THE CLINICAL UTILITY OF THE WASI-II AND ITS ASSOCIATION WITH ACCULTURATION AMONG ARAB AMERICAN ADOLESCENT MALES

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ABSTRACT

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Neuropsychologists attempting to provide an ethical, and clinically useful assessment of intellectual capability among immigrant youth face great challenges. This is because young immigrants undergo an acculturation process that has a profound effect on cognitive development, and the reliability and validity of norm-referenced intelligence tests. This study explored the clinical utility of the WASI-II among male adolecent Arab Americans (n = 80). It also explored the association between proxy and systematic acculturation factors with verbal and language-reduced IQ performances. The possible moderating influence of accutluration on the predicitive utility of IQ for academic outcomes was also examined. Results showed that proxy acculturation variables were not associated with WASI-II outcomes. Results showed lower verbal than language-reduce IQs, but that difference occurred in the context of signficant variability within and between each IQ index. The difference between each IQ index was mostly associated with sociodemographic factors. English language competence was associated with performance on Vocabulary. No acculturation variable was assocaited with language-reduced IQ after controlling for parent income. Performance on Matrix Reasoning was not influenced by any sociodemographic or acculturation factors. Estimated Full-Scale IQ was the single best predictor of basic reading and math skills, which had moderate level association. Acculturation did not moderate the predicitive association between estimated FSIQ and academic outcomes. Important clinical and research implications, and limitations were outlined.

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CHAPTER I: INTRODUCTION

The flood of immigrants to the United States (US) over the past two decades is only matched by the great immigration waves of the early 20th century (Portes & Rumbaut, 2006). The new wave of immigration is occurring in the contexts of a substantial demographic shift. Currently, over 50 percent of school age population in the US is comprised of ethnic minorities (National Center for Education Statistics, 2009). By 2020, first and second generation immigrant students are projected to make up approximately 40 percent of public school students (Portes & Rumbaut, 2006). The factions of ethnic and racial minority groups shape a population mosaic that is incredibly diverse.

Neuropsychologists are sometimes asked to assess students from a wide range of cultural, linguistic, and ethnic backgrounds, for a multitude of reasons, using standardized norm-referenced tests. The assessment of intelligence is one of the most critical components of a comprehensive neuropsychological evaluation and it provides a valuable metric for evaluating the learning potential of students, the integrity of neurocognitive functioning, and in clarifying differential psychological and neurodevelopmental diagnoses (Sattler, 2008; Lezak, Howieson, Bigler, & Tranel, 2012). Neuropsychologists administer norm referenced and standardized tests to immigrant youth. If individuals performed significantly worse than the normative mean then such performances can be interpreted as reflecting brain pathology (Nell, 2000; Lezak et al., 2012). However there are a number of factors that can lead to poor performance that do not stem from brain pathology. For instance effort, fatigue, and pain are common factors neuropsychologist try to rule out (Tombaugh, 1996; van der Linden, Frese, & Meijman, 2003; Grigsby, Soenberg, & Busenbark, 1995; Brickman, Cabo, & Manly, 2006). Culture and language factors also influence performance on intelligence tests (Nell, 2000). Unlike other non-target

factors such as effort level, there are no clear ways of understanding how cultural background or varying bilingual language competence can influence performance on intelligence tests. Cultural and linguistic experiences influence cognitive development and behavior, but research examining the role of cultural and language factors on intelligence test remains scarce (Kennepohl, 1999; Mindt, Burd, Saez, & Manly 2010).

The limited available multicultural assessment research with immigrants has been done with larger ethnic groups like Hispanic (e.g., Nieves-Brull, 2006) and Asian Americans (Razani et al., 2007) without careful analysis of how individual and group level factors relate to assessment outcomes. Further, there is very little research available with smaller ethnic minority groups that possess unique and salient cultural and language factors. One of those newly arriving group of immigrants to the US are Arab Americans. There are important cultural and demographic attributes of Arab Americans that neuropsychologists need to be mindful of when providing evaluating Arab American youth. Examining how those factors influence intellectual assessment will provide empirically based guidance to enhance multicultural assessment competence which is currently non-existent.

As with most ethnic groups in the US, there is substantial heterogeneity within Arab Americans. Arab Americans are those who may have voluntarily or involuntarily immigrated from any of the 22 Arab speaking countries (Gregg, 2005). It is not clear what the exact number of Arab Americans residing in the US is, but estimates show a range of 1.5-3.5 million (AAI, 2009; Brittingham & de la Cruz, 2005). Arab Americans immigrated to the US in three major waves that span over 100 years. Each wave consisted of immigrants with diverse histories (Wave-1: 1880-1920; Wave-2: 1938-1958; Wave-3: 1965-current; Gregg, 2005). The first wave Arab Americans were mostly Christian voluntary immigrants with light skin, and were well

educated. Arab American immigrants from the second wave were comprised of volunteer immigrants that resembled those of the first wave, but also included a substantial number of Muslim Arab Americans who were fleeing from conflict and instability in their homelands and sought refugee status. The third wave immigrants were mostly Muslim Arab Americans, who have less education, and many came because of political conflicts and economic instability in their homeland (Gregg, 2005). These three waves resulted in experiences that varied depending when these immigrants came, where they came from, and where they settled. As a result, these unique acculturative experiences may likely have specific associations with how well a particular youth may perform on measures of intelligence.

The challenges associated with assessing immigrant youth are wide ranging. Young immigrants may be developing cultural and language competencies across English and their native language simultaneously. It has been argued that culture influences the content of tests, the testing process, frames of thinking, and the development of the neural underpinning of cognition (Nell, 2000; Ardila, 2005; Park & Huang, 2010). Culture involves the development of learned traditions and living styles that are shared by a particular group of society resulting in the internal representations of knowledge, values, beliefs, and modes of behavior (Ardila, 2005). It follows that the acculturation process is likely to influence how knowledge is acquired, stored, and expressed.

Acculturation is a process of cultural and psychological change that results from when individuals interact across multiple cultures (Sam & Berry, 2010). Conceptually, acculturation was viewed as a unidimensional process where an individual sheds his culture of origin at the expense of assimilating to the new host culture (Sam & Berry, 2010). It is now accepted that acculturation is best viewed as a bidimensional process that involves simultaneous maintenance

of the culture of origin and assimilation to the host culture (Berry et al., 2005). Others have also pushed for evaluating specific bidimensional acculturative levels across specific domain within the host and heritage cultures (Rudmin, 2009). For instance, a person can be bilingual and may only identify with the heritage culture, but is much more culturally competent within the host culture. Ultimately, characteristics of the acculturating individual (e.g., acculturation levels, country of origin, age, gender, education background, and SES), testing process (e.g., individual, impersonal, specific communication requirements), and those of the test (e.g., translated tests, normative sample and psychometrics) are factors to consider whenever assessing an immigrant youth. These variables complicate the interpretation of performances across diverse cultural groups.

The best available IQ tests are normed in accordance with mostly general US population census demographic factors, such as age, gender, parental education level, geographic region, and racial or ethnic backgrounds (Sattler, 2008). Most immigrant youth are not adequately represented by these general normative classifications. This is significant because it violates the assumption of comparability of obtained scores with available norms. Namely, acculturating youth are less likely to meet developmentally appropriate expectations of cognitive, cultural, and linguistic knowledge acquisition that is directly assessed by the most widely used intelligence tests (Flanagan & Harrison, 2012; Flanagan & Ortiz, 2007). Even the inclusion of those from Asian and Hispanic backgrounds in some normative samples does not include the variability of the immigrant experience associated with their unique acculturation experiences (Ardila, 2005; Nell, 2000). It has also not been investigated whether there are causal associations between levels of intellectual capability and adoption of particular acculturation orientations. Questions such as, “Is it possible that those with higher intelligence are likely to adopt or assimilate at a

faster rate than those with a lower IQ?" cannot be examined until our basic understanding of how acculturation patterns relate to performances on intelligence tests is better developed. Acculturation is a dynamic process influenced by the level of cultural exposure, level of linguistic competence, and the development of a cultural identity (Berry et al., 2003).

Additionally, the content of an intelligence test is shaped by a unique cultural framework and experiences. The development of intellectual tests occurred mostly in the U.S., and to a lesser extent in Europe (Boake, 2002). As a result, the conception of intelligence and how it is assessed reflects the values and experiences associated with Western culture (Neisser et al., 1996, Nell, 2000). Those from non-Western backgrounds may not share or be familiar with the culturally implicit Western values, and with the modes of perception, reasoning, and knowledge acquisition involved with individual standardized testing (Nell, 2000; Park & Huang, 2010). A lack of exposure to the values and content of the test, as well as unfamiliarity with the test taking process, or what has been referred to as *test wiseness*, has been documented to attenuate overall IQ performance (Ardila, 2005; Anastasi, 1982; Flanagan & Harrison, 2012; Razani et al., 2007). Consequently, the results from IQ assessments with immigrant youth are possibly more reflective of cultural and linguistic competence than intellectual capability.

It is often assumed that if language demand is controlled, then an equitable and valid assessment is possible (Rhodes et al., 2005). This is often accomplished through the use of interpreters and interpreted tests, or the use of language-reduced tests with immigrant youth (Flanagan & Harrison, 2012). Language-reduced or nonverbal tests do not demand any verbal language expression by the examinee, and they require limited, if any, verbal instruction during their administration (Sattler, 2008). For instance, over 80 percent of psychologists who work with children were surveyed and reported using nonverbal tests as a primary approach for

evaluating English Language Learners (Rhodes et al., 2005). However, the sole use of nonverbal or performance based tests is inherently limited in that it only surveys a limited set of cognitive skills (Flanagan & Harrison, 2012). Additionally, reducing language based instruction and expression does not eliminate culturally-mediated communication that occurs during the testing process as well as the use of culturally-fused test content and stimuli (Nell, 2000). Furthermore, the predictive validity of such tests is lower than tests that require both verbal and language-reduced performances (Lohman et al., 2008). The performance results from language-reduced tests, or those obtained with the aid of interpretation, are ultimately interpreted based on normative samples that are unlikely to be representative of immigrant youth. The development of ethnic or racial specific norms is rare and when they are available are deemed controversial because they do not address why there is a difference to begin with (Manly et al., 2005). Another issue to consider are those immigrant youth who learned their native and English language simultaneously and may even prefer using English. In these instances, it is likely more appropriate to use a verbal and nonverbal combined IQ test, but it remains unclear how language and cultural levels relate to how they perform on combined IQ tests. In summary, interpretation of test outcomes will be misguided without a clear understanding of how acculturation variables factor into verbal and language-reduced test performances especially among immigrants who ae bilingual.

A promising theoretical framework has been introduced by Flanagan and Ortiz (2007). It attempts to evaluate systematically the influence of the language requirements and cultural loadings embedded within IQ tests and the interactive role of the individual's acculturative characteristics. The framework is called the Cultural-Language Interpretative Matrix (C-LIM), and it was developed through the consensus of clinical and research experts on the assessment of

immigrants. The framework is structured along linguistic demand and cultural loading dimensions such that each dimension can have low, moderate, or high saturation, thus resulting in a three by three matrix. The C-LIM model predicts a declining pattern of scores as a function of limited language competence and level of acculturation. It is assumed that the decline in performance will be more pronounced on tests that are more culturally-and-linguistically-loaded than on novel and language-reduced tests (Flanagan & Ortiz, 2007). A specific matrix was developed for 20 of the most widely-used standardized IQ tests, including the Wechsler scales, which are considered the gold standard of intellectual assessment and are the most frequently used tests when evaluating students (Flanagan & Ortiz, 2007; Sattler, 2008).

The clinical utility of the C-LIM framework has been examined in mostly dissertation studies (Dynda, 2008; Sotelo-Dynega, 2007; Verdorosa, 2007; Nieves-Brull, 2006). The results from these studies were generally supportive of the clinical utility of the C-LIM when examining group mean differences. However, there has been two peer-reviewed published studies, finding mixed support for the C-LIM (Kranzler, Flores, & Coady, 2010; Styck & Watkins, 2013). Kranzler and colleagues (2010) found no support for the C-LIM predicted patterns when conducting within-subject instead of between group analyses. Styck and Watkins (2013) also did not find significant clinical utility of the C-LIM approach to differentiate between ELL and non-ELL populations using the Wechsler Intelligence Scale for Children, Fourth Edition (WISC-IV). The C-LIM framework may improve test selection and performance interpretation by understanding how acculturation factors and test factors interact to allow for better differentiation between differences and deficits. However, studies that have examined the C-LIM did not assess how levels of acculturation correspond to the classification patterns of the subtests. It is unclear if a more systematic evaluation of the acculturation process will improve our

understanding of how acculturation relates to performances on verbal and language-reduced IQ. Also, there have been no verification if the C-LIM classification pattern correspond to direct measures of acculturation orientations and linguistic competence levels.

According to the American Psychological Association (APA), developing multicultural competence is essential for practitioners and trainers in meeting general competency and ethical imperatives (APA, 2003). The APA published two guiding documents in 2002 and 2003 (Guidelines on Multicultural Education, Training, Research, Practice, and Organizational Change for Psychologists; Ethical Principles and Codes of Conduct) that highlight the importance of moving away from a monoculture lens towards recognizing and embracing a multicultural framework that will lead to more precise assessment and ultimately more effective treatment (APA, 2002, 2003). Mindt, Burd, Saez, & Manly (2010) have published a call to action for increasing culturally competent neuropsychological services for ethnic minority populations. They argued that clinical neuropsychology as a field has not kept pace with the needs of ethnic minority clients. A crucial component in developing cultural competence among clinicians is increasing one's knowledge base about their clients, raising awareness of their own potential biases, and continually enhancing culturally-sensitive services (Eccles, Wong, & Peck, 2006). With any group of recent immigrants, neuropsychologists will increase their cultural competence by considering how acculturation levels and the association of other relevant demographic factors (e.g., age, gender, SES) with intellectual assessment outcomes. Improved understanding of the acculturation influence on intellectual performance will improve distinguishing between performances that reflect cultural factors or cognitive deficits.

This study was designed to make multiple contributions to the multicultural neuropsychological assessment literature. This was accomplished by using the C-LIM

predictions as a guide to understand how Arab American youth, an underrepresented population, performed on standardized verbal and language-reduced IQ tests. Arab Americans are a heterogeneous ethnic group that present with unique and salient cultural factors that are likely to affect how they perform on IQ tests. No studies have examined the clinical utility of IQ tests among Arab American youth. The contrast between Arab American's heritage host culture presents a unique opportunity to examine the association between cultural and language development with IQ tests. The study will be conducted by examining the association between proxy and systematic measures of acculturation with verbal and language-reduced IQ tests. Also, the predictive association between IQ performance and academic achievement was examined and whether there was a moderating effect of the acculturation levels toward US mainstream culture. This was the first study to directly examine the influence of acculturation and predictive utility of a commonly used IQ tests (i.e., WASI-II).

In the next chapter, a summary history and the clinical utility of IQ assessment among ethnic and racial minorities will be outlined. Also, the implications of culture for cognition is summarized. A review of the available literature on the association between acculturation and cognitive tests is synthesized. The chapter also provides a detailed overview of the acculturative experience of Arab Americans.

CHAPTER II: LITERATURE REVIEW

What is Intelligence?

There has been considerable debate over the exact nature of human intelligence since ancient times. There is not a common and widely used conception of intelligence. Historically, people across many different cultures have conceptualized intelligence using a wide range of human cognitive, emotional, and behavioral attributes identified at the individual, group, and social levels of human functioning. Some have argued that attempting to define intelligence is a futile enterprise (Lynn, 2006). Despite the elusive nature of intelligence, several models of intelligence have been proposed that have gained some acceptance.

Howard Gardner's theory of Multiple Intelligence has had strong appeal and is regarded as one of the most complete conceptions of intelligence (Gardner, 2011). The central tenet of the Multiple Intelligence theory is that there are multiple and independent intellectual capabilities. Such abilities include visual-spatial, verbal-linguistic, bodily-kinesthetic, logical-mathematical, interpersonal, musical, intra-personal, and naturalistic abilities. Although all humans are assumed to possess these capabilities, they can vary across individuals and across cultural groups. The values of a particular society may drive the development of one form of intelligence over another. For instance, in developed societies, the acquisition of literacy is valued and cultivated, and as a result abstract verbal reasoning and acquired culturally relevant information are considered foundational to overall intelligence (Gardner, 1985).

Among the most prominent theoretical conceptions of intelligence has been the Triarchic Theory of Intelligence proposed by Robert Sternberg (1985). The theory defines intelligence as a set of interactive mental abilities that are directed toward purposive adaptation, selection, and shaping of real-world environments relevant to one's life (Sternberg, 1985). The theory's

foundation is based on three discrete yet interactive factors: analytical intelligence, which refers to abstract problem-solving abilities; creative intelligence, which refers to the processing of new and novel situations while using past or momentarily acquired knowledge; and practical or contextual intelligence (i.e., street smarts), which refers to adapting to changing environments. Despite the positive reception and intuitive face validity of these two theories, there has been minimal empirical support and practical utility when compared to the psychometric conceptualizations of intelligence.

The psychometric approach has attracted the most attention and research support of any conception of intelligence (Sattler, 2008). It is the basis of the most widely used assessment tools of intelligence (Sattler, 2008). It has been argued that measuring intelligence is one of psychology's most important contribution (Rushton & Jensen, 2004). Today, the construct of intelligence has become almost synonymous with the psychometric derived Intelligence Quotient (IQ). At the heart of this approach is that intelligence is a phenomenon that can be reliably and objectively measured. Many psychometric tests measure cognitive abilities that are believed to be indicative of intelligence, such abstract reasoning, fluid problem solving, level of acquired knowledge, and processing speed (Sattler, 2008). These capabilities are assumed to be normally distributed among all humans. The emergence and dominance of the psychometric approach arose from over a century of research and development that began in Europe, but mostly matured in United States, and it has become the foundation for nearly all IQ tests.

The Utility of IQ Assessment

Assessment of intellectual ability has become a pervasive practice across vocational, educational, and clinical settings (Sattler, 2008). One of the most frequent applications of IQ is in assessing the learning potential of students. The development of standardized intelligence tests

arose from the societal need to differentiate scholastic ability and identify cognitively normal and abnormal children (Sattler, 2008). There is moderate to strong correlation between IQ and academic achievement (Naglieri & Borenstein, 2003; Rhode & Thompson, 2007; Watkins, Lei, & Canavaz, 2007; Sattler, 2008; Wechsler, 2011). Performance on global intelligence measures is the strongest single predictor of academic achievement and total educational attainment (Sattler, 2008). There is also a strong predictive relationship between IQ and academic achievement as measured by grade point average (GPA), the Scholastic Aptitude Test (SAT), the American College Test (ACT), and psychometrically normed academic achievement tests of reading, writing, and mathematics (Naglieri & Borenstein, 2003; Rhode & Thompson, 2007; Watkins, Lei, & Canavaz, 2007; Sattler, 2008; Wechsler, 2011). Additionally, specific cognitive abilities relate differently to various academic outcomes. In general, global cognitive ability is equally predicative of reading and math outcomes among school age children (Sattler, 2008; Rhode & Thompson, 2007). However, IQ tests with greater emphasis on spatial ability are better predictors of mathematical outcomes than verbally loaded ability tests among middle school and high school students (Rhode & Thompson, 2007; Lubinski et al., 2001).The use of IQ is likely to continue being an important clinical tool for evaluating the learning potential of students.

It is estimated that nearly two million IQ tests are administered to school-age children each year (Watkins, Lei, & Ganivez, 2007; Budd, Felix, Ponidexter, Naik-Polan, & Sloss, 2002). Not only is IQ a strong predictor of academic achievement, it is also viewed to have a causal association with academic achievement (Watkins, Lei, & Gaivez, 2007). Neuropsychologists have traditionally used IQ for selection, evaluation, or diagnostic purposes. Frequently, IQ tests are used to diagnose brain pathology that may underlie occupational, behavioral, adaptive, or academic difficulties. Definitions of cognitive impairment, by various organizations (e.g.,

International Classification of Diseases-Tenth Edition; Diagnostic and Statistical Manual-Fifth Edition) are partially conceptualized based on IQ performance (Sattler, 2008). Although the new definitions of learning disabilities under federal special education laws (e.g., IDEA, 2004) do not require the administration of IQ tests to meet eligibility criteria, it remains the case that the etiology of a learning disability is best viewed as a result of underlying neurocognitive processing deficits which have been reliably documented by cognitive tests (MacMillan & Forness, 1998).

Including an IQ measure as part of a comprehensive neuropsychological evaluation provides important clinical information (Flanagan, Ortiz, & Alfonson, 2007). Children and adolescents with cognitive processing differences can look behaviorally similar. Implemented interventions can be misapplied, and ultimately be ineffective without understanding the nature of the child's cognitive profile (Newton & McGrew, 2010; Lezak et al., 2012). The information gained from including intelligence tests enables clinicians to determine better the status of cognitive strengths and weaknesses (Newton & McGrew, 2010; Flanagan & Harrison, 2012; Lezak et al., 2012). Cognitive assessment also provides important clinical information for documenting and monitoring neurological pathology.

The IQ test is an integral component of neuropsychological evaluations because it provides an anchor for expected level of performance on other cognitive, behavioral, academic, and adaptive outcome measures (Fuster, 2008; Lezak et al., 2012). Such evaluations are conducted to survey brain-behavior integrity. Cognitive tests are sensitive to the effect of developmental complications and acquired neurological insults (Sattler, 2008; Lezak et al., 2012). Adverse events occurring in utero or postnatal can alter brain development, and they often correspond to focal or global cognitive impairments (Breaslau, Johnson, & Lucia, 2001). For

instance, individuals who have experienced injuries through exposure to toxins, strokes, or blunt trauma to the brain are likely to experience significant cognitive dysfunction when compared to non-injured controls (Fuster, 2008). Pre-natal exposure to certain substances (both illicit and licit) is also associated with an array of neuropsychological deficits, ranging from focal to more global cognitive impairments to specific language or visual-spatial processing deficits (Delaney-Black, Covington, Ondersma, Nordstromklee, et al., 2002). A variety of genetic (e.g., neurofibromatosis) and medical disorders (e.g., brain tumors, hydrocephalus, epilepsy) also affect brain functioning and intellectual development (Breier, Fletcher, Wheless, Clark, Cass, & Constantionou, 2000; Jokeit & Ebner, 2002). A neuropsychological evaluation can provide a more nuanced and sensitive approach to assessing brain dysfunction that may not be detected by traditional neurological studies, but interpretation of neuropsychological assessment is jeopardized without a reliable and valid measure of global baseline intellectual capability. In these clinical contexts, it is insufficient to only use nonverbal assessment. Surveying language based reasoning and processing is often clinically necessary to aid differential diagnoses. Without understanding how language development and culture influence language mediated tests could lead to diagnostic errors. Despite the wide use of IQ tests and greater psychometric robustness, there are significant controversies surrounding their use with individuals who were not well represented during the normative and content development of these tests.

