



The Woodcock-Muñoz Foundation

RESEARCH BRIEF

DOCTORAL DISSERTATION ABSTRACT

**A CROSS SECTIONAL ANALYSIS OF THE
RELATIONSHIP BETWEEN SOCIOECONOMIC
STATUS (SES) AND COGNITIVE
FUNCTIONING ACROSS CATTELL-HORN-
CARROLL (CHC) COGNITIVE ABILITIES**

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Abstract

Since ethnic/racial I.Q. divergences were first documented, the extent to which environmental factors contribute to one's performance on intelligence tests has been debated and empirically investigated. One of the most extensively studied variables in this pursuit has been socioeconomic status (SES). The current study re-examines the relationship between SES and cognitive functioning using new assumptions, methodological procedures, and empirically-validated theoretical frameworks. One new assumption is that academic achievement is predicated upon both abilities less susceptible to the qualitative influence of formal instruction and learning and less amenable to intervention (i.e., less instructionally malleable abilities) and that intelligence tests, as valid predictors of future academic achievement, assess both types of abilities. It is further assumed that the pivotal mediating factor associated with the optimal development of these latter cognitive abilities is SES. The new methodological procedure consists of a cross sectional analysis of the nationally representative standardization sample of the Woodcock Johnson Tests of Cognitive Abilities, Third Edition (WJ III COG). The cognitive ability factors assessed by this instrument represent an exact measurement model of the empirically-validated Cattell-Horn-Carroll (CHC) theoretical framework of cognitive functioning. Within both the CHC theoretical framework and the factor organization of the WJ III COG, cognitive functioning is differentiated among seven broad cognitive abilities: processing speed (*Gs*), short-term memory (*Gsm*), fluid reasoning (*Gf*), long-term storage and retrieval (*Glr*), auditory processing (*Ga*), visual processing (*Gv*), and crystallized ability (*Gc*). Abilities at the *Gs* end are designated as less susceptible to the qualitative influence of formal instruction and learning and less amenable to intervention; abilities at the *Gc* end are designated as more susceptible to the qualitative influence of formal instruction and learning and more amenable to intervention.

The central research questions being asked in this study are whether: 1.) increasingly divergent cross-sectional trends exist across SES groups among CHC abilities at the more instructionally fostered or more instructionally malleable end of the continuum and 2.) More comparable cross-sectional trends exist across SES groups among CHC abilities at the less instructionally fostered or less instructionally malleable end of the continuum.

In order to answer this research question, an overall omnibus test of significance was performed first—a 7x3 multi-factor MANOVA. The results of the omnibus test revealed a significant interaction effect and significant main effects for SES and chronological age. The Partial Eta Squared (η_p^2) values for each of the multivariate effects indicate that 14.8%, 57.6%, and 2% of the variance in the

new combination dependent variable can be attributed to the main effect of SES, the main effect of chronological age, and the interaction effect of SES and chronological age, respectively. Because significant multivariate effects were obtained, the MANOVA was followed up with multiple two-way ANOVAs for each of the 6 broad CHC cognitive ability clusters. For *Gc*, the two-way ANOVA analysis revealed a significant interaction effect. For all the remaining cognitive abilities, no significant interaction effects were obtained. There were, however, significant main effects for SES and chronological age for each of these cognitive abilities. The Partial Eta Squared (η_p^2) values for the univariate effects of each of the CHC cognitive abilities, including *Gc*, indicate that 1.) relatively larger portions of the variance in each of these cognitive abilities can be attributed to the main effect of chronological age (i.e., range: 17.7%–52%) and 2.) minimal portions of the variance in each of these cognitive abilities can be attributed to the main effect of SES (i.e., range: 1.9%–13.9%) and the interaction effect of SES and chronological age (i.e., range: 0.4%–1.1%). The significant univariate interaction effect for *Gc* was followed up with two families of simple effects analyses. The first family of analyses revealed some insignificant differences among the three SES groups at the first level of the chronological age variable (children aged 5-6) and significant differences among the three SES groups at all the remaining levels of the chronological age variable. The results of the second family of analyses revealed significant differences between most consecutive age groupings up to the middle teens for the middle and high SES groups, and insignificant differences between most consecutive age groups for the low SES group.

Overall, these findings provided some support for the accumulative detrimental toll of SES on crystallized ability (the most instructionally fostered of all the cognitive abilities); no support for the accumulative detrimental toll of SES among abilities at the less instructionally fostered end of the continuum, as well as the remaining cognitive abilities at the more instructionally fostered end of the continuum; and no support for the insignificant/minimal impact of SES among abilities at the less instructionally fostered end of the continuum.

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