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THE EFFECT OF CULTURAL AFFILIATION AND LITERACY ON THE
NEUROPSYCHOLOGICAL TEST PERFORMANCE OF AFRICAN AMERICANS

By

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ABSTRACT

THE EFFECT OF CULTURAL AFFILIATION AND LITERACY ON THE NEUROPSYCHOLOGICAL TEST PERFORMANCE OF AFRICAN AMERICANS

By

Christine M. Jean-Jacques

This study explored the potential effects of cultural affiliation (operationalized as acculturation and racial identity) and literacy on the neuropsychological test performance of non-impaired African Americans when examined alone and when compared to age-matched Caucasians. Participants were 44 African American and 37 Caucasian undergraduate students recruited from a mid-western university. Participants completed commonly used measures of executive functioning, a measure of literacy, and measures of cultural affiliation. Acculturation was unrelated to neuropsychological test performance. While racial identity influenced Trails B, portions of the WCST, and the COWA, its influence did not go beyond the effects of participants' SES and parental level of education. Literacy influenced the neuropsychological test performance of Caucasian participants, but not African American participants.

Dedication

This work is dedicated to my husband, my daughter, and my parents.

ACKNOWLEDGEMENTS

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Introduction

Measures of neuropsychological functioning assist neuropsychologists to understand the relationship between human behavior and brain functioning (Ross, n.d.). The ability of these measures to accurately evaluate brain functioning, specifically, their ability to detect the presence of brain impairment, is potentially limited by failure to consider the role the patient's cultural affiliation and literacy level plays on neuropsychological test performance (Manly, Jacobs, Touradji, Small, & Stern, 2002; Van Gorp, Myers, Drake, 2000). Van Gorp et al. argue that in order to fully understand performance on neuropsychological measures, examiners need to recognize that brain-behavior relationships occur within social contexts and because of this more research needs to be dedicated to ethnocultural issues. According to Ardila (1995), this is an area of acute concern within the field of neuropsychology because few investigators are sensitive to the effect that culture has on neuropsychological test performance and as such are not adequately prepared to interpret the test results of ethnic minorities (Wong, Strickland, Fletcher-Janzen, Ardila, Reynolds, 2000). Van Gorp et al. and Wong et al. further assert that attempts to integrate the role of culture into test interpretation generally do not exceed superficial statements about the need to consider the role of culture or the caveat that normative data may not apply to the patient; test results are then interpreted without further consideration of the role of culture. Considering literacy, research demonstrates that patient's reports of their educational level are often inconsistent with their grade level abilities on measures of reading (Adams, Boake, &

Crain, 1982; Albert & Teresi, 1999; Baker, Johnson, Velli, & Wiley, 1996; Manly, Jacobs et al., 1998). This is an issue of concern because incorrect estimates of patients' educational attainment increase the chance that they will be incorrectly diagnosed as brain impaired. A small, but growing body of literature suggests that adding a measure of reading achievement to neurocognitive test batteries enhances researchers' and clinicians' ability to determine patients' educational attainment and thus use appropriate educational norms to interpret patients' test scores (Manly et al., 2002).

Purpose of Study

This investigation explored the potential effects of cultural affiliation (operationalized as acculturation and racial identity) and literacy on the neuropsychological test performance of non-impaired African Americans when examined alone and when compared to age-matched Caucasians. A small body of literature explores the proportion of test score variance explained by level of acculturation and literacy between African Americans and Caucasians on measures of neuropsychological functioning above and beyond demographic variables such as age, gender, education, and socio-economic status (SES). This study marked an initial effort to examine the ability of racial identity to explain test score variance.

Prior to discussing cultural affiliation and literacy, it is useful to: 1) discuss why research and clinical neuropsychologists need to consider cultural affiliation and literacy when working with African American patients, 2) define ethnicity and race, 3) discuss approaches to cognitive assessment, 4) discuss the issue of demographic correction for ethnic minorities, and 5) define culture.

Need to Consider Cultural Affiliation and Literacy

Cultural Affiliation

Aponte and Johnson (2000) assert that it is necessary to consider the patient's cultural affiliation as part of cognitive assessment because culture directly influences psychological functioning, the expression of symptoms, and the patient's concept of illness. Failure to consider cultural affiliation inhibits the ability of clinical and research neuropsychologists to conduct reliable and valid assessments of ethnic minorities' neurocognitive functioning. The need to consider patients' cultural affiliation is increasing in direct proportion to the growing number of ethnic minorities residing in the US (Aponte & Crouch, 2000; Brislin, 2000; Dick, Teng, Kempler, Davis, & Taussig, 2002). According to Grieco and Cassidy (2001), the percentage of African Americans (12.7%), Asians (3.8%), and Hispanics (12.6%) residing in the US will increase dramatically by the year 2050. By 2050, African Americans, Asians, and Hispanics are expected to comprise 14.6%, 8%, and 24.4% of the US population, respectively. Wong et al. (2000) suggest that neuropsychologists may not have the "...awareness, skills, knowledge, sensitivity, or resources..." (p. 4) necessary to adequately provide diagnosis, treatment, and recommendations to patients from culturally dissimilar backgrounds.

Campbell et al. (1996) propose that because the cultural realities of African Americans are not typically considered during the conceptualization and development of neuropsychological tests, the diagnostic validity of these measures for African Americans is questionable. Multiple studies demonstrate significant test score differences between African Americans and Caucasians on various neuropsychological measures (e.g. Johnson-Selfridge, Zalewski, & Aboudarham, 1998; Manly, Jacobs, et al., 1998;

Marcopulos, McLain, & Giuliano, 1997; Roberts & Hamsher, 1984). Further, previous research also demonstrates unacceptably high rates of false positive diagnoses of brain impairment among African Americans (e.g. Campbell et al., 1996; Harp, 1993; Knuckle & Campbell, 1984). Lowenstein, Arguelles, Arguelles, and Linn-Fuentes (1994) suggest that misdiagnosis is problematic because it gives rise to poor intervention and incorrect prognosis.

Though the need to consider cultural affiliation and literacy is an area of concern with respect to multiple ethnic minority groups (e.g., Hispanics, Asians, and African Americans), the present study focused on the impact these variables have on the neuropsychological test performance of African Americans. This focus was guided by significant health disparities between African Americans and Caucasians. Nabors, Evans, and Strickland (2000) report that African Americans are at increased risk to develop dementia and other neurological disorders. According to the Martin (2000), African Americans "have a higher prevalence of stroke and cardiovascular disease risk factors such as hypertension, diabetes mellitus, obesity, and cigarette smoking" and are approximately twice as likely as Caucasians to have and/or die from a stroke. Additionally, compared to other groups, African Americans have higher rates of cerebrovascular disease, Alzheimer's disease (Black Health Care.com, n.d.), and traumatic brain injury (TBI Model Systems, n.d.).

Literacy

Manly and Jacobs (2000) state that within the United States, there is a significant discordance between years of education and quality of education (operationalized as literacy). This discordance is especially prevalent among African Americans (Manly &

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Jacobs). An example of this discordance is a patient who reports to have 12 years of formal education. Despite the patient's report, s/he reads as someone who has only received eight years of education. This example supports Manly et al.'s (2002) suggestion that literacy may be a better predictor of educational attainment than years of education.

The disparity between literacy and years of education is apparent on tests of cognitive functioning. Compared to Caucasians, African Americans persistently obtain lower scores on verbal and nonverbal measures despite being matched on demographic variables such as age, gender, socioeconomic status (SES), and years of education (Manly et al., 2002). Using samples of older adults, Manly et al. (2002) and others (i.e., Adams et al., 1982; Albert & Teresi, 1999; Baker et al., 1996; Manly, Tuoradji, Tang, & Stern, 2003) demonstrated that higher levels of literacy predicted better performance on verbal recall and fluency measures.

Considering older African American adults, Manly and Jacobs (2000) suggest that disparities between years of education and literacy may in part be due to inequalities in quality of education at the turn of the 20th century. Prior to the Supreme Court's 1954 *Brown v. Board of Education* decision, racial segregation in public education was the norm and schools for African American children were frequently inferior to schools for Caucasian children (Cozzens, 1995). In addition to poor quality of education, Margo (1985) reports that opportunities for literacy among African Americans of this period were further limited by the need of African American children to miss significant amounts of school to work in support of their families. Though African American children no longer miss school because of a need to work, this study asserts that disparities in quality of education persist and that these disparities impact the cognitive

development of African Americans (Kozol, 1992). Disparities in literacy thus may predict performance on cognitive measures among younger African Americans as they do among older African Americans.

Ethnicity and Race

Despite numerous attempts to differentiate them, the terms ethnicity and race are frequently used interchangeably (Wilkinson & King, 1987). Both constructs involve categorizing groups of people according to distinguishing physical characteristics such as skin color (Nabors et al., 2000). Clear distinctions between these terms are complicated by a paucity of empirically supported procedures that reliably identify which race a person belongs to (Nabors et al.). Efforts to define these constructs separately generally conceptualize race biologically and socially. Biologically, race consists of characteristics such as gene pools, blood type, and skin color (Wilkinson & King). Socially, race consists of a group's "behavioral practices (e.g., cultural patterns, language), social factors (e.g., stratification, income, discrimination), as well as phenotypic characteristics (e.g., hair texture, skin color, facial features)" (Wilkinson & King, p. 56). Wong et al. (2000) define ethnicity as that which is "...often considered to reflect group composition in which membership is based on common descent, physical characteristics, and heritage" (p. 7). Additionally, Nabors et al. suggest that ethnicity is a sociocultural construct that focuses on "the values, customs, and rules that members of an ethnic group share" (p. 32). These conceptualizations of race and ethnicity support the difficulty of differentiating them as constructs. As a consequence of this difficulty, the term ethnicity was used in the proposed study instead of race. This choice of terms was fairly consistent with bodies of literature similar to the proposed study.

Ethnic groups residing within the US include: Caucasian/ European Americans (mainstream/ majority culture), African Americans, Hispanic/Latino Americans, American Indians/ Alaskan Natives, and/ or Asian/Pacific Islander Americans, all of whom are classified as ethnic minorities (Wong et al., 2000). Difficulties associated with this grouping are 1) it does not recognize that persons may fit into more than one category and 2) it does not recognize within group heterogeneity that is endemic to each classification (Wong et al.). Given the ethnic diversity within the US and the tendency of psychologists to work from within a framework that minimizes group differences that are culturally based (etic perspective), a significant challenge in neuropsychology is creating a system of care that meets the needs of non-majority patients whose ethnic background may differ from that of the care provider (Wong et al.). Efforts at understanding this relationship include examination of how psychologists typically approach patient assessment.

Approaches to Cognitive Assessment

Approaches to choice of cognitive assessment measures and subsequent interpretation include the etic and emic approaches (Dana, 1993) and the race homogenous and race comparative paradigms (McLoyd & Randolph, 1986). The etic approach emphasizes behaviors that are believed to be similar across cultures. Behaviors thought to be similar across cultures include "socializing children to become responsible members of society, maintaining harmony among people so that disagreements do not result in violence; and dealing with stresses encountered when cultures come into contact" (Brislin, 2000, p. 83). The emic approach emphasizes behaviors that are believed to be endemic to particular cultures and thus strives to view human behavior within the context of a person's cultural

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affiliation (Brislin, 2000; Dana, 1993). Behaviors thought to be endemic to particular cultures are typically specific variations of behaviors that are similar across cultures (Brislin); for example, though most cultures emphasize raising children to be responsible adults they do so in very different ways.

Similar to the emic approach, the race homogenous paradigm strives to view behavior from within its cultural context. Regarding performance on measures of neurocognitive functioning, the race homogenous paradigm and the emic approach attempt to control for the effects of culture and thus assert that the most appropriate context for interpreting the neuropsychological test performance of African Americans should be the normative behavior of African Americans (Dana, 1993; McLoyd & Randolph, 1986). Efforts at creating such instruments include 1) creating measures that are normed using racially stratified samples (i.e., Dellis-Kaplan Executive Functioning Scale) and to 2) creating demographically corrected norms that account for race in addition to traditional demographic variables such as age, gender, and SES for measures such as the Halstead-Reitan Neuropsychological Test Battery (HRNB) that were initially normed on samples that were not representative of the various persons on whom the measure would be used (a more detailed discussion of demographic corrections will be presented shortly). Although these efforts are underway, and expected to continue, it is important to discuss why they are needed. Following is a brief discussion of difficulties related to working within a race comparative/ etic approach.

The difficulty of working within a race comparative paradigm/ etic approach is that differences between groups are often attributed to inherent flaws in cognitive functioning as opposed to possibly being related to cultural affiliation (McLoyd & Randolph, 1986).

