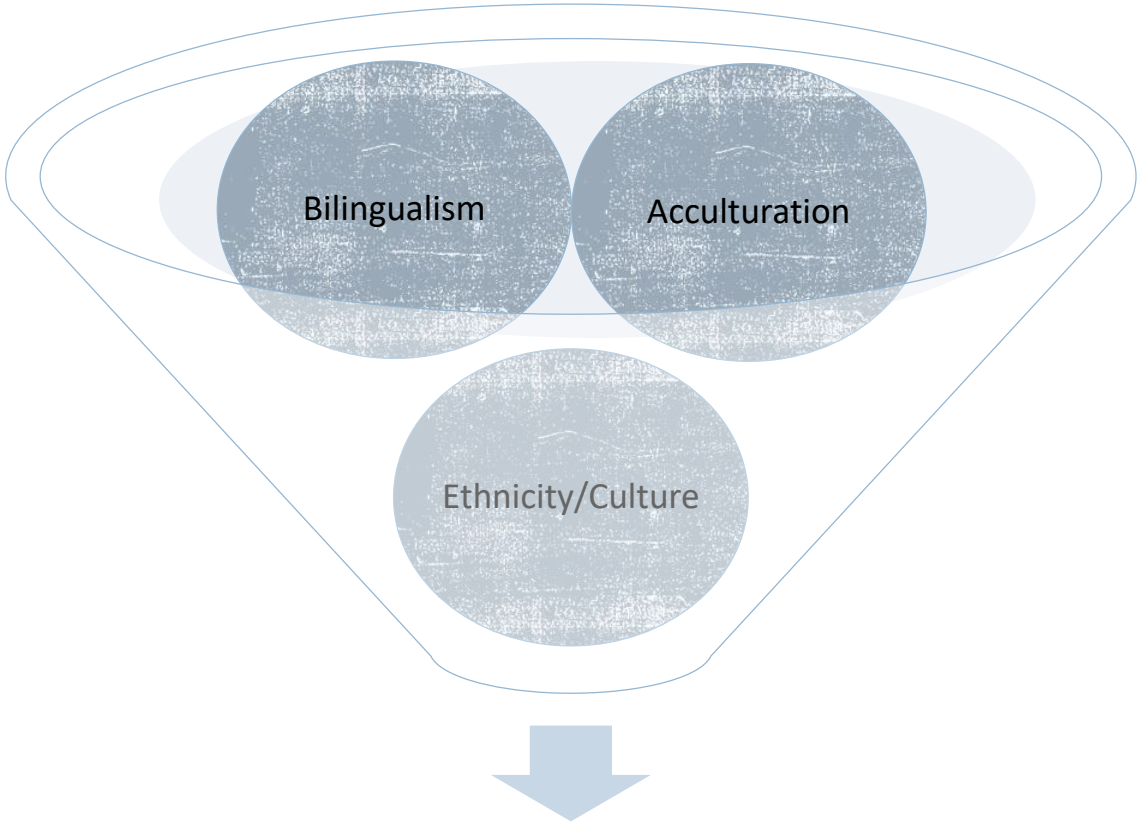
There is…

- An increasing need for measures that accurately and efficiently contribute to the neuropsychological assessment of bilingual populations.

- Complexity and discrepancies regarding the conceptualization and measurement of bilingualism and its association with immigration status, language of test administration and the standardized assessment tools appropriate for the cultural background of the tested population.

