Predictors of Cognitive Decline in a Multi-Ethnic Sample of Midlife Women: A Longitudinal Study

Supplemental Materials

Introduction

Risk Factors of Cognitive Decline in Older and Midlife Adults. There is cross-sectional and longitudinal evidence of depressive symptoms, diabetes, hypertension, and smoking predicting poorer cognition in older adults (Table 1) and midlife adults (Table 2). Results are largely mixed in both age groups. Several studies have also examined racial group differences between European Americans and African Americans (Table 3). In previous literature, diabetes was associated with poorer cognition in African Americans, hypertension was associated with poorer cognition for European Americans. The evidence for smoking and depressive symptoms were mixed.

Results

Association between Practice Effects and Cognition. We determined whether the practice effects for episodic memory, processing speed, and working memory were associated with cognitive scores at the end of the study. Practice effect was associated better episodic memory ($b = 0.365, p < 0.001$), processing speed ($b = 1.218, p < 0.001$), and working memory ($b = 0.231, p < 0.001$). Thus, consistent with previous research, greater practice effects – which indicate gains from repeat administration of the same test – were associated with better cognitive outcomes at the end of the study.

Tables

Table 1

Studies Examining Cognitive Decline in Older Adult Samples

	Processing Speed	Working Memory	Episodic Memory	Global Cognition
Diabetes	+ Arvanitakis et al., 2004 + Hassing et al., 2004 + Knopman et al., 2009 + Gregg et al., 2000 - Arvanitakis et al 2010 (cross-sectional) - Bangen et al. 2015	- Arvanitakis et al., 2004 - Hassing et al., 2004 - Espeland et al., 2011 -Arvanitakis et al., 2010 (cross-sectional)	+ Okereke et al., 2008 + Pappas et al., 2017 + Wennberg et al., 2017 + Espeland et al., 2011 -Arvanitakis et al., 2004 - Hassing et al., 2004 - Knopman et al., 2009 - Bangen et al. 2015	- Arvanitakis et al 2010 (cross-sectional) + Okereke et al., 2008 + Crowe et al., 2010 + Gregg et al., 2000 + Mayeda et al., 2016
Hypertension	+ Hajjar et al. 2017 - Knopman et al., 2009	0	- Schneider et al., 2014 - Knopman et al., 2009	+ Gifford et al., 2013 (cross-sectional) + Gatto et al, 2008 (cross-sectional) +Obisesan et al., 2008 (cross-sectional)
Smoking	0	0	+ Reitz et al., 2005 - Vasquez et al., 2016	+ Collins et al., 2009 + Ott et al., 2004 + Anstey et al., 2007
Depressive Symptoms	+ Bielak et al., 2011 + Kohler, et al., 2010 + Brewster et al, 2017 (cross-sectional) + Hamilton et al, 2014 (cross-sectional)	0	+ Gonzalez et al., 2008 - Ganguli et al., 2006 - Royall et al., 2012 + Kohler et al., 2010 + Panza et al., 2009 + Gallagher et al., 2016 + Brewster et al, 2017 (cross-sectional) + Hamilton et al, 2014 (cross-sectional) + Evans et al. 2019 (cross-sectional)	+ Kohler et al., 2010 + Hazzouri et al., 2014 + Paterniti et al., 2002 + Chodosh et al., 2007 + Dotson et al., 2008 + Wilson et al., 2004 (composite score) + Goveas et al 2014 + Baer et al., 2012 +Panza et al., 2009