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Further, over reliance on race comparative paradigm/ etic approaches to assessment of cognitive functioning create an ethnocentric bias that "not only leads to spurious interpretations of neuropsychological findings, but also imposes constraints on the definitions and measurement of neuropsychological processes and competencies in African Americans" (Campbell et al., 1996. p. 77). Additional problems that arise when culture is ignored or minimized include "poor rapport between professional and client, over-pathologizing of patient behavior or report, over- or underestimation of symptom significance, faulty attribution of symptom presentation, and misdiagnosis" (Wong et al., 2000, p. 5). Multiple solutions have been offered and explored to address problems arising from the use of race comparative paradigms/ etic approaches to assessment. Among these solutions are the use of demographic corrections, and the inclusion of acculturation and racial identity measures to neurocognitive test batteries when working with clients from cultural backgrounds that are different from the service provider.

<center>Demographic Corrections</center>

Demographic corrections are increasing in popularity as a means of decreasing false positive impairment classification errors among ethnic minorities. Historically, demographic corrections were primarily used to adjust test scores for the influences of age, gender, and education. Recently, evidence is increasing that ethnicity also accounts for test score variance (Campbell et al., 1996; Evans, Miller, Byrd, & Heaton, 2000; Heaton, Miller, Taylor, & Grant, 2004). The need to correct for ethnicity accompanies persistent findings of generally poorer performance among ethnic minorities in comparison to Caucasians, despite adjusting for the effects of age, gender, socioeconomic status (SES), and years of education. Dick et al. (2002) suggest that these patterns may

persist because most measures of neurocognitive functioning were developed with Caucasians in mind and were subsequently normed using primarily Caucasian middle class males. Given that the term norm refers to "the performance of a particular group", it follows that norms are only useful to the extent that they accurately represent the characteristics of the group with which they were obtained (Ardila, 1995, p. 147; Dick et al., 2002). While Dick et al.'s argument is likely applicable to earlier measures of neurocognitive functioning, it is lacking in its application to newer measures, which as indicated previously are often use normed on racially stratified samples. Demographic corrections that adjust for ethnicity have emerged as a viable means of decreasing test bias.

Gladsjo, Schuman, Evans, and Peavy (1999) investigated the influence of the demographic variables age, education, and ethnicity on verbal fluency and developed corrections based on these variables. Their sample consisted of African Americans and Caucasians. Education, age, and ethnicity accounted for significant proportions of variance in verbal fluency performance. Education and ethnicity most significantly influenced letter fluency, while education, age, and ethnicity all influenced category fluency. Overall, Gladsjo et al. demonstrated that false positive diagnostic classifications among African Americans decreased from 31.2% to 15.3% on letter fluency and 38.5% to 17.4% on category fluency tasks when age, education, and ethnicity were taken into account.

Dick et al. (2002) developed the Cross-Cultural Neuropsychological Test Battery (CCNB) in an attempt to deliver a culturally fair measure of neuropsychological functioning in older adults. Despite correcting for age, education, and ethnicity they

found that education and ethnicity still influenced test performance. Specifically, they observed that ethnicity, particularly language, was related to measures of attention, category fluency, and visual-spatial functioning. Dick et al. came to the conclusion that other efforts (in addition to theirs) need to be conducted to develop norms that correct for age, education, and ethnicity. Heaton et al. (2004) sought to continue Dick et al.'s (2002) effort to develop appropriate test norms for ethnic minorities by developing demographic corrections for age, education, gender, and ethnicity for an expanded Halstead-Reitan Neuropsychological Test Battery (HRNB). Taken together, Heaton et al.'s work plus that of the other studies presented here, strongly suggests that demographic corrections for ethnicity assist research and clinical neuropsychologists to improve their ability to diagnose impairment among African Americans. Although demographic corrections have been used to reduce the possibility of ethnic minorities being incorrectly diagnosed as impaired secondary to test bias, it should be noted that there is a risk that overcorrecting may take place such that actual impairment may be missed. Such a phenomena as this combined with the findings of Dick et al.'s study demonstrate the complexity of demographic corrections. As indicated earlier, inclusion of measures of acculturation and racial identity also facilitate improving the validity of neurocognitive measures for use with African Americans. Prior to exploring specific measures of acculturation and racial identity, it is useful to first define culture.

Culture

Culture is not a well-understood construct and is consequently difficult to define (Ardila, 1995; Brislin, 2000). Though difficult to define, it is generally accepted that culture consists of variables such as values, attitudes, feelings, beliefs and behaviors that

are shared among a group of people that "…can have ethnic, geographic, generational, linguistic, and social determinants" (Aponte & Johnson, 2000; Wong et al., 2000, pps. 4-5). The construct of culture also includes widely shared values among people who communicate in the same language and live in close proximity to one another (Brislin). Brislin identifies multiple aspects of culture.

According to Brislin (2000) culture consists of six components. First, culture consists of values, ideas, and assumptions about life that can be stored in each person's mind, guide everyday behavior, and are not obvious to those who are not part of the culture. Second, culture is created by people and guides how they respond to the environment around them (Brislin, 2000; Spiro, 1978). Third, culture is transmitted from one generation to the next (Brislin, 2000; Rohner, 1984; Webb, Looby, & Fults-McMurtey, 2004). Cultural values are most often passed onto future generations via figures such as parents, teachers, and religious leaders (Brislin). Fourth, because cultural ideas and values are widely shared, there is little need to discuss them and as such people do not frequently talk about their own culture or the influence that their culture has over their behavior. Fifth, culture involves well meaning clashes between cultural groups that occur during interactions in which one of the persons involved does not share the same cultural background as the other person; the clash develops when the behaviors considered normal in one person's culture are considered to be abnormal in the other person's culture. For instance, Williams, Chambless, and Steketee (1998) indicate that a common belief of African Americans raised in the Southeast and Caribbean is that one can be influenced by "root magic" (e.g., can be made ill). Endorsement of this belief to an uninformed non-member of this cultural group likely results in a diagnosis of psychosis

reflective of the notion that belief in "root magic" is not normal. The sixth aspect of culture discussed by Brislin is an extension of the fifth and indicates that members of a culture possess detailed knowledge of it and practices inherent to it. Outsiders not socialized within a particular culture lack the ability to fully understand and participate in practices that require intricate knowledge taken for granted by group members.

Though knowledge of the intricacies of dissimilar cultures is difficult to achieve, efforts at increasing cross-cultural knowledge are essential to adequate assessment, diagnosis, and treatment of neurocognitive functioning. According to Spiro (1978) and Rohner (1984), psychological processes such as perception, cognition, expressions of emotion, and motivation are culturally shaped and it thus follows that neuropsychological test performance is influenced by cultural variables such as the patient's beliefs and behaviors (Ardila, 1995). A difficulty encountered in working with culturally dissimilar patients is the tendency to make attributions about their performance when it is inconsistent with established norms (Brislin, 2000). Brislin suggests that examiners should strive to make isomorphic attributions that seek to explain patient's performance within its cultural context and understand it in the same manner as persons socialized into the culture of the patient.

Considering psychological processes further, Ardila (1995) asserts that "basic cognitive processes are universal and cultural differences in cognition reside more in the situations to which particular cognitive processes are applied than in the existence of the process in one cultural group and the absence in the other (p. 145)." Ardila further asserts that cognitive abilities typically measured during neuropsychological assessment represent learned abilities and that performance on these measures correlates with

learning opportunities and cultural experiences. More specifically, culture dictates what should be learned and when it should be learned (for example, concepts worth learning to individuals being reared in large cities may not be worth learning to inhabitants of rural farming communities). Providing further elaboration of this, Goodenough (1981) indicates that meanings of what should be learned vary from group to group such that persons outside of one's cultural group are likely to view aspects of the world differently than persons within one's cultural group. Given that patient's experiences within their respective culture have significant effects on their behaviors in multiple domains such as family environments, school, the work place, and health care organizations (Brislin, 2000), it intuitively follows that culture may mediate performance on neuropsychological tests (Welsh et al., 1995).

Although it is intuitive that cultural experiences influence performances on neuropsychological measures, Ardila (1995) and Manly, Miller, et al. (1998) indicate that relatively little research has been done to understand the impact that cultural variables have on assessment and treatment within the field of neuropsychology. Following are discussions of how cultural affiliation (acculturation and racial identity) and literacy influence African American's performance on neurocognitive measures. In summary of the preceding discourse, these variables are being examined because they are thought to predict African American's performance on neurocognitive measures above and beyond the influences of age, SES, gender, and years of education.

Cultural Affiliation

"In the multicultural literature, the concept of within-group differences is often mentioned but seldom empirically investigated. One way to investigate within-group

differences is through the construct of cultural affiliation. The affiliation construct represents the degree to which individuals associate with their own cultural group, the majority group or both" (Pope-Davis, Liu, Ledesma-Jones, & Nevitt, 2000, p. 98). Birman (1994) suggests that racial identity and acculturation are useful ways of measuring cultural affiliation.

Racial Identity

Helms (1990) defines racial identity as "a sense of group or collective identity based on one's perception that he or she shares a common racial heritage with a particular racial group" (p. 3). Racial identity has its roots in Cross' Model of Nigrescence (1971), which is defined as the psychology of becoming Black (Pope-Davis et al., 2000). Cross' model of Nigresence consists of four stages: pre-encounter, encounter, immersion, and internalization. Bagley and Copeland (1994) define Cross' original stages as:

1. Pre-Encounter: the minority person endorses Euro-American values or the dominant culture and devalues his or her own race.

2. Encounter: the individual has a shocking experience that forces him or her to re-examine values and to become anti-White.

3. Immersion: the individual immerses himself or herself in Black culture and Black pride and rejects the dominant culture.

4. Internalization: the individual internalizes values of his or her own culture and has commitment to that culture. A person at this stage accepts the mainstream culture but endorses his/her culture. It is characterized by a tolerance for diversity (p. 168).

Identities are endemic to stages one, three, and four. A Pro-White/Anti-Black identity style is associated with the Pre-Encounter stages; the opposite identity style is associated with the Immersion stage. Persons at the Internalization stage, manifest a Humanist style of identity. An identity style is not defined for the Encounter stage (Vandiver, 2001).

Cross' model of identity development has recently been expanded (Worrell, Cross, & Vandiver, 2001). Although the stages are still the same as in the original model, new identities have been developed. Specifically, the Pre-Encounter stage is now associated with Assimilation, Miseducation, and Self-Hatred identities. Similar to the original model, all of these reflect identification with the majority racial group over one's own racial group. As with the original model, the Encounter stage has been retained and is not associated with a specific identity style. The Immersion stage now consists of Anti-White and Intense Black Involvement identity styles. Consistent with the original model, this stage represents rejection of the dominant racial group in favor of one's own racial group. Finally, the Internalization stage consists of Black Nationalist (Afrocentrism), Biculturalist, and Multicularist Inclusive identity styles. In summary, each stage of Cross' model (1971 and 2001) represents a different way of conceptualizing racial information concerning the self, others, and institutions (Helms, 1986). Racial identity, therefore, is a developmental process that lays the cognitive foundation for acculturation (Pope-Davis et al., 2000).

Acculturation

Acculturation is most often defined as change in a person's cultural traditions, values, beliefs, and practices following extensive intercultural contact introduced by outside forces (Brislin, 2000). For purposes of this study, African Americans are

considered to acculturate to the values, practices, and beliefs of Caucasians. Regardless of one's ethnicity, acculturation exists on a continuum ranging from un-acculturated to bicultural to acculturated. Persons on the un-acculturated end of the continuum remain immersed in the "beliefs, practices, and values" of their culture of origin and thus hold a traditional cultural orientation. Such persons should score high on a measure of cultural affiliation/ involvement in one's own culture. Biculturally oriented persons fall toward the middle of the continuum and "retain the beliefs and practices of their own culture but also have assimilated the beliefs and practices of the dominant white society, and so practice in two very different cultural traditions." Persons falling into this group should also score high on a measure of cultural affiliation/ involvement in one's own culture. Acculturated persons "have often rejected the beliefs and practices of their culture of origin in favor of those of the dominant white society, or never learned their own culture's traditions" (Landrine & Klonoff, 1996, p. 120). This type of person should score low on a measure of cultural affiliation. While highly un-acculturated African Americans tend to perform differently from Caucasians on various measures and behaviors, more acculturated African Americans do not (Dana, 1993; Manly, Miller, et al., 1998); Dana supposes this is so because minorities low in endorsement of their culture's "beliefs, practices, and values" tend to behave similarly to Caucasians.