There have been consistent and persistent findings that show significant cross-racial and cross-ethnic differences which have affected clinical utility and contributed to socio-political controversies (Rushton & Jensen, 2005; Neisser et al., 1996). These findings show significantly higher IQ performance of people who of White and East Asian background and much lower performances of people from Black and Hispanic background (Rushton & Jensen, 2005). These

patterns have been documented across a wide range of age groups but mostly involving adult samples (e.g., Brooks-Gunn, Klebanov, & Duncan, 1996; Rushton & Jensen, 2005). As a result of these differences, the appropriate use and clinical utility of IQ tests among ethnic and racial minorities and those from non-Western and non-English speaking cultures remains controversial (Neisser et al., 1996). Considerable debate and research has been dedicated to investigating these issues (Neisser et al., 1996). The focal point of the controversy stems from the explanations put forth to explain performance differences. For instance, some have interpreted the persistent cross-racial differences in performance as reflecting differences in inherent ability. Others have attributed the differences to possible biasing factors associated with the tests, testing environments, and cultural and environmental context of development (Neisser et al. 1996). What follows is a brief survey of this controversy to highlight the complex interaction between cultural, environmental, biological factors in shaping intellectual development and assessment.

Race, Culture, and Intellectual Assessment

Explanations of cross-ethnic and cross-racial IQ differences have essentially fallen along two schools of thought, namely the Universalists (i.e., nature or genetics) and the Environmentalists (i.e., nurture, cultural context).

The Universalists assume there are fundamental and universal human cognitive abilities that are best estimated by global intelligence factor regardless of cultural or environmental influence (Rushton & Jensen, 2005). Such cognitive abilities are inherently genetic, and cultural factors have little or no influence on the development and capacity of cognitive functioning. The Environmentalists emphasize the dramatic influence of the socio-cultural developmental context on cognitive development and assessment.

Universalist's Approach

Universalists assume that the basis of global cognitive capacity is determined almost entirely by biological markers such as DNA, developmental maturation, and cortical volume. These biological factors have been shaped by evolutionary pressures to serve an adaptive function (Lynn, 2006). Such abilities are posited to vary across different groups of people, as with other physical morphological variations that also have resulted from unique adaptive pressures (Neisser et al., 1996; Rushton & Jensen, 2005). For instance, it is argued that Whites and East Asians may have faced harsher climates that required more elaborate adaptive cognitive skills than what Blacks endured in Africa. It is assumed that those who lived in the African continent faced less harsh environmental demands and thus required less adaptive cognitive pressures (Shorbis, 1996; Lynn, 2006). Thus, when group differences are identified they reflect differences in aptitude attributed to adaptive genetic predispositions (Rushton & Jensen, 2005; Lynn, 2006).

One study examined the association between cortical volume and IQ scores among 6,000 U.S. Army personal; it found a strong positive correlation between IQ and cranial capacity after adjusting for body size (Rushton, 1993). In that same study, East Asians were found to have the largest capacity, followed by Whites, and the smallest capacity was found among African Americans. Furthermore, Rushton and Jensen (2005) analyzed data from different groups of twins and found that the mean Black-White IQ differences were highly related to mean differences in cortical volume. It was also argued that numerous twin studies from a multitude of ethnic and racial background groups have suggested that as much as 80% of the variance in mean IQ scores is explained by genetic heredity and not environmental factors (Jensen, 1980; Rushton & Jensen, 2005; Shorbis, 1996; Lynn, 2006).

Further, a multitude of studies have failed to document systematic bias in IQ assessment involving various racial and ethnic minorities (Rushton & Jensen, 2005). Among the most controversial, yet persistent findings is the lower mean scores of African Americans and others of African descent which fall on average one standard deviation below that of Whites and East-Asians (Lynn, 2006). Findings also show that other ethnic groups, such as Hispanics and Native Americans, also fall below the averages of Whites but above Blacks (Herrnstein & Murray, 1994; Rushton & Jensen, 2005). Two meta-analyses have suggested that these identified group differences are systematically linked to *g* loadings (te Nijenhuis & Dragt, 2010; te Nijenhuis & Repko, 2011). That is, the more cognitively demanding a task is the more it is loaded onto the *g* factor. The *g* factor is a psychometric property believed to reflect an overall global cognitive capability (i.e., intelligence). Also, higher heritability associations are found among more complex cognitive tasks (Lynn, 2006). These findings have provided compelling evidence that differences in performance between U.S. minority ethnic and racial groups and Whites, and between non-Western immigrants in Europe with White Europeans, are best attributed to genetic differences and not societal, cultural, or environmental factors (Lynn, 2006). Controlling for education and SES levels attenuate the differences, but do not eliminate them, especially on the more complex cognitive tasks (Herrnstein & Murray, 1994).

Herrnstein and Murray (1994, *p. 281-282*) argued that *"no one has found statistically reliable evidence of predictive bias against blacks…the cultural content of test items is not the cause of group differences in scores"* and go on to conclude that *"the gaping cultural gap between the habits of the underclass and the habits of the rest of society, far more impassable than a simple economic gap between poor and not poor, or the racial gap of black and white,*

will make it increasingly difficult for children who have grown up in the inner city to function in the larger society even when they want to"(p.524).

Such conclusions imply that the higher performance of Whites and East Asians on IQ assessment validly reflects inherently higher ability when compared to African Americans, Hispanics, and other minority groups. However, claims of cross-racial genetic differences in intelligence have been the subject of serious critiques. Critics have questioned the evidence put forth to justify such strong conclusions which suggests that differences are biologically based, that the tests are not biased, and that culture and environment have little or no effect.

Some have argued that biological correlates of cross-racial differences have failed to discern biological from environmental inheritance (Richards, 2006; Lewontin, 1993). Additionally, the correlates of biological markers, such as cranial capacity to IQ performance, are often small and show higher variability within than between cross-racial samples (Lewontin, 1993). Studies citied to support cross-racial differences often failed to provide systematic control of potential SES factors that may have contributed to possible race or ethnic based differences in relation to the used biological markers (Goodman, 2000; Nguyen & McDaniel, 2000; McDaniel, 2005). There is also variability in how biological markers are assessed. For example, cranial capacity has sometimes been measured by using the circumferences of the skeletal cranium, and only recently have in-vivo measures using MRI been available (McDaniel, 2005). Furthermore, many scholars do not view race as a biologically discernable construct, rather it is viewed as an ideological concept ascribed to biology (Goodman, 2000). Even if it is assumed that some remote discernible genetic basis of race exists, it does not necessitate that certain traits, like intelligence, are concordant with such genetic predispositions (Goodman, 2000).

Critics have questioned the claims that IQ tests are not biased toward certain population groups (Nell, 2000). For instance, Nell (2000) argued that when the claim of "no bias" is put forth by the Universalists, like Jensen, Herrnstein, and Murray, they are referring to a lack of predictive bias that is often measured against the criteria of school or college success. It has been argued that such culturally specific criteria are as biased as the IQ tests "the educational system and test system are devised and implemented by a single intellectual elite that shares a wide range of work-related and cultural values and the two systems are two side of the same coin" (Nell, 2000, p. 65).

Moreover, a recent study examined whether differences between immigrants in Europe and white Europeans are best explained by complex cognitive loading (i.e., *g*) or by cultural loading (i.e., *c)*. Essentially, the more complex cognitive tasks are, the more they are culturally loaded. The authors concluded that their results presented a serious challenge to those insisting that differences among non-Westerners and Westerners are solely attributed to heritable genetic differences without a serious contribution of cultural or environmental factors (Helms-Lorenz, van de Vijver, & Portinga, 2003). This finding also indicates that potential cultural bias is imbedded within cognitively complex tasks. Nell (2000) argued that the Universalists need to ensure equitable comparisons beyond a reasonable doubt by controlling for significant variables across comparison groups, such as language proficiency, educational quality, testing familiarity, cognitive style, and the establishment of cross-cultural construct equivalence of intelligence, before differences can be primarily attributed to biologically based differences (Nell, 2000). The limitation of explaining cross-racial and cross-cultural differences as a matter of differences in biological predispositions gives rise to explanations emphasizing environmental and sociocultural influences.

Environmentalist's Approach

In contrast to the Universalists' conceptions, the Environmentalists assume that intelligence can be viewed as a culturally relative construct in how it is defined and assessed, but more significantly, that culture can shape the cognitive development of specific cognitive abilities. This view was strongly advocated by Lev Vygotsky (1978), who argued that the mind is the product of the material conditions of culture, and the formation of higher level cognitive abilities arises from a dynamic interaction between biological, developmental, and environmental factors. Over time, fundamental changes occur in the process of thinking due to changes in the material conditions in which such processes arise. From these principles, he believed that IQ is immutable, that learning necessarily trails behind development, and that learning and cognitive functions are circumscribed by developmental maturation and sociocultural context (Vygotsky, 1978). Thus, learning and cognition are dependent on attained levels of development, and development is shaped by the context of culture and environment.

Alexander Luria, who was highly influenced by Vygotsky and who is credited with establishing the foundations of modern cross-cultural neuropsychology, further advanced the theoretical details of how environment and culture can directly shape cognitive abilities. In 1937, Luria and colleagues set out to investigate environmental conditions, especially education attainment, and the new push for acculturation to the cultural modernity after the Bolsheviks revolution of 1917. The focus was on how sociocultural contexts have shaped cognitive abilities, by comparing those that have been greatly influenced by the push of modernity and those that remained traditional. He examined five groups of women: illiterate women from remote villages, women in remote villages with an individualistic economy, women who had attended short teaching courses but remained semiliterate, officeholders in the collective system who were

barely literate, and women students who were admitted to teaching schools and lived in urban settings (Luria, 1976). He investigated two modes of cognitive generalization abilities, namely functional and abstract generalizations or reasoning, by asking participants to choose and select objects that go together and to explain why they go together. Luria (1976) identified that the more sophisticated (i.e., more education and more modern) group of women were able to display abstract categorical associations while the unsophisticated (traditional with very little or no education) women made functional associations based on the presented items' everyday use (e.g., a circle is a plate; a triangle, a kettle stand). Luria observed, "The process of abstraction and generalization are not invariant at all stages of socioeconomic and cultural development. Rather, such processes are themselves products of the cultural environment" (Luria, 1976, p. 74).

Although Luria believed there are some basic cognitive processes that may be universal, he argued that higher level cognitive functions are social in origin, and their development may depend on the social and cultural milieu in which an individual is embedded. Luria later formulated his theory of the extracortical organization of brain functions. The theory proposed three hierarchical structures (Nell, 2000). Basic foundational process can be assumed to be universal, such as sensation, movement, and elementary processes of attention and memory storage capacity, but higher level brain functions, such as abstract reasoning, fluid reasoning, specific memory encoding strategies, and imagination, arise as a function of environmental demand and sociocultural contexts (Luria, 1976). Luria's early studies and theoretical conceptions have been supported by more contemporary studies.

Ogden and MacFarlane-Nathan (1997) examined the performance of indigenous Maori young men from rural and urban backgrounds in New Zealand and found their overall performance to be variable in predictable and unpredictable patterns. For instance, the

participants scored below the standardized U.S. norms on tests assessing vocabulary and logical memory, but performed within the above average range on a task involving visual-spatial abilities (e.g., one standard deviation difference). The authors argued that differences are best explained by cultural differences in that lower language based measures were evident, but the superiority in visual-spatial abilities was reflected by Maori cultural values. It was argued that the Maori may have a particular aptitude for visual-spatial perception, construction, and visual memory, as reflected by their high value for arts that involves intricate facial painting designs and carved totems. This study supported the view that culture can give rise or suppress modes of perceptual and cognitive functions. Similarly, environmental variables can also have dramatic effects on cognitive development.

Environmental and socio-economic factors can have deleterious effect on neural development. For instance, environmental toxins, such as lead or fetal-alcohol exposure, can lead to significant cognitive impairment (Sattler, 2008; Flanagan & Harrison, 2012). Malnutrition and deprivation during early childhood have been found substantially to lower performance on IQ tests (Politt et al., 1994). A meta-analysis by Devlin and colleagues (1997) showed a positive association between breastfeeding duration and IQ performance. Similarly, levels of SES are associated with IQ performance and heritability. For instance, low SES and low education attainment were strongly associated with lower IQ performance (Flannigan & Harrison, 2012; Heaton, Taylor, & Manly, 2003; Pollitt, Gorman, Engle, Martorell, & Riveria, 1993). Both verbal and language-reduced performances correlated positively with education levels (Heaton, Taylor, & Manly, 2003; Harris, Tulsky, & Schulthei, 2003). Higher parental education and types of parental practices positively correlated with higher IQ performances (Molfese, Modglin, & Molfese, 2004). Among adults, education level was the most important factor for predicting IQ

levels, especially verbal IQ (Sattler, 2008). Not only was education level an important predictor of IQ, the quality of education mattered.

Shuttleworth-Edwards and colleagues (2004) examined the effect of the quality of schooling on IQ performance; despite the same level of education obtained, those from superior quality education backgrounds consistently outperformed those with lower quality education across verbal and language-reduced tasks after age, gender, and ethnicity were controlled. In that same study, South Africans with higher quality education had commensurate scores with U.S. standardization norms, but those with lower quality education performed significantly worse, irrespective of whether the participants were White or Black South Africans. The Shuttlesworth-Edwards and colleagues (2004) study suggested that education quality is a more powerful moderator of IQ performance than ethnicity. Green, Hoffman, Morse, Hayes, & Morgan, (1964) conducted a study in a Virginia county where school was closed for several years in the 1960s to avoid integration, leaving most Black children with no formal education at all. When compared to controls, the IQ scores of these children dropped by a 0.4 standard deviation per missed year. Thus, environmental conditions, exposure to educational experiences, and cultural values have important implications for cognitive development and assessment.

Acculturation and Cognitive Development

The Acculturation Process

The process of acculturation can have significant implications for the cognitive, cultural, and linguistic development of young immigrants. In turn, it has significant implications for the intellectual assessment of immigrants. The term "acculturation" was first used in 1880 as a way to describe group-level acculturation phenomenon (Sam & Berry, 2006). A classic definition of acculturation was provided by anthropologists Redfield, Linton, & Herskovits (1936), who stated

that “acculturation comprehends those phenomena which result when groups of individuals having different cultures come into continuous first hand contact with subsequent changes in the original culture patterns” (p. 149). Psychological acculturation, which occurs at the individual level, was first postulated by Graves (1967), who stated that acculturation is a process that “refers to changes in an individual who is a participant in a culture-contact situation—a person who is being influenced directly by the external culture and by the changing culture of which the individual is a member” (Berry, 2003, p. 19). Important changes to the individual’s personal identity, beliefs, values, attitudes, behavior, cognition, and language competence occur during acculturative experiences (Berry, 1997).

Acquisition of a new language is arguably one of the most influential changes an individual experiences. Language competence can itself be a determining factor of how well an individual acculturates to their host society (Berry, 2003). This in turn has substantial implications when assessing the cognitive functioning of immigrant youth who may have variable language skills. The process of second language acquisition is complex and is likely to vary across individuals, depending on their language of origin, pace of acquisition and developmental stage of language acquisition.

Cummins (1984) hypothesized that second language acquisition follows two general stages of development among immigrants. The first stage describes the initial acquisition skills that involve surface level fluency and capacity referred to as the Basic Interpersonal Communication Skills (BICS). This level of competence often develops after two to five years of immersion. Although students who have reached the BICS level of acquisition may appear fluent in the acquired language as they rely heavily on contextual cues, they may lack significant skills, including level of vocabulary knowledge, which can indirectly affect more complex

comprehension and reasoning. Subsequently, another set of more sophisticated competence skills are achieved which are referred to as the Cognitive Academic Language Proficiency (CALP), after five to seven years of immersion (Cummins, 1984). The CALP level of acquisition is viewed to be essential for success on academic tasks, and potentially for a non-biased performance on a verbally mediated IQ measure.

It is important to note that the projected pattern of language development is also affected by the age of exposure. Acquisition of a second language at a younger age is associated with more efficient processing of both languages, compared to acquisition at an older age (Miyaki et al., 2000; Carhill, Suarez-Orozco, & Paez, 2013).Additionally, immigrant children's language development varies depending on their age of immigration and level of exposure to their native language. Children born in the U.S. to immigrant parents are likely to develop more competent language skills than children who learn English as a second language (Carhill, Suarez-Orozco, & Paez, 2013). Those learning English as a second language are likely to do so by making use of their existing native language skills (Bialystok, 2011). It remains unclear how patterns of acculturation and level of language competence are related to performance on IQ and academic outcomes. There has been important development of theoretical attempts to conceptualize the dynamic changes that occur during the acculturation process. Such theoretical models can be used to evaluate how the process of acculturation affects intellectual assessment and academic achievement.

Models of Acculturation

The acculturation patterns have largely been viewed through unidimensional or bidimensional models (Rudmin, 2009). The unidimensional approach explains the acculturation process as a movement between two cultural influences (i.e., host vs. heritage). In general,

immigrants undergo a process of assimilation to the host society, and they move away from their heritage background. It is a zero-sum linear acculturation process that ultimately results in the individual's complete assimilation to the host culture and complete shedding of heritage identification (Gordon, 1964; Berry, 1997; Cabassa, 2004). It has been documented, across many different ethnic immigrant groups in America, that the cultural orientations of third or even second generation individuals are far more likely to embrace cultural views, and develop better cultural and language competencies associated with the host culture, than with their heritage background (Sam & Berry, 2010; Cabassa, 2004). However, the acculturation experiences of first generation immigrants, especially those from a more incongruent heritage society, may have different patterns of acculturation changes (Sam & Berry, 2006).

The need for more nuanced conceptualizations of potentially diverse multiple acculturation orientations has resulted in the development of the bidimensional approach and its subsequent modifications (Berry, 1980; Berry et al., 2006; Rudmin, 2009). The bidimensional approach recognizes the possibility of various acculturation orientations as a result of the interactions between adaptation and maintenance processes (see Table 1). Central to this model is the concept that there are two independent (i.e., orthogonal) dimensions underlying the process of acculturation (i.e., participation in the host culture and maintenance of the heritage culture). This model is more sensitive to the dynamics of psychological change that occur across the domains related to the heritage background and the host context, especially for first generation immigrants.

Berry's bidiminsional model of acculturation has been the most researched and most supported model. The assumptions of the model allow for a total of four possible theoretically

distinct acculturation orientations that may develop: integration, assimilation, separation, and marginalization (Berry, 1997).

Table 1

Berry's Bidimensional Model of Acculturation

		Heritage:	
		Maintenance (YES)	Maintenance (NO)
Host:	Participation (YES)	Integration	Assimilation
	Participation (NO)	Separation	Marginalization

The assimilation orientation describes the momentum toward the adoption of the host culture's customs, beliefs, and language while expending lower efforts (less time) on maintaining one's heritage background. The forces that shape a person's motivation may not always be controlled by the individual however. For instance, children of immigrants or children who immigrate at a very young age, for developmental and cultural exposure reasons, may find it easier to assimilate to the host society without having continual and direct contact with the heritage society (Sam & Berry, 2010; Brown & Zagefka, 2011). The separation orientation is the continual embrace and maintenance of the heritage culture while not identifying with the host society's structure, values, and customs. Individuals who integrate both cultural backgrounds by combining different aspects of each society to form a unified identity are described as having an integrated orientation. Lastly, the marginalization orientation describes individuals who have moved away from both their host and heritage cultures. Overall, the bidimensional framework has found empirical support for defining acculturation orientations, and it has enabled cross-cultural acculturation research among a multitude of ethnic minority immigrants (Ryder et al.,

2001; Berry et al., 2006). Berry's framework has been expanded by applying it to multiple domains of functioning. That is, an individual can have an integrated acculturation orientation with language acquisition, but may have a separated or assimilated cultural identity development. Similarly, an individual can have an integrated cultural identity, but may only speak one language. Researchers have highlighted the importance of assessing acculturation orientation in a bidimensional framework along multiple domains (Zea, Asner-Self, Birman, & Buki, 2003; Rudmin, 2009; Berry et al., 2006).

Assessing Acculturation

The method of conceptualizing the acculturation process has evolved over the years. A recent 22-year literature review of acculturation research indicated that there has been an increase in acculturation research using the bidimensional approach to multiple dimensions of functioning, but the vast majority of studies have been based on unidimensional models looking at an overall dimension (Yoon, Langrehr, & Ong, 2011; Zea, Asner-Self, Birman, & Buki, 2007). Both models have been used to develop over 50 acculturation scales which are freely available. However there are only a few available scales that survey multiple dimensions of acculturation based on a bidimensional approach and have adequate psychometric properties among younger and older immigrants (see Zea, et al., 2007 for a review). According to Yoon, Langrehr, & Ong (2011), adequate acculturation scales should meet four basic criteria: 1) they should assume a bidimensional framework; 2) they should consider domain specificity adaptation; 3) they should have sufficient items per domain; and 4) they should have good internal consistency. These guidelines have been used to develop, adapt, or select relatively comprehensive acculturation scales. However, available robust scales have mostly been developed for use among Hispanic and Asian immigrants, and to a lesser extent with other ethnic groups in and out of America

(e.g., Berry, et al., 2006; Chung et al., 2004; Costigan & Dokis, 2006). The bidimensional framework has generalized approach among a wide range of cross-cultural acculturation studies which have explored the process of acculturation and associated educational, psychological, and cognitive outcomes. The development of useful models and measurements of acculturation will contribute to enhancing multicultural competence that can be applied when providing psychological services to immigrant populations. Even the most reliable and valid acculturation scales will not capture the vast complexity that is unique to each individual immigrant group and individual immigrant. Immigrant groups like Arab Americans possess unique cultural, linguistic, religious, and socio-political histories that shape their acculturative experience in the US.

Acculturation of Arab Americans

The term *Arab* refers to an ethnic designation of people who reside in 22 countries that span North Africa and the Middle East. The total Arab population worldwide is estimated to be 367 million (Gregg, 2005). Arabic is the fourth most widely spoken language in the world (Gregg, 2005), and it is the language in which the Koran is written. The Koran is the Muslims' holy book. This is a significant cultural fact because it is foundational source of common identity for Arabs and Muslims living in and outside of the Middle East. Notably, most Arab Americans are Christians, and they may identify with being Arab more through language than through religion (Arab American Institute; AAI, 2003). Many Christian Arab Americans came from predominantly Muslim countries, so they may have been exposed to cultural norms similar to many Muslim Arab Americans. Being Arabic does not connote a racial description; rather it is an ethnic classification based on shared cultural, linguistic, and religious values (Gregg, 2005). Although the Arab identity is imbued with broad characteristics such as shared historical

identity, hierarchical interdependence, family and social structures, the Arabic language, and Abrahamic faiths, there are very important differences.