Conclusion

Study 2: Cross-cultural comparison of neuropsychological test performance



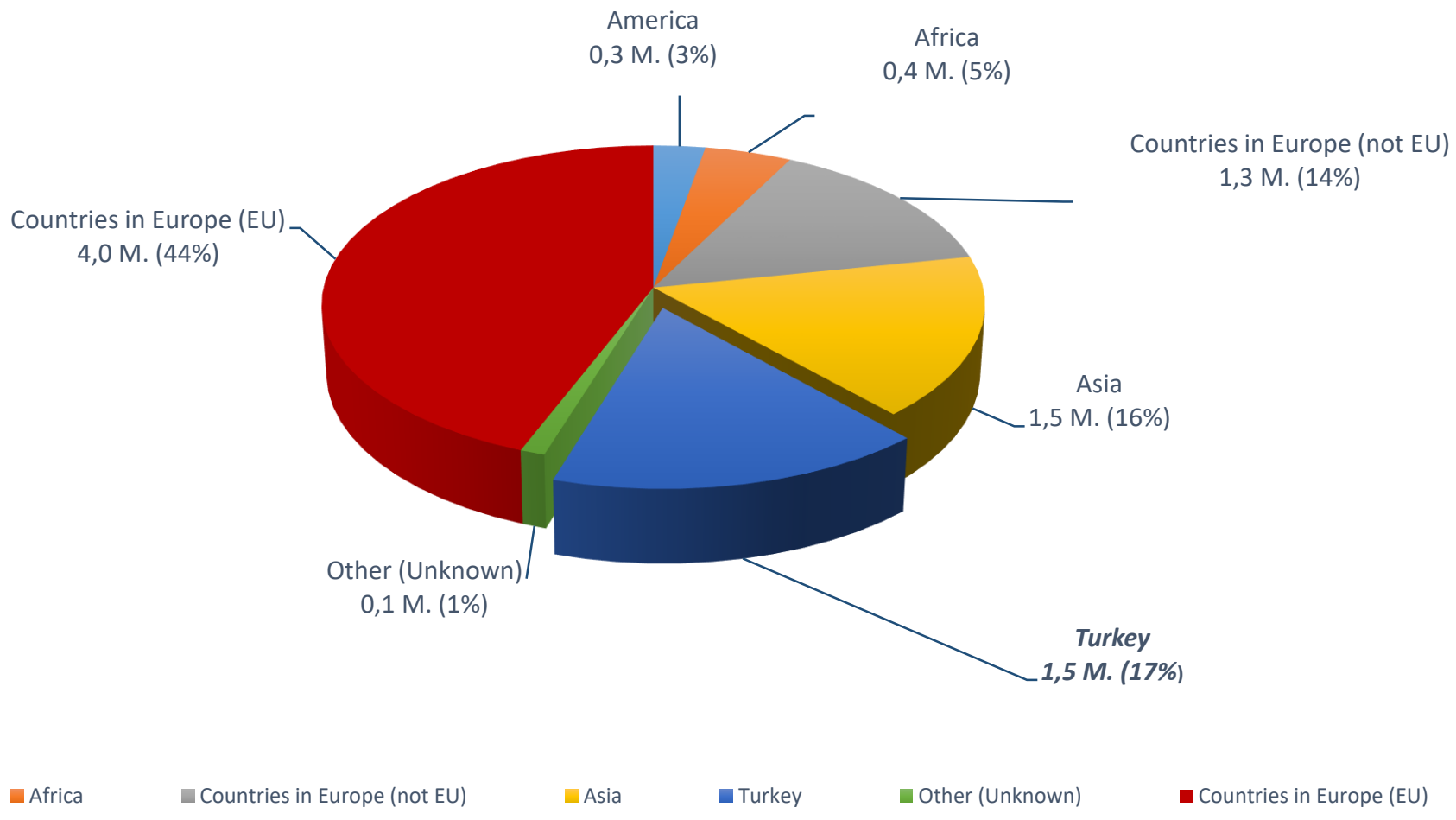
Cognitive functions

Neuropsychological test performance

Evidence regarding the impact of these factors on test performance is scarce.

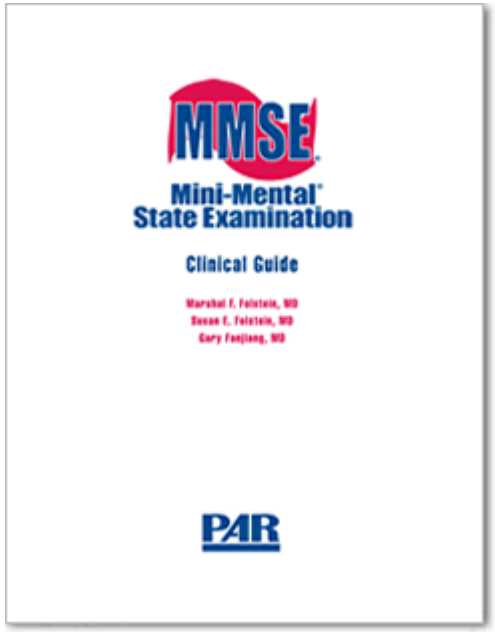
- Two measures of cognition were used in the study.
- Self-report questionnaires measuring level of acculturation (FRAKK) and bilingualism **(LSBQ)** were administered to only Turkish immigrants.