Relationship between Racial Identity and Acculturation

Racial identity and acculturation to the dominant culture have demonstrated to be somewhat related constructs. Smith (2001) examined the relationship between racial identity and acculturation using the Racial Identity Attitudes Scale (RIAS) and the African American Acculturation Scale-Revised (AAAS-R). Though hypothesized to be

mutually independent, Smith (2001) observed that racial identity appeared to be a type of acculturation. Further, Wilcots (2001) demonstrated that acculturation was related to three of Cross' (1971) stages of racial identity development: pre-encounter, immersion, and internalization. Comparing their responses to the RIAS and the AAAS-R, African Americans at the pre-encounter stage did not endorse affiliation/ involvement with their ethnic community (this would be reflected by low scores on the AAAS-R). African Americans at the immersion stage rejected Caucasian values in favor of those associated with their own ethnic community (this would be reflected by high scores on the AAAS-R). Finally, internalized African Americans endorsed attachment to their ethnic community (also reflected in high scores on the AAAS-R). In theory then, African Americans functioning at the pre-encounter stage can be thought of as more acculturated to Caucasian culture than African Americans at the immersion and internalized stages. Though racial identity and acculturation have been jointly examined as they influence psychological well-being (Wilcots), self-esteem and depression (Ellis, 2000), and personal problem-solving strategies (Bagley & Copeland, 1994), they have not been jointly examined as they influence performance on measures of cognitive functioning in general and neurocognitive functions in particular. The following discussion thus examines their individual influences on these measures.

Influence of Racial Identity on Measures of Achievement

Although the present study focuses on neurocognitive test performance, racial identity has been discussed more as it pertains to achievement than as it specifically pertains to performance on cognitive tests. In general, higher stages of racial identity (e.g., internalization) appear to be related to higher levels of achievement than do lower

stages (e.g., pre-encounter). Specifically, Davis (2000) and Marks (2001) examined the relationship between stereotype threat, racial identity, and performance. Steele and Aranson (1995) define stereotype threat as "being at risk of confirming, as self-characteristic, a negative stereotype about one's group" (p. 797). Using the Graduate Record Exam (GRE), Davis demonstrated that when stereotype threat was not invoked, higher levels of racial identity were related to higher GRE scores. Marks sought to determine if university racial composition, length of time in college, and racial identity influenced African American students' performance. While racial composition did not influence performance in first year or senior students, stereotype threat did. This effect was heightened among first year students who held their racial group in high regard. The performance of seniors was not significantly influenced by stereotype threat or stage of racial identity. Considering racial identity and academic performance further, Lockett (2002) suggests that racial identity is more useful in explaining the academic behavior of African American students than academic outcomes such as grade point average (GPA). Specifically, Lokett demonstrated that racial identity accounted for a greater percentage of variance in students' GPA than did scores on the scholastic aptitude test. In summary, stage of racial identity appears to play a key role in African American students' performance on measures of achievement such that more advanced stages of racial identity development appear to be predictive of better outcomes on measures of achievement.

Influence of Acculturation on Neuropsychological Test Performance

Campbell et al. (1996) suggest that attempts to understand brain-behavior relationships among African Americans must include evaluation of their beliefs, value

orientations, ideals, and cultural traditions; measures of acculturation are often utilized to accomplish this. Acculturation has typically been assessed among immigrant groups, such as Hispanics and Asians; Landrine and Klonoff (1996) developed the African American Acculturation Scale (AAAS) for use with African Americans. According to Manly, Miller, et al. (1998) the AAAS assesses meaningful aspects of African American culture including preference for music, media, people, religious beliefs and practices, and traditional childhood experiences. While the AAAS is useful in this regard, its utility is limited by its unidimensional nature. Specifically, this scale treats acculturation as a linear construct where a person is either acculturated or un-acculturated. This is problematic because the scale fails to capture persons who either score high or low on both ends of the scale or fall in the middle of the scale. Recall that persons who fall in the middle of the scale are considered to be acculturated to the dominant culture as well as involved in their own culture.

Manly, Miller, et al. (1998) reported that they had knowledge of one study that assessed the relationship between acculturation and neuropsychological test performance. A recent search of the literature (2005) concerning this area was conducted in the database PsychINFO using the key words "African American and acculturation and neuropsychological test performance"; in addition to Manly, Miller, et al.'s study, this search yielded two empirical studies (Kennepohl, 2002; Manly, 1996), and one book chapter discussing future directions in neuropsychological assessment with African Americans (Manly & Jacobs, 2000). A somewhat less restrictive search was conducted using the keywords "acculturation and neuropsychological test performance"; this search yielded 3 empirical studies not already identified in the first search (Corona & Marta,

2001; Franco, 1996; Touradji, Manly, Jacobs, & Stern, 2001) and one additional book chapter that discussed normal and abnormal aging with a particular focus on the neuropsychological assessment of elderly Spanish speakers (Rosselli & Ardila, 2001). These searches suggest that though there is interest in the relationship between acculturation and the neuropsychological test performance of ethnic minorities, research has been slow to emerge. Following are brief discussions of the empirical studies that focus on the relationship between African American's level of acculturation and their performance on neuropsychological measures.

Manly, Miller, et al. (1998) is an extension of Manly (1996) and thus only Manly, Miller, et al. will be discussed in detail. The overall study was broken into two studies wherein low levels of acculturation were predicted to negatively influence neuropsychological test performance on measures of attention-working memory, fluency, abstraction, information processing speed, learning, visuo-spatial functioning, and verbal skills; acculturation was not hypothesized to influence motor and sensory skills. Study 1 consisted of 170 non-impaired African Americans participating in a larger study that sought to develop demographically based normative data using African Americans for commonly administered neuropsychological measures that had originally been normed using a Caucasian sample. Study 2 consisted of 20 HIV positive African American and 20 HIV positive Caucasian patients. While both studies assessed level of acculturation using the AAAS-33 (short form), Study 1 also assessed acculturation by examining participants' use of "Black English."

Initial findings from Study 1 demonstrated that a significant proportion of the non-impaired African American sample scored at least one standard deviation below the

normative mean (impaired range) on most administered measures. Self-report (AAAS) and behavioral ("Black English" use) measures of acculturation, when examined, explained unique variance in deficient neuropsychological test scores. For example, the Preferences, Religion, Food, and Childhood subsections of the AAAS accounted for a significant amount of variance on the Category Test (measure of abstraction), Trails A (information processing speed), and WAIS-R Information subtest (verbal skills). Similar findings were demonstrated in Study 2, wherein adjusting for acculturation reduced apparent score differences between African American and Caucasian participants on most measures of neuropsychological functioning.

Kennepohl (1996) examined the influence of acculturation on neuropsychological test performance among 45 African Americans who had sustained traumatic brain injury. Consistent with Manly, Miller, et al. (1998), Kennepohl demonstrated that lower levels of acculturation were associated with lower scores on measures of neuropsychological functioning.

Relationship between Literacy and Neuropsychological Test Performance

Knowledge of patient's educational attainment is often used to account for lower scores in one group versus another (Lamberty, 2002). Failure to consider education as a variable that impacts neuropsychological test performance often leads to the faulty assumption that group differences are solely due to cultural and ethnic factors; this is commonly the case when differences arise between the test performance of Caucasians and the test performance of ethnic minorities (Ardila, 1995). According to Ardila and Lamberty, educational attainment influences neuropsychological test performance such that cognitively intact patients with low levels of education tend to score lower than

mildly impaired patients with high levels of education; higher levels of education thus appear to act as a protective factor against neurocognitive impairment. Furthering this discussion, researchers examining neuropsychological test performance often equate groups on level of education. Though this is typical, recent research suggests that matching groups on educational attainment does not ensure they are comparable (Manly, Jacobs, et al., 1998).

Manly, Jacobs, et al. (1998) suggest that disparate school experiences may explain why African Americans continue to earn lower scores on cognitive measures after controlling for years of education. After matching African Americans and Caucasians on quantity of education, Manly, Jacobs, et al. (1998) found that African Americans still scored significantly lower on measures of figure memory, verbal abstraction, category fluency, and visuospatial skill; these findings were not accounted for by including occupational attainment or history of medical difficulties, such as hypertension and diabetes, in their analyses. Welsh et al. (1995) provide support for Manly, Jacobs, et al.'s (1998) findings, demonstrating that significant differences between racial groups occurred on cognitive measures despite controlling for quantity of education. Welsh et al. suggest that, "There may be differences in educational experiences across groups that are not completely controlled for through statistical covariance or by applying white educational norms. Specifically, the quality of education may not be captured by simply adjusting for years of education (p. 7)." Manly, Jacobs, et al. (1998) suggest that matching on years of education may be appropriate within ethnic groups, but not across ethnic groups and those researchers examining neuropsychological test performance should consider including quality of education as an explanation of group differences.

Quality of education has most recently been examined using the Reading subtest of the Wide Range Achievement Test-III (WRAT-III). This subtest requires the examinee to recognize and name letters and to read individually printed words. The advantage of using the WRAT-3 is it allows the examiner to convert the examinee's score into grade and age level ratings. This aspect is important in terms of measuring quality of education because it allows researchers to determine the proximity between reported years of education and quality of education. For example, Manly et al. (2002) sought to determine if discrepancies in quality of education could explain differences in cognitive test scores between African American (n = 192) and Caucasian (n = 192) elders matched on years of education. When matched on years of education, Africans Americans reported a mean of 12.8 (SD = 2.3) years of education and Caucasians reported a mean of 13.0 (SD = 3.0) years of education. However, review of each group's WRAT-3 Reading scores revealed that 33% of the African American participant's compared to 7% of Caucasian participant's self-reported years of education was higher than their actual reading ability. Further, after accounting for quality of education, group differences on measures of word list learning and memory, figure memory, abstract reasoning, and letter fluency became non-significant. This finding strongly indicates that matching these groups on years of education was not as useful as matching them on quality of education.

Albert and Teresi (1999) examined how reading ability impacted participants' performance on a screening measure of cognitive status, the Mini Mental Status Examination (MMSE); they also evaluated the discrepancy between reported educational level and grade-equivalent reading ability. Their sample included 164 African American adults age 65 and older. Participants were given the MMSE and the reading subtest of the

Wide Range Achievement Test-Revised (WRAT-R). In general, Albert and Teresi demonstrated that reading ability predicted performance on the MMSE such that higher levels of reading ability were significantly related to better performance; this was particularly true among the oldest participants in the study. Considering the match between reported level of education and grade-equivalent reading ability, Albert and Teresi found that reported educational level matched grade-equivalent reading ability in 25.9% of participants; reported educational level was less than grade-equivalent reading ability in 26.6% of the sample (e.g., participants may have reported to have 8 years of education, but were reading at a 10th grade level); reported educational level exceeded grade-equivalent reading ability in 47.5% of the participants (e.g. participants may have reported to have 10 years of education, but were reading at an 8th grade level). Albert and Teresi report that these discrepancies were evident in all education groups (e.g., of 18 subjects who reported having had more than 12 years of education, only 9 were reading at grade level). Overall, Albert and Teresi concluded that given the discrepancy between reported level of education and actual reading ability, combined with literacy's effect on cognitive test performance, assessing reading ability may be useful in interpreting the results of cognitive screening tests among minority patients and patients with low levels of education.

Finally, Baker et al. (1996) also examined the relationship between reported educational level and reading ability using the WRAT-R Reading subtest. Baker et al.'s participants were 57 adults (83% of the sample were African American) ranging in age from 50 to 90 years. Baker et al. found that 63% (36) of their overall sample was reading below grade level and of this number 92% (33) were African American.

Summary, Methodology, Procedures, and Measures

Summary

In summary, cultural affiliation, as measured by acculturation and racial identity, and literacy appear to be variables worthy of consideration when exploring the neurocognitive test performance of African Americans. Further, all three variables were considered in the proposed study in an effort to cover multiple domains. Specifically, it was hoped, for example, that measuring literacy would account for variance left unexplained by acculturation or racial identity such that higher levels of literacy would be predictive of better performance on measures of neuropsychological functioning.

Methodology

Participants were 44 African American and 37 Caucasian undergraduate students recruited from a mid-western university. The majority of participants were female (72.8%, n = 59), between the ages of 18-20 (72.9%, n = 59), and in their first year of post-secondary education (40.7%, n = 33). Participant's GPA ranged from 1.78 to 4.00 with a mean of 2.96 (s.d. = .52). IQ ranged from 77 to 129 with a mean of 109.02 (s.d. = 11.58). Participants' parental level of education ranged from a High School Diploma or GED to attaining a graduate or professional degree for mothers and some high school to a graduate or professional degree for fathers. Most parents had completed some college up to a 4-year degree (56.8% among mothers and 50.6% among fathers). Participants reported that their family SES ranged from poor to wealthy with the average participant reporting a family SES of middle class (Participants were not given an operational definition of SES terms such as wealthy and poor, but were asked to respond according to what these terms meant to them). Family income was reported to range from

less than $10,000 annually to more than $60,000, with the average participant reporting an annual family income of $40,000 to $60,000. The average participant indicated that s/he was raised in a suburban setting. Frequencies for demographic data are reported in Tables 1a and 1b.