There are important variations among Arabs in their religious faiths, language dialects, colonial influences, and physical features. Approximately 92% of Arabs are Muslims, and approximately 5% are Christians (AAI, nd). A popular misconception is that all Muslims are Arabs; Arabs in fact make up approximately 17% of the total Muslim population worldwide (AAI, nd). Countries such as Indonesia, Pakistan, Afghanistan, Turkey, and Iran are predominantly Muslim, but are not Arab. In countries like Lebanon, approximately half of the population is Christian (Abudabbeh, 1997). Skin color is another variation among Arabs. People in countries like Lebanon, Syria, and Palestine have lighter skin than those from the Persian Gulf, Arabian Peninsula, or North African countries. Also, the socio-historical context based on colonial influence culturally differentiates between some Arab countries. For instance, Yemen and Oman were mildly influenced by British colonialism. As a result, their language dialect and cultural customs were affected to a lesser extent than the North African Arab countries. Morocco and Algeria were heavily influenced by French colonialism. Consequently, people in these North African Arab countries began to speak an Arabic dialect that is a hybrid of Arabic and French (Gregg, 2005). Furthermore, some Arabic countries are much wealthier than others (e.g., Saudi Arabia vs. Yemen), and as a result their citizens may have acquired greater educational access. Immigrants from higher SES countries may not face as many cultural hurdles as those with lower SES during the immigration process (Bradley & Corwyn, 2002). Where an immigrant comes from, the reason for their immigration, and when they arrive in America, matters to how well they acculturate to life in America.

There have been three major Arab immigration waves that have led to the primary concentration of settlements in America. The first wave occurred in the 1880s through the 1920s, during which most of the immigrants were primarily farmers with very little education. Most of these immigrants were Christians, and they arrived from Syria, Lebanon, and Palestine (AAI, nd). This wave of immigrants typically settled along the Eastern Coast of America (e.g., New York and New Jersey). Not very much is known about the adjustment of first wave immigrants besides that they shared common physical features and religious background with European Americans. The second wave occurred between 1935 and 1958, during which there was an equal number of Muslims and Christians, both with higher levels of education (Gregg, 2005). The second wave was triggered by instability before, during, and after World War II. Most of the immigrants from the second wave settled on the East Coast and in the Midwest (Gregg, 2005). The second wave of immigration came to an end with the introduction of new legislation that required the use of quotas for incoming immigrants (Kayyali, 2006). Many Arab Americans were not able to immigrate to the U.S. until 1965, which is considered the beginning of the third wave (Gregg, 2005). The third wave immigrants came from many countries of the Arab world and were mostly Muslim. Many of the third wave immigrants came to America to escape war and other social unrest (Gregg, 2005). Most of them settled on the West Coast and in the Midwest (primarily in the Detroit Metropolitan Area). Arab Americans have immigrated to the U.S. for well over a century for many different reasons and under many different circumstances.

The impetus for immigration among Arab Americans has not been identical. Although most came to America on a voluntary basis, a significant number of immigrants left to escape conflict in their homeland. This is especially true for the second and third wave immigrants, who fled their countries to seek refuge or asylum (Abudabbeh, 1997). The reason for immigration has

been conceptualized under two broad categories, namely voluntary or involuntary (Ogbu & Simons, 2008). Many Arab American immigrants came to America as asylum seekers and refugees (Wrobel, Farrag, Hymes, 2009). Many of the refugees and asylum seekers from Iraq and Lebanon mostly resided in Detroit, New York, and Los Angeles (Gregg, 2005). These separate waves of immigration have contributed to the diverse assortment that constitutes the modern Arab American identity. As a result, the umbrella of the Arab American identity encompasses a highly heterogeneous group that is similar to other broadly described groups, such as Hispanic or Asian Americans. It is imperative that greater attention is paid to the unique acculturative patterns and how they directly relate to cognitive outcomes in order to gain a greater understanding of how the process of acculturation is associated with cognitive performance.

Key Demographics of Arab Americans

The current number of Arab Americans living in the U.S. is unknown, but is estimated to be between 1.2 million and 3.5 million (Brittingham & de la Cruz, 2005; AAI, 2009). The first estimate is based on the 2000 U.S. Census, and the second estimate is based on an epidemiological study conducted by the Arab American Institute (AAI, 2009) to address some of the underlying limitations of the Census data. Part of the difficulty in assessing the Arab American population is that they are not officially recognized as an ethnic minority group by the U.S. government. People whose origin is in the Middle East or North Africa are considered White (as identified on the census demographic form); however, Arab Americans are a multi-cultural, multi-ethnic, and a multi-racial group (Abudabbeh & Nydell, 1993). One Arab American can have white skin, blue eyes, and red hair while another can have dark skin, brown eyes, and black hair. This creates a unique set of challenges for Arab Americans; they are not

typically recognized as an ethnic minority group, but appear to have experiences of prejudice, profiling, and discrimination that parallel those of Hispanic, Asian, and African Americans. Arab American's identity with White ethnicity is relatively high among the older generation of Arab American immigrants who are often light skinned and Christian (Ajrouch, 2000). However, among the more recent Arab American immigrants, only a small minority might identify with being White (Ajorouch & Jamaal, 2007). These challenges make it very difficult to obtain an accurate depiction of Arab Americans and their patterns of adjustment in America. It is likely that such differences in socio-demographic and phenotypic differences affect the pattern of acculturation in the United States.

According to a nationally representative Zogby poll (2002), approximately 51% of Arab-Americans speak a language other than English at home (predominantly Arabic). It is also estimated that 40% of Arab Americans are school-age children. Approximately 80% of Arab Americans are American citizens; 89% have at least a high school diploma; 46% have a bachelor's degree, and 19% have a post-graduate degree. Also, about two-thirds of Arab Americans were born in America (Erickson & Al-Taimimi, 2001). However, there is no specificity in these demographic rates based on country of origin. It is possible that such stratification would show that recent immigrants, such as those coming from Iraq or Yemen, and who are more likely to be Muslim, would have considerably lower SES than Arab Americans who can trace their roots back to the first and even second immigration waves.

Arab Americans live in every state across America according to a poll conducted by the Arab American Institute (AAI, nd); although most are concentrated in urban constellations across the East Coast, the Midwest, and the West Cost. Approximately 94% live in metropolitan areas of major U.S. cities, such as Detroit, Los Angeles, New York, Chicago, Washington D.C.,

and Northeastern New Jersey (AAI, nd). The cultural background of Arabs as well as where the settle in the US is important for understanding the acculturative experience of Arab Americans.

Settlement Dynamics

Not only are macro-level socio-political factors important for the developments of a child, but so are the characteristics of the neighborhood. It is repeatedly documented that people who live in safer, cleaner, and friendly neighborhoods experience higher levels of health and well-being as they grow older (White, 2008; Bradley & Corwyn, 2002). Those who live in neighborhoods with more vandalism, graffiti, and crime are associated with poorer health and overall wellbeing outcomes (e.g., higher depression and anxiety). Other studies have shown that children raised in lower SES households are less likely to graduate from high school and attend college (Bradley & Corwyn, 2002). The assessment of SES in the reviewed studies was mostly based on quantifying family income and parental education. Immigrants have historically sought settlement in areas with higher low-skill labor markets such as manufacturing (Gregg, 2005). The settlement patterns of Arab Americans are also highly variable, and as a result could influence how well they adjust to life in America. For instance, the Metro-Detroit area is home to the largest Arab concentration outside the Arab world and Paris. Nearly 500,000 Arab Americans were estimated to reside in the Metro-Detroit area over a decade ago (Zogby, 2002). Although the vast majority of Arab Americans are Christian, the majority in the Detroit-Metro area are Muslims who arrived during the third major wave of immigration (Wrobel, Farrag, & Hymes, 2009). Many immigrants from the second and third immigration called the Detroit area home because of the historically great manufacturing job opportunities. During the past few decades Detroit has become symbolic with deterioration, poverty, violence, low economic opportunities, and dysfunctional school systems (Mrozowski, 2008). Such changes in settlement

contexts change affected Arab American youth and their families because they add additional stressors that will affect their developmental context (Coll, Lamberty, Jenkins, McAdoo, Crnic, Wasi, & Garcia, 1996).

Arab American Family Dynamics

There are unique and salient factors about Arab American families that are essential for researchers, educational and mental health practitioners to be knowledgeable of. The family system for Arab Americans is an integral component of their self-identity in dynamic ways. Arab Americans come from ethnic backgrounds that are largely traditional, tribal, and collectivistic, in which the family is the core of their ethnic and self-identity (Abudabbeh, 1997). Individuals who come from collectivistic societies experience greater adaptation challenges. In general, a collectivistic society values interpersonal connectivity, strong family connectivity, and an identity that is based on such interdependence (Triandis, 1995). There is less focus on individuality and more value on communal attitudes and behaviors (Triandis, 1995). In addition, collectivism can be divided into horizontal collectivism and vertical collectivism. Horizontal collectivism is relatively independent of hierarchical relationships, and there is relative equality among individuals. Decentralized collective communist societies are considered to have horizontal collectivism (Triandis, 1995). Vertical collectivism refers to a more hierarchical structure of power and moral and centralized cultural conformity (e.g., Arab countries). In general, individualistic societies are characterized by their values of personal freedom, self-reliance, and individuality. Psychological and cognitive style changes are implicated as a result of exposure to two such relatively diverse cultural frameworks. Also, the individual assessment context could prove to be an unfamiliar alienating process, especially when there is no gender concordance between the examinee and the examiner.

Gender is an important dimension of Arab American family life. In general, gender roles are largely fixed by tradition and religious values. For instance, marriage is often arranged, and women are allowed to divorce only in very rare circumstances. This cultural fact has important implications for gender interaction during mental health service delivery. Intercourse before marriage is taboo, especially for females. Engaging in sexual behavior prior to marriage runs the risk of ruining family honor and family reputation (Arabic terms *sharaf al-aila; somaat al-aila*); this is more so for females than for males *(*Amer, 2005). In more traditional Arab families, a female of child bearing age cannot be alone with another male without the accompaniment of an adult male family member. Thus, dating before marriage is controversial and could elicit strong feelings from the family that may negatively impact the individual's wellbeing. The traditional gender role expectation is likely to affect how Arab American youth acculturate to life in America.

Arab American youth raised in America may strive to participate in mainstream American norms at the expense of strong family rebuke. Traditional roles contribute to some challenges children may face growing up in America. Many youth may not resolve such differences with their family without experiencing substantial mental health difficulties or separatist acculturation orientation (e.g., Berry et al., 2006). Children are expected to be obedient to their parents and fully to adopt family values. Children are expected to take care of their parents as they get older; the concept of a retirement home is not culturally practiced by Arab Americans. Corporal punishment may be considered proper parenting by many Arab Americans, as has been documented with other immigrant and ethnic groups (e.g., Mexican, African American; Berlin, Ispa, Fine et al., 2009); overall, parenting style is less structured than European Americans and is gender specific (Abudabbeh & Hays, 2005). Parents are likely to be

more permissive with males and more restrictive with females (Abudabbeh & Hays, 2005). The father is often involved with discipline and needs outside the home, whereas the mother attends to the child's home and sometimes to school needs. Not only is gender relevant to possible strategies of acculturation for the youth it also plays a role in how their parents are able to interact in and with American mainstream society.

Many immigrant parents from developing countries do not view themselves as having a large role in their child's education, and so they may simply defer to the school staff and other educational authority figures (Lopez et al., 2001). This may be true for Arab Americans as well, since they may face the same challenges. Such challenges may include cultural and language barriers to participation. It is plausible that school expectations for behavior may not be consistent with home expectations, and as result behavioral challenges could manifest in school (Berlin et al., 2009). As a result, Arab American youth must adjust to two different disciplinary environments at home and at school. Children who come from households with a more relaxed structure may struggle with understanding the more subtle, less corporal methods of behavior modification often employed within school environments (Downey & Pribesh, 2004). Cultural differences between students and teachers are associated with greater risk of behavioral disruption and lower academic achievement (Downey & Pribesh, 2004).

In summary, Arab American adolescents live under unique cultural circumstances. They may grow up in America witnessing the perceived cultural clash between America and the Middle East; they may even be discriminated against as a result of socio-political tensions. The push and pull between two cultural identities is likely to affect how Arab American youth develop and acculturate to American mainstream society as has been identified among adolescent boys of Hispanic background (Romero & Roberts, 2003; Gil, Vega, Dimas, 1994).

Arab Americans have called America home for over 100 years, and they have become a substantial immigrant group, although they are still not recognized as an official ethnic group. Very little is known about the way Arab Americans adjust to life in America. What is clear is that the acculturation process has substantial influence in how immigrant youth and their families function across multiple domains. What is not clear is the acculturative contexts influences cognitive development and assessment.

The Cultural Milieu of Cognitive Assessment

Psychological testing arose from a Western cultural tradition, and its foundational development was driven by elite White men from Europe and the United States (Boake, 2002). Also, contemporary normative standards that guide interpretation continue to be based on predominately monolingual White individuals of middle class status living in the United States (Sattler, 2008; Flannigan & Harrison, 2012). As a result, the testing process is essentially a culturally relative practice that was created to measure culturally specific functions.

The value-laden testing situation and its effect on performance is not a matter of theoretical suppositions, but has been empirically substantiated (Shuttleworth-Edwards et al., 2004). The familiarity with testing, referred to as "test-wiseness," has been found to moderate test performance significantly (Anastasi & Urbina, 1997; Nell, 2000). Individuals who have been brought up in a test-taking culture are likely to have more experience with similar test-taking situations, and to have more advanced strategies that will improve their performance. In one study, elementary school children from diverse cultural backgrounds who were not familiar with individual testing performed significantly lower than native children who were familiar with individual testing (Tzuriel & Kaufman, 1999). However, after the migrant children were provided with some initial training of the testing scenario, their performance significantly

improved much more than the performance among the native children, who were also provided with the same level of training (Tzuriel & Kaufman, 1999). In another study, van de Vijver (2008) examined the cross-cultural differences of basic reaction-time tasks among secondary school students in Zimbabwe and the Netherlands, using a total of four trials. The results indicated that the Dutch students performed faster on initial trials, but the Zimbabwe students made the greatest performance gain in subsequent trials, and overall there were no subsequent between-group differences. The author concluded that extra caution is warranted when interpreting initial cross-cultural differences because they may reflect non-target variance attributed to understanding and exposure of the task, and not to inherent ability (van de Vijver, 2008). Similarly, non-target factors such as differences in cultural experiences and lower language competence levels may depress or bias cognitive performances that are not directly related to overall cognitive ability.

Deconstructing Bias in Assessment

Arguably, among the biggest challenge practitioners face in their assessment of immigrant youth is ensuring that performance and result interpretation are not biased by acculturation factors. In general, bias occurs when the intended target of measurement is not reflected in the obtained performance. Bias in the context of intellectual assessment among non-mainstream samples has been deconstructed into three forms: construct bias, method bias, and item bias (van de Vijver & Tanzer, 2004). Construct bias occurs when the intended construct is not identically measured across cultural groups. For example, individuals from cultures that value social aspects of intelligence and have less emphasis on speeded performances may underperform on intelligence measures that are heavily determined by demonstrating processing efficiency and individualized reasoning (Nell, 2000).

Method bias refers to problems that occur because of the test components and testing process (van de Vijver & Tanzer, 2004). Individuals from cultural backgrounds who are not familiar with the process of standardized testing are likely to have their performance reflect their testing experience and not their targeted measured ability. The use of stimuli such as geometric blocks, paper, and pencil problem-solving tasks, or analyzing culturally specific pictures, may be novel to some immigrant children, but are relatively over learned skills for many American born children (Nell, 2000). Method bias can also occur if there are communication problems during the test's administration. This is likely to occur with individuals who are not fluent in English, or if there are salient characteristics difference between examinee and examiner.

Method bias may also refer to sample bias. Namely, the standardized scores are based on sampling a population that may not reflect the characteristics of the individual being assessed. For instance, assumption of comparability across salient factors such as educational attainment, parental education backgrounds, level of cultural exposure, and other salient socio-demographic factors (e.g., income, access to health care) may not be met, thus making the comparison potentially invalid. No available IQ tests have stratified norms for individuals who are English language learners and have variable levels of acculturation to U.S. society (Sattler, 2008; Kranzler et al., 2010). Thus, method bias becomes a strong possibility when assessing immigrant children who have not had adequate cultural and linguistic exposure.

Lastly, item bias, which refers to distortions at the item level, may occur in a number of ways. Biased items may have different meanings and importance across cultures, and this is likely to be encountered on tests that emphasize acquired knowledge. Many IQ tests require the demonstration of acquired experiential knowledge and the ability to use such knowledge to solve problems. For instance, the Verbal Comprehension Index from the Wechsler scales, or other

measures of crystallized intelligence, are essentially cognitive acculturation measures because they require the demonstration and use of age-expected word, informational, and experiential knowledge that is culturally specific. For example, an immigrant student may struggle with naming relatively familiar items to very young American children, such as a "fire hydrant." They may also struggle to reason about common cultural experiences, such as providing a rationale about the importance of exercising and eating a healthy diet. Thus, the process of acculturation has important implications not only for cognitive development but also for administering and interpreting performances on measures of cognitive ability.

The Influence of Acculturation on Cognitive Performance

There has been evidence of performance differences on cognitive tests between immigrants and natives since the early 20th century. Results from a study conducted by Yerkes (1921) using the Stanford-Binet intelligence test showed that performance increased as a function of years of residency. Individuals who resided for five years or less in the U.S. averaged 11.9 mental age score points, where the expected average mental age was 13.08. Those who resided for 10 years or more met or exceeded the expected mental age (Yerkes, 1921). The results showed similar and more systematic trends using the Wechsler scales with Hispanic groups. Vukovich and Figueroa (1972, as citied in Flanagan & Harrison, 2012) assessed a group of Hispanic adult participants and showed significantly below average performance on language and culturally saturated tasks (e.g., Vocabulary, Information, Comprehension subtests) contrasted by within the average range performance on language-reduced or performance tasks (e.g., Block Design, Picture Concepts). The same sample was tested a decade later and the participants performed within the average range across verbal and language-reduced tasks (Vukovich & Figueroa, 1982). The sample improved on verbal tasks as well as on language-

reduced tasks, suggesting some acculturative effect on language-reduced tasks. Another study also showed better performance on language-reduced than verbal tasks, but the overall performance was below average the across verbal and language-reduced tasks (Cummins, 1982). Only recently has there been an effort to identify the systematic influence of acculturation on measures of cognitive functioning.

Razani and colleagues (2007) investigated the relation between some acculturation variables and a variety of cognitive outcomes among Hispanic, Asian, Middle Eastern, and European American non-clinical samples. Acculturation was conceptualized by a unidimensional measure of language acquisition, level of education, and duration of stay in the host culture. Results indicated that European Americans performed significantly better than ethnic immigrant minorities on the verbal but not on the language-reduced, subtests from the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999). Acculturation variables indicative of greater assimilation are generally associated with higher performance on the Vocabulary (i.e., word knowledge) and Similarities (i.e., verbal categorical and abstract reasoning task) subtests than individuals with high heritage identity. The differences between more assimilated ethnic individuals and European Americans were not statistically significant. Language loaded tests are highly likely to be affected by acculturation levels, and by some possible influence with language-reduced tests as well.

The relation between acculturation and language-reduced intelligence was assessed among pluralistic group of immigrant and native children in Europe (van de Vijver, Helms-Lorenz, & Feltzer, 1999). The study included children who were Moroccan, Turkish, Bosnian, Serbian, Somali, and Pakistani who resided in the Netherlands. Positive correlations among acculturation orientation and verbal and language-reduced cognitive outcomes were higher

among first generation compared to second generation immigrants (van de Vijver, Helms-Lorenz, & Feltzer, 1999). Those with higher assimilation performed better than those with lower assimilation. Also, those with higher heritage were likely to be less assimilated, and thus generally performed lower than those with lower heritage acculturation. However, the independent effect of heritage acculturation, or enculturation was not separately analyzed. Survey of the literature also failed to identify any study that has examined the possible moderating effect of heritage acculturation even though acculturation is best viewed as a bidimensional construct. The results from the reviewed study were somewhat variable among the different immigrant groups, but the study's sample was not adequate to detect any statistically meaningful differences. Thus, it was not clear if there was an interactive association between acculturation and cognitive outcomes between different ethnic groups.

Some language-reduced neuropsychological measures (e.g., Wisconsin Card Sorting Test) are assumed to be relatively culture-free, but normative differences were documented in a sample of Mexican American adults (Coffey, Marmol, Schock, & Adams, 2005). Variations within a Mexican American sample were significantly associated across different levels of cultural assimilation, but it was not clear if level of ethnic association was related with the obtained results. Another study, among Mexican and African American children, found that a greater number of "Anglo" sociocultural characteristics were associated with higher IQ performance (Mercer, 1973). However, both of these studies did not systematically analyze the experience of acculturation by differentiating between proximal measures and levels of assimilation across different domains of functioning (e.g., language competence or cultural knowledge). These results are consistent with previous studies in documenting that better

cognitive performance is associated with greater assimilation on verbal and language-reduced cognitive tasks (Dana, 2005).

The available literature on the influence of acculturation on cognitive performance is limited. Most of the available studies have been conducted with adult samples and have not systematically and concordantly controlled for acculturative variables such as duration of residency, language competence, acculturation orientation, cultural identification, and generation status. The few available studies with children have similar limitations. Studies have also neglected to assess the clinical utility of IQ tests among immigrant youth, despite possible bias. Although it is clear that acculturation factors influence cognitive performance it remains unknown what predictive value these tests can serve among such populations. It remains unclear what acculturation variables are prominent in affecting intellectual assessment. Clinicians assessing children from culturally and linguistically diverse backgrounds continue to face great hurdles with their attempts to provide reliable, valid, and non-discriminatory assessments.

