Early Life Neighborhood, School, and Household Socioeconomic Conditions and Young Adult Working Memory

Kristen Schorpp

Department of Sociology

Carolina Population Center

University of North Carolina at Chapel Hill

December 8, 2015

Short Abstract

While the literature has documented socioeconomic disparities in early life cognitive development and adult cognitive function, conceptualization and measurement of socioeconomic conditions is often limited. Further, the mechanisms that underlie these associations remain unclear. Using the National Longitudinal Study of Adolescent to Adult Health, this study examines the longitudinal associations of household, neighborhood, and school disadvantage with young adult working memory. I find significant, inverse associations of disadvantage across all contexts with working memory, though these associations are mostly due to household and school disadvantage. Interaction models indicate that the association of adult disadvantage with adult working memory is moderated by early life disadvantage, such that downward mobility is the most detrimental for working memory. Further analysis will utilize multilevel models to more closely examine how timing and contexts of disadvantage additively and multiplicatively affect adult working memory, and will also test underlying mechanisms that might explain these associations.

Extended Abstract

Early-life socioeconomic conditions are thought to be fundamental in shaping cognitive development, and potentially have a lasting impact on cognitive function across the life span. Experiences of early life socioeconomic advantage or disadvantage shape exposure to multiple risk and protective factors that enhance or restrict the development of cognitive skills and abilities, thus having important implications for future educational, economic, and cognitive outcomes (Duncan et al. 1998; Evans & Schamberg 2009; Kaplan et al. 2001). Therefore, in order to better understand the socioeconomic contributors to cognitive function across the life span, it is necessary to explore how the relationship between disadvantage and cognitive function operates early in the life course, long before the emergence of clinical cognitive impairments or decline in late life.

In addition, early life trajectories of socioeconomic conditions must be conceptualized and measured in ways that best capture the components of disadvantage most relevant to cognitive function. This requires an approach that considers disadvantage as a 1) multidimensional, 2) multilevel, and 3) longitudinal construct, while also considering the underlying mechanisms that explain the link between disadvantage and cognitive function. However, studies that explore early life socioeconomic conditions and cognitive function are often limited in their conceptualization of disadvantage. First, studies often rely on only a few measures of household disadvantage, such as household income or low parent education, thus lacking other dimensions of household disadvantage that include family structure, parent receipt of welfare, and unemployment. Second, little is understood about how early life disadvantage in contexts *outside* of the household – such as in schools or neighborhoods – influence cognitive function. Third, studies often measure disadvantage at a single point in time or average

measurements taken over time, thus missing the influence of timing and change in disadvantage across early life. Finally, the underlying mechanisms that explain these associations remain unknown.

To fill these research gaps, my first dissertation chapter will test the unique and interactive roles of household, school, and neighborhood disadvantage across time in predicting young adult working memory. My investigation will include several stages: 1) to utilize multilevel modeling to assess longitudinal associations of household, school, and neighborhood disadvantage with cognitive function; 2) to test for cross-level interactions in the associations of disadvantaged contexts with cognitive function; and 3) to test for social, psychological, behavioral, and physiological factors that might explain these multilevel associations. This longitudinal and multilevel approach considers the dominant social contexts in which adolescents live and develop across the transition to adulthood, while also exploring the mechanisms through which disadvantage in these contexts affects cognitive outcomes. Further, assessment of cognitive function in young adulthood will allow for insight into socioeconomic disparities in cognitive outcomes long before the emergence of late life cognitive impairment and decline.

Data and Methods

The data come from 11,709 participants in the National Longitudinal Study of Adolescent to Adult Health (Add Health), a nationally representative, school-based sample of adolescents that were first interviewed in grades 7-12 during the 1994-95 academic year. The sampling frame for Add Health included all high schools in the United States, and a total of 80 high schools were randomly selected to participate in the survey, with an additional 52 feeder middle schools attached to the sample of high schools. Respondents were followed for four

survey waves, with the most recent survey conducted in 2008. In addition, tract-level data on neighborhood characteristics and composition was gathered from the US Census around the time of data collection for all waves. My analysis will use adolescent interviews, parent interviews, and Census data from Wave I (1994-95) when respondents were age 12-18, and young adult interviews and Census data from Wave IV (2008-09) when respondents were 24-32.

Young adult working memory was measured by combining three memory tasks administered at Wave IV: immediate word recall, delayed word recall, and number recall. Collectively, these tasks assess working memory, which is an important component of cognitive functioning (Baddeley 1992). Combining these three tasks produced a continuous scale of working memory with a possible range of 0-37.