All participants entered into the study received $10.00 and a raffle ticket to earn either: 1 of 5 $25.00 gift certificates to a local bookstore, a 19-inch color television, or 1 of 3 DVD players. Raffled incentives were disbursed upon completion of data collection. Participants were screened out of the study under the following conditions:

1. Self-reported presence of psychiatric disorders known to affect executive functioning such as schizophrenia, OCD, and ADD (Moering, Schinka, Mortimer, & Graves, 2004).

2. Given that two of the selected measures, the Wisconsin Card Sorting Test and the Stroop, were dependent, in part, on the ability to perceive color, potential participants were excluded if they reported to be color-blind.

3. Potential participants were also excluded if they reported to be under the influence of drugs and or alcohol at the time of testing.

No participants endorsed psychiatric diagnoses, color-blindness or substance use.

Procedures

In addition to completing screening measures of emotional functioning, selected participants completed a battery of commonly utilized measures of neuropsychological functioning. Specifically, selected measures evaluated participants' executive functions. Executive functions are those abilities that allow individuals to engage in behavior that is self-directed and goal-oriented (Moering et al., 2004). Abilities categorized as being

executive functions include the ability to initiate, plan, and carry out behaviors, the ability to flexibly modify behaviors that are not working, self-regulation, attention and freedom from distractibility/ vigilance, and abstract reasoning (Moering et al., 2004; National Academy of Neuropsychology, 2000). Executive functions additionally allow individuals to adapt to novel, complex, and unstructured situations by using effective problem solving strategies that are supported by "hypothesis generation, planning and execution, utilizing existing knowledge, entertaining alternative solutions, controlling for potential sources of interference, (and) utilizing environmental feedback to monitor [our] progress and to modify [our] approaches when necessary" (Ross, n.d., pps 1-2; Spikman, Deelman, & von Zomeren, 2000). Measures of neuropsychological functioning selected for this study were also chosen because they had norms that were specifically corrected for African Americans. These measures were Trails A and B and Controlled Oral Word Association. This writer and eight advanced undergraduate students trained on the following measures completed all testing.

Measures

Measures of Cultural Affiliation

African American Acculturation Scale

The African American Acculturation Scale (AAAS) is a self-report measure, developed by Landrine and Klonoff (1996) to facilitate the study of African American behavior as a function of immersion in African American culture. Given that many ethnic differences can be understood as a function of the person's level of immersion (acculturation) in the dominant society, the AAAS offers a non-racist way of understanding ethnic differences. The AAAS suggests that between-group differences on

measures of intelligence are not to be thought of as deficits but as a lack of familiarity with the dominant culture (Landrine & Klonoff).

The AAAS assesses an individual's "...knowledge of and participation in the various beliefs and practices of African American culture" (Landrine & Klonoff, 1996, p. 119). Higher scores on the AAAS are more indicative of a traditional orientation (immersion in the African American culture/ less acculturated to the dominant Caucasian culture), whereas lower scores indicate a less traditional/ more acculturated orientation (immersion in the dominant culture). As discussed previously, a difficulty with the AAAS is that it fails to capture persons who are neither high nor low in their endorsement of African American values, but who score in the middle of the scale. Such persons are considered to be bi-cultural and are difficult to observe on unidimensional measures such as the AAAS. While it would thus make sense to employ a multidimensional measure to capture persons capable of moving between their culture and the dominant culture, such measures are not presently available for the evaluation of African Americans.

There are 10 subscales on the AAAS: Preference for Things African American (media, arts), Religious Beliefs and Practices, Traditional Foods (knowledge of preparation), Traditional Childhood Experiences, Superstitions, Interracial Attitudes, Falling Out (knowledge of what this is), Traditional Games, Family Values (knowledge and playing of), and Family Practices. The AAAS consists of 74-items and takes 15 minutes to administer; scores range from 33-231.

Reliability data concerning the AAAS suggest that all items consistently and reliably measure African American culture. Alphas for the AAAS range from .71 to .90. Split-half reliability for the AAAS was calculated by correlating the even-numbered items with

the odd-numbered items (r = .93, p<.0001). Concerning validity, the AAAS has

demonstrated to differentiate between African Americans and other ethnic groups,

including Caucasians. Specifically, Landrine and Klonoff (1996) report that African

Americans scored an average of 141.47 points higher on the AAAS (t = 13.03, p = .0001)

than non-African Americans. Validity was further checked by examining the responses of

African Americans who endorsed living in a "Black" neighborhood. As expected,

African Americans who reported living in a "Black" neighborhood scored higher than

African Americans who endorsed living in other residential settings (364.26 vs. 314.04,

respectively; t(49) = -3.10, p<.003).

Cross Racial Identity Scale

The Cross Racial Identity Scale (CRIS; Worrell, Vandiver, & Cross, 2000) is a

self-report measure of racial identity development based on Cross' Expanded Model of

Nigrescence (Worrell et al., 2001). As indicated earlier, this model of identity

development consists of four stages and eight associated identities; however, only six of

these identities (Assimilation, Miseducation, and Self-Hatred for the Pre-Encounter stage;

Anti-White for the Immersion stage; and Black Nationalist and Multiculturalist Inclusive

for the Internalization stage) are covered in the scale. Intense Black Involvement,

affiliated with the Immersion stage of development, was not included in the CRIS

because it was believed to be immeasurable (Vandiver, Cross, Worrell, & Fhagen-Smith,

2002). The Biculturalist identity (Internalization stage) was not included due to overlap

with the Mulitculturalist Inclusive Identity (Vandiver et al., 2002).

The CRIS consists of 40 items that inquire about attitudes that African Americans

hold toward each other and toward Caucasians. The CRIS also includes a demographics

sheet that inquires about the respondent's racial background, family SES, religious preferences, GPA, and other demographically related data. Overall, the CRIS takes 10-15 minutes to complete.

The CRIS was normed on African American undergraduate students attending predominately Caucasian Northeastern universities. The average respondent was 21 years of age and female. In general, the CRIS demonstrates to be a reliable and valid measure of racial identity for African American adolescents and young adults (Worrell et al., 2000). Internal consistency reliability coefficients range from .78 to .90 (Worrell et al., 2000). Convergent validity for the CRIS was examined by correlating it (using bivariate and canonical correlations) with the Multidimensional Inventory of Black Identity (MIBI; Sellers, Smith, Shelton, Rowley, & Chavous, 1998). The MIBI consists of seven subscales: Assimilation, Centrality, Humanist, Nationalist, Oppressed Minority, Private Regard, and Public Regard. Worrell et al. (2000) indicate that these subscales are described in Sellers, Rowley, Chavous, Shelton, and Smith (1997). Correlations between the subscales of these measures ranged from .01 to .59 (Vandiver et al., 2002), providing support for the CRIS subscales.

Measurement of Literacy

Reading Recognition Subtest of the Wide Range Achievement Test-3

The Wide Range Achievement Test-3 (WRAT-3; Wilkinson, 1993) consists of three subtests: Reading, Spelling, and Arithmetic; consistent with previously discussed literature, the Reading subtest was used for this dissertation as a measure of literacy. The Reading subtest of the WRAT-3 takes approximately 5 minutes to administer and consists of having the examinee orally pronounce words out of context. Examinees taking

the WRAT-3 read a list of words that increase in magnitude of difficulty; scores on the WRAT-3 are based on the correct number of words read and may be converted to grade and age level ratings from kindergarten through adulthood.

US Census data collected in 1999 were used to create the standardization sample for the WRAT-3. The norm sample was selected using a "...national stratified sample that controlled for age, regional residence, gender, ethnicity and socioeconomic level" (Wilkinson, 1993, p. 27). Considering ethnicity, 71.7% of the total WRAT-3 standardization sample were Caucasian, 13.6% were African American, 10.7% were Hispanic, and 3.9% were classified as Other; the standardization sample was broken into 23 age groups and consisted of a total of 4,433 persons ranging in age from 5 years to 74 years, 11 months. The total sample reading reliability correlation was .98. Construct validity for the WRAT-3 Reading subtest was determined by correlating it with the WAIS-R FSIQ, yielding a coefficient of .53. Based on previous research and the reliability and validity data presented here, the WRAT-3 reading subtest is an appropriate measure of literacy for this study.

Measures of Neuropsychological Functioning

Wisconsin Card Sorting Test

The Wisconsin Card Sorting Test (WCST; Heaton, 1981; Heaton, Chelune, Talley, Kay, & Curtiss, 1993) assesses mental flexibility, abstract problem solving, preservative tendency, and failure to maintain set (National Academy of Neuropsychology, 2000). The WCST consists of four stimulus cards and 128 response cards depicting various forms, colors, and numbers of figures. The examinee is required to match the response cards to the stimulus cards without instruction on how to do so.

While the examinee is not told how to match the cards s/he receives feedback as to whether each match is right or wrong; the examinee is to use this feedback to guide his/her decisions about how to match the cards.

According to Heaton et al. (1993), the WCST has been normed for individuals from 6.5 to 89 years old. The total normative sample consisted of 899 non-impaired persons grouped into 6 samples according to various characteristics such as age and geographic location. Age matched census data for 1987 are available for persons age 20 and older. Normative data were not determined by race.

Heaton (1981) reports interscorer reliability coefficients for Nonpeseverative Errors (r = .88), Preseverative Errors (r = .92), and Nonpreseverative Responses (r = .93). Intrascorer reliability coefficients were also reported (Nonpreseverative Errors, r = .91, Preseverative Errors, r = .94, and Nonpreseverative Responses, r = .96). Considering its validity, Heaton et al. (1993) report that the WCST has been widely used in clinical and research settings as a measure of executive functioning. Thomas (1992) demonstrated that the WCST effectively differentiates between brain impaired persons and non-brain impaired persons in terms of Total Number of Errors (r = .78), Percent Conceptual Level Responses (r = -.53), and Number of Categories Completed (r = .67). Thomas' findings support the WCST as a measure of abstract thinking and concept formation.

Trail Making Test

The Trail Making Test, developed by Reitan (1979, 1993) as part of the Halstead-Reitan Neuropsychological Test Battery, requires "immediate recognition of the symbolic significance of numbers and letters, ability to scan the page continuously to identify the next number or letter in sequence, flexibility in integrating the numerical and alphabetical

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series, and completion of these requirements under the pressure of time" (Reitan &

Wolfson, 1993, p. 74). The Trail Making Test (TMT) consists two parts: A and B. Part A

of the Trail Making Test (Trails A) consists of circles numbered 1 to 25. The examinee is

required to draw sequential lines connecting the circles as quickly as possible. Part B

(Trails B) of the Trail Making Test immediately follows Trails A, and requires the

examinee to alternate between numbered and lettered circles (e.g., draw a line from 1 to

A, A to 2, 2 to B, B to 3, etc.) as quickly as possible. The TMT for adults is appropriate

for people age 15 years and older. The TMT takes approximately 5 minutes to administer

and scores are based on the total number of seconds required to complete each part.

While number of errors can also be used as a scoring tool, this study only utilized time as

a measure of performance.

Spreen and Strauss (1991) report that reliability coefficients for the TMT range

from .60 to .90; most coefficients fall around .80. Though slow performance on the TMT

is indicative of brain impairment at any age, it does not reveal the source of the

impairment in terms of "motor slowing, incoordination, visual scanning difficulties, poor

motivation, or conceptual confusion" (Lezak, p. 382, 1995). Additionally, while Trails A

and B discriminate brain impaired patients from non-impaired patients, Reitan (1958)

indicates that Trails B possesses greater clinical efficacy in this regard.

Symbol Digit Modalities Test

Although the Symbol Digit Modalities Test (SDMT; Smith, 1982) was obtained,

it was not analyzed due to its utility more as a measure of processing speed than

executive functioning. The SDMT is a brief measure of attention, visual scanning, and

tracking that requires the examinee to "...substitute a number for randomized

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presentations of geometric figures. The appropriate number is shown in a key presenting numbers from one to nine, each of which is paired with a different geometric figure" (Smith, 1982, p. 3). Smith (1982) suggests that the SDMT is a culture free measure that can be used across ethnic groups because of its use of numbers and geometric symbols. The SDMT takes approximately 5 minutes to administer and has been normed for persons aged 8 to 75 years.

Test-retest reliability coefficients for the written and oral portions of the SDMT are .80 and .76, respectively (Lezak, 1995). The SDMT differentiates between clinical and non-clinical populations (Smith, 1982). Ponsford and Kinsella (1992) report that written and oral scores were significantly lower among severely injured head trauma patients than they were among healthy controls.

Controlled Oral Word Association (COWA)

Spreen and Strauss (1998) indicate that the COWA is also commonly referred to as FAS-Test, Letter Fluency, and Category Fluency. For purposes of the proposed research Letter Fluency (phonetic association) and Category Fluency (semantic association) will be utilized. Letter Fluency requires the examinee to name as many words, excluding proper nouns that begin with the letters F, A, and S. Category Fluency requires the examinee to name as many animals as possible. Both of these measures allow the examinee one minute to produce as many responses as possible. Letter and Category Fluency require 5-10 minutes to administer and examinees receive one point for each word named; points are not given for words that are perseverations of previously stated words, different forms of previously stated words (e.g. eat followed by eating), or

intrusions (e.g., responding with a word that begins with a letter different than the one given).