Addressing Challenges in the Intellectual Assessment of Immigrant Youth

There are a limited number of strategies available to help clinicians reduce bias and non-target confounds during the assessment of immigrant youth. The vast majority of practitioners lack a clear understanding about how acculturation variables affect cognitive assessment (Rhodes et al., 2005). Approximately one of five young people under the age of 20 speaks a language other than English at home and by 2040 it is projected to be one of three (Hernandez, Denton, & Macartney, 2007). A national survey, completed by over 400 school psychologists across the U.S., indicated that over 80 percent of psychologists did not feel that they were properly trained by their graduate programs to conduct assessments of bilingual children (Ochoa, Rivera, & Ford, 2004). Over 75 percent responded that they did not feel competent assessing

English Language Learners (Ochoa, Rivera, & Ford, 2004). Rhodes and colleagues (2005) highlighted serious shortcomings in the assessment of culturally and linguistically diverse students through the use of untrained interpreters, and through conducting cognitive assessment without assessing acculturation levels or even language competence. These deficient practices were partly attributed to the lack of empirically based guidelines of what the specific effects of language and acculturation may be during cognitive evaluations. There are relatively more resources available to practitioners when assessing larger minority groups such as Hispanics and African Americans than there are for smaller minority groups. Although development of translated and adapted IQ tests and sometimes ethnic specific norms, have become available (see Heaton et al., 2002) the use of translated tests and population-specific norms remains controversial (Manly et al., 2004).

Ethnic Specific Norms

Developing racial or ethnic based norms has been advocated by some as a way to enhance the sensitivity and accuracy of cognitive measures (Heaton, Taylor, & Manly, 2003). However, significant drawbacks are associated with such an approach. First, specific norms are minimally available to large ethnic groups such as African and Hispanic Americans. Also, the generalizability of such norms may not be completely appropriate, given the significant heterogeneity among ethnic groups like Hispanics, Asians, or African Americans. Assuming that such norms can be readily available for a wide range of ethnic groups, there are still foundational problems that arise from this approach. For instance, Manly (2008) noted the following drawbacks: 1) race or ethnic specific forms do not explain how or why test scores vary as a function of group membership; 2) issues of test bias or cultural equivalence are not sufficiently addressed; 3) such an approach will lead to irresponsible social, biological, and genetic

conclusions regarding differences; and4) development of such norms is logistically difficult to develop for existing tests. Practitioners have attempted to attenuate the effect of ethnicity by using standardized language-reduced tests.

Language-Reduced and Nonverbal Assessment

Other methods of reducing cultural and linguistic bias have been through using language-reduced tests. Language-reduced tests are often referred to as "culturally free" or "culturally fairer" because they involve novel stimuli, are performance based, and do not require expressive language from the examinee, and some tasks are administered using pantomime instructions. Such methods may be an improvement over culturally or linguistically complex tests, but they are not considered a comprehensive or unbiased alternative (Flanagan & Harrison, 2012). Just because no expressive language is required to administer and complete the tasks does not eliminate the occurrence of language-reduced communication that ensues during the evaluation. Furthermore, others have also found that language-reduced tests are equally if not more affected by culture and language factors than verbal based measures (van de Vijver, 2007; Rushton & Jensen, 2005). Performances on major language-reduced tests are similarly influenced by sociocultural factors, such as years of education (Ardila, Rosselli, & Rosas, 1989; Heaton, Taylor, & Manly, 2003), level of acculturation (Arnold et al., 1994; Boone et al., 2007; Coffey et al., 2005; Harris) and ethnicity (Coffey et al., 2005). It has been argued that the idea of a "culture free" test is illusory, because the testing experience is a culturally specific exercise that requires a significant level of overt and covert communication between the examiner and examinee (Nell, 2000). Also, language-reduced tests have been found to have limited predictive validity (Giguero, 1989; Lohman et al., 2008). Despite limitations, the use of language-reduced tests is very popular; 88 percent of surveyed practitioners choose to administer language-reduced tests

when evaluating immigrant populations (Sotelo-Dynega et al., 2011). More recently, cross-cultural and multicultural assessment researchers have advocated more systematic approaches to control simultaneously for assessment bias associated with cultural and language demands of the test and the cultural and linguistic competencies characteristics of the examinee (Flanagan & Ortiz, 2007).

Culture-Language Interpretative Matrix (C-LIM)

Flanagan and Ortiz (2001) proposed a systematic process when assessing individuals from linguistic and cultural minority backgrounds. It was recognized that language and cultural factors attenuate performance on standardized cognitive assessment among immigrant individuals. As has been reviewed, language and cultural competence is likely to influence performance on intelligence tests at multiple levels. At one level, the assessment process itself involves culturally bound and culturally specific forms of communication and functional dispositions. At another level, the language and cultural knowledge embedded within the tests are likely to affect performance. What Flanagan and Ortiz (2001) proposed was a method to increase the reliability and validity of assessment administration and performance interpretation. The process was meant to enable selection of more appropriate tests and to provide an a priori expected pattern of performance based on the cultural and linguistic loadings of the test and also the acculturation levels of the examinee.

Based on expert consensus and review of the available literature, Flanagan and Ortiz (2001) developed the Culture-Language Interpretative Matrix (C-LIM). The C-LIM is a bidimensional (i.e., Language vs. Culture) three by three matrix (i.e., high, moderate, and low saturation levels; See Table 2). It allows practitioners to examine possible systematic bias in the assessment procedures and content of the tests. For example, immigrant individuals are likely to

perform more poorly on tests that are linguistically demanding and culturally loaded (e.g., verbal tests), compared to tests with lower language and cultural demand (e.g., language-reduced tests). Also, the variability in performance is assumed to vary as a function of the test and the examinee's characteristics. Flanagan and Ortiz categorized an individual's level of acculturation into three broad categories based on how culturally different they are from the host culture. Individuals deemed *Slightly Different* are those that are third generation or later, have very high levels of English language competence (e.g., advanced BICS and Emerging CALP), and have a high level of acculturation. Those deemed *Moderately Different* are those who are second generation, have moderate levels of English language competences (e.g., intermediate to advanced BICS), and have a moderate level of acculturation. Those deemed *Markedly Different* are likely to be first generation, have very low levels of English language competences (e.g., early BICS) and have a low levels of acculturation (see Table 2). Thus, the combination of test characteristics (e.g., levels of linguistic demand and levels of cultural loading) and the individual's acculturation characteristics (e.g., slightly, moderately, or markedly different) are used to estimate, in standardized points, the level of performance (see Table 2; Flanagan & Oritz, 2007). This is a promising approach but there has be limited empirical support.

Table 2

Culture-Language Interpretation Matrix

(Developed from Flanagan & Harrison, 2012)

Culture Loading	Language Loading: Low	Language Loading: Moderate	Language Loading: High
Low	Slightly Different 3-5 points Moderately Different 5-7 points Markedly Different 7-10 points	Slightly Different 5-7 points Moderately Different 7-10 points Markedly Different10-15 points	I Slightly Different 7-10 points Moderately Different 10-15 points Markedly Different 15-20 points
Moderate	Slightly Different 5-7 points Moderately Different 7-10 points Markedly Different 10-15 points	Slightly Different 7-10 points Moderately Different 10-15 points Markedly Different 15-20 pints	Slightly Different 10-15 points Moderately Different 15-20 points Markedly Different 20-25 points
High	Slightly Different 7-10 Moderately Different 15-20 Markedly Different 20-25	Slightly Different 10-15 points Moderately Different 15-20 points Markedly Different 20-25 points	Slightly Different 15-20 points Moderately Different 20-30 points Markedly Different 25-35 points

A number of dissertations have examined the clinical utility of the C-LIM with immigrant youth that were largely supportive of the framework. Nieves-Brull (2006) examined the utility of C-LIM with monolingual and bilingual samples using a Wechsler scale (i.e., WISC-IV). The mean squared differences between the two groups were consistent with the predictions of the C-LIM model. A greater group of mean differences was more associated with culturally and linguistically demanding tasks than with less demanding tasks. The average difference between monolinguals and bilinguals ranged from 8.76-16.08 points on verbal tasks (i.e., Vocabulary, Similarities, and Comprehension subtests) and between .21-.1.99 on language-reduced tests (i.e., Block Design, Matrix Reasoning, and Concept Formation subtests). Dynda (2008) examined the association between the WASI and language competency with immigrant and non-immigrant elementary school students. No differences emerged on language-reduced tasks (e.g., Matrix Reasoning and Block Design), but significant differences were observed on verbal tasks (e.g. Vocabulary and Similarities). Similarly, Sotelo-Dynega (2007) examined the association of acculturation measures and verbal and language-reduced IQs, and found a relation between the level of language competence and the overall cognitive performance (including verbal and language-reduced). Those with low language competence performed within the borderline-impaired range; those with intermediate to advanced language competence performed within the below average range; and those with proficient language competence performed within the average range. Verdorasa (2007) tested the utility of C-LIM with a preschool bilingual sample using the Differential Abilities Test-Second Edition (DAS-II). The results showed systematic outcomes between English language competence and performance on verbal and language-reduced clusters. The mean difference between those with high language competence and the low language competence was 13.65 standardized points on the verbal index and 5.9

standardized points on the language-reduced index. The above reviewed studies were relatively consistent in their findings across three different cognitive batteries and samples. However, all of the above reviewed studies examined mean group differences and implemented proxy measures of acculturation (i.e., language competence, length of stay). Kranzler and colleagues (2010) argued that the model is not substantiated when examining within-individual performance.

Kranzler and colleagues (2010) examined the utility of the C-LIM with a diverse sample of 46, 5 to18 year-old immigrant students by using a within-subject analytical strategy (Kranzler, Flores, & Coady, 2010). The results showed generally consistent patterns of performance as predicted by the C-LIM within the overall sample. However, such patterns were not statistically significant differences based on within-subject analyses. Overall, a large proportion of the sample did not reflect pattern of scores that were predicted by the C-LIM model. They found 13% of all participants had scores consistent with the patterns predicted for the effects of linguistic demand, cultural loading, and their combination. Almost half of the sample had scores that did not follow any of the predicted patterns in the C-LIM. The authors concluded that their results, when using the Woodcock-Johnson Tests of Cognitive Abilities among a diverse sample of immigrant children, did not substantiate the use of C-LIM model. What this study highlights is the importance of examining within-subject patterns of associations between acculturation and cognitive performance for contributing important information for individual assessment.

Although the reviewed studies show relatively consistent support for the C-LIM model at the group level, there are important limitations when examining the model at the individual level, as highlighted by the Kranzler and colleagues (2010) study. The C-LIM utility was also challenged when attempting to discriminate between ELL and non-ELL students (Styck & Watkins, 2014). It also remains unclear if the process of acculturation has unique contributions to

understanding the effect of culture and language on cognitive performance because there was no systematic evaluation of acculturation levels. The one study that used a within-subject design did not analyze the level of acculturation or even the generation status of the ethnically, linguistically, and culturally heterogeneous sample assessed. It is not clear if there are unique cultural and linguistic factors within a specific ethnic or linguistic group that may be more pronounced in how they substantiate the model, or in how acculturation variables relate to verbal and language-reduced performances. There are no available studies that have examined the clinical utility of IQ testing among Arab Americans who possesses unique cultural and linguistic attributes. There have been some studies that have evaluated Arab children using Wechsler scales outside of America.

Cognitive Assessment with Arab Children

There have been no published studies that have examined the cognitive performance of Arab American youth or Arab youth in Europe. However, there have been some studies of examining the cognitive performance of Arab youth residing in Arab countries and in Israel. The available studies are mostly normative studies using the Raven's Colored Progressive Matrices, a language-reduced reasoning task (i.e., Raven's Matrices). Results show that the mean performance varies from the lowest mean of 78 to the highest mean of 87 (Lynn, 2006; Dickins, Sear, & Well, 2007). However, the available studies were often conducted in the late 1980s and early 1990s, and the normative comparisons used were based on a sample of British children. The studies also lacked adequate controls for important educational and geographical setting variables. The most detailed studies of Arab youth were conducted in Israel.

There have been several studies using full intelligence assessment batteries with Arab and Israeli children that have revealed some important findings. Liblich and Kugelmass (1981)

looked at the patterns of intellectual ability of Arab school children (age 6-16) in Israel using the WISC-R. This particular study followed up prior studies that analyzed the intellectual profiles of much younger Arab children using the WPPSI (Kugelmass et al., 1974). Results overall indicated higher performances on verbal than language-reduced tasks. This difference was much more pronounced among younger age groups (e.g., 6-12 years old). Arab children were also compared to Israeli children. In general, Israeli children scored higher, but the difference nearly disappeared when comparing samples that lived in the same city and had comparable SES factors. However, some significant differences continued to be observed on visual perceptual and speed-tests. The authors posited some culturally based explanations of the observed differences. For instance, they highlighted that Arab cultural attitudes toward time and speeded tasks are negative, citing popular Arab sayings that "speed is from the devil" and implying preference to work in a relaxed, collaborative, and unhurried fashion. Such speculations were supported by the higher performance Picture Completion subtest, which is an untimed visual-perceptual categorical reasoning task. Another cultural-specific factor that may explain weaker visual perceptual abilities may be associated with Islam and its prohibition of pictorial arts and sculptures. Because of these popular cultural values, there may be less developmental interaction with drawing pictures and construction activities in Arab homes. The authors argued that their analysis of Arab youth's performance on the WISC-R challenges the notion that language-reduced performance based tests are more "culturally fair."

Ethical Obligations and Multicultural Competency

According to the American Psychological Association (APA), developing multicultural competence is essential for practitioners and trainers in meeting general competency and ethical imperatives (APA, 2003). The APA published two guiding documents in 2002 and 2003

(Guidelines on Multicultural Education, Training, Research, Practice, and Organizational Change for Psychologists; Ethical Principles and Codes of Conduct) that highlight the importance of moving away from a monoculture lens towards recognizing and embracing a multicultural framework that will lead to more precise assessment and ultimately more effective treatment (APA, 2002, 2003). Developing cultural competence allow for better delivery of psychological assessment services that are more consistent with established ethical and professional guidelines. Sue and colleagues (1998) outlined four dimensions in the process of developing cultural competence. First, it requires involves being aware of one's own assumptions, values, biases, and stereotypes about an ethnic minorities. Second, it involves developing knowledge and understanding regarding one's own worldview and that of one's client; specific knowledge regarding the culture of one's clients and underlying sociopolitical influences. Third, cultural competence requires acquisition of specific, culturally appropriate assessment and communication skills necessary to effectively work with ethnic minority groups. Lastly, it also requires the development of core cultural competencies based on new theories, practices, policies, and organizational structures. In light of these guidelines, intellectual assessment among minorities has received very little attention that would allow practitioners to enhance their multicultural competence and provide ethically and professionally responsible services.

A crucial component in developing cultural competence among clinicians is increasing one's knowledge base about their clients, raising awareness of their own potential biases, and continually enhancing culturally sensitive services (Rogers, Ingraham, Bursztyn, et al., 1999). With any group of recent immigrants, clinicians, educators, and researchers will increase their cultural competence by considering how well they adjust and the effect of other relevant

demographic factors (e.g., age, gender). Meeting these goals will require a better understanding of how the process of acculturation affects intellectual assessment. Improved understanding of the acculturation influence on intellectual performance will help better interpret results that reflect a cultural difference from results that are indicative of cognitive processing deficits.

Rationale and Aims of the Proposed Study

Assessment of global cognitive functioning has played an important societal role across clinical, vocational, and educational settings. The available research has not provided an adequate analysis of how the acculturation process influences performance on cognitive tests by immigrant populations. Cultural exposure to the host culture and the development of language competence has been documented to have dramatic influence on cognitive outcomes (Flannigan & Ortiz, 2007). Although a substantial amount of research has highlighted significant moderating effects of some acculturation variables on verbal and language-reduced intelligences tests, most of that research has been conducted with adult samples. Additionally, the available studies with children have often utilized proxy measures of acculturation (Flanagan & Harrison, 2012). Acculturation is a dynamic process that leads to changes in the cultural, affective, and cognitive domains (Sam & Berry, 2006; Nell, 2000). Proxy level conceptualizations of acculturation may not provide an adequate account of the association between the acculturation process and cognitive assessment. Not accounting for acculturation variables will likely threaten the reliability and validity of the outcomes, lessen the quality of care provided, and fall short of meeting professional multicultural competence and ethical standards. Thus our understanding of how the acculturation process affects cognitive development and assessment is fragmented and has not resulted in foundational clinical implications for assessing immigrant youth.

Models such as the C-LIM have provided a systematic framework to understand how the level of linguistic and cultural loadings within IQ tests could affect performances and help differentiate between cultural differences and disability. This framework has found some empirical support, but important limitations have been highlighted (see Kranzler et al., 2010). The current study is designed to contribute to the gaps in the literature, as well as to document the clinical utility of intelligence test with Arab American youth. No study has examined the influence of a systematic conceptualization of acculturation on performance of intelligence tests and how well such tests predict academic achievement. This will also be the first study to examine the bidimensional nature of acculturation and its potential association with verbal and language-reduced cognitive performance. It remains unclear if enculturation factors have independent association with performance on intelligence tests, and whether that association differs across verbal and language-reduced tests.

The proposed study has three main aims. The first aim is to examine whether there is a clinically meaningful difference between the Arab American youths performances on verbal and language-reduced IQ tests. The second aim is to examine the association between proxy and systematic acculturation factors with verbal and language-reduced IQ performances. The third aim is to identify how well IQ predicts academic achievement and whether that association is moderated by acculturation factors. Despite potential bias in the intelligence assessment among immigrant groups, it has been found that they may not be biased when it comes to their predictive validity. The predictive validity of IQ among Arab American youth is unknown.

CHAPTER III: METHODS

Population of Interest

Youth. A total of 83 non-clinical, community based Arab American males between the age of 12 and 17 were recruited for the study, but only 80 participated. Three participants were dropped because they were currently undergoing aggressive epilepsy treatment. Approximately 39 percent (n = 31) were between the age of 12 and 14, and approximately 61 percent (n = 49) were between the age of 15 and 17. The average age was m = 15.34, sd = 1.7. All participants were general education students at charter and public schools. Approximately 55 percent (n = 44) of the youth were born in the US, while 45 percent (n = 36) were born outside the US. All participants were Arab American, lived in the US for a minimum of three years, and spoke fluent English. A total of nine youths preferred using Arabic over English in general, while the rest preferred English. The sample was predominantly composed of participants from Yemeni origins (77.5 %), but included others from Iraq, Jordan, Lebanon, Syria, and Palestine. At least one parent provided demographic information for each youth (see Tables 1 & 2).

Table 3

Country of Birth for Adolescents and Parents

Country of Birth	Adolescents (n = 80)		Parents (n = 80)	
	n	%	*n*	%
United States	44	55.0	3	3.8
Yemen	24	30.1	61	7.36
Iraq	4	5.0	8	10.0
Lebanon	3	3.0	1	1.3
Jordan	3	3.8	2	3.0
Palestine	2	3.0	3	3.8
Syria	1	1.3	1	1.3

Table 4

Demographic Characteristics of Adolescent Participants

	Total Participants	Total Percentage
Age		
12-14	49	62.2
15-17	31	38.8
Language Preference		
English	71	88.8
Arabic	9	11.2
Language Used at Home		
Mostly English	15	18.8
Mostly Arabic	27	33.7
Both Equally	38	47.5
Language Use at School		
Only English	22	27.5
Mostly English	57	71.3
Mostly Arabic	0	0
Both Equally	1	1.3
Friends		
Mostly Arab	79	98.7
Mostly Non-Arab	1	1.3
Place of Birth		
US	44	55
Outside US	36	45

Parents. Out of 83 parents who provided consent to participate in the study, 80 were included in the analysis. Seventy-six of 80 reporters were fathers. Parents' socio-economic statuses were generally in the low range (Hollingshead Index score $m = 30.06$, $sd = 8.93$, Median = 28, Range = 8 to 53; Hollingshead, 1975). Approximately 90 percent of the reporters were married to the child's other parent. Eighty eight percent ($n = 70$) of the parents were born outside the US. Approximately 70 percent ($n = 56$) of the mothers and 39 percent ($n = 31$) of the fathers earned less than a high school diploma. Slightly over 11 percent ($n = 9$) of the mothers and 26 percent ($n = 21$) of the fathers had some college or higher. Only four of the 80 mothers had at least part-time employment. The majority of fathers were employed; 66.25 percent ($n = 53$) were full-time employed, 12.5 percent ($n = 10$) were part-time, and 21.25 percent ($n = 17$) were

unemployed. The majority of those employed were blue collar workers in primarily the manufacturing and service industry (e.g., restaurant staff, cashiers). Total family SES was in the low range (Hollingshead Index *m* = 30.06, *sd* = 8.93). The average household consisted of six to seven individuals (*m* = 6.68, *sd* = 1.66). A total of 34 percent (*n* = 27) reported communicating with their child primarily in Arabic, 18 percent (*n* = 15) primarily in English, and 48 percent (*n* = 38) reported using both languages equally (See Tables 2 & 3).

Table 5

Parents' Education, Employment, and Income

Variable	Mother (*n* =80)	Father (*n* = 80)
Education		
Grade 0-3	23	5
Grades 4-6	22	3
Grades 7-9	11	23
Grades 10-12	14	26
Some college	6	13
Bachelors or higher	3	8
Employment		
Full Time	2	53
Part Time	2	10
Not working	76	17
Family Income (frequency/%)		
< 10, 000	19 (23.8%)	
10,001-20,000	26 (32.5%)	
20,001-30,000	12 (15%)	
30,001-40,000	12 (15%	
> 40,001	11 (13.8%)	
	Family SES[a]	
Mean (SD)	30.06 (8.93)	
Range	8-53	

[a]Family SES based on Hollingshead Index

Exclusion criteria. Participants with any psychiatric, developmental, neurological, or behavioral disorders were excluded from the study. The exclusions included children receiving special education services at their schools for neurodevelopmental disabilities (e.g., ASD, ADHD, and Specific Learning Disability). Additional exclusion criteria included individuals with psychological (e.g., depression), neurological (e.g., seizures, traumatic brain injury), or cognitive impairment (e.g., intellectual disability). Also, those who resided in the US for less than three years or did not identify as Arab American were excluded. A total of three individuals were dropped from the analyses because they had a history of or were currently undergoing aggressive treatment for epilepsy. Female participants were also excluded because controlling for possible examiner and examinee interaction as a function of gender, ethnic, and religious background would have introduced great pragmatic challenges that could not be realistically controlled for in the current dissertation study. As a result only a single male examiner evaluated only males.

Recruitment and Assessment

Recruitment procedures were multifaceted. Overall, recruitment was conducted through schools, a community center, and by posting flyers in community centers, mosques, schools, and local markets. Most of the participants were recruited from two schools (one public and one charter) and a community center. Those affiliated with the community center were all enrolled in after school programs located in a public high school. The primary investigator cooperated with school and community center staff to introduce the study and pass out study descriptions, consent, and demographic forms. School staff and community center coordinators collected completed consent forms and some demographic forms. The parent demographic forms were mostly completed through an in-person or over the phone interview by the primary investigator.

Students were tested after consent and demographic information were collected. Those recruited via flyers were provided with an overview of the study and in some cases e-mailed study descriptions and consent forms. Those interested were scheduled for testing after parent consent and demographic information were obtained.