People with immigration background in 2015 in Germany

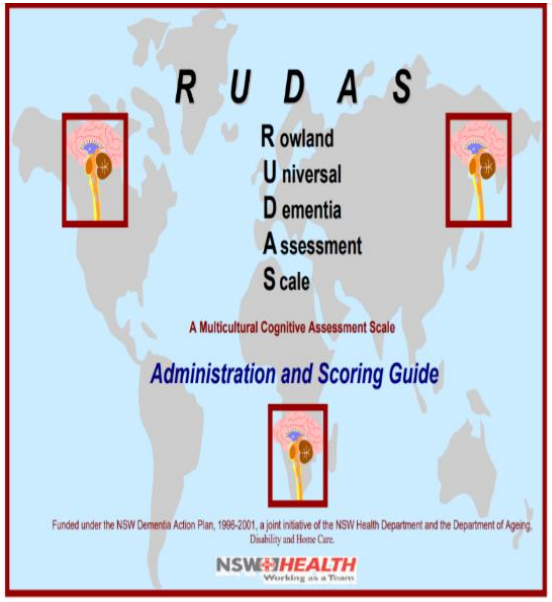


Study 2: Method

The most widely used measure of cognition in clinical practice worldwide was selected to investigate the effect of bilingualism, acculturation and culture on test performance.



A multicultural measure of cognition was selected to examine whether it is influenced less by these factors.



German patients diagnosed with Alzheimer´s Disease

- No immigration background
- Monolingual

Turkish patients living in Turkey diagnosed with Alzheimer´s Disease

- No immigration background
- Monolingual

Turkish patients living in Germany diagnosed with Alzheimer´s Disease

- Immigration background from young adulthood
- Bilingual: German language knowledge

Study 2: Aim and Method

- To compare performance on the MMSE and RUDAS to examine which test is less influenced by these factors and applicable to patients coming from diverse cultural backgrounds.
- To examine the impact of cultural background, acculturation, bilingualism, demographic factors (age, gender, education) on test performance.

Groups	Turkish AD patients in Turkey (n=24)	Turkish immigrants with AD (n= 21)	German AD patients (n=20)	*p* Value
Age	70.33 (7.73)	71.62 (7.41)	74.70 (7.50)	.090
Gender (Female %)	14 (%58)	12 (57%)	10 (50%)	.841
Education (years)	8.13 (4.11)	**7.05 (4.44)**	11.00 (4.09)	**.003**
Length of residence in Germany (years)	**----**	46.38 (7.9)	**----**	
Age at arrival in Germany	**----**	25.24 (7.3)	**----**	
MMSE score (out of 30)	**18.79 (4.19)**	**17.90 (5.06)**	21.60 (3.30)	**.019**
RUDAS score (out of 30)	19.63 (4.61)	20.62 (4.09)	20.75 (2.84)	.584

Study 2: Results

- The cultural background had no impact on the tests employed in the study, however, educational level of participants affected performance on a test developed in a Western/ European context (MMSE).
- After adjustment for educational level, MMSE performance was comparable between groups.

Turkish immigrants: Group classification based on acculturation and bilingualism scores

		MMSE Mean (SD)	r_s	RUDAS Mean (SD)	r_s
Acculturation	Low (n=10)	17.60 (4.6)	.04	21.20 (4.2)	-.21
	High (n=10)	18.40 (5.8)		19.60 (3.9)	
Language groups	Monolingual (n=9)	15.78 (4.3)	.52*	21.11 (4.2)	-.15
	Bilingual (n=6)	21.83 (5.4)		19.67 (5.1)	

Immigration-related characteristics of Turkish immigrants diagnosed with AD and their Spearman correlation coefficients with MMSE and RUDAS total scores

Study 2:Results

- Turkish immigrants who were proficient in German performed better on the MMSE than their counterparts who did not have German knowledge. This was not the case for the cross-cultural test (RUDAS).
- Acculturation was not associated with performance on any of the tests used in the study.