In general, Letter and Category Fluency demonstrate to be reliable and valid measures of executive functioning. Spreen and Strauss indicate that reliability coefficients for these tests average .70. Additionally, this measure is suitable for African Americans as demonstrated by Gladsjo et al.'s (1999) development of demographically corrected norms that included African Americans in their sample. Considering validity, Letter and Category fluency have demonstrated to differentiate brain impaired patients from non-impaired patients (Mutchnick, Ross, and Long, 1991).

Stroop Color-Word Test

The Stroop Color-Word Test (Stroop) takes approximately 5 minutes to administer and consists of a Word Page with color words printed in black ink, a Color Page with X's printed in color, and a Color-Word Page with words from the first page printed in colors used from the second (Golden, 1978). The examinee is given 45 seconds to read as many words printed in black, name as many colors, and read as many colored words as possible per respective page.

Reliability coefficients for the Stroop are high and consistent across different forms and test-retest periods (Spreen & Straus, 1991); reliability coefficients range from .69 to .81 when administered individually and .73 to .89 when administered in a group (Golden, 1978). Considering its validity, Jopie et al. (2002) further report that the Stroop "...effectively differentiates normal individuals, non-brain damaged psychiatric patients and brain damaged patients. It measures cognitive functioning and is based on the observation that individuals can read words much faster than they can identify and name

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colors (p. 1)." As a measure of executive functioning the Stroop word (W), color (C), and color-word (CW) test assesses cognitive flexibility and resistance to interference to outside stimuli (Moering et al., 2004). The Stroop is also a measure of sustained and selective attention in that the examinee is required to attend to one stimulus while selectively inhibiting another (National Academy of Neuropsychology, 2000).

Measurement of Intelligence

Wechsler Abbreviated Scale of Intelligence

The Wechsler Adult Intelligence Scale (WAIS, WAIS-R, and WAIS-III) and shortened versions of it are frequently used to assess intelligence (The Psychological Corporation, 1999). A reliable short form of the WAIS is the Wechsler Abbreviated Scale of Intelligence (WASI). Similar to other short forms, the WASI has been designed to quickly and accurately estimate the individual's verbal, nonverbal, and overall intellectual functioning. Significant strengths of the WASI, in comparison to other short forms of intelligence, are the WASI has been standardized, normed, and validated on a sample independent of the most recent version of the WAIS, the WAIS-III. This is a strength because future changes in the WAIS-III will not affect the validity of the WASI in the way that such changes will affect short forms that are developed using the WAIS-III's standardization sample and associated norms.

Subtests on the WASI are similar to those on the WAIS-III and WISC-III. The WASI may be administered in two forms; the 4-subtest form takes approximately 30 minutes to administer and the 2-subtest form takes approximately 15 minutes to administer. The 2-subtest form was used for this study, and consists of the subtests Vocabulary and Matrix Reasoning.

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The Vocabulary subtest is a 42-item task that requires the examinee to define orally and visually presented words. Vocabulary measures the examinees' "...expressive vocabulary, verbal knowledge, and fund of information..." (The Psychological Corporation, 1999, p.4). Matrix Reasoning consists of a "...series of 35 incomplete gridded patterns that the examinee completes by pointing to or stating the number of the correct response from five possible choices" (The Psychological Corporation, p. 4); this measure assess the examinee's nonverbal fluid reasoning.

The WASI's standardization sample consisted of 1,145 adults between the ages of 17 and 89. The standardization sample was divided into 23 age groups from persons 6 years of age to persons 89 years of age. Further, the standardization sample was based on 1997 US Census data. Considering race/ethnicity, each age group in the standardization sample consisted of the proportions of Caucasians, African Americans, Hispanics, and racial groups identified as other in each age group. The following reliability and validity data pertain to the WASI's adult sample.

Considering the 2-subtest form of the WASI, reliability coefficients for the Vocabulary subtest ranged from .90 to .98 and were an average of .94; Matrix Reasoning reliability coefficients ranged from .88 to .96 and were an average of .94. Reliability coefficients for the Full Scale IQ (FSIQ) ranged from .93 to .98 and were an average of .96. In addition to reporting strong reliability coefficients, the Psychological Corporation (1994) also reported small standard errors of measurement (SE$_M$) for the WASI. Vocabulary subtest SE$_M$ ranged from 1.41 to 3.16 and averaged 3.30; Matrix Reasoning SE$_M$ ranged from 2.00 to 3.46 and averaged 2.53. SE$_M$ for the 2-subtest FSIQ ranged from 2.33 to 3.91 and averaged 2.97.

Construct validity for the WASI was determined by correlating it with the WAIS-III. The correlation coefficients between the WASI and WAIS-III for the subtests Vocabulary and Matrix Reasoning were .88 and .66 respectively. The correlation coefficient between the 2-subtest form FSIQ for the WASI and the FSIQ for the WAIS-III was .87. Based on the reliability and validity data presented here, the WASI is an appropriate measure of intelligence for the proposed dissertation research.

Measures of Emotional Functioning

State Trait Anxiety Inventory

The State Trait Anxiety Inventory (STAI; Spielberger, Gorusch, Lushene, Vagg, & Jacobs, 1983) is a self-report scale that assesses situational (state) and enduring (trait) levels of anxiety. The STAI takes approximately 10 to 15 minutes to administer. The state portion of the STAI consists of items that tap into how the person feels "right now" concerning feelings of apprehension, nervousness, tension, and worry. The trait portion of the STAI assesses how the person "generally feels" and has been widely as a screening tool for anxiety problems among college students.

The STAI was normed on groups of working adults, college students, high school students, and military recruits. Since the STAI is being used with college students for the proposed dissertation research, the following norms are those reported for college students. The college sample consisted of 324 males and 531 females. The alpha coefficient for the state portion of the STAI was .91 for males and .93 for females; the alpha coefficient for the trait portion of the STAI was .90 for males and .91 for females. Considering the validity of individual items, the coefficient for males (N = 202) was .91 and .93 for females (N = 481).

Beck Depression Inventory-II

The Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996), is a self-report measure of the presence and degree of depressive symptomatology consistent with the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV). The BDI-II is appropriate for persons as young as age 13 and takes 5 to 10 minutes to complete. Participants completing the BDI-II are asked to respond to statements according to how they have been feeling over the past two weeks including the day they are completing the BDI-II.

The BDI-II was normed on a group of outpatients and a group of college students. Since the BDI-II is being used with college students for the proposed dissertation research, the following norms are those reported for college students. The college sample consisted of 120 Caucasian students. Coefficient alpha was .93. Validity of the BDI-II was assessed by comparing it to other measures of depression and anxiety. The correlations were .68 between it and the Beck Hopelessness Scale, .37 between it and the Scale for Suicidal Ideation, .60 between it and the Beck Anxiety Inventory, .71 between it and the Hamilton Psychiatric Rating Scale for Depression, and .47 between it and the Hamilton Rating Scale for Anxiety.

Results

Within Group Hypotheses and Analyses

Consistent with published literature, it was hypothesized that acculturation, racial identity, and literacy would predict and explain unique variance in African American participants' neuropsychological test performance above and beyond the effects of age, years of education (participant and parental), gender, and SES. African American

participants' Tscore for their performance on selected measures of neuropsychological

functioning are presented in Table 2 (Note that all scores are within normal limits).

Correlations run between the demographic data for African American participants and

their performance on selected measures of neuropsychological functioning (See Table 3)

revealed that age and participant level of education did not correlate with any of the

outcome variables. Consequently, these variables are not discussed further. Although

gender correlated with the Word Reading portion of the Stroop ($r = -.319$, $p< .05$),

acculturation, racial identity and literacy did not; therefore, gender also will not be

discussed further. Correlations between acculturation total score, racial identity, literacy

and neuropsychological test performance are reported in Table 4. Hierarchical multiple

regressions were used to learn more about significant relationships identified by

computing individual correlations. Specifically, hierarchical multiple regressions were

used to determine if the predictors acculturation, racial identity and literacy explained test

score variance above and beyond the effects of parental level of education and SES.

Additionally, cross tabs were computed to determine what percentage of African

American participants were reading at their reported grade level and what percentage

were reading below grade their reported grade level.

The following within group hypotheses were analyzed:

a. African Americans higher in acculturation, as measured by lower scores on

the African American Acculturation Scale (AAAS- higher scores on this

measure are more indicative of a traditional orientation/ immersion in the

African American culture, whereas lower scores indicate a less traditional/

more acculturated orientation [immersion in the dominant culture]) would

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perform better on the neuropsychological outcome measures than African Americans lower in acculturation.

b. African American participants' who endorsed higher levels of internalized racial identity (e.g., acceptance of one's own culture, as well as mainstream society), as assessed by the Black Nationalist and Multiculturalist domains of the Cross Racial Identity Scale (CRIS), would perform better on selected measures of neuropsychological functioning than those who endorsed higher levels of pre-encounter racial identity. Pre-Encounter racial identity was assessed using the Assimilation, Miseducation, and Self-Hatred domains of the CRIS.

c. African American participants' whose WRAT-3 Reading score was consistent with or exceeded their reported years of education would perform better on selected neuropsychological outcome measures than those whose WRAT-3 score was lower than their reported years of education.

Hypothesis a.

Individual correlations between African American participants' total score on the AAAS and all selected measures of neuropsychological functioning did not reveal any significant relationships (See Table 4). This indicated that the selected measure of acculturation was not predictive of African American participants' performance on the selected neuropsychological outcome variables. Although acculturation was not predictive of neuropsychological test performance, it is worth noting that it should have at least been negatively related to all neuropsychological test performance outcomes (e.g., low scores on the AAAS were expected to be predictive better performance on measures

of neuropsychological functioning). Since acculturation was not predictive of participant's performance on measures of neuropsychological functioning, no further analyses were warranted.

Hypothesis b.

Although the CRIS consists of six subscales, only three (Pre-Encounter Assimilation, Pre-Encounter Self-Hatred, and Multiculturalist Inclusive) were significantly related to African American participants' performance on the measures of neuropsychological functioning selected for this study. Negative relationships were expected between the Pre-Encounter domains and neuropsychological outcomes, such that participants who endorsed higher levels of Pre-Encounter Assimilation and/or Self-Hatred were not expected to perform as well as those who endorsed higher levels of Internalized racial identity (Multiculturalist Inclusive). Positive relationships were expected between the Internalization domain and neuropsychological outcomes, such that participants who endorsed higher levels of internalized racial identity would perform better than those who endorsed higher levels of Pre-Encounter racial identity.

As expected, Pre-Encounter Assimilation was negatively related to African American participants' performance on Stroop Color Naming ($r = -.302$, $p< .01$) and the Learning to Learn portion of the Wisconsin Card Sorting Test (WCST) ($r = -.375$, $p<.01$), however, it was unexpectedly positively related to Trails B ($r = .342$, $p< .01$). Pre-Encounter Self-Hatred was expectedly negatively related to African American participants' FAS letter fluency total score ($r = -.300$, $p<.01$). Multiculturalist Inclusive racial identity was unexpectedly negatively related to African American participants'

performance on the Conceptual Level Response and Failure to Maintain Set portions of the WCST ($r = -.325$, $p< .01$ and $r = -.303$, $p< .01$, respectively).

Hierarchical multiple regressions were not computed to determine if Pre-Encounter Assimilation predicted African American participants' performance on the Stroop Color Naming task above and beyond the effects of SES and parental level of education because these demographic variables did not correlate with their performance on this measure (See Table 3). Hierarchical multiple regressions also were not computed to determine if Multiculturalist Inclusive predicted African American participants' performance on the Conceptual Level Response and Failure to Maintain Set portions of the WCST above and beyond the effects of SES and parental level of education because these demographic variables did not correlate with African American participants' performance on this measure (See Table 3). A hierarchical multiple regression was computed to determine if Pre-Encounter Self-Hatred predicted African American participants' performance on the FAS fluency task above and beyond the effects of SES. SES was entered on step one and Pre-Encounter Self-Hatred was entered on step two. While adding Pre-Encounter Self-Self Hatred to the regression model increased the R^2 change by 5.5%, the change was not significant, thus indicating that Pre-Encounter Self-Hatred did not predict African American participants' performance on the FAS fluency task above and beyond the effects of SES ($F_{change} = 2.63$, $p = .112$). Complete regression data are provided in Table 5.

Hypothesis c.