All testing was conducted in English only and in accordance with standardization procedures of the instruments used. The participants were all individually assessed in quiet and private rooms located in two different schools and one community center. The individual student evaluation included measures of verbal and language-reduced intellectual abilities, measures of basic academic reading and mathematics skills, brief demographic information report, and a self-report acculturation scale. Administration time for each student took approximately 60 minutes. Upon completion of the study requirements, each youth received a 20-dollar gift card. Three 50-dollar gift cards were also provided to three different parents who were selected through a raffle. See Appendices D, E, and F for consent/assent and recruitment materials.

Variables of Interest and Materials

Demographic variables. Guardians and youth completed brief demographic forms that were developed by the principle investigator (see Appendixes A & B). The parent form included the following information about the family: country of origin, length of stay in the U.S. (i.e., number of years resided in the U.S.), relation to child, child's age of arrival, languages spoken in the home, total family members, occupation status, household income level, parent education levels, and screening questions of learning, psychological, developmental, or neurological impairments.

Guardian education level. Defined as follows: Scale from 1 to 7: 1= third grade or below; 2 = fourth grade up to sixth grade; 3 = seventh grade up to ninth grade; 4 = 10^{th} grade up to high

school graduate; 5) beyond a high graduate and up to two years of college; 6) bachelor's degree; 7) master's degree or higher.

Income level. Defined as follows: scale from 1-10: 1 = 5,000 or below; 2 = 5,001-10,000; 3 = 10,001-20,000, 4 = 20,001-30,000; 5 = 30,001-40,000; 6 = 40,001-50,000; 7 = 50,001-60,000; 8 = 60,001-70,000; 9 =70,001-100,000; 10) More than 100,000.

These measures, used for assessing income and education level, have been viewed as adequate measures to control for SES effects (Bialystok, 2001). The Hollingshead Index (1975) method was used to construct the SES variable that took into account type of job and education levels. The youth demographic forms included questions about language preference, friendships, religiosity, ethnicity, place of birth, school attending, school grades, and city of residence.

Intellectual assessment. The *Wechsler Abbreviated Scale of Intelligence -Second Edition (*WASI-II; Wechsler, 2011) was used to estimate verbal and language-reduced intelligence. The WASI-II provides four major indices. It has an overall composite score that is comprised of all four subtests (i.e., FSIQ-4) and another overall abbreviated measure that is comprised of one verbal and one language reduced subtests (i.e., FSIQ-2). The WASI-II is also structured into an abbreviated measure of Verbal Comprehension Index (VCI) and Perceptual Reasoning Index (PRI).

The VCI may be referred to as an estimated verbal IQ [V-IQ]) and is composed of two subtests, Vocabulary and Similarities. The Vocabulary subtest has 31 items, including three picture items and 28 verbal items. Vocabulary requires the participant to orally express definitions for words that increase in difficulty. For picture items, the examinee names the object, and for verbal items, the examinee defines words that are presented visually and orally. The Vocabulary subtest is designed to measure word knowledge and verbal concept formation. It

is also believed to be a reliable estimate of the examinee's crystallized intelligence, fund of knowledge, learning ability, degree of language development, and long-term memory (Wechsler, 2011; Lezak et al., 2012). The Vocabulary subtest has strong internal consistency among youth populations (Average Cronbach's Alpha = .91; Wechsler, 2011).

The Similarities subtest includes three basal picture items and 24 verbal items. The examinee is orally presented two words that represent common objects or concepts and are asked to describe how they are similar. The Similarities subtest is designed to measure abstract verbal concept formation and categorical reasoning. It is also assumed to be a reliable indicator of crystallized intelligence, auditory comprehension, categorical thinking, and verbal expression (Wechsler, 2011, Lezak et al., 2012). It also has strong internal consistency among youth populations (Average Cronhbach's Alpha = .89; Wechsler, 2011).

The PRI may be referred to as an estimated language reduced IQ (LR-IQ). It is composed of two subtests (Block Design and Matrix Reasoning) that involve reduced levels of language instruction, comprehension, and processing to perform the tasks. The Block Design subtest is composed of 13 modeled or printed two-dimensional geometric patterns that the examinee replicates within specified time limits using two-color blocks. It is designed to assess the ability to analyze and synthesize abstract visual-spatial stimuli. It also involves nonverbal concept formation and reasoning and is regarded as an indicator of broad visual intelligence, fluid intelligence, and visual perception and organization (Lezak et al., 2012). It also requires simultaneous processing, visual-motor coordination, and learning and problem solving ability (Wechsler, 2011, Sattler, 2008). Block Design has strong internal consistency among youth populations (Cronbach's Alpha = .89, Wechsler, 2011). The second language reduced subtest is Matrix Reasoning, which has 30 items. The examinee views a series of incomplete matrices and

completes them by selecting the correct response from a set of choices. Matrix Reasoning is viewed as a measure of fluid and nonverbal reasoning. It taps into broad visual intelligence, perceptual organization, classification, spatial ability, and knowledge of part-whole relationships (Sattler, 2008; Wechsler, 2011). Matrix Reasoning has strong internal consistency among youth populations (Cronhbach's Alpha = .87).

The four subtests and two subtests estimated FSIQ scores have strong concurrent validity with more comprehensive IQ measures ranging from .78 to .91 (Wechsler, 2011). The correlation between the WASI-II four subtests FSIQ had moderate to strong correlation with Wechsler's Word Reading and Numerical Operations. Please see table (Table 6) below for individual composite and individual subtests correlations. The total estimated administration time for the WASI-II ranges from 30 to 45 minutes (Table 6).

Table 6

Normative Sample Correlations between the WASI-II and Wechsler's Academic Outcomes

	Wechsler Academic Achievement Tests	
WASI-II Subtests/ Composites	Word Reading	Numerical Operations
Block Design	.46	.50
Matrix Reasoning	.53	.60
Vocabulary	.64	.53
Similarities	.62	.53
VCI	.68	.56
PRI	.59	.65
FSIQ-4	.70	.68
FSIQ-2	.67	.65

Measure of acculturation. *The Abbreviated Multidimensional Acculturation Scale (AMAS; Zea, Asner-Self, Birman, & Buki, 2003)* is a bilinear and multidimensional scale used to assess acculturation toward American mainstream society (AMAS-Total American) and maintenance of heritage culture or enculturation (AMAS-Total Arabic). The AMAS-Total American includes three subscales: English Language Competence, American Cultural

Competence, and American Cultural Identity. The AMAS-Total Arabic also includes three comparable subscales: Arabic Language Competence, Arabic Cultural Competence, and Arabic Identity Levels. Thus, the scale allows for unidimensional and bidimensional conceptualizations of acculturation across multiple domains.

The AMAS has been used and analyzed across diverse samples of Hispanic and Asian young immigrants and demonstrated robust reliability indicators across groups and across scale domains (Cronbach's alpha ranging from .90 to .97; Zea et al., 2003). The scale also demonstrated strong internal consistency with the current study sample when examining the entire scale and individual scales (see Table 7).

Table 7

Internal Consistency of AMAS with Arab Americans as Measured by Cronbach's Alpha

AMAS-Scales	English	Arabic
Total Scale	.82	.85
Language Competence	.84	.89
Cultural Competence	.79	.77
Cultural Identity	.77	.93

The structure of the questions allowed for relatively facile adaptations by simply changing the reference group when referring to the heritage acculturation (e.g., "I think of myself as_____" or "I have a strong sense of being _____)." There are 12 questions that survey cultural identity, 12 questions that survey cultural competence, and 18 questions that survey language competence on the acculturation and enculturation domains (AMAS-Total American and AMAS-Total Arabic). Each question was answered using a Likert-Scale ranging from 1 (strongly disagree) to 4 (strongly agree). The scale is designed so that higher scores reflect higher levels of acculturation and enculturation. Approximately a fourth grade reading level is required

for participants to individually complete the scale. The completion of the AMAS acculturation scale took approximately 5 to 10 minutes.

Academic achievement. The Word Reading and Numerical Operations subtests from the *Wechsler Individual Achievement Test-Third Edition* (WIAT-III; Wechsler, 2009) will be used as measures of academic outcomes. The Word Reading subtest measures the rate and accuracy of word reading. The examinee is asked to read aloud from a list of words that increase in difficulty. This subtest allows for a timed and untimed interpretation. Only untimed performances will be used for the current study. The Numerical Operation subtest is an untimed task that presents the examinee with a wide range of math calculation problems to be solved in a paper and pencil format without the aid of a calculator. The subtest assesses a range of skills that include basic arithmetic, basic operation with integers, geometry, algebra, trigonometry, and calculus. Both achievement subtests are standardized on kindergarten through 12th grade and have demonstrated strong predictive validity with overall school achievement and excellent internal reliability (Word Reading, r = .98; Numerical Operations, r = .93). These two subtests have also been shown to be very reliable across age, gender, and ethnic backgrounds (Wechsler, 2009). Administration of both academic tasks takes between 15 to 20 minutes.

Data Analysis

The SPSS (version 20) software was used to conduct descriptive and inferential statistical analyses. For the first question, a paired-sample t-test was conducted to examine within-individual differences between verbal and language reduced IQ. *Cohen's d* effect size was used to determine the magnitude of the difference between verbal and language-reduced IQ. The difference between V-IQ and LR-IQ was analyzed by creating an IQ Difference variable that was generated by subtracting V-IQ from LR-IQ. A hierarchical regression equation was conducted to

evaluate what important sociodemographic variables explained IQ Difference. Two hierarchical regression analyses were conducted to examine the association between proxy and systematic measures of acculturation with V-IQ and LR-IQ. Follow-up analyses were conducted using multiple regression procedures to examine which aspects of acculturation best explained variance in V-IQ and LR-IQ performances. A multiple regression equation was used to evaluate how well the FSIQ-4 predicted basic reading and math skills. An interaction term was added to explore the possible moderating influence of acculturation levels on the predicative association between IQ and achievement. All terms were centered when interaction terms were entered to all equations.

Power analysis. A statistical power approaching .80 is considered adequate for rejecting the null hypothesis if it were false. For multiple regression procedures with up to four independent variables, given an alpha level of .05, assuming a small to moderate effect size (e.g., .15), a sample size of up to 80 participants will achieve a total power of .82.

Three Study Aims, Questions, Rationales, and Analyses

Aim One

The first aim was to examine whether there existed a significant difference between Arab American youth's performances on V-IQ and LR-IQ as predicted by the C-LIM framework. Studies with immigrants have identified that verbal IQ is often underestimated because of acculturation factors (Flanagan & Ortiz, 2007). Results have found that language-reduced IQ assessment can be less sensitive to cultural and language factors and may be a more reliable indicator of overall cognitive ability and possibly a better predictor of important academic skills (Flanagan & Ortiz, 2007; Sattler, 2008).

Question 1: Is there a significant difference between the performance on V-IQ (i.e., estimated Verbal IQ) and LR-IQ (i.e., estimated language-reduced IQ) among Arab American youth? As predicted by the C-LIM framework, it was anticipated that Arab American youth's scores would be significantly greater on LR-IQ than on V-IQ. A paired-sample t-test was used to examine how big the difference was between V-IQ and LR-IQ. Further, the difference between V-IQ and LR-IQ was regressed against important sociodemographic variables. A moderate to large effect size (*Cohen's d* > .5) represented a clinically meaningful difference.

Aim Two

The second aim was to evaluate the association between acculturation variables with V-IQ and LR-IQ performances. As outlined in the literature, there is a considerable influence of acculturation factors on intellectual assessment. Moreover, there has been inconsistent conceptualization of the acculturation process among available studies that have examined intellectual capability among immigrant populations. Some studies have used proxy and sociodemographic factors to account for possible acculturation influence. It has been argued that acculturation is a dynamic process that is not sufficiently captured by proxy variables and that a systematic bidimensional assessment instrument better organizes and conceptualizes the complexity involved. If more systematic measures are important, it remains unclear whether there is an added explanatory benefit of conceptualization acculturation as a unidimensional or bidimensional construct when assessing its potential effect on IQ performance. The following question was aimed at evaluating the relation between the acculturation process and IQ performances and determining whether there was a difference in explanatory power when using proxy and more systematic evaluations of acculturation.

Question 2a: Is acculturation associated with performance on measures of verbal IQ among Arab American youth? The influence of acculturation on V-IQ was examined using hierarchical regression equation. Sociodemographic variables were entered first followed by acculturation factors that were significantly associated with V-IQ. This allows for evaluating the association of acculturation independent of sociodemographic factors.

Question 2b: Is acculturation associated with performance on measures of Language-Reduced IQ among Arab American youth? The influence of acculturation on LR-IQ was examined using a hierarchical regression equation. Sociodemographic variables were entered first followed by acculturation factors that were significantly associated with LR-IQ. This allows for evaluating the association of acculturation independent of sociodemographic factors.

Aim Three

The third aim was to evaluate how well FSIQ-4 predicted basic academic skills and whether there was a moderating effect of the acculturation levels toward American mainstream society. On average, there is a moderate to strong predictive association between IQ and standardized academic measures when using the Wechsler scales (Watkins, Lei, & Ganivez, 2007; Gagne & St. Pere, 2001; Wechsler, 2011, 2009). Specifically, verbal IQ was found to be the strongest single predictor of word reading, reading comprehension, and math calculation (Mayes & Calhoun, 2007). Overall, Full-Scale IQ (i.e., combined verbal and language-reduced IQs) has been viewed as the most robust predictor of academic achievement (Mayes & Calhoun, 2007; Sattler, 2008). Studies with immigrant groups have shown similar but more variable associations between intelligence performance and academic achievement (Rushton & Jensen, 2005; Flynn, 2008). It is not clear if such variability is partly explained by levels of acculturation or language competence levels. In general, despite potential bias in the process of intellectual assessment

among immigrant groups, it has been found that intelligence tests may be unbiased in how they predict academic achievement (Rushton & Jensen, 2005). This can hold important clinical utility when examining immigrant youth who may be immersed in two different cultural and language backgrounds with no viable assessment alternatives. The capability to estimate learning potential more robustly is a clinically and ethically important undertaking. It is unknown whether this predictive association can be generalized to understudied groups such as Arab American youth and whether acculturation is an important moderating variable in that association. To meet this aim, the following questions were put forth:

Question 3. Is FSIQ-4 predictive of academic outcomes (e.g., Word Reading and Numerical Operations)?

3a. FSIQ-4 is expected to be moderately to strongly predictive of Word Reading.

3b. FSIQ-4 is expected to be moderately to strongly predictive of Numerical Operations.

Question 4. Is the predictive association moderated by acculturation?

It was anticipated that the predictive association between FSIQ-4 and academic achievement will be influenced by level of acculturation toward American mainstream society. The predictive association was anticipated to increase as the level of AMAS-American increased.

A hierarchical regression model for each outcome variable was completed (i.e., Word Reading and Numerical Operations). The order of entry was centered FSIQ-4, followed by a centered US-AMAS, and lastly a centered interaction term was included (i.e., FSIQ-4 X US-AMAS).

4a. The association between FSIQ-4 and Word Reading will be positively moderated by US-AMAS.

4b. The association between FSIQ-4 and Numerical Operations will be positively moderated by US-AMAS.

CHAPTER IV: RESULTS

Summary of Purpose

The overall goal of the study was to evaluate the clinical utility of the WASI-II among Arab American youth by examining how well it predicts academic achievement and what effect acculturation factors have on verbal (e.g., V-IQ) and language-reduced (e.g., LR-IQ) intelligence tests. Three specific aims were outlined in the previous chapter. The first aim was to evaluate if there was a meaningful difference between the youth's performances on V-IQ and LR-IQ. The second aim was to evaluate the association between proxy and systematic measures of acculturation (i.e., rating scale acculturation assessment) with intelligence tests performances. The third aim was to evaluate the predicative association between FSIQ-4 and basic academic skills (e.g., reading and math) and determine whether acculturation moderates the relation. The results are presented by providing descriptive, correlational, and inferential statistics. For descriptive statistics, multiple tables are presented that provide an overview of the sample characteristics. Matrices of correlations with means and standard deviations are presented for the main study variables. Inferential analyses are organized around the research questions and stated hypotheses. Exploratory analyses were added at the end of the chapter as a result of the outcomes observed in the core analyses.

Sample Characteristics

The data were inspected for form, distribution, and completeness prior to their use in any analyses. For non-demographic items, the mean score replaced missing responses to preserve power. This was the most appropriate imputation strategy since there was a very small amount of missing data. Approximately 0.1% of items required replacement. A Shapiro-Wilk's test (p>.05; Shapiro & Wilk, 1965; Razali & Wah, 2011) and visual inspection of their histograms, normal Q-Q plots, and box plots showed that the IQ and achievement scores were normally distributed

for the entire sample (Cramer, 1998; Cramer & Howitt, 2004; Doane & Seward, 2011). Inspection of Mahlanobis and Cook's values indicated no presence of outliers for the main study variables including acculturation, IQ, and achievement. The instruments and scales used in the study had appropriate characteristics to allow for the use of standard, inferential, parametric statistics. Please see Tables 6, 7, and 8 for means, standard deviation, correlations, skewness, and kurtosis for the main variables.

Table 8

Intercorrelations of Study Variables, with Means, Standard Deviation, Kurtosis, and Skewness

	1	2	3	4	5	6	7	8	9	10	11
1. 4-FSIQ[b]											
2. 2-FSIQ[c]	.93**										
3. V-IQ	.84**	.78**									
4. LR-IQ	.88**	.81**	.50*								
5. Reading	.51**	.50**	.56**	.32**							
6. Math	.60**	.57**	.43**	.57**	.39*						
7. Arab-AMAS	-.10**	-.12	-.08	-.09	.19	-.05					
8. US-AMAS	.28**	.24*	.29**	.22	-.26*	.28	.26				
9. Age	.00	.06	-.01	-.01	-.01	.06	-.14	-.08			
10. LOS[x]	.16	.11	.13	.15	.17	.09	-.27*	-.05	.23*		
11. SES[y]	.15	.04	-.01	.25*	.04	.21	.09	.36**	-.12	.24*	
Mean	89.29[a]	93.30[a]	88.51[a]	92.25[a]	89.16[a]	94.10[a]	61.70	67.15	15.27	12.73	30.06
(SD)	(11.20)	(11.66)	(11.03)	(13.33)	(13.20)	(13.22)	(10.58)	(9.17)	(1.70)	(3.36)	(8.93)
Kurtosis	.18	.03	.09	.14	-.27	.23	-1.24	1.69	-1.81	.05	.18
Skewness	1.44	.98	1.55	.28	-1.47	1.02	-1.04	.69	-1.45	4.01	1.44

[a] Scores are based on a standard score, mean = 100, SD ± 15; [b]4-FSIQ comprised all four WASI-II subtests; [c]2-FSIQ comprised the Vocabulary and Matrix Reasoning subtests; [x] Length of Stay (LOS) equals total years or US residence; [y] Socio-economic status (SES) based on Hollingshead method (1975); Note: * P < .05, **P < .001

Table 9

Intercorrelation of Acculturation Subscales, Sociodemographic, and IQ

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. US-AMAS															
2. English Competence	.55**														
3. US Culture Competence	.57**	.27*													
4. US Identity	.57**	.10	.10												
5. Arab-AMAS	.26*	.16	.35**	.15											
6. Arabic Competence	.15	.02	.28*	.03	.80**										
7. Arab Culture Competence	.24*	.01	.42**	.03	.77**	.62**									
8. Arab Identity	.19	.05	-.08	.19	.30*	-.07	.11								
9. Length of Stay	-.07	-.01	-.08	-.12	-.29*	-.31**	-.22	.00							
10. SES	.36**	.10	.20	.31**	.10	-.01	.11	.28*	.24*						
11. Income	.28*	.10	.15	.25*	.11	-.01	.09	.13	.25*	.90**					
12. Mother's Education	.21	.08	.23*	.12	-.17	-.22*	-.09	.06	.31*	.34*	.16				
13. Father's Education	.24*	.08	.11	.19	.07	.06	.13	.02	-.02	.44**	.03	.33*			
14. Age	.08	.04	-.10	.03	-.14	.02	-.14	-.16	.20	-.12	-.05	-.14	-.21		
15. V-IQ	.29*	.35**	.06	-.17	-.08	-.16	-.15	.12	.13	-.01	-.06	.39**	.10	-.01	
16. LR-IQ	.22*	.17	.01	.26*	-.09	-.10	-.02	.02	.15	.25*	.27*	.15	.01	-.01	50**

Note: *<.05, **<.001

Table 10

Intercorrelations among WASI-II and AMAS Scales

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. US C.C.[a]																
2. US ID.[b]	.10															
3. Eng. C.[c]	.27*	.10														
4. A.C.C.[d]	.42**	.03	.02													
5. A. ID.[e]	-.08	.19	.05	.03												
6. Arabic	.28*	.03	.02	.62**	-.07											
7. Vocabulary	-.01	.20	.40**	-.24	.10	-.17										
8. Similarities	-.13	.08	.15	-.05	.11	-.12	.54**									
9. MR[f]	-.04	-.00	.10	-.10	-.00	-.12	.38**	.47**								
10. BD[g]	.02	.27*	.20	.02	.27**	-.10	.38**	.47**	.66**							
11. NO[h]	.09	.29**	.24*	-.08	.11	-.14	.41**	.40**	.54**	.55**						
12. WR[i]	-.03	.06	.32	-.25*	-.02	-.32**	.56**	.35**	.41**	.26*	.39**					
13. V-IQ[j]	.06	.17	.35**	-.15	.12	-.16	.89**	.85**	.48**	.45**	.43**	.56**				
14. LR-IQ[k]	.01	.26*	.17	-.03	.03	-.10	.39**	.46**	.90**	.91**	.57**	.32**	.50**			
15. 4-FSIQ	.01	.27*	.26*	-.12	.11	-.16	.72**	.75**	.82**	.80**	.60**	.51**	.88**	.87**		
16. 2-FSIQ	-.01	.26	.26*	-.15	.01	-.13	.76**	.46**	.85**	.6**	.57**	.50**	.81**	.81**	.93**	

[a] = AMAS American Cultural Competence; [b] = AMAS American Identity; [c] = AMAS English Competence; [d] = AMAS Cultural Competence; [e] = AMAS Arab Identity; [f] = Matrix Reasoning; [g] = Block Design; [h] = Numerical Operation; [I] = Word Reading; [j] = Verbal IQ; [k] = Language-Reduced IQ

* p < .05, **p<.001

Acculturation levels. The sample acculturation characteristics are described below, followed by examining the internal reliability of the AMAS acculturation scale, as measured by Cronbach's Alpha. Further, the means and intercorrelations between systematic and proxy acculturation, and sociodemographic factors are summarized (see Tables 7 and 8). The entire sample was composed of first and second generation Arab American male immigrants. A total of 44 (55%) males were born in the US, while 36 (45 %) were born outside the US. Most of those born abroad came at a very young age. The Length of Stay (LOS) reflected the total number of residence years in the US (m = 12.73 sd = 3.36). Approximately 89 percent (n=71) of the sample preferred speaking English over Arabic. However, 100 percent of the sample spoke English and did not require any modifications or interpretations of the assessments. Each male completed the AMAS Acculturation Scale (Zea et. al., 2003) to assess their acculturation, bidimensionally, across language competence, cultural competence, and cultural identity domains (See Table 11 for means, range, and internal reliability and Table 10 for subscales intercorrelations).