I constructed five disadvantage indexes that separately capture adolescent and adult household and neighborhood disadvantage, as well as adolescent school disadvantage. *Household disadvantage indexes* were created for adolescence (Wave I) and young adulthood (Wave IV) using five binary indicators. For Wave I, I used the sum of low parent educational attainment, parent-reported difficulty paying bills, parent welfare receipt, single parent household, and parent unemployment. Wave IV household disadvantage was measured using disadvantage indicators that are appropriate for young adulthood. Each disadvantage scale ranges from 0-5 with higher numbers indicating higher disadvantage. A *school disadvantage index* was created by taking the mean of each aggregated Wave I household disadvantage indicator, and then taking the sum of the means. *Neighborhood disadvantage indexes* in Wave I and Wave IV were constructed based on five disadvantage indicators that were available at all waves and capture tract-level prevalence of poverty, low educational attainment, utilization of welfare,

female-headed households, and unemployment. Consistent with the household disadvantage indices, the neighborhood disadvantage indexes range from 0-5.

I estimated OLS models that assess the associations of disadvantage with young adult working memory. I first assessed binary associations of each disadvantage index separately, and next simultaneously included disadvantage indexes to assess relative significance of the timing and context of disadvantage. Finally, I tested interactions between the different disadvantage indexes to determine whether the association of adolescent household disadvantage with young adult working memory is moderated by adult household disadvantage or by disadvantage in neighborhoods or schools. All models adjust for sex, race/ethnicity, and age. Additional analyses will utilize multilevel models to more accurately identify the associations of school- and neighborhood-level disadvantage with working memory, while also allowing for incorporation of individual, household, school, and neighborhood mediating mechanisms. Mechanisms will include indicators of school quality, neighborhood disorder, social integration, stressor exposure, psychological conditions, health behaviors, and physiological functioning.

Results

Table 1 shows OLS models of the associations of disadvantage with young adult working memory. As shown in Models 1-5, all five disadvantage indexes are significantly and inversely associated with working memory when indexes are modeled separately. In other words, as expected, higher disadvantage is associated with lower working memory. Further, Models 6-10 show that when disadvantage indexes are combined in models, young adult household disadvantage appears to have the strongest associations with working memory, followed by adolescent household disadvantage, followed by adolescent school disadvantage. Associations of

neighborhood disadvantage with working memory appear to be explained by household and school disadvantage. Finally, I find a significant interaction of adolescent household disadvantage with adult household disadvantage, suggesting that the association of adult disadvantage with working memory is moderated by early life disadvantage. This interaction is shown in Figure 1, and suggests that downward mobility (that is, moving from the least disadvantaged to the most disadvantaged group from adolescence to young adulthood) is associated with the lowest working memory relative to other socioeconomic trajectories. These associations will be tested further using multilevel models to appropriately account for clustering and to test for cross-level interactions of household, neighborhood, and school effects. Finally, additional analysis will explore potential mechanisms at the neighborhood, school, household, and individual level that explain these associations.

References

Baddeley, A. (1992). Working memory. *Science*, *255*(5044), 556-559.

Duncan, G. J., Yeung, W. J., Brooks-Gunn, J., & Smith, J. R. (1998). How much does childhood poverty affect the life chances of children?. *American sociological review*, 406-423.

Evans, G. W., & Schamberg, M. A. (2009). Childhood poverty, chronic stress, and adult working memory. *Proceedings of the National Academy of Sciences*, *106*(16), 6545-6549.

Kaplan, G. A., Turrell, G., Lynch, J. W., Everson, S. A., Helkala, E. L., & Salonen, J. T. (2001). Childhood socioeconomic position and cognitive function in adulthood. *International Journal of Epidemiology*, *30*(2), 256-263.

Table 1. Associations of Household, Neighborhood, and School Disadvantage with Young Adult Memory Function, Coef. (SE) (N=11,709)

	Baseline					Combined				Interaction
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Adol HDI	-0.472***					-0.368***		-0.194**		-0.135*	-0.382***
	(0.0654)					(0.0594)		(0.0687)		(0.0629)	(0.0870)
Adol NDI		-0.211***				-0.0409			-0.162**	-0.00371	
		(0.0580)				(0.0762)			(0.0586)	(0.0731)	
Adol SDI			-0.347***			-0.248*				-0.168+	
			(0.0825)			(0.105)				(0.0969)	
Adult HDI				-0.943***			-0.917***	-0.882***		-0.840***	-1.066***
				(0.0757)			(0.0816)	(0.0836)		(0.0850)	(0.101)
Adult NDI					-0.239***		-0.0941+		-0.187***	-0.0454	
					(0.0437)		(0.0508)		(0.0418)	(0.0472)	
Adol HDI x Adult HDI											0.157***
											(0.0436)

Standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

All models adjust for sex, race/ethnicity, and age

HDI = Household Disadvantage Index

NDI = Neighborhood Disadvantage Index

SDI = School Disadvantage Index

Figure 1. Longitudinal Household Disadvantage and Young Adult Memory Function