Note. + = positive association; - = negative association

Table 2

Studies Examining Cognitive Decline in Midlife Adult Samples

	Processing Speed	Working Memory	Episodic Memory	Global Cognition
Diabetes	+ Knopman et al., 2001 - Anstey et al., 2014	- Anstey et al., 2014	- Debette et al., 2011 - Anstey et al., 2014 -Knopman et al., 2001	+ Rawlings et al., 2014 (midlife diabetes and cognition examined 20 years later) + Nooyens et al., 2010
Hypertension	+ Knopman et al., 2001 -Anstey et al., 2014 + Tarraf et al. 2017 (cross-sectional)	-Anstey et al., 2014	- Debette et al., 2011 - Anstey et al., 2014 -Knopman et al., 2001 + Singh-Manoux et al., 2005 (cross-sectional) + Tarraf et al., 2017 (cross-sectional)	0
Smoking	- Knopman et al., 2001 + Anstey et al., 2014 - Richards et al., 2003	- Anstey et al., 2014	- Debette et al., 2011 - Anstey et al., 2014 - Knopman et al., 2001 + Richards et al., 2003	+ Sabia et al., 2012
Depressive Symptoms	- Anstey et al, 2014	- Anstey et al., 2014	-Anstey et al., 2014 + Singh-Manoux et al., 2010 (cross-sectional)	+ Singh-Manoux et al., 2010 (cross-sectional)

Note. + = positive association; - = negative association

Table 3

Racial Group Differences in Cognitive Decline Between European Americans and African Americans

	Processing Speed		Episodic Memory		Working Memory	
	EA	AA	EA	AA	EA	AA
Diabetes	- Mayeda et al., 2014 (midlife) * Knopman et al., 2001 (midlife) - Obidi et al., 2008 (cross-sectional; older adults) * Knopman et al 2009 (midlife)	+ Mayeda et al., 2014 (midlife) * Knopman et al., 2001 (midlife) + Obidi et al., 2008 (cross-sectional; older adults) * Knopman et al 2009 (midlife)	- Rajan et al., 2016 (older adults; composite score with executive function and global function) - Dore et al., 2016 (cross-sectional; interaction with poverty status)	+ Rajan et al., 2016 (older adults; composite score with executive function and global function) + Dore et al., 2016 (cross-sectional; interaction with poverty status/below poverty level)	- Dore et al., 2016 (cross-sectional; interaction with poverty status)	+ Dore et al., 2016 (cross-sectional; interaction with poverty status/below poverty level)
Hypertension	+ Gottesman et al., 2014 (midlife) + Knopman et al., 2001 (midlife)	- Gottesman et al., 2014 (midlife) -Knopman et al., 2001 (midlife)	0		0	
Smoking	- Knopman et al., 2001 (midlife)	+ Knopman et al., 2001 (midlife)	+ Schneider et al., 2014 (older adults)	- Schneider et al., 2014 (older adults)	0	
Depressive Symptoms	* Wilson et al., 2004 (older adults; composite of episodic memory and processing speed) + Zahodne et al., 2014 (older adults; cross-sectional)	* Wilson et at al., 2004 (older adults; composite score of episodic memory and processing speed) - Zahodne et al., 2014 (older adults; cross-sectional)	* Wilson et al., 2004 (older adults; composite of episodic memory and processing speed) *Sol et al., 2020 (older adults) - Zahodne et al., 2014 (older adults; cross-sectional)	* Wilson et al., 2004 (older adults; composite of episodic memory and processing speed) *Sol et al., 2020 (older adults) + Zahodne et al., 2014 (older adults; cross-sectional)	0	

Note. + = positive association; - = negative association; * = no racial differences; EA = European Americans; AA = African Americans

Table 4

Standardized Regression-Based Formulas for Practice Effects

Outcome	Formulas
Episodic Memory	$T2' = c + (b*T_1) + (b*Education)$
	$RCI_{SRB} = T2 - T2'/SEE$
Processing Speed	$T2' = c + (b*T_1) + (b*Age) + (b*Income)$
	$RCI_{SRB} = T2 - T2'/SEE$
Working Memory	$T2' = c + (b*T_1) + (b*Education)$
	$RCI_{SRB} = T2 - T2'/SEE$

Notes. T_1 = score at Time 1(Visit 4 raw score); T_2 = score at Time 2 (Visit 6 raw score); $T2'$ = predicted Time 2 score; *b*= unstandardized coefficient (beta-weights); c = intercept of the regression model (constant); SEE = standard error of the estimate; RCI = reliable change index; SRB = standardized regression-based formula; education is measured in years and the income is indicated by level (from less than $19,999 and $100,000 and greater). Linear regression determines which variables are predictive of Time 2 score.