Overall, the results show higher US-AMAS than Arab-AMAS means. There was also a positive association between Arab-AMAS and US-AMAS (r (78) =.26, p = 02). There were differences in level of acculturations within American and Arab cultural domains. A total of 72 (90%) participants rated higher Arab than American identity, but 64 (80%) participants endorsed higher English and American cultural competences than Arabic language and Arab culture competences.

Table 11

Internal Consistency, Means, and Range of AMAS with Arab Americans

AMAS-Scales	English[a]	Mean (*sd*)[b]	Range	Arabic	Mean (*sd*)	Range
Total Scale	.82	67.15 (9.17)	47-84	.85	61.7 (10.58)	42-83
Language Competence	.84	31.94 (4.33)	22-36	.89	24.98 (6.57)	9-36
Cultural Competence	.79	17.78 (3.84)	7-24	.77	14.75 (4.26)	7-23
Cultural Identity	.77	18.05 (4.17)	6-24	.93	21.84 (3.42)	7-24

[a]Cronbach's Alpha used to measure internal consistency

[b] Mean scores reflect likert-totals (1-low, 4-high) for each scale and subscale

Relation between acculturation and sociodemographic variables. Some AMAS acculturation scales were significantly associated with proxy acculturation and sociodemographic variables. The acculturation levels toward the US or Arab culture were not related to what language individuals preferred using or where they were born. The longer individuals stayed in the US (i.e., LOS) the lower they rated their total acculturation levels toward Arab culture [Total Arab AMAS (78) = -.27, p = .02; Arab Cultural Competence r (78) = -.24, p = .03]. However, the longer they stayed in the US did not positively relate to increased ratings of US cultural competence, identity, or English levels. Participants who came from higher SES background rated higher acculturation levels toward the US [US-AMAS r (78) = .36, p < .001; US Identity[r (78) = .31, p < .001] and rated having higher Arab Identity [r (78) = .28, p < .001]. Individuals from higher SES were also more likely to have lived in the US longer [LOS r (78) =.24, p = .02], and had more educated mothers [r (78) = .34, p < .001]. Those from families with higher incomes were more likely to have lived longer in the US and rated having higher US acculturation levels toward the US [US-AMAS [r (78) = .28, p =.01]; US Identity r (78) = .25, p = .02; LOS [r (78) = .25, p = .02]. The higher the mother education level the higher the ratings of US cultural competence [US Cultural Competence r (78) = .23, p = .02] but had lower ratings of Arab cultural competence [Arabic Competence r (78) = -.22, p = .05]. Higher mother education was also positively associated with longer stays in the US [LOS r (78) =.31, p < .001].

Participants who had more educated fathers were more likely to rate having higher acculturation levels toward the US [US-AMAS r (78) = .24, p = .02].

Relations between age, country of origin, and main outcome measures. The possible effect of age and country of origin group were examined. The sample was broken into two age groups, those 14 years or younger and those 15 years and older. Results from an independent sample t-test showed no significant association between age group with IQ, academic, or acculturation factors. The sample was also divided into two groups by country of origin. Group one was composed of all Yemeni American males and sample two was all other Arab American male. Results from an independent sample t-test showed no significant association between the two ethnic groups with respect to IQ, academic, or acculturation outcomes. As a result, age and ethnic background were not controlled for in subsequent analyses.

Academic outcomes. Academic subtests were first examined to identify the sample mean academic strength and weakness. Next, each academic sample mean was compared to national normative data. Academic outcomes were examined in how they relate to intelligence and acculturation outcomes.

The participants performed significantly higher on Numerical Operations (m = 94.10, sd = 13.22) than on Word Reading (m = 89.16, sd = 13.20), [t (2, 78) = 2.34, p = .01, *Cohen's d* =.37]. The sample performed significantly lower than the normative mean for Word Reading and Numerical Operations (Word Reading m = 89.16, sd = 13.20; *Cohen's d* = -1.07; Numerical Operations m = 94.10, sd = 13.22; *Cohen's d* = -.57). Both academic subtests were significantly correlated with FSIQ-4 [Word Reading: r (78) = .51, p < .001; Numerical Operations: r (78) = .60, p < .001]. The V-IQ was strongly associated with Word Reading [r (78) = .56, p < .001], whereas LR-IQ was strongly associated with Numerical Operations [r (78) = .57, p < .001].

Word Reading performance results were negatively associated with total Arabic Competence [r (78) = -.32, $p < .001$]. Total Arab Cultural Competence [r (78) = .32, $p < .001$] was positively related with English Competence [r (78) = .32, $p < .001$]. Performance on Numerical Operations was positively correlated with US-AMAS [r (78) = .28, $p < .001$] (see Tables 6, 7, and 8).

WASI-II performances. The sample IQ scores were described in comparison to normative means and designated qualitative descriptors. The sample mean FSIQ-4 was approximately 11 standardized points below the national normative mean (FSIQ-4 m = 89.29, sd = 11.20, *Cohen's d* = -.92). The sample mean V-IQ was approximately 12 standardized points lower than the normative mean (V-IQ m = 88.51, sd =11.03, *Cohen's d*= -.87), and the sample mean LR-IQ was approximately 8 standardized points lower than the normative sample (LR-IQ m = 92.25, sd = 13.33, *Cohen's d*= -.55). The highest performance was on Matrix Reasoning, followed by Vocabulary, Block Design, and Similarities (see Table 12). The lowest performance on Similarities was unexpected. Performances on the WASI-II are classified based on where a score falls in a normal distribution. Approximately 6 percent (n = 5) of participants performed within the Above Average range; 42.4 percent (n = 33) performed within the Average range; 30.1 percent (n = 24) performed within the Below Average range; 18.8 percent (n = 5) performed within the Borderline-Impaired range; and 2.5 percent (n = 2) performed within the Impaired range (see Table 13).

Table 12

Difference between Obtained and Normative Means

Subtest	Sample T-Score Mean (*sd*)	Normative T-score Mean (*sd*)	Difference *Cohen's d*
Vocabulary	44.84 (8.07)	50.8 (8.5)	-.72
Similarities	41.11 (6.96)	49.5 (7.8)	-1.13
Block Design	43.59 (8.43)	50.2 (9.7)	-.73
Matrix Reasoning	47.68 (8.79)	49.8 (8.9)	-.24
4-FSIQ	89.29 (11.20)	100.2 (12.5)	-.92
2-FSIQ	93.30 (11.66)	100.1 (12.1)	-.57

Table 13

Classification of Research Sample According to Normative Standards

FSIQ-4	Classification	Current Sample (%)	WASI-II Normative Sample
130 and above	Very Superior	0	2.1
120-129	Superior	0	7.4
110-119	High Average	6.2	15.8
90-109	Average	42.4	50.9
80-89	Low Average	30.1	16.1
70-79	Borderline	18.8	5.6
69 or below	Extremely Low	2.5	1.1

Aim One Outcomes

The goal of the first aim is to determine if a significant difference in performance between V-IQ and LR-IQ exists. It was hypothesized that the participants would perform significantly higher on LR-IQ than V-IQ. A total of 50 of the participants had higher LR-IQ than VIQ, 26 had higher V-IQ than LR-IQ, and four performed equally well on V-IQ and LR-IQ. A paired-sample t-test was conducted to examine within-subject differences between V-IQ and LR-IQ. Results show a statistically significant difference [t (79) = -2.70, p = .01, *Cohen's d* = .61]. A new variable, IQ Difference, was created by subtracting V-IQ from LR-IQ to better understand whether the identified difference was associated with acculturation or sociodemographic factors.

Statistically significant results showed that Parent Income [r (78) = .35, p < .001] and SES [r (78) = .28, = .01] were positively associated with IQ Difference. A small but not significant negative association between Mother Education and IQ Difference was also observed. A multiple regression equation was conducted to examine how much variance in IQ Difference was explained by Parent Income and Mother Education. Socio Economic Status was not calculated because of its very high association with Parent Income [r (78) = .90, p < .001] and its overall lower association with IQ Difference when compared with Parent Income.

The overall model was statistically significant [F (2, 78) = 8.32, p < .001, R^2 = .18.]. Parent Income explained 14 percent of the variance (b = -3.15, $\Delta R^2_{\text{Parent Income}}$ =.14), and Mother Education explained an additional 3 percent of the variance (b= 2.04, $\Delta R^2_{\text{Mother Ed}}$= .03) after controlling for Parent Income. Results showed that for every $10,000 increase in Parent Income, the difference between V-IQ and LR-IQ lessened by 3.15 standard scale points. In contrast, for each three years of education obtained by mothers, the gap between V-IQ and LR-IQ widened by 2.04 standard scale points.

Contrary to expectations, there was notable variability within each index. To investigate the differences between each subtest, six pair-wise t-tests were conducted with appropriate Bonferroni corrections (p-value = .008). The t-test values were converted to *Cohen's d* effect sizes to demonstrate the difference magnitude. Results showed that performance on the Vocabulary subtest was significantly higher than Similarities (*Cohen's d* =1.03), significantly lower than Matrix Reasoning (*Cohen's d* = -.61), and it did not significantly differ with the performance on Block Design. Further, results showed the performance on Similarities was significantly lower than Matrix Reasoning (*Cohen's d* = - 1.15), but it did not significantly differ from Block Design. Results showed that Block Design was significantly lower than Matrix

Reasoning (*Cohen's d* =-.58, see Table 14). The performance difference within the V-IQ index show that the sample performed higher on concrete word knowledge retrieval task than on verbal categorical reasoning and concept formation task. Within the LR-IQ index, the sample performed higher on untimed fluid reasoning task than on a timed visual-spatial construction task.

In summary, results from Aim 1 show that the sample performed higher on LR-IQ than on V-IQ overall, but there was equally discrepant performances within each index as there was between the indices. In addition, mother education and parent income were related to the difference between V-IQ and LR-IQ. Specifically, higher mother education levels were associated with higher V-IQ (r (78) =*.39,* $p < .001$), and higher parent income was associated with higher LR-IQ (r (78) =*.27,* $p =$. 03; Table 9). Below is an exploration of how acculturation variables relate to V-IQ and LR-IQ when controlling for these relevant sociodemographic variables.

Table 14

Cohen's d Values from Pair-Wise T-test Comparison of WASI-II Subtests

	1	2	3	4
1. Vocabulary		1.03	-.61	.27
2. Similarities			-1.60	-.58
3. Matrix Reasoning				1.15
4.Block Design				

Aim Two Outcomes

The possible association between acculturation and WASI-II performance was evaluated by considering V-IQ and LR-IQ separately. Acculturation was conceptualized using proxy and systematic factors. Proxy variables were first considered, followed by systematic bidimensional variables. It was hypothesized that V-IQ and LR-IQ performances would be related to proxy and systematic acculturation variables. Further, it was hypothesized that systematic measures of

acculturation would explain additional variance of the dependent measures beyond that explained by proxy variables. A greater association was anticipated between the acculturation levels toward the US with V-IQ than LR-IQ than acculturation toward heritage culture. Explorations, using bivariate correlations and t-tests, of how demographic, proxy, and systematic acculturation variables relate to intelligence tests performances were conducted before testing the outlined hypotheses.

Results from correlation and t-test analyses between proxy acculturation variables, such as length of stay (LOS), place of birth (POB), and language preference (LP), and intelligence outcomes (e.g., V-IQ and LR-IQ) were not significant. A significant association between Mother Education and V-IQ was observed[r (78) = .39, p < .001]. Also, a significant association between Parent Income and LR-IQ was identified [r (78) = .27, p = .02]. As a result, proxy variables were eliminated from further regression analyses, but Mother Education was controlled for when evaluating V-IQ and Parent Income was controlled for when evaluating LR-IQ. The systematic measures of acculturation variables were centered, and an interaction term was developed from the product of centered US-AMAS and centered Arab-AMAS. The centered interaction term was negatively associated with V-IQ [r (78) = -.23, p = .04] but not with LR-IQ.

A hierarchical regression (HR) equation was conducted to test the association between bidimensional acculturation and V-IQ. A centered Mother Education variable was entered first as a control, followed by the centered US-AMAS, centered Arab-AMAS, and then the centered interaction acculturation product term. Variance Inflation Factors (VIF) was less than 10, suggesting no multicollinearity (Bowerman & O'Connell, 1990). The overall model was significant and explained approximately 21% of the variance [F (4, 76) = 4.84, p =.002, R^2 = .21]. However, the contributions of Arab-AMAS and the interaction were not significant after

controlling for Mother Education and US-AMAS. These results showed that the majority of variance explained was attributed to Mother Education [F (1, 79) = 14.10, $p < .001$, $\Delta R^2 = .15$, $\beta_{MotherEd} = .39$] followed by US-AMAS [F (2, 78) = 9.46, $p < .001$, $\Delta R^2 = .04$, $\beta_{US\text{-}AMAS} = .21$]. These results show that for every three years of education obtained by the mothers, the V-IQ increased by 2.36 standard scale points with all other variables controlled (Table 15).

Table 15

Summary of Hierarchical Regression Analysis for Variables Predicting V-IQ

	Model 1			Model 2			Model 3			Model 4		
Variables	*b*	*SE b*	*β*	*b*	*SE b*	*β*	*b*	*SE B*	*β*	*b*	*SE b*	*β*
Mother Education	2.90	.77	.39**	2.56	.78	.35**	2.42	.80	.33**	2.36	.82	.32**
US-AMAS				.26	.13	.22*	.29	.13	.24*	.27	.14	.22*
Arab-AMAS							-.08	.11	-.08	-.06	.13	-.06
Interaction Term										-.01	.01	-.06
ΔR^2	.15.			.04			.01			.00		
Total R^2	.15			.20			.20			.21		

Note: Interaction term is product of centered US-AMAS and Arab-AMAS

*$p < .05$ **$p < .001$.

A second regression was conducted to examine the association between acculturation and LR-IQ. Correlation and t-test results showed that proxy acculturation variables and Arab-AMAS were not significantly associated with LR-IQ; only Parent Income [r (78) = .27, p = .01], SES [r (78) = .25, p = .02], and US-AMAS [r (78) = .22, p = .06] were significantly associated with LR-IQ. However, SES was no longer significant after controlling for Parent Income. Thus, the association of US-AMAS with LR-IQ was explored when controlling for Parent Income. Results indicated a significant overall model [F (2, 78) = 4.06, p =.02, R^2 = .10, β = .27], which explained 10% of the LR-IQ variance. However, the contribution of US-AMAS was not significant when Parent Income was controlled for (US-AMAS ΔR^2 = .02). Parent Income explained approximately 8 of the total 10 percent [F (2, 78) = 6.03, p = .01, R^2 = .08, β = *.23*].These results show that an increase of 10,000 dollars in Parent Income leads to 2.04 standard scale points increase in LR-IQ (Table 16).

In summary, the associations of acculturation and sociodemographic factors were separately related to V-IQ and LR-IQ. Acculturation toward the US mainstream culture was significantly associated with performance on V-IQ but a higher association was found between V-IQ and mother education levels. Only Parent Income was significantly related to performance on LR-IQ.

Table 16

Summary of Hierarchical Regression Analysis for Variables Predicting LR-IQ

	Step 1			Step 2		
Variable	*b*	*SE b*	*β*	*b*	*SE b*	*β*
Parent Income	2.41	.96	.27*	2.04	1.00	.23*
US-AMAS				.22	.16	.15
TotalR^2	.08			.10		
ΔR^2	.08			.02*		

*$p < .05$. **$p < .001$.

Aim Three Outcomes

The goal of the third aim is identify the predictive association between FSIQ-4 and academic skills (i.e., Word Reading and Numerical Operations) and to explore if acculturation levels toward US mainstream culture (i.e., US-AMAS) moderated that predictive association. Two hierarchical regression equations were conducted to examine the predictive association between FSIQ-4 with Word Reading and Numerical Operations, and whether US-AMAS moderated such associations. It was hypothesized that FSIQ-4 would have a moderate to strong association with Word Reading and Numerical Operations. Higher US-AMAS was hypothesized to increase the association between FSIQ-4 and academic outcomes and lower US-AMAS to lower that association. All independent predictors were centered, including the interaction term (FSIQ-4 X US-AMAS). The interaction term was positively related to Word Reading [r (78) = .23, p = .04]. Total US-AMAS was not significantly related to Word Reading [r (78) = .19, p = .10]. The order of independent predictors was the same for both regression models: centered FSIQ-4 was entered first, centered US-AMAS was entered second, and the centered interaction term was entered third.

Results from the first model revealed a significant overall model [F (3, 76) = 8.99, $p <$ .001, β = .51, Model R^2 = .26], with FSIQ-4 emerging as a significant independent predictor [F

(1, 79) = 26.91, $p < .001$, $\beta = .51$, $\Delta R^2 = .26$], accounting for 25.7 percent of the variance in Word Reading. Additionally, US-AMAS did not moderate the relationship between FSIQ-4 and Word Reading (See Table 17).These results show that each standard scale point increase in FSIQ-4 leads to .60 standard scale points increase in Word Reading.

A second regression was conducted to examine FSIQ-4 association with Numerical Operations and whether US-AMAS moderated that association. A significant association was observed between the interaction term and Numerical Operations [r (78) = .33, $p < .001$]. Results from the second regression revealed a significant overall model [F (3, 76) = 15.70, $p < .001$, β = .51, Model $R^{2 =}$ .38]. The FSIQ-4 emerging as a significant independent predictor [F (1, 79) = 44.39, $p < .001$, $\beta = .62$, $\Delta R^{2=}$ .36] accounting for 36 percent of the variance in Numerical Operation. Additionally, US-AMAS did not moderate the association between FSIQ-4 and Numerical Operation (See Table 18).These results show that each standard scale point increase in FSIQ-4 accounts for .71 standard scale point increase in Numerical Operations. In summary, the FSIQ-4 was moderately to strongly predictive of Word Reading and Numerical Operations scores, and acculturation did not moderate the association.

Table 17

Summary of Hierarchical Regression Analysis for Variables Predicting Word Reading

	Step 1			Step 2			Step 3		
Variable	*b*	*SE b*	*β*	*b*	*SE b*	*β*	*b*	*SE b*	*B*
FSIQ-4	.60	.12	.51**	.58	12	.49**	.53	.15	.45**
US-AMAS				.07	.15	.05	-.54	1.07	-.38
Interaction						.	.01	.01	.44
Total R^2	.26			.26			.26		
ΔR^2	.26			.00			.00		

Note: **p* <.05. ***p* <.001, (N=80)

Table 18

Summary of Hierarchical Regression Analysis for Variables Predicting Numerical Operation

	Step 1			Step 2			Step3		
Variable	*b*	*SE b*	*β*	*b*	*SE b*	*β*	*b*	*SE b*	*B*
FSIQ-4	.71	.11	.60**	.67	11	.57**	.60	.14	.51**
US-AMAS				.17	.14	.12	-.71	.98	-.49
Interaction						.	.01	.01	.64
Total R^2	.36**			.38**			.38**		
ΔR^2	.36**			.01			.01		

Note: *p<.05. **p <.001, (N = 80)

Exploratory Analyses

Subtests and academic outcomes. Further correlational analyses of how other WASI-II scales and subtests relate to academic outcomes in comparison to normative associations were conducted. In the current sample, Word Reading was most related to the Vocabulary subtests [r (79) = .58, p < .001] and least related to Block Design [r (79) = .26, p =.02]. The normative data for the WASI-II showed that Word Reading was most related to FSIQ-4 and least related to Block Design. In the current sample, Numerical Operations was most related to FSIQ-4 [r (79) = .60, p < .001] and least related to Similarities (See Table 16). The normative data for the WASI-II showed that Numerical Operation was most related to FSIQ-4 and least related to Block Design (See Table 19).

Table 19

Study and Normative Sample Correlations between the WASI-II and Wechsler's Academic Outcomes

	Wechsler Academic Achievement Tests			
WASI-II Subtests/ Composites	Word Reading		Numerical Operations	
	Norms	Current Sample	Norms	Current Sample
Block Design	.46	.26	.50	.55
Matrix Reasoning	.53	.36	.60	.54
Vocabulary	.64	.56	.53	.41
Similarities	.62	.41	.53	.35
V-IQ	.68	.56	.56	.43
LR-IQ	.59	.32	.65	.57
FSIQ-4	.70	.51	.68	.60
FSIQ-2	.67	.50	.65	.57

US-AMAS scales relation to WASI-II subtest scores. The results showed that the associations between sociodemographic and acculturation variables with WASI-II performances were primarily related to the US-AMAS scale, mother education, and parent income. Exploratory regressions were conducted to evaluate which US-AMAS subscale explained the most variance in each of the four WASI-II subtests after controlling for Mother Education and Parent Income levels.

Four hierarchical regressions were conducted to examine the contribution of each AMAS scale for predicting each subtest of the WASI-II after controlling for Parent Income and Mother Education. Each model included Mother Education and Parent Income as controls in the first block, followed by the three US-AMAS scales: English Competence, US Cultural Competence, and US Identity scales, as independent predictors of performance on Vocabulary, Similarities, Matrix Reasoning, and Block Design. If the US-AMAS scales explained significant amount of variance beyond what was explained by sociodemographic variables, then multiple regression equations were conducted to investigate which specific US-AMAS scale made significant contributions.

First model: vocabulary subtest. The overall model of the first regression was significant [F (5, 74) = 7.11, $p < .001$, Model $R^{2 =}$ .32]. The sociodemographic variables (Mother Education and Parent Income) accounted for 10.4 percent of the variance in Vocabulary (ΔR^2= 10.4, p = 0.14). With sociodemographic variables controlled, the US-AMAS scales accounted for an additional 22 percent of the variance (ΔR^2 = 22.0, $p < .001$). The English Language Competence scale was significant with other variables controlled indicating that it, alone, could uniquely explain Vocabulary scores. The English Language Competence accounted for 17.3 percent of Vocabulary variance in the sample (ΔR^2 = 17.3, $p < .001$).

Second model: similarities subtest. The overall model of the second regression model was also significant [F (5, 74) = 2.70, p = .03, Model R^2 = .15]. However, contributions of the US-AMAS scales were not significant after controlling for sociodemographic variables (US-AMAS scales ΔR^2= .02, p = .22).