From research to implications

- **Culture or education?** More research is needed to clarify whether education or culture plays a role in cognition.

- **Language-related acculturation or linguistic integration of ethnic-minority groups** may be more critical to understanding the role of the immigration status and acculturation on cognition.

- **The Rowland Universal Dementia Assessment Scale (RUDAS)** can be a valuable cognitive assessment tool for dementia evaluation across all cultural, linguistic groups, not just minorities. This test was not influenced by cultural background, acculturation, bilingualism, demographic factors (age, gender, education).

Celik S., Onur, Ö., Yener, G., Meyer P., Kessler, J., Özbek, Y., Frölich* L., Teichmann*, B. (Submitted). Cross-cultural comparison of MMSE and RUDAS in German and Turkish patients with Alzheimer's Disease.

We need to move away from “All patients are the same” or “One size fits all” approach since the brain has the ability to change in response to the cultural environment, lifetime experiences, including higher educational attainment and second language knowledge. Consideration of these factors is essential for accuracy in detecting the presence, nature, and severity of cognitive impairment.

General Conclusion

Robert Bosch Stiftung

Zentralinstitut für Seelische Gesundheit

NETZWERK ALTERNS-FORSCHUNG

UNIVERSITÄT HEIDELBERG ZUKUNFT SEIT 1386

Thank you for your attention!

Simge Celik, Neuropsychologist

Doctoral Candidate in the Graduate Program "People with Dementia in Acute Care Hospitals"

Mail: celik@nar.uni-heidelberg.de

References

- Antoniou, M. (2019). The advantages of bilingualism debate. *Annual Review of Linguistics*, *5*, 395-415.
- Bender, A., & Beller, S. (2013). Cognition is… fundamentally cultural. *Behavioral Sciences*, *3*(1), 42-54.
- Cox, S. R., Bak, T. H., Allerhand, M., Redmond, P., Starr, J. M., Deary, I. J., & MacPherson, S. E. (2016). Bilingualism, social cognition and executive functions: A tale of chickens and eggs. *Neuropsychologia*, *91*, 299-306.
- Elbulok-Charcape, M. M., Rabin, L. A., Spadaccini, A. T., & Barr, W. B. (2014). Trends in the neuropsychological assessment of ethnic/racial minorities: A survey of clinical neuropsychologists in the United States and Canada. Cultural Diversity and Ethnic Minority Psychology, 20(3), 353.
- Klimova, B., Valis, M., & Kuca, K. (2017). Bilingualism as a strategy to delay the onset of Alzheimer's disease. Clinical interventions in aging, 12, 1731.
- Luk, G., Bialystok, E., Craik, F. I., & Grady, C. L. (2011). Lifelong bilingualism maintains white matter integrity in older adults. *Journal of Neuroscience*, *31*(46), 16808-16813.
- Padilla, C., Mendez, M. F., Jimenez, E. E., & Teng, E. (2016). Bilingualism in older Mexican-American immigrants is associated with higher scores on cognitive screening. BMC geriatrics, 16(1), 189.
- Nielsen, T. R., Vogel, A., Riepe, M. W., de Mendonça, A., Rodriguez, G., Nobili, F., ... & Waldemar, G. (2011). Assessment of dementia in ethnic minority patients in Europe: a European Alzheimer's Disease Consortium survey. International Psychogeriatrics, 23(1), 86.
- Schweizer, T. A., Ware, J., Fischer, C. E., Craik, F. I., & Bialystok, E. (2012). Bilingualism as a contributor to cognitive reserve: Evidence from brain atrophy in Alzheimer's disease. *cortex*, *48*(8), 991-996.
- Yeung, C. M., John, P. D. S., Menec, V., & Tyas, S. L. (2014). Is bilingualism associated with a lower risk of dementia in community-living older adults? Cross-sectional and prospective analyses. Alzheimer Disease & Associated Disorders, 28(4), 326-332.
- Zahodne, L. B., Schofield, P. W., Farrell, M. T., Stern, Y., & Manly, J. J. (2014). Bilingualism does not alter cognitive decline or dementia risk among Spanish-speaking immigrants. Neuropsychology, 28(2), 238.