While 52.3% of African American participants were reading below their reported grade level (n = 23), 47.7% were reading at their reported grade level (n = 21). Literacy

was negatively related to Category Fluency ($r = -.263$, $p<.05$) and positively related to the Perseverative Errors portion of the WCST. Hierarchical multiple regression was conducted to determine if literacy predicted African American participants' performance on Category Fluency above and beyond the effects of parental level of education. Parental level of education was included on step one and category fluency was included on step 2. While adding Literacy to the regression model increased the R^2 change by 5.4%, the change was not significant, thus indicating that Literacy did not predict African American participants' performance on the Category fluency task above and beyond the effects of parental level of education ($F_{change} = 2.78$, $p = .104$). Complete regression data are provided in Table 6. Hierarchical multiple regression was not run to determine if literacy predicted African American participants' performance on the WCST Perseverative Errors domain because it did not correlate with any of the demographic variables. It can thus be assumed that Literacy predicts performance on this domain above and beyond the effects of demographic variables.

Summary of Within Group Hypotheses

While significant relationships were identified between three of the CRIS cultural affiliation domains (Pre-Encounter Assimilation, Pre-Encounter Self-Hatred and Multiculturalist Inclusive) and some of the selected neuropsychological outcome variables (see Table 3), these domains did not predict African American participants' performance on any of the selected neuropsychological outcome variables above and beyond the effects of SES or parental level of education. Additionally, unexpected relationships were observed between Pre-Encounter Assimilation and Trails B, as well as between Multiculturalist Inclusive and the Wisconsin Card Sorting Test's Conceptual

Level Response and Failure to Maintain Set scores. The hypothesis related to literacy also was not supported. Findings for literacy are also not very compelling. Only two out of 12 possible correlations were significant. While it is assumed that literacy predicts performance on the Perseverative Errors portion of the WCST above and beyond the effects of demographic variables (because none of them correlated with this outcome), it was observed that literacy does not predict performance on Category Fluency above and beyond the effects of parental level of education and SES.

Between Groups Hypotheses and Analyses

The following analyses were used to examine this group of hypotheses. Differences between reported grade level and WRAT-3 Reading level were determined for each participant. Chi square tests were then used to determine if a significant difference existed between African American and Caucasian participants. It was expected that hierarchical multiple regressions would be used to determine if acculturation, racial identity, and literacy explained remaining between group test score variance despite controlling for age, gender, SES, participant and parental years of education, and participant ethnicity. Since only African American participants received the measure of acculturation and the measure of racial identity, these variables were not included in hierarchical multiple regressions because they could not be controlled for. Although age correlated with Stroop Word Reading ($r = -.300$, $p<.01$), it was not included in hierarchical multiple regressions because Stroop Word Reading did not correlate with literacy. Gender and participant years of education were not included in hierarchical multiple regressions because they did not correlate with the neuropsychological outcome variables selected for this study. African American and Caucasian correlations between

demographic variables, literacy, and neuropsychological test performance are reported in Table 7. Means and standard deviations for African American and Caucasian participants' group scores (N=81) on measures of neuropsychological functioning are reported in Table 8.

Hypothesis a.

It was expected that African American participants would demonstrate larger disparities between their reported years of education and their grade-level reading ability, as measured by the WRAT-3 Reading subtest, than Caucasian participants. This hypothesis was analyzed using a chi square test to determine if a statistically significant relationship existed between participants' report of their grade level reading ability and ethnicity. Specifically, participants were asked how many years of education they had attained. This value was compared to their WRAT-3 Reading score to determine if they were reading at or below grade level. Participants were considered to have been reading at grade level if their grade level WRAT-3 Reading score fell within the postsecondary range of greater than 12 years. Thus, participants who reported to have 13 or more years of education and a WRAT-3 reading score that fell within the postsecondary range were considered to be reading at grade level.

Significant differences were observed between participants' reports of their grade level reading ability and ethnicity ($X^2 = 3.821$, df = 1, p< .10). While nearly half (47.7%, n = 21) of African American participants were reading at their reported grade level, just over half of them were reading below their reported grade level (52.3%, n = 23). Over two-thirds of Caucasian participants were reading at their reported grade level

(69.4%, n = 25), compared to 30.6% (n = 11) who were reading below their reported grade level. These findings support this hypothesis. Grade level reading abilities by ethnicity are presented in Table 9.

Hypothesis b.

Consistent with the within group hypothesis, it was expected that accounting for acculturation, racial identity, and literacy would explain test score differences between African American and Caucasian participants that remained despite controlling for age, gender, SES, and years of education (participants' and their parents). This hypothesis could not be tested in its current form. As indicated above, acculturation and racial identity could not be controlled for because only African American participants received the AAAS and the CRIS. This hypothesis was thus reworded to state that it was expected that literacy would explain test score differences between African American and Caucasian participants that remained despite controlling for age, gender, SES, and years of education (participants' and their parents).

As expected, literacy was positively related to Trails B and the WCST's Total Errors and Perseverative Errors ($r = .301$, $p<.01$; $r = .292$, $p<.01$; $r = .329$, $p<.01$, respectively). Unexpected negative relationships were observed between literacy and letter fluency ($r = -.224$, $p<.050$) as well as between literacy and category fluency ($r = -.288$, $p<.01$). While literacy was predictive of these neuropsychological outcome variables, hierarchical multiple regressions were not computed to determine if literacy predicted participants' performance on Trails B or WCST's Total Errors and Perseverative Errors above and beyond the effects of SES and parental level of education because these demographic variables did not correlate with participants' performance on

these measures (See Table 7). Hierarchical multiple regression was used to determine if literacy predicted participants' performance on Letter and Category Fluency above and beyond the effects of demographic variables. Considering Letter Fluency, SES was entered on step one and literacy was entered on step two (parental education and ethnicity did not relate to Letter Fluency and so were not included in the model). Adding literacy to the regression model increased R^2 by 4.3%. This change was significant (F (1, 77) = 3.86, p = .05) indicating that literacy predicted participants' performance on Letter Fluency above and beyond the effects of SES. A hierarchical multiple regression was computed to determine if literacy predicted participants' performance on Category Fluency above and beyond the effects of parental level of education (ethnicity and SES were not included in the regression because they did not correlate with participants' performance on this measure). Parental level of education was entered on step one and literacy was entered on step two. Adding literacy to the regression model increased R^2 by 5.1%. This change was significant (F (1, 74) = 4.96, p = .03) indicating that literacy predicted participants' performance on Category Fluency above and beyond the effects of parental level education. Complete regression data for Letter Fluency are reported in Table 10. Complete regression data for Category Fluency are reported in Table 11.

Summary of Between Groups Hypotheses

Significant findings were observed concerning disparities between African American and Caucasian participants' reading abilities. While nearly half of African American participants were reading below their reported grade level, approximately one-third of Caucasian participants were reading below grade. Although literacy predicted participants' performance on five out of 12 measures of neuropsychological performance,

only two of the predictions were above and beyond the effects of demographic variables. Further, these two (Letter and Category Fluency) occurred in the opposite direction of what was expected.

Discussion

This study set out to examine the influences of cultural affiliation and literacy on the neuropsychological test performance of healthy college aged African Americans. In general, it was hypothesized that cultural affiliation (defined as acculturation and racial identity), and literacy (defined as grade level reading ability) would predict African American's neuropsychological test performance above and beyond the effects of demographic variables such as age, SES, and level of education. With few exceptions, this overall aim was not demonstrated. The following discussion seeks to take a closer look at the findings of this study in an effort to determine why they were not comparable to similar studies (i.e., Albert & Teresi, 1999; Baker, Johnson, Velli, & Wiley, 1996; Kennepohl, 1996; Manly, 1996; Manly, Jacobs, Touradji, Small, & Stern, 2002; Manly, Byrd, Touradji, and Yaakov, 2004; Manly, Miller et al., 1998; Welsh et al. ,1995) that found cultural affiliation and literacy to be predictive of African Americans' performance on measures of neuropsychological functioning above and beyond the effects of demographic variables. This discussion will begin with a brief review of these studies. A discussion of how the current study compares to previous studies will follow this review. Following this, there will be a discussion of the strengths and weaknesses of this study. This discussion will conclude with suggestions for future research.

This study was largely guided by the small, but growing, body of research that examines the influences of culture and literacy on African Americans'

neuropsychological test performance. Research demonstrates that acculturation and literacy explain unique variance in African Americans neuropsychological test performance when they are studied alone and in comparison to Caucasians. To this writer's knowledge, this study is the first to examine racial identity as a predictor of neuropsychological test performance.

Relationship between Acculturation and Neuropsychological Test Performance

Recall that prior to this study, the empirical relationship between African American acculturation and neuropsychological test performance had only been examined among a community sample of older adults (Manly, 1996 and Manly, Miller et al., 1998) and patients recovering from TBI (Kennepohl, 1996). Both of these studies demonstrated that acculturation explained unique variance in African Americans' test performance above and beyond the effects of demographic variables. Since the initiation of this study, one additional study examining African American acculturation and neuropsychological test performance had been published. This study, by Manly, Byrd, Touradji, and Yaakov (2004) examined the effects of acculturation and literacy on the neuropsychological test performance of nondemented African Americans over the age of 65. While more acculturated African Americans performed better on most measures than less acculturated African Americans, the effect of acculturation was diminished after accounting for age, years of education, and reading level.

The Present Study

This study considered the role of acculturation as a predictor of neuropsychological test performance under two conditions: African Americans compared to each other and African Americans compared to Caucasians. This study hypothesized

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that within the African American only group, African Americans higher in acculturation to the dominant Caucasian culture, as measured by lower scores on the AAAS, would perform better on the selected neuropsychological outcome measures than African Americans lower in acculturation. Concerning the between subjects group (African Americans and Caucasians), this study hypothesized that acculturation would explain unique variance between African Americans' neuropsychological test scores and Caucasians' test scores. Neither of these hypotheses was supported. It is likely that although the AAAS has been useful in predicting the performance of elderly and brain impaired African Americans, it may not be able to predict the performance of younger unimpaired African Americans. This may be due in part to the unidimensional nature of this scale, as well as generational differences from their older counterparts that have been examined in the previous studies discussed in this paper.

It is useful to provide a brief discussion of unidimensional and multidimensional scales of acculturation. According to Smith (2003), scales of acculturation are based on one of two models: unidimensional or multidimensional. Unidimensional models are characterized by the abandonment of one's own culture in favor of a different, usually more dominant culture. This change in cultural identity is presumed to be linear in nature and occurs over time (Olmeda, 1979 as cited in Smith, 2003). The chief disadvantage of this model is that it fails to recognize individuals who are capable of maintaining their own cultural identity as well as acquiring the values and beliefs of the dominant culture. Such a person is considered bicultural, and this type of functioning is recognized within multidimensional models (Ward, 2001 as cited in Smith, 2003). Smith (2003) summarizes stating that unidimensional models of acculturation are overly simplistic

compared to the broader and more inclusive framework of multidimensional models. For example, in addition to being able to identify bicultural individuals, multidimensional models are also able to capture persons who do not identify with either cultural group (their own or the dominant culture). While the AAAS assesses different aspects of traditional African American behavior (i.e., preference for African American objects such as media and art, religious beliefs and practices, knowledge of how to prepare traditional foods, traditional childhood experiences, and superstitions) each aspect taps into the same concept/ dimension (traditional African American behavior). Overall, Smith (2003) supports this writer's contention that the AAAS was not a good measure of acculturation for the sample used in this study. Unfortunately, beside one other measure that is also unidimensional, the AAAS is the only measure available to assess African American acculturation.

In addition to the possibility that the AAAS is not sensitive to individuals who endorse a more bicultural orientation, it is also possible that this measure did not predict performance in this study secondary to generational effects. It is probable that given the relatively young age of this non-impaired sample (72.9% between 18-20 years of age), that their life experiences were quite different from those of the older adults tested in previous studies. History indicates that when the older adults examined in previous studies were between 18-20 years of age, it was more difficult for them to engage in mainstream society to such a level that attainment of its values was possible to the extent that it is now. This supposition is supported by Manly et al. (1998) who note that African Americans over the age of 65 have experienced greater lifetime experiences of social, occupational, and educational segregation than younger African Americans.

Consequently, acculturation may be more strongly related to neuropsychological test performance among older African Americans than it is among younger African Americans. At this time in history multiculturalist attitudes that encourage knowledge of one's own culture as well as the culture of others is highly valued and encouraged. The AAAS contains a multiculturalist domain; however as indicated above, it is not truly multidimensional and thus does not adequately capture persons who are neither low nor high in acculturation, but move easily between their culture and that of the dominant society.