Third model: matrix reasoning subtest. The overall regression model was not significant. There was no significant association between sociodemographic or US-AMAS subscales with Matrix Reasoning.

Fourth model: block design subtest. The overall model of the fourth regression was significant [F (5, 74) = 3.48, p = .002, Model R^2 = .19]. Sociodemographic variables accounted for 13 percent of the explained Block Design variance. After controlling for sociodemographic variables, the US-AMAS scales accounted for an additional 6.4 percent of the variance (See Table 17). The US Culture Identity and English Competence scales each explained approximately three percent of Block Design variance.

Overall, the four models related differently to sociodemographic and acculturation variables. Vocabulary was significantly associated with Mother Education [t (5, 74) = *3.10*, p <. 001, β = .31], Parent Income [t (5, 74) = -2.10, p <. 001, β =.-22], and English Competence [t (5, 74) = 4.14, p <. 001, β = .44]. Similarities was not significantly associated with any of the US-AMAS scales. A significant association between Similarities and Mother Education was observed [t (5, 74) = 3.27, p < .00*1,* β = .36]. No significant association was found between sociodemographic and US-AMAS with Matrix Reasoning. Block Design was significantly associated with Mother Education [t (5, 74) = 2.54, p =. 02, β = .28].

Table 20

Multiple Regression Results for US-AMAS and WASI-II Subscales

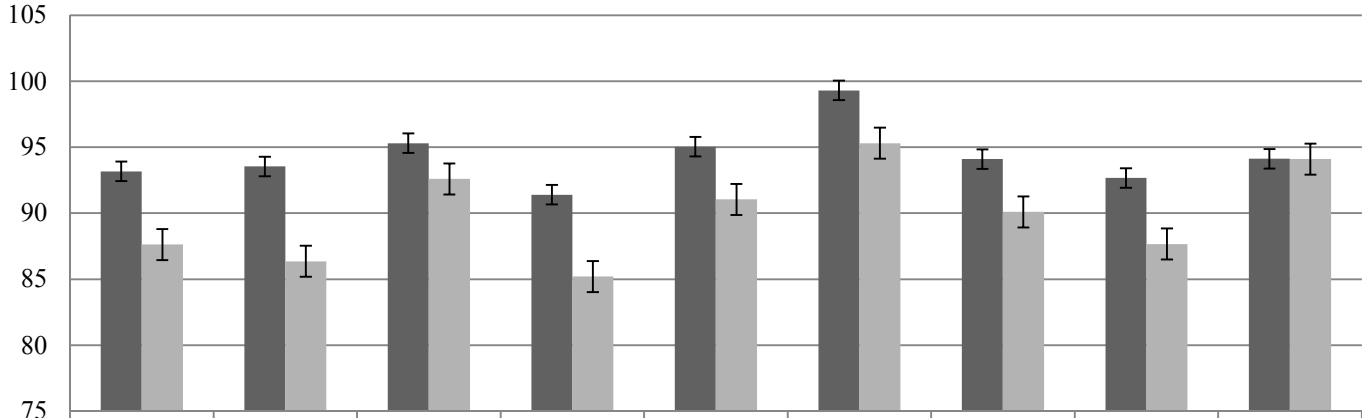
	Similarities		Vocabulary		Matrix Reasoning		Block Design	
	ΔR^2	β	ΔR^2	β	ΔR^2	*B*	ΔR^2	*B*
Sociodemographic	.13*		.10*		.03		13*	
Mother Education		.36**		.31**		.10		.28*
Parent Income		-.09		-.22*		.12		.10
English Competence	.02	.14	.17**	.44**	.01	.10	.03	.18
Cultural Competence	.00	-.02	.03	-.19	.01	-.13	.01	-.11
Cultural Identity	.00	.05	.03	.19	.03	.17	.03	.18
Total R^2	.15*		.32**		.06		.19*	

Note: * $p < .05$, ** $p < .001$

Mother education and WASI-II performances. Mother Education was significantly associated with most of the WASI-II subtests. An extreme group analysis was constructed as a function of Mother Education levels. One group included participants whose mothers earned at least a high school diploma ($n = 24$), and a second group included participants whose mothers earned less than a high school diploma ($n = 56$). The higher education group had higher scores on all WASI-II and academic subtests. Results from an independent sample t-test showed significant group differences across FSIQ-4, V-IQ, and Similarities (see Figure 1).

Figure 1.

Cogntive Results as a Function of High and Low Mother Education



	FSIQ-4	V-IQ	Vocabulary	Similarities	LR-IQ	Matrix Reasoning	Block Design	Word Reading	Math
High Education (N = 24)	93.17	93.54	95.3	91.4	95.04	99.3	94.1	92.67	94.13
Low Education (N = 56)	87.63	86.36	92.6	85.2	91.05	95.3	90.1	87.67	94.1

Figure 1. Individuals whose mothers had at least a high school diploma outperformed those individuals whose mothers had education levels below high school diploma on all cognitive outcomes.

CHAPTER V: DISCUSSION

Purpose of the Study

Psychologists are sometimes asked to assess individuals from a wide range of cultural, linguistic, and ethnic backgrounds using standardized norm-referenced intelligence tests. This can be challenging when evaluating the intellectual ability of young first or second generation immigrants who are in the process of acculturative and developmental transformations. The assessment of intelligence is the most critical component of a comprehensive neuropsychological or psychological evaluation, as it provides a valuable marker for understanding the learning potential of students, the integrity of neurocognitive functioning, and it aids in differential psychological and neurodevelopmental diagnoses (Sattler, 2008; Lezak et al., 2012). The difficulty emerges when administering standardized tests to individuals who are not well represented by the normative samples of the most commonly used IQ tests. There is a growing but very limited body of literature that highlights the profound influence of cultural and language factors on intelligence test performances (Flanagan & Ortiz, 2007; van de Vijver & Phalet, 2004). Practitioners often resort to empirically unsupported practices when evaluating immigrant male because they have received minimal training in multicultural assessment and because of the scarcity of research evaluating the clinical utility of intelligence tests among immigrant populations (Rhodes et al., 2005). Consequently, immigrant students are twice as likely to be identified as having learning, intellectual, or language impairments (Sullivan, 2011).

Available multicultural assessment research with immigrants has been done with larger ethnic groups such as Hispanic and Asian Americans, but very little research is available with smaller ethnic minority groups such as Arab Americans. The available literature is also limited because there has been no direct assessment of how acculturation and language levels relate to

verbal and language-reduced tests. No study has evaluated the association between proxy and systematic measures of acculturation with verbal and language-reduced assessment among typically developing immigrant adolescents. There are also no studies to date that have examined the clinical utility of intelligence tests among the Arab American population.

The current study was designed to expand the research on the influence of acculturation and language levels on verbal and language-reduced IQs. Specifically, the study examined the association between proxy and systematic measures of acculturation with IQ assessment among an adolescent population while controlling for important sociodemographic variables. A total of 80 typically developing Arab American male adolescents participated in the study. The majority of participants were born in the US (n = 45) and were of Yemeni backgrounds (n = 63). Each participant was evaluated using the WASI-II, an abbreviated test of intelligence, and the Numerical Operations and Word Reading subtests of the WIAT-IV, a comprehensive test of achievement. Participants also completed the AMAS acculturation rating scale and a demographic form. At least one guardian provided demographic information for each male.

Discussion of Findings

The study had three primary aims. The first aim was to investigate if performance differences existed between verbal and language reduced intelligence tests that are clinically meaningful. The second aim was to evaluate how specific acculturation factors relate to verbal and language reduced tests. The third aim was to examine if acculturation levels toward the US moderated the predictive association between the WASI-II and academic achievement.

Aim one. With regards to aim one, it was hypothesized that the study sample would perform higher on language-reduced tests than on verbal tests. Flanagan and Ortiz (2007) argue that immigrant students, who are considered moderately different from the normative sample, are

expected on average to perform 20-30 standard scale points below the mean on Vocabulary and Similarities, and approximately 7-10 standard scale points below the mean on Block Design and 5-7 standardized points Matrix Reasoning (see Figure 2).

Figure 2.

Sample's Subtest Performances in Comparison to Normative Outcomes and C-LIM

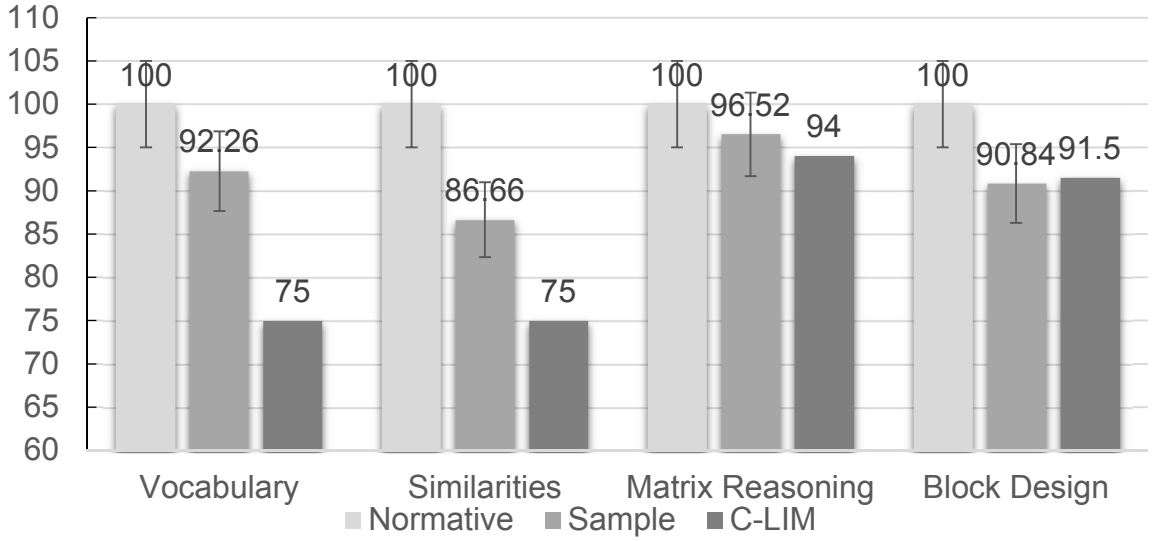


Figure 2. The sample's performances on verbal and language reduced subtests varies from the normative and the C-LIM projections.

A moderate to large mean difference was observed between LR-IQ and V-IQ. This finding supported the stated hypothesis, and it was also largely consistent with available studies that have used similar Wechsler's IQ tests (Dynda, 2008; Reed, 2000; Vardarosa, 2007; Dana, 2005; Vukovich & Figueroa, 1972, as cited in Flanagan & Harrison, 2012). The magnitude of the difference was also clinically meaningful However, the study participants' performance varied notably within each index; the sample's highest performance was on Matrix Reasoning, followed by Vocabulary, Block Design, and Similarities. This pattern of performances and the magnitude of variation from the normative mean within each index were unexpected. These results were

also inconsistent with projected performances as outlined by the C-LIM framework and with results from prior studies with other immigrant groups (Flanagan & Ortiz, 2007; Cummins, 1981; Reed, 2000; Sotelo-Dynega, 2007; Donoso, 2010; Coffey et al., 2005).

The C-LIM framework was used as a guide to understand WASI-II performances in the current sample. Overall, there was considerable variability among subtests that were not greatly consistent with expected C-LIM patterns. The divergence of performances between Vocabulary and Similarities likely reflected the culturally and linguistically mediated cognitive demands required by each subtest, which is not captured by the three-by-three C-LIM classification framework. Results from the current study challenge the C-LIM classification assumption that Vocabulary and Similarities reflect equal language and cultural demands. Vocabulary is a rote verbal test that depends on verbal retrieval from an acquired fund of vocabulary knowledge, whereas Similarities not only requires vocabulary knowledge, it also requires verbally mediated abstract categorical reasoning (Sattler, 2008; Lezak et al., 2012). Fluent English-speaking immigrant students have more exposure to English vocabulary at school, in the community, with peers, and through the media than to the demands and style of reasoning required by Similarities. It is possible that the cultural loading within Similarities is higher than for Vocabulary. For example, culture-based differences in level of abstraction and modes of categorization were documented by Luria's ethnographic studies in Uzbekistan (Luria, 1979) and by James Flynn, who attributed part of the increase in IQ over the last seven decades (i.e., *Flynn Effect*) to increased abstraction reasoning skills, such as taking on the hypothetical as if it were real and an expansion of educational and cultural complexity (Flynn, 2012). Other studies have also identified that the greater cognitive complexity a test has, the greater the cultural loading it carries (Helms-Lorenz, van de Vijver, & Portinga, 2003). The significant difference between the

two Vocabulary and Similarities deemphasizes the value of examining the differences between V-IQ and LR-IQ and highlight the importance of considering within index variation.

The variation of the two subtests that compose the LR-IQ was more consistent with C-LIM expectations than V-IQ outcomes discussed above. According to C-LIM framework's projections for the current sample, Block Design standard scores were expected to be 90 to 93 and Matrix Reasoning standard scores were expected to be 93 to 95. Performance on Block Design was anticipated to be lower because it is classified as having moderate level language requirements and low cultural demand; whereas Matrix Reasoning was classified as having low cultural and language demands. The current sample means were approximately 91 on Block Design and 96 on Matrix Reasoning (see Figure 2).

The small variation observed within the LR-IQ index may be partly attributed to the characteristics of the test and how it was administered. The Block Design subtest in the WASI-II has a shorter discontinuation rule when compared to other Wechsler full-battery Block Design. As a result of a shorter discontinuation rule, it is feasible that performance efficiency becomes weighted more (Lezak et al., 2012). Although the target cognitive process assessed is visual-spatial processing, the underperformance by the current sample could be attributed to slower performances because the test is timed. Ardilla (2005) argued that *speed* is a value that varies cross-culturally. Some cultures, like the US, value speed and fast production whereas in other cultures, slower and careful processing may be primarily valued. Another possible explanation is that the task itself is affected by cultural peculiarities such as exposure to visual perceptual stimuli, block manipulation experiences, and negative cultural attitude toward speeded tasks (Liblich & Kugelmass, 1981; Kugelmass, 1974). A study with elementary school Arab students in Israel also documented significantly lower performance on Block Design than Matrix

Reasoning (Liblich & Kugelmass, 1981). The authors suspected that the dominance of oral traditions and less emphasis on imagery in Arabic and Islamic culture was a possible explanation (Liblich & Kugelmass, 1981). Culture emphasis on imagery among the indigenous Maori young men from rural and urban settings in New Zealand was believed to be the underlying factor that explained the nearly 15 standard scale points above the US normative mean performance on Block Design (Ogden & MacFarlane-Nathan, 1997). Liblich and Kugelmass (1981) also identified overall higher verbal than visual test performance among Arab children in Israel and noted significant deficits with processing speed. Other possible explanations could be that Arab American male may not be as familiar with block manipulation tasks as those children included in the normative sample. This assumption is based on the overall low SES; consistent associations between low SES, low education attainment, and lower overall IQ performances have been observed across a number of studies (Flannigan & Harrison, 2012; Heaton, Taylor, & Manly, 2003; Pollitt, Gorman, Engle, Martorell, & Riveria, 1993). This explanation is consistent with the small to moderate association between the mother's education level and performance on Block Design. Mother's education was also positively associated with longer stay in the US and higher income (see Figure 1).

In summary, results from aim one showed a measurable and statistically significant difference between verbal and language reduced IQ. However, the difference was less meaningful when considering the significant variation within each index and across the four WASI-II subtests. Overall, results did not substantiate the pattern of performance predicted by C-LIM framework within the V-IQ. The C-LIM patterns were more consistent with performances within the LR-IQ index. The empirical support for the clinical utility of the C-LIM has been variable. Support for its use has come mainly from unpublished dissertation studies. However,

two available published studies have underscored the lack of utility for the C-LIM (Styck & Watkins, 2013; Kranzler et al., 2010). For instance, Kranzler and colleagues (2010) found limited utility of the C-LIM when using Woodcock Johnson Tests of Cognitive Abilities, Third Edition (WJ-III) among a multi-ethnic sample of referred elementary school students. Kranzler and colleagues (2010) explained that when examining within-individual variation, the C-LIM patterns of performances were not substantiated, but the overall sample means were consistent with expected C-LIM patterns. More recently, Styck, and Watkins (2013) showed that the C-LIM approach failed to discriminate between ELL from non-ELL children beyond chance levels when using the WISC-IV. All prior studies have used clinically referred-samples, which further complicates examining the association with acculturation and language development independent of possible neurocognitive impairments (Nieves-Brull, 2006; Sotelo-Dynega, 2007; Verdorasa, 2007; Dynda, 2008; Kranzler et al., 2010; Styck & Watkins, 2013). The current study used an underrepresented non-referred community-based sample and examined the association of language and acculturation for each subtest. The applicability of C-LIM classifications across different ethnic groups and different IQ tests likely varies which undermines the clinical utility of the C-LIM approach for systematically understanding the interaction between culture, language, and test factors across all ethnic groups. A closer examination of how different acculturation and language factors relate to performances on V-IQ and LR-IQ was conducted in aim two of the study.

Aim two. To meet the second aim, sociodemographic, proxy acculturation, and systematic acculturation factors were examined in relation to performances on V-IQ and LR-IQ indices. Sociodemographic variables included Parent Income, Mother Education, Father Education, and SES. Proxy acculturation variables included the Length of Stay (LOS), Place of

Birth (POB), and Language Preference (LP). The POB and LP variables were both dichotomous (i.e., Born in or outside the US; Prefer English or other language). Systematic acculturation was measured by the AMAS, a bidimensional multi-domain acculturation scale. Acculturation variables have been noted to be important for understanding performances on IQ tests (van de Vijver & Phalet, 2004).

Contrary to expectations, there was no measurable association between proxy acculturation and systematic acculturation measures. Total US-AMAS was not significantly associated with total length of stay, as was identified in the validation study of the AMAS (Zea et al., 2003). There was a small negative relation between total length of stay with Arab acculturation levels. The lack of strong associations between proxy and systematic acculturation measures are likely reflecting the lack of variation within the proxy acculturation variables. Nearly the entire sample preferred using English over Arabic. The majority of the sample was born in the US, and those born outside the US, immigrated at a very young age. The restricted variation among proxy acculturation also resulted in no significant association with V-IQ and LR-IQ. As a result, these proxy acculturation measures were not meaningful for understanding variation in IQ performances with this particular sample. Acculturation was also measured using systematic rating scales.

The evaluation of acculturation using the AMAS scale showed significant variations across US and Arab cultural domains. Overall, there was a positive association between American and Arab Acculturation scales. The results showed that the majority of the sample endorsed high ratings on both Arab and American acculturation levels, reflecting bicultural acculturation orientation for the majority of the sample. However, acculturation orientation within the sample varied as a function of the specific acculturation domains assessed. For

instance, the majority of the sample rated having higher English and American Cultural Competencies than Arabic and Arab Cultural Competencies, but 78 of 80 rated having higher Arab than American Identity, although there was a small, positive association between Arab and American Identity ratings. This is not surprising given that the sample was composed of first- and second-generation immigrants with an average LOS of approximately 12 years. Studies with other immigrant groups have shown that cultural identity is often viewed as a deeper form of assimilation and may be the last cultural domain to be influenced by the host culture (Phinney, 2003; Berry et al., 2006; Zea et al., 2003). Overall, these domain specific variations are consistent with models that view acculturation as an interactional, hierarchical, and dynamic process that can vary as a function of specific domains (Rudmin, 2009; Arends-Tóth & van de Vijver, 2003, 2006). This implies that bidimensional acculturation scales that do not separately evaluate multiple domains of acculturation run the risk of oversimplification and a loss of insight into how acculturation orientations vary not only among and within groups, but among and within individuals. The AMAS scale was valuable for capturing varying levels of variations across multiple domains. Such variation allowed for a more nuanced evaluation of how cultural and language factors related to WASI-II performances.

Cultural and language levels were assumed to systematically relate to WASI-II performance as expected by C-LIM predictions (Flanagan & Ortiz, 2007). It was hypothesized that systematic measures of acculturation would contribute additional explanatory power beyond proxy acculturation or sociodemographic measures. Assimilation toward the US was anticipated to be positively associated with intelligence test outcomes, and the maintenance of Arab culture was anticipated to be negatively associated with intelligence test outcomes. Results showed no association between proxy acculturation variables with performances across verbal and

language-reduced IQ tests. However, important associations emerged between sociodemographic variables and WASI-II outcomes.

It is well established in the literature that SES is positively associated with IQ performance (Lezak et al., 2012; Sattler, 2008; Heaton, Taylor, & Manly, 2003). Total family income and mother education have also been positively linked with overall IQ performances (Lezak et al., 2012; Heaton, Taylor, & Manly, 2003). In the current study, there was a small to moderate level association between mother education levels with V-IQ and a small association between total parent incomes with LR-IQ. The mother's education level was also mildly associated with total length of stay and parent income. In this sample, it appears as if those families with a longer length of stay were also more likely to have higher income and greater mother education attainment. It can be argued that such higher sociodemographic factors may result in a more enriched environment that better approximates that of the normative sample. Approximately 95 percent of the WASI-II normative sample had a parent with at least a high school diploma (Wechsler, 2011). As a result, IQ performances were closer to the normative means (see Figure 2). The evaluation of systematic measures of acculturation was conducted after controlling for these important associations.

Examination of systematic acculturation variables showed some correlation across US and Arab acculturation orientations. Total US acculturation was positively associated with V-IQ and LR-IQ; the strength of that association was small. The interaction between American and Arab Acculturation orientations was significantly associated with V-IQ, but not with LR-IQ. Overall, maintenance of Arab culture was not significantly related to V-IQ or LR-IQ outcomes. There is one previous study that found higher scores with higher assimilation and lower scores with higher heritage endorsement (van de Vijver, Helms-Lorenz, & Feltzer, 1999). Further

exploration was conducted to measure how specific host and heritage scales related to WASI-II subtests.

The association between domain specific host and heritage acculturation levels with specific WASI-II subtest revealed important associations. For instance, a small negative association was observed with Vocabulary and Arab cultural competence and a positive moderate association with Vocabulary and English competence. Also, results showed that English competence and mother education were equally important for predicting Vocabulary. No acculturation variable was associated with Similarities. Thus, the overall positive association between US acculturation and V-IQ was better explained by specific associations between mother education and English levels with Vocabulary. The mother's education level was equally important for predicting Similarities performance. There were also specific association identified between sociodemographic and acculturation factors with LR-IQ.