Relationship between Racial Identity and Neuropsychological Test Performance

Multiple studies indicate that stage of racial identity appears to play a key role in African American students' performance on measures of achievement such that more advanced stages of racial identity development appear to be predictive of better outcomes on measures of achievement (i.e., Davis, 2000; Lockett, 2002; Marks, 2001). As indicated previously, this study marks an initial effort to examine the influence of racial identity on neuropsychological test performance. Similar to previous studies, this study hypothesized that more advanced stages of racial identity would be predictive of better performance on measures of cognitive ability, namely neuropsychological ability, than lower stages. While this study demonstrated that racial identity could predict neuropsychological test performance, it was unable to predict performance beyond the effects of demographic variables such as SES and parental level of education. Additionally, while the Cross Racial Identity Scale (CRIS) was able to predict participants' test performance, some of the predictions occurred in unexpected directions. Specifically, unexpected relationships were observed between Pre-Encounter

Assimilation and Trails B, as well as between Multiculturalist Inclusive and the Wisconsin Card Sorting Test's Conceptual Level Response and Failure to Maintain Set scores.

In theory, Pre-Encounter Assimilation is a lower domain of racial identity and should have been negatively related to any measure of neuropsychological functioning. Instead, this study found it to be predictive of better performance on the Trails B visuosequencing task. A possible explanation for this finding centers on the description of Pre-Encounter Assimilation itself. Recall that individuals at the Pre-Encounter stage of racial identity development are more aligned with the majority racial group than their own (Worrell et al., 2001). It is therefore likely then that this stage of racial identity development is similar to the idea of acculturation where the individual's culture (or in this case racial identity) is rejected in favor of another culture. This possibility seems to fit with the identities that are contained within this domain (Assimilation, Miseducation, and Self-Hatred). Although this explanation seems to be plausible, it should be applied with caution pending future research. A failure to identify with one's own race should produce a sense of alienation and anxiety that would potentially limit one's ability to excel on a measure of cognitive ability.

The Multiculturalist Inclusive domain, being the highest level of racial identity, should have predicted better performance on the Wisconsin Card Sorting Test. Instead the findings of this study suggest that higher levels of racial identity are predictive of poorer performance on these domains of neuropsychological functioning. This is a very difficult finding to explain. It is possible that since the Multiculturalist Inclusive domain is part of the Internalization stage, the individual may lack enough interest in the

dominant culture to gain a full sense of its values and ways of perceiving the world. Recall that the Internalization stage indicates that while the person accepts mainstream culture, s/he is committed to his/her own culture and endorses its values over the values of the mainstream. This being the case, perhaps a person at this stage of racial identity development is tolerant of others but unwilling to relinquish his/her own identity for another race. Similar to the Pre-Encounter finding, this conclusion should be applied with caution pending future research that uses a measure of racial identity such as the CRIS as a predictor of neuropsychological test performance.

Relationship between Literacy and Neuropsychological Test Performance

While knowledge of patient's educational attainment is often used to account for lower scores in one group versus another (Lamberty, 2002), matching groups on educational attainment does not ensure groups are comparable (Manly, Jacobs, et al., 1998). Recall that Manly, Jacobs, et al. (1998) suggest that disparate school experiences may explain why African Americans continue to earn lower scores on cognitive measures after controlling for years of education. Manly, Jacobs, et al. (1998) and others (Albert and Teresi, 1999; Baker et al., 1996; Manly et al., 2002; Welsh et al., 1995) demonstrated that controlling for literacy explains unique variance in older African Americans' performance on measures of cognitive and neuropsychological functioning. Byrd, Jacobs, Hilton, Stern, and Manly (2005) and Manly et al. (2004) add support to these findings. Using the Benton Visual Retention Test, a measure of visuoperceptual functioning, Byrd et al. demonstrated that literacy was a better predictor of performance than years of education. Manly et al. (2004) demonstrated that literacy predicted neuropsychological test performance beyond the effects of demographic variables and acculturation.

Consistent with the studies just discussed, this study hypothesized that performance on a measure of reading would predict performance on measures of neuropsychological functioning above and beyond the effects of demographic variables. It was specifically expected that African Americans whose reports of their grade level reading ability was either consistent with or exceeded their actual grade level reading ability would perform better than those whose grade level reading ability fell below their report. This study also hypothesized that African Americans would have larger disparities between their reported grade level reading ability and their actual reading ability, and that literacy would explain test score differences between African American and Caucasian participants that remained despite controlling for age, gender, SES, and years of education (participants and their parents).

While slightly more African American participants were reading below their reported grade level reading ability than those who were reading at or above their reported grade level reading ability, the difference between these was not significant. Further, among African American participants, reading ability was not found to be related to performance on the selected measures of neuropsychological functioning. This finding is difficult to explain because reading ability, as considered for the entire sample (African Americans and Caucasians), did predict neuropsychological test performance. While it may be tempting to suggest that reading ability did not predict performance among the group of African American participants because the group was too small (lack of power), this conclusion would be incorrect. This conclusion would be incorrect because reading ability was not only predictive of performance among the entire sample; it was also predictive of performance among the group of Caucasians, which was slightly smaller

than the group of African Americans. The finding that reading ability was not predictive of performance among the group of African American participants is in contrast to the findings of the studies discussed above. Similar to the difficulties encountered with trying to use acculturation as a predictor of performance among younger African Americans, it is possible that the findings of this study are inconsistent with previous studies as a result of generational differences in access to the things of the mainstream culture. In this instance such things would include educational access that is similar to that had by Caucasians. Although this conclusion has merit, it must be approached with caution because of the body of literature that suggests that although younger and middle-aged African Americans have higher SES and greater access to a better quality of education than their older counterparts, there is still a body of literature which suggests that differences in academic achievement continue to exist between African Americans and Caucasians.

Considering the between group hypotheses that examined differences in reading ability between African Americans and Caucasians, as well as the ability of a measure of reading to predict performance beyond demographic variables, this study found that just over half of African American participants were not reading at their reported grade level compared to one-third of Caucasian participants. This finding was expected and corresponds to the above statement that improvements in SES and access to a higher quality of education for African Americans have not removed all disparities in academic performance. It should be noted that while disparities in academic performance still exist, they are not global. For instance, this study predicted, and demonstrated, that higher levels of literacy predicted better performance on the Perseverative Errors portion of the

WCST. Unexpected findings were observed when literacy was used to predict performance on the Category Fluency test. The results of this study suggest that higher levels of literacy predict poorer performance on this measure. Not only do higher levels of literacy predict poorer performance on Category Fluency, it explains unique performance variance beyond the effects of parental level of education. It is possible that literacy does not predict category fluency because they measure different domains. Specifically, it is likely that category fluency requires a level of abstraction that is not required for literacy. Therefore, the ability to read at a certain level may not adequately capture the ability to engage in higher cognitive abilities such as verbal fluency. A similar conclusion was reached by Manly et al. (2002), who observed that WRAT-3 reading scores did not explain differences between African American and Caucasian older adults on a measure of semantic fluency. Manly et al. (2002) attributed this to the possibility that a measure of literacy is not able to adequately capture aspects of education that are related to verbal fluency.

Strengths and Weaknesses

A significant strength of this study is that it marks an initial effort to examine the influence of culture on neuropsychological test performance among younger African Americans. Given that younger African Americans are at greater risk for traumatic brain injury compared to other groups, it is essential that health care providers understand how culture influences the findings of neuropsychological tests these patients will likely take. Proper understanding of test findings is important because inadequate or inappropriate interpretation of results may lead to inadequate and/or inappropriate service referrals. While the use of a control group (Caucasians) was also a strength of this study, its utility

was diminished by the fact that ethnicity could not be controlled in an effort to observe the effects of cultural affiliation. Recall that ethnicity could not be controlled because only African American participants received the measures of cultural affiliation. In retrospect, it is not clear how such an event could have been avoided as this study was based on the supposition that cultural affiliation among African Americans influenced their neuropsychological test performance. It therefore did not make sense to attempt to give Caucasian participants similar measures of cultural affiliation. Although the measure of literacy utilized in this study did not correlate with any of the neuropsychological outcomes among African Americans, its use still represented a strength of this study because it removed over reliance on number of years of education as a means of equating groups.

A weakness of this study is that it relied on a college sample that may have been overly homogenous in terms of variables such as participants' age and SES. The subsequent lack of variance may have diminished the findings of this study. This study might have been strengthened if it had retained the college sample and added a sample of similar aged, healthy community dwelling residents. Recruitment and matching difficulties in terms of variables such as level of education precluded the inclusion of a community sample. Another possible source of diminished variance could have been the use of a purely healthy sample. In citing Lowenstein et al. (1994), Kennepohl (1996) suggests that the influence of cultural variables may be more evident among cognitively impaired individuals. Kennepohl suggests that this may be particularly so among bicultural persons. According to him, such persons are able to move between their culture and the dominant culture upon which neuropsychological tests are largely based. It seems

that this "cultural flexibility" is lost with brain trauma, leaving the person more dependent on the values of his/her home culture. Culture, in this instance, is thus allowed to become more influential. It is possible that because this study relied on a healthy and likely bicultural sample that the influence of culture was significantly reduced. Recall that the demographically corrected mean T scores of the African American participants in this study were all within normal limits.

Future Research

A key area of research is the continued effort to design a truly multidimensional measure of African American acculturation. While Landrine and Klonoff's (1996) measure has been used as something of a gold standard in assessing African American acculturation, this study did not find it useful as a predictor of performance among college-aged African Americans. A second area of research includes further study of racial identity as a predictor of neuropsychological test performance. While this study demonstrated weak findings using the CRIS, much works needs to be done. Such future studies may improve health care provider's ability to interpret the test results of African Americans, and therefore improve healthcare service delivery.

Table 1a. Demographic Data: Participant Ethnicity, Gender, Level of Education, SES, Family Income, and Community of Origin

	Frequency	%
Ethnicity		
African American	44	54.3
Caucasian	37	45.7
Gender		
Male	22	27.2
Female	59	72.8
Participants' Year In College/ Level of Education		
Freshman	33	40.7
Sophomore	16	19.8
Junior	18	22.2
Senior	13	16.0
Participants' Family SES		
Poor	2	2.5
Working Class	17	21.0
Middle Class	35	43.2
Upper Middle Class	25	30.9
Wealthy	1	1.2

	Frequency	%
Participants' Annual Family Income		
<10K	1	1.2
10K to 20K	4	4.9
20K to 30K	11	13.6
30K to 40K	7	8.6
40K to 60K	16	19.8
>60K	37	45.7
Community Participant Raised In		
Rural	10	12.3
Suburban	45	55.6
Urban	25	30.9

Table1b. Demographic Data: Participants' Parental Level of Education

	Mothers		Fathers	
	Frequency	%	Frequency	%
Some High School	-	-	1	1.2
High School Diploma or GED	13	16.0	11	13.6
Business or Trade School	7	8.6	5	6.2
Some College	16	19.8	17	21.0
Associate or 2-Year Degree	12	14.8	10	12.3
Bachelor or 4-Year Degree	18	22.2	14	17.3
Some Graduate or Prof. School	3	3.7	6	7.4
Graduate or Prof. Degree	11	13.6	14	17.3

Table 2 Tscores for African American Participants' Performance on Measures of Neuropsychological Functioning

	N	Minimum	Maximum	Mean	Std. Deviation
Stroop WR[a]	44	31	64	47.39	6.75
Stroop can	44	20	61	46.07	8.11
Stroop CW[a]	44	25	76	48.11	10.42
Letter Fluency[b]	44	31	84	55.34	10.75
Category Fluency[b]	44	29	75	51.91	10.53
Trails A[b]	44	24	68	50.52	10.09
Trails B[b]	43	23	70	51.40	11.41
WCST Total Errors[c]	43	39	69	56.95	6.83
WCST Perseverative Errors[c]	43	32	80	60.67	11.95
WCST Conceptual Level Response[c]	43	40	61	45.21	4.45
WCST Failure to Maintain Set[b, d]	43	1	4	1.14	0.52
WCST Learning to Learn[b, d]	43	1	3	1.05	0.30

a. Corrected for age
b. Corrected for age, education, and ethnicity
c. Corrected for age and education
d. These values are not Tscores and are equivalent to the following coding scheme: 1 = >16%ile, 2 = 11-16%ile, 6-10%ile, 4 = 2-5%ile, ≤1

Table 3 African American Correlations between Demographic Variables and Neuropsychological Test Performance (N=44)

	P. Gender	P. Age	P. Educ.	M. Educ.	F. Educ.	SES
Stroop WR	-.319*	.168	.172	-.234	-.114	.020
Stroop CN	-.127	.109	.131	-.191	-.223	-.063
Stroop CW	.171	.095	.058	-.123	-.054	-.062
Letter Fluency	.018	.121	.004	.049	.039	-.303*
Cat. Fluency	-.219	.118	.064	.404**	.303*	.089
Trails A	-.136	-.056	-.094	-.030	.001	-.233
Trails B	-.149	-.126	-.155	-.111	.194	.092
WCST Total Errors	.099	-.165	-.171	.018	.124	.105
WCST Per. Errors	.014	-.158	-.152	-.027	.142	.049
WCST Con. Lev. Res.	-.006	-.020	.006	-.236	-.096	.143
WCST Fail. To Main. Set	-.089	.016	.071	-.158	.043	.155
WCST Lrng to Lrn	-.093	.072	.057	.118	-.229	-.011

* = p,.05
** = p<.01
P. Age = Participants' Age, P. Gender = Participants' Gender, P. Educ. = Participants' Reported Level of Education, M. Educ. = Participants' Mothers' Level of Education, F. Educ. = Participants' Fathers' Level of Education, SES = Socioeconomic Status, Stroop WR = Stroop Word Reading, Stroop CN = Stroop Color Naming, Stroop CW = Stroop Color Word, Cat. Fluency = Category Fluency, WCST = Wisconsin Card Sorting Test, WCST Per. Errors = WCST Perseverative Errors, WCST Con. Lev. Res. = WCST Conceptual Level Response, WCST Fail. to Main. Set = WCST Failure to Maintain Set, WCST Lrng to Lrn = WCST Learning to Learn

Table 4 Correlations between Acculturation Total Score, Racial Identity, Literacy and Neuropsychological Test Performance

	AAAS	PEA	PEM	PSH	IEAW	IA	MCI	Literacy
Stroop WR	-.202	-.032	-.196	-0.195	-.085	-.123	.034	-.027
Stroop CN	.009	-.032*	.054	-.140	-.037	-.040	-.145	-.001
Stroop CW	-.178	.053	-.061	-.033	-.182	-.178	.039	-.070
Letter Fluency	-.151	-.068	-.176	-.300*	-.134	.099	.024	-.210
Cat. Fluency	-.205	.087	-.041	-.139	-.207	.227	.187	-.263*
Trails A	-.165	-.062	-.201	-.107	.050	-.049	-.061	-.079
Trails B	-.167	.342*	.032	.177	-.008	-.032	.080	.147
WCST Total Errors	.123	.022	.122	.216	-.012	.094	.079	.190
WCST Per. Errors	.065	.018	.088	.245	.008	.134	.034	.237*
WCST Con. Lev. Res.	.071	.083	.146	.189	.127	-.222	-.325*	.113
WCST Fail. to Main. Set	.169	.129	.213	.265	.255	-.057	-.303*	.112
WCST Lrng to Lrn	.054	-.375*	-.214	-.013	-.263	.162	.142	-.052

* = p<.05

AAAS = African American Acculturation Scale, PEA = Pre-Encounter Assimilation, PEM = Pre-Encounter Miseducation, IEAW = Immersion-Emersion Anti-White, IA = Internalization Afrocentricity, MCI = Multiculturalist Inclusive, Stroop WR = Stroop Word Reading, Stroop CN = Stroop Color Naming, Stroop CW = Stroop Color Word, Cat. Fluency = Category Fluency, WCST = Wisconsin Card Sorting Test, WCST Per. Errors = WCST Perseverative Errors, WCST Con. Lev. Res. = WCST Conceptual Level Response, WCST Fail. to Main. Set = WCST Failure to Maintain Set, WCST Lrng to Lrn = WCST Learning to Learn

Note: Negative correlations were expected between AAAS and neuropsychological test performance, as well as between PEA, PEM, PSH, IEAW and neuropsychological test performance. Positive Correlations were expected between IA, MCI and neuropsychological test performance, as well as between Literacy and neuropsychological test performance.

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Table 5 Regression Data: Pre-Encounter Self-Hatred and FAS Letter Fluency (Within Groups)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.303a	.092	.070	11.99724	.092	4.235	1	42	.046
2	.383b	.146	.105	11.77047	.055	2.634	1	41	.112

a. Predictors: (Constant), Participants' Family SES
b. Predictors: (Constant), Participants' Family SES, Pre-Encounter Self-Hatred

ANOVA^c

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	609.5781926	1	609.5781926	4.235130514	0.0458366a
	Residual	6045.217262	42	143.9337443		
	Total	6654.795455	43			
2	Regression	974.4907234	2	487.2453617	3.516899317	0.0389365b
	Residual	5680.304731	41	138.5440178		
	Total	6654.795455	43			

a. Predictors: (Constant), Participant's family SES
b. Predictors: (Constant), Participant's family SES, Pre-Enounter Self-Hatred
c. Dependent Variable: FAST_RAW

Table 5 Regression Data: Pre-Encounter Self-Hatred and FAS Letter Fluency (Within Groups) Continued

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	59.158	6.379		9.273	.000
	Participant's family SES	-4.467	2.171	-.303	-2.058	.046
2	(Constant)	62.037	6.505		9.536	.000
	Participant's family SES	-3.605	2.195	-.244	-1.642	.108
	Pre-Enounter Self-Hatred	-.556	.343	-.241	-1.623	.112

a. Dependent Variable: FAS Letter Fluency Total Raw Score

Table 6 Regression Data: Literacy and Category Fluency (Within Groups)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	0.432	0.186	0.146	5.207511	0.186	4.591	2	40	0.016
2	0.49	0.24	0.182	5.09548	0.054	2.778	1	39	0.103

a. Predictors: (Constant), feducation, meducation
b. Predictors: (Constant), feducation, meducation, Actual grade level reading ability

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	249.04049	2	124.520246	4.59176371	0.016025307
	Residual	1084.7269	40	27.11817374		
	Total	1333.7674	42			
2	Regression	321.17338	3	107.0577937	4.12332455	0.012408031
	Residual	1012.5941	39	25.96395028		
	Total	1333.7674	42			

A Predictors: (Constant), feducation, meducation
B Predictors: (Constant), feducation, meducation, Actual grade level reading ability
C Dependent Variable: cat

Table 6 Regression Data: Literacy and Category Fluency (Within Groups) Continued

Model		Coefficients[a]				
		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	12.416	2.852		4.353	0.000
	meducation	0.945	0.437	0.330	2.159	0.037
	feducation	0.521	0.43	0.185	1.213	0.232
2	(Constant)	16.11	3.563		4.520	0.000
	meducation	0.863	0.431	0.301	2.002	0.052
	feducation	0.554	0.421	0.197	1.317	0.196
	Actual grade level reading ability	-2.118	1.271	-0.234	-1.667	0.104

a. Dependent Variable: Category Fluency

Table 7 African American and Caucasian Correlations between Demographic Variables, Literacy and Neuropsychological Test Performance (N=81)

	P. Age	P. Gender	P. Educ.	M. Educ.	F. Educ.	SES	Literacy
Stroop WR	-.300**	.099	.184	-.216	.014	.147	-.116
Stroop CN	-.092	.047	.058	-.093	-.101	-.055	-.105
Stroop CW	.057	-.009	-.009	.010	.061	-.018	-.110
Letter Fluency	-.130	.219	.166	.065	.019	-.324**	-.224*
Cat. Fluency	-.101	.098	.079	.351**	.377**	.096	-.288**
Trails A	-.121	.050	.031	-.046	-.076	-.218	.003
Trails B	-.162	-.023	-.059	-.113	.027	.000	.301**
WCST Total Errors	-.030	-.036	-.019	-.034	-.068	-.013	.292**
WCST Per. Errors	-.069	-.052	-.034	-.061	-.054	-.016	.329**
WCST Con. Lev. Res.	-.106	.096	.125	-.239**	.254**	.024	.159
WCST Fail. to Main. Set	-.141	.077	.101	-.210	-.143	.000	.117
WCST Lrng to Lm	-.090	.020	.015	.009	-.130	.033	-.132

* = p<.05

** = p<.01

P. Age = Participants' Age, P. Gender = Participants' Gender, P. Educ. = Participants' Reported Level of Education, M. Educ. = Participants' Mothers' Level of Education, F. Educ. = Participants' Fathers' Level of Education, SES = Socioeconomic Status, Stroop WR = Stroop Word Reading, Stroop CN = Stroop Color Naming, Stroop CW = Stroop Color Word, Cat. Fluency = Category Fluency, WCST = Wisconsin Card Sorting Test, WCST Per. Errors = WCST Perseverative Errors, WCST Con. Lev. Res. = WCST Conceptual Level Response, WCST Fail. to Main. Set = WCST Failure to Maintain Set, WCST Lrng to Lm = WCST Learning to Learn

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Table 8 Means and Standard Deviations[a] for the Total Sample (African Americans and Caucasians, N=81)

	N	Minimum	Maximum	Mean	Std. Deviation
WRAT-III Reading Grade Level Equiv.	80	1	3	1.48	0.59
Stroop WR	81	65	194	104.72	17.23
Stroop CN	81	29	100	75.40	11.92
Stroop CW	81	18	71	44.67	10.62
Letter Fluency	81	21	90	44.00	11.36
Category Fluency	81	7	34	21.46	5.26
Trails A	81	12	59	23.99	7.66
Trails B	80	30	166	55.86	24.36
WCST Total Error	78	4	45	12.32	7.12
WCST Perseverative Errors	78	2	24	6.81	3.79
WCST Conc. Level Response	78	60	87	65.04	5.00
WCST Failure to Main. Set	78	0	3	0.33	0.62
WCST Learning to Learn	78	-10.23	8.89	0.27	2.64

a. Means and standard deviations based on participants raw scores.

Coding scheme for the WRAT-III Reading Grade Level Equivalent: 1=Post High School, 2=High School, 3=Lower than High School. Stroop WR = Stroop Word Reading, Stroop CN = Stroop Color Naming, Stroop CW = Stroop Color Word

Table 9 Grade Level Reading Ability by Ethnicity.

	Ethnicity	
	African American	Caucasian
Reading at Grade Level	47.7% (N = 21)	69.4% (N = 25)
Reading below Grade Level	52.3% (N = 23)	30.6% (N = 11)
Post High School	47.7% (N = 21)	69.4% (N = 25)
High School	45.5% (N = 20)	27.8% (N = 10)
Lower Than High School	6.8% (N = 3)	2.8% (N = 1

Table 10 Regression Data: Literacy and Letter Fluency (Between Groups)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	0.324a	0.105	0.094	10.86162748	0.105	9.157	1	78	0.003
2	0.384b	0.148	0.126	10.6676464	0.043	3.863	1	77	0.053

a. Predictors: (Constant), Participant's family SES
b. Predictors: (Constant), Participant's family SES, Literacy

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1080.341282	1	1080.341282	9.15737847	0.003355[a]
	Residual	9202.046	78	117.9749515		
	Total	10282.388	79			
2	Regression	1519.889167	2	759.9445836	6.67797365	0.002116[b]
	Residual	8762.498333	77	113.7986796		
	Total	10282.3875	79			

a. Predictors: (Constant), Participant's family SES
b. Predictors: (Constant), Participant's family SES, Literacy
c. Dependent Variable: Letter Fluency

Table 10 Regression Data: Literacy and Letter Fluency (Between Groups) Continued

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	57.899	5		12.259	0.000
	Participant's family SES	-4.492	1	-0.324	-3.026	0.003
2	(Constant)	63.267	5.383		11.753	0.000
	Participant's family SES	-4.332	1.460	-0.313	-2.967	0.004
	Literacy	-3.972	2.021	-0.207	-1.965	0.053

a. Dependent Variable: FASt_raw

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Table 11 Regression Data: Literacy and Category Fluency (Between Groups)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	0.437	0.191	0.170	4.8591367	0.191	8.859	2	75	0.000
2	0.492	0.242	0.211	4.73580266	0.051	4.957	1	74	0.029

a. Predictors: (Constant), Participant's father's education, Participant's mother's education
b. Predictors: (Constant), Participant's father's education, Participant's mother's education, Literacy.

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	418.3387746	2	209.1693873	8.85890184	0.00035171
	Residual	1770.841	75.000	23.6112095		
	Total	2189.179	77.000			
2	Regression	529.520	3	176.507	7.870	0.000
	Residual	1659.659	74.000	22.428		
	Total	2189.179	77.000			

a. Predictors: (Constant), Participant's father's education, Participant's mother's education
b. Predictors: (Constant), Participant's father's education, Participant's mother's education, Literacy
c. Dependent Variable: Cat_raw

Table 11 Regression Data: Literacy and Category Fluency (Between Groups) Continued

Model		Coefficients[a]		standardized Coefficients		
		Unstandardized Coefficients				
		B	Std. Error	Beta	t	Sig.
1	(Constant)	13.006	2.082		6.248	0.000
	Participant's mother's education	0.661	0.309	0.239	2.135	0.036
	Participant's father's education	0.756	0.295	0.287	2.565	0.012
2	(Constant)	16.625	2.600		6.395	0.000
	Participant's mother's education	0.635	0.302	0.230	2.106	0.039
	Participant's father's education	0.682	0.289	0.259	2.357	0.021
	Literacy	-2.032	0.913	-0.228	-2.227	0.029

a. Dependent Variable: Category Fluency

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