The association between acculturation levels and LR-IQ performance was mostly explained by total parent income levels. A small-to-moderate positive association between total parent income and Block Design was observed. A small positive association was observed between levels of US cultural identity and Block Design. However, the association was no longer significant after controlling for mother education and parent income. Performance on Matrix Reasoning was not substantially associated with any acculturation or sociodemographic factors. This suggests that Matrix Reasoning may be the most robust WASI-II subtest against the influence of sociodemographic and acculturation factors among Arab American male. This is consistent with other studies that found Matrix Reasoning or other cognitive tests with similar formats (e.g., Raven's Matrices) to be the least affected by culture and language factors

(Flanagan & Ortiz, 2007; Nell, 2000, Brouwers, Van de Vijver, & Van Hemert, 2009, Rushton & Jensen, 2010).

In summary, exploration of aim two showed that different components of sociodemographic and acculturation variables were uniquely associated with specific WASI-II subtests. Proxy measures of acculturation were not useful for understanding WASI-II performances. The relation between language and cultural factors was not similarly distributed across V-IQ and LR-IQ indices. Aim two results showed that Vocabulary subtest is much more sensitive to English competence levels than Similarities. Whereas performances on Similarities was mostly predicted by the education level of the mother. These variations were unexpected in light of the C-LIM predictions. No acculturation factor was significantly associated with LR-IQ performances after controlling for mother education and parent income levels. Performances on the LR-IQ were also more consistent with C-LIM predictions and were not associated with any measured acculturation factors. A better understanding of how acculturation and sociodemographic factors explained variance in V-IQ and LR-IQ but it remained unclear if these tests were clinically useful for predicting basic reading and math skills.

Aim three. The third aim was to examine whether acculturation levels toward the US moderated the predictive association between FSIQ-4 and basic academic skills. It is well established that IQ is the single best predictor of academic achievement and total academic attainment (Naglieri & Borenstein, 2003; Lezak et al., 2012). A moderate to strong association is documented between FSIQ and standardized academic measures (Wechsler, 2011; Lezak et al., 2012). It was hypothesized that a moderate to strong association would be observed between FSIQ-4 with basic math and reading outcomes as was identified in the normative sample (Wechsler, 2011). It was further hypothesized that acculturation would positively moderate both

associations. Both hypotheses (i.e., FSIQ-4 with reading and math) were supported; results showed a moderate level association between FSIQ-4 with basic math and reading outcomes. The predicative association between FSIQ-4 and math was slightly higher than that between FSIQ-4 and reading. The levels of US acculturation were examined for possible moderating effect on the association between FSIQ-4 with basic reading and math skills. Results showed that acculturation was not a moderating factor for both associations. This is not surprising because there were limited association identified between US acculturation level and WASI-II performances. Additional exploratory analyses were conducted to examine whether individual scales or subtests had higher association with academic outcomes than FSIQ-4. In general, language-reduced tests have been found to have limited predictive power when compared to verbal or combined IQs (Giguero, 1989; Lohman et al., 2008). The conducted analyses did not identify any single scale or subtest that predicted academic outcomes significantly better than FSIQ-4, which is consistent with findings with other populations (Mayes & Calhoun, 2007; Sattler, 2008). Results from aim three imply that the use of FSIQ-4 among Arab American male holds good clinical utility for predicting basic academic skills independent of moderating effects of acculturation levels.

Integrative Summary

With regards to the measurement of acculturation, proxy acculturation variables were not associated with WASI-II performances. The multidimensional AMAS outcomes illustrated important acculturation variation between and within individuals. Single domain acculturation scale may be limited in capturing between and within individual differences among Arab American male, as was observed in the current study. The AMAS subscales were mildly informative for understanding variation between and within V-IQ and LR-IQ. The most

important subscale was English Competence scale, which had a small association with only Vocabulary. There was a significant discrepancy between Vocabulary and Similarities scores that was likely associated with cognitive processing demands and possible higher cultural loading of Similarities. No association was identified between Acculturation toward American or Arab culture with Similarities, Block Design, or Matrix Reasoning after controlling for mother education and parent income. Although a notable difference emerged between V-IQ and LR-IQ, such a difference was not systematically associated with language and cultural factors as anticipated by C-LIM. Instead, the difference was better explained by variations in mother education and parent income.

Sociodemographic variables proved to be important factors for understanding WASI-II performances. Specifically, total parent income was associated with Similarities and Block Design. Mother education was moderately associated with Vocabulary, and it was relevant for understanding performances on all WAS-II subtests. Individuals whose mother had at least a high school diploma scored within the average range across all subtests. These results are consistent with the Environmentalists' view of IQ development in that the cultural and sociodemographic milieu are important factors to understanding variation in levels of IQ among cultural and language minority populations (Nell, 2000; Helms-Lorenz, van de Vijver, & Portinga, 2003). Despite the influence of some acculturation and sociodemographic factors, these results showed that the FSIQ-4 had a moderate level predicative association with academic outcomes, which was not moderated by acculturation levels. The overall predicative utility was largely comparable with associations between FSIQ-4 and academic outcomes among the normative sample, especially for math skills. Overall, the FSIQ-4 was the best single predicative value for basic reading and math outcomes. These results also support the assessment of both

verbal and language-reduced domains with Arab American male. This is important information in light of the challenges neuropsychologist face when attempting to provide a useful and ethically responsible assessment. Results from this study highlight continued evaluation of how specific individual and test factors influence overall clinical utility. Although, a much higher number of study participants performed within the below average and impaired ranges than the normative distribution. This skew in performance likely reflects the cumulative divergence of cultural, linguistic, and sociedemographic outcomes of the study participants when compared to the normative sample. Without a randomized expanded sample it is difficult to determine if such skewed distribution will persists. The US will continue to experience shifts in its demographics which will place great difficulties on all psychologist working with children. Continued evaluation of how norm-referenced tests such as the WASI-II will enhance multicultural assessment competence by developing the empirical foundation for selecting and interpreting performances. The results from this study provided useful research and clinical implications. With any empirical study, there are limitations. A summary of notable limitations are provided below.

Study Implications and Limitations

Clinical implications. Results from this study support recommendations that the interpretation of specific WASI-II subtests should be completed cautiously. For example, Arab American male performed the lowest on Similarities, which also had the lowest association with academic outcomes. In contrast, they performed significantly higher on Vocabulary than Similarities, which had a moderate level association with basic reading skills. Performance on Vocabulary reflects a better measure for crystalized knowledge than Similarities. There were no significant influences of sociodemographic and acculturation factors on Matrix Reasoning.

Clinicians assessing Arab Americans can have some confidence that Matrix Reasoning likely measures the intended target cognitive skills, namely nonverbal and fluid reasoning, without great cultural or linguistic influence. Clinicians should be cautious when administering and interpreting the Block Design subtest to this population. Block Design on the WASI-II may be sensitive to cultural influences regarding speed due to a lower discontinuation limit on this measure compared to, for example Block Design on other available tests such as the Wechsler Individual Scale for Children-Fourth Edition (WISC-IV) and Developmental Abilities Scale-Second Edition (DAS-II). Ardila (2005) argued that *speed* is a value that varies cross-culturally. Some cultures, like the US, value speed and fast production whereas in other cultures, slower and careful processing may be primarily valued. Clinicians will be best served if they use Block Design scoring and administration that allows for untimed interpretation and with a higher discontinuation rule to obtain a better assessment of visual-spatial processing skills. Despite the lower performance on Block Design, it proved to be a moderately good predictor of math skills.

Even though there was variability within and between each WASI-II index, the FSIQ-4 was the single best predictor of reading and math skills. This is consistent with the identified factor structure of the WASI-II among the normative group as it reflects a latent measure of wider set of cognitive abilities. Overall, the clinical utility of the WASI-II among English speaking Arab American population is adequate for anticipating academic outcomes. Important attention should be given to mother education, parent income, and English language competence levels when administering and interpreting test scores from this measure. Results from this study also showed that a much higher number of individuals performed within the below average to impaired range across some subtests and overall IQ. Interpretation of such outcomes need to be interpreted in light of the possible cultural, linguistic, and sociodemographic effects. It is unclear

if this distribution pattern will persist if a larger randomized sample of Arab American male was evaluated.

Research implications. Important research implications can be gleaned from the current study. The purpose of the current study was to contribute to the multicultural assessment research specific to intellectual assessment. Results from the current study highlighted important factors to consider in future studies with Arab American and possibly other immigrant groups. However, there are several factors in the current study that limit the generalizability of the results. These factors should be examined in detail in future research. One area in which the current study could be extended is by examining Arab Americans who are not residing in an ethnic dense urban setting. Important acculturation variations occur as a result of the host context. For instance, there may be less pressure to learn English and develop US cultural competencies than those who live without connection to immigrants from similar cultural, linguistic, or religious background (Sam & Berry, 2006). It is unclear if the acculturation context differences could also lead to IQ performance differences.

The study can also be extended by including female participants. Due to logistical complications, female youth were not included in the study. It can be argued that Arab and Muslim girls and young women are likely to have different acculturation and educational experiences than males, and as a result, could vary in their IQ and academic scores. It is also possible that no difference would emerge since there was weak association between IQ and acculturation factors in the current study.

Future research can also examine possible differences on how Arab Americans perform when compared to national and local norms. It is unclear if performance differences would have emerged if they were compared to a control sample comprised of non-immigrant individuals

residing in the same context and who have comparable sociodemographic factors. However, it will be challenging to find an adequate sample control comparison in light of the unique cultural, linguistic, and sociodemographic attributes of the study sample.

It is also unclear if assessment of vocabulary knowledge is best conducted using an expressive or receptive format. The current study showed that expressive Vocabulary was a test that moderately predicted basic reading skills and was mildly associated with English competence skills and mother education level. It is possible that the use of a receptive vocabulary task can mitigate expressive language competence factors and provide a better measure for vocabulary knowledge. Lastly, the clinical utility of the WASI-II and similar tests could be examined when predicting other forms of academic outcomes, such as standardized national and state tests or school-based grades.

Study limitations. The present study was attempted to understand the influence of acculturation on intellectual assessment and the clinical utility of WASI-II with Arab American males. However, there were significant limitations to this study. First, the current study had a non-experimental design and used mostly correlations, t-tests, and linear regression analytic techniques. Participants were composed of non-random convenience sample located in urban and ethnically dense communities and schools.

There were other notable limitations specific to the study sample and instrument characteristics. As discussed by Ardila (2005), psychometric cognitive testing is laden with cultural values and the assessment context is culturally shaped. One particular value is what he referred to as *isolated environment*, in that tests are often done in an isolated room with closed doors for an extended period of time. Such value may be culturally insensitive, particularly given religious values with the targeted population of the study. It is culturally inappropriate for an

Islamic girl or woman to be alone with a man without the presence of a male relative. The inclusion of female participants would have required controlling for examinee and examiner gender, religious, and ethnic background. Such control would have introduced pragmatic and statistical demands that could not be practically met for this dissertation study. As a result of these complications, the current study included only males. In addition, the examiner was a male Arab American. It is possible that characteristics of the examiner could influence the assessment context and performance (Ardila, 2005). Future studies can examine the possibility of concordant and discordant assessor and assessee dynamics.

Another important limitation is the restricted ranges of SES, immigration, and country of origin in the study's sample. The sample was primarily comprised of first and second generation Yemeni immigrants residing in an urban ethnic enclave dense setting. This limitation is relevant in two ways: First, such composition inhibits generalization of the current results to other Arab Americans who are not Yemeni or do not live in a primarily urban ethnic dense context. However, when evaluating results across Yemeni individuals versus others groups, no significant difference emerged. Second, restricted sociodemographic range could have obfuscated the effect of acculturation levels on WASI-II performances due to the lack of variability in the composition of the sample.

There were also possible limitations of the instruments used. The uses of a full IQ battery include paper and pencil processing speed tasks that would have allowed exploration of how acculturation factors may be associated with speeded performance. Cross-cultural differences with processing speed performances have been documented (Nell, 2000). In Western culture, speed is valued, but in other cultures, slow and careful processing is valued (Ardila, 2005; Nell, 2000). In Arabic and Islamic cultures, speed may be not be valued as much as in Western

culture, and speeded performances carry a negative cultural connotation (Liblich & Kugelmass, 1981). The inclusion of a full Wechsler battery would have allowed better understanding why the current sample performed much lower than anticipated on Block Design.

Furthermore, assessing English Language competence by an acculturation rating scale may have been a limiting factor for illuminating the association between language development and cognitive functioning. A standardized measure to determine English expression and comprehension competencies could have allowed greater precision in determining the association between language levels with verbal and language reduced tests. Important information can be deduced from this study despite these important limitations.

Concluding Remarks

The current study contributed important information for clinicians and researchers despite significant limitations. Administering verbal and language reduced tests to first and second generation immigrants proved to be useful for predicting basic math and reading skills. This study directly examined language and cultural levels for all subtests while using the C-LIM framework as a guide to understanding language demand and cultural loading patterns for each WASI-II subtests. The C-LIM classification framework provided very little utility for explaining the performance variability observed by the study's sample. The current study presented an underrepresented ethnic population that possessed unique cultural and linguistic attributes that are disparate when compared to the cultural and language of mainstream America. Despite the great cultural and language contrasts, sociodemographic factors were the most salient factors for understanding WASI-II performances, and acculturation factors, although to a much lesser extent. Finally, results from the study highlight that psychologist need to be better aware of the tests they use when they are administered to individuals not reflected by the normative

standardization. It is the psychologist's responsibility to know their test, to know what they can and cannot do when established reliability and validity of a test is threatened.

APPENDICES

APPENDIX A: PARENT DEMOGRAPHIC QUESTIONNAIRE

1) Name:_____	**2) Relation to child?_____**
3) What country did you immigrate from?	**_____**
4) When did you arrive in the U.S.?	**_____**
5) What is your marital status? (Check one below)	
Single____ Married____ Divorced_____	**Separated_____ Other_____**

6) What is the COMBINED household yearly income? (Check one below)

☐	$ 5, 000 or less	☐	$ 40,001-50,000
☐	$ 5,001-10,000	☐	$ 50,001-60,000
☐	$ 10,001-20,000	☐	$ 60,001-70,000
☐	$ 20,001-30,000	☐	$ 70,001-100,000
☐	$ 30,001-400,000	☐	More than $ 100,000

7) What is the highest education level achieved by the mother and father?

(Check for each)

Education Level	**Mother**	**Father**
Kindergarten up to 3rd grade		
4th grade up to 6th grade		
7th grade up to 9th grade		
10th grade up to high school graduate		
One or two years of college		
Bachelor's degree		
Master, professional or doctorate degree		

8) What is the primary language spoken at home?

	Mostly Arabic		**Mostly English**		**Both Equal**		**Other**

9) What language do you use to speak with your child?

	Mostly Arabic		**Mostly English**		**Both Equal**		**Other**

10) Total number of family members in the household? _____

11) What is the occupation of the mother and father

a) Mother's Occupation_____ b) Father's

Occupation_____

12) Please check all that apply to your child:

Learning Disability		Seizures	
Developmental Disability		Brain Injury	
Psychiatric Diagnoses		Vision Impairments	
Pre-mature Birth		Hearing Impairment	

APPENDIX B: ADOLESCENT DEMOGRAPHIC SURVEY

1. What is your age? _____
2. What country were you born in? _____
3. If born outside the U.S., what age did you arrive in the U.S.?_____
4. Have you ever visited your country of origin, if so, how many times? _____
5. What country was your mother and father born in? _____
6. How long have your family lived in the U.S.? _____
7. How many years have you attended English as a Second Language (ESL) classes? _____
8. What is your overall estimated GPA?_____

9. How do you identify yourself? (please choose one)

1- Arabic	2- American	3- Arab American

10. How do your parents identify themselves? (please choose one)

1- Arabic	2- American	3- Arab American

11. How religious are you? (please choose one)

1- Not Religious	2- Somewhat Religious	3- Very Religious

12. How often do you practice your religion? (please choose one)

1- Never	2- Sometimes/ Special Occasion like *Eid or Ramadan*	3- Daily

13. How religious are your parents? (please choose one)

1- Not Religious	2- Somewhat Religious	3- Very Religious

14. In school, most of your friends are? (please choose one)

1- Arab	2- non-Arab

15. Outside of school, most of your friends are? (please choose one)

1- Arab	2- non-Arab

16. How religious are you? (please choose one)

1- Not Religious	2- Somewhat Religious	3- Very Religious

17. How often do you communicate with family in your country of origin? (please choose one)

1- Daily	2- Weekly	3- Monthly	4-Yearly	5- Never

18. In school, you speak English or Arabic? (please choose one)

1- English Only	2- Mostly English	3- About the Same	4- Mostly Arabic	5- Only Arabic

19. At home, you speak English or Arabic? (please choose one

1- English Only	2- Mostly English	3- About the Same	4- Mostly Arabic	5- Only Arabic

APPENDIX C: ACCULTURATION SCALE: AMAS

Abbreviated Multidimensional Acculturation Scale (Zea, Asner-Self, Birman, & Buki, 2003)

The following section contains questions about your culture of origin and your native language. By culture of origin we are referring to the culture of the country either you or your parents came from (e.g., Yemen). By native language we refer to the language of that country, spoken by you or your parents in that country (e.g. Arabic).

Instructions: Please mark the number from the scale that best correspond to your answer.

1	2	3	4
Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree

ABBREVIATED MULTIDIMENSIONAL ACCULTURATION SCALE				
1. I think of myself as being American.				
2. I feel good about being American.				
3. Being American plays an important part in my life.				
4. I feel that I am part of American culture.				
5. I have a strong sense of being American.				
6. I am proud of being American.				
7. I think of myself as being Arabic				
8. I feel good about being Arabic				
9. Begin Arabic plays an important part in my life.				
10. I feel that I am part of the Arabic culture.				
11. I have a strong sense of being Arabic.				
12. I am proud of being Arabic.				
Please answer the questions below using the following response				
1 Not at all	2 A little	3 Pretty well	4 Extremely well	
How well do you speak English:				
13. At school?				
14. With Americans?				
15. On the phone?				
16. With strangers?				

17. In general?				
How well do you understand English:				
18. On television or in movies?				
19. In newspapers and magazines?				
20. Words in songs?				
21. In general?				
How well do you speak Arabic:				
22. with family?				
23. With Arabic or other Arabs?				
24. On the phone?				
25. With strangers?				
26. In general?				
How well do you understand Arabic:				
27. on television or in movies?				
28. in newspapers and magazines?				
29. words in songs?				
30. in general?				
How well do you know:				
31. American national heroes?				
32. Popular American television shows?				
33. Popular American newspapers and magazines?				
34. Popular American actors and actresses?				
35. American history?				
36. American political leaders?				
37. Arabic national heroes				
38. popular Arabic/Arabic television shows				
39. popular Arabic newspapers and magazines?				
40. popular Arabic actors and actresses				
41. Arabic, Islamic, or Arabic history?				
42. Arabic/ Arabic political leaders				

Subscales available:

IDENTITY:

American Cultural Identity (Possible scores range 6-24; 6-12 = low, 13-24 = high)

Arabic Cultural Identity (Possible scores range 6-24; 6-12 = low, 13-24 = high)

LANGUAGE:

English Language Competence (Possible scores range 9-36; 9-18 = low, 19-36 = high)

Arabic Language Competence (Possible scores range 9-36; 9-18 = low, 19-36 = high)

CULTURE:

American Culture Competence (Possible scores range 6-24; 6-12 = low, 13-24 = high)

Arabic/Arabic Culture Competence (Possible scores range 6-24; 6-12 = low, 13-24 = high)

UNIDIMENSIONAL MODEL OF ACCULTURATION

Total possible Arabic/Arabic 21-84 (21-41 = low, 42 = high)

Total possible American 21-48 (21-41 = low, 42 = high)

BERRY'S BIDIMENSIONAL CLASSIFICATION

Integrated = High American and High Arabic

Separate = High Arabic and Low American

Assimilated = High American and Low Arabic

Marginalized = Low Arabic and Low American (will not be included to anticipated low numbers)

APPENDIX D: PARENT INFORMED CONSENT

Your child is being asked to participate in a research project. Researchers are required to provide a consent form to inform you about the study, to inform you that participation is voluntary, to explain risks and benefits of participation, and to allow you to make an informed decision. You should feel free to ask the researchers any questions you may have.

Study: The Association between Acculturation and Intellectual Assessment among Arab American Adolescents

Researchers: Ramzi M. Hasson, Doctoral Candidate in School Psychology
Jodene G. Fine, Ph.D., Assistant Professor, School Psychology & Educational Psychology
Department of Counseling, Educational Psychology, and Special Education
Michigan State University

PURPOSE OF RESEARCH:
Research shows that your cultural background and language levels influence your performance on cognitive tests. The assessment of cognitive ability plays an important role in clinical and educational services provided to individuals from many different cultures. There is no research, however, on the connection between culture, language and cognitive ability among Arab American children. In this study, the researchers hope to learn about how your child's development in the U.S. is related to how well they perform on cognitive tests. All children and adolescents ages 12-17 that identify themselves as being of Arab descent are invited to participate in this research study. Your child's participation in the study will take about 60 to 90 minutes. Your participation will take approximately 5 minutes.

WHAT YOU AND YOUR CHILD WILL DO:
Your child will complete a brief background information form, an acculturation scale and undergo a brief psycho-educational assessment. The acculturation scale will ask questions about cultural identity, language competence, and cultural knowledge. An adult will either read the questions to your child or your child can complete the survey by him or herself. The direct assessment will involve an evaluation of cognitive ability and academic functioning. You will be asked to complete a demographic survey that will include questions about your family background, home life, language use, and your child's developmental history. You will be able to complete this survey individually at home or through a phone call by the examiners. The surveys will be completed for research purposes only, and the results will not be shared with you or your child. Please note, this consent form must be signed and returned for participation to be possible.

POTENTIAL BENEFITS:
You or your child will not directly benefit from participation in this study, but participation may help contribute to a better understanding of how culture and language influences cognitive performance. This study, along with future research, may increase our knowledge to reduce bias during standardized intellectual assessment among immigrant youth.

POTENTIAL RISKS:
This study poses minimal risk for you and your child. You will complete a survey that includes some questions that may cause you to experience some discomfort. Your child will be complete a survey that includes some questions about adjustment, and cultural identity, which may cause him/her to experience some discomfort or distress. You and your child may skip any question. Your child will also undergo a cognitive evaluation that will last approximately 60-90 minutes. Some discomfort maybe experienced during the assessment.

PRIVACY AND CONFIDENTIALITY:
The data for this project will be kept confidential to the greatest extent allowable by law. Only the researchers and Michigan State University's Human Research Protection Program will have access to the data. After you and your child complete the survey, an identification number will be assigned to the survey and the cognitive assessment results. The consent form with you and your child's names will be separated from the survey and filed in a locked cabinet. Completed surveys will be kept in a in a locked office of the researcher. All documents will be destroyed ten years after completion. The results of this study may be published or presented at professional meetings, but the identities of all research participants will remain anonymous. It will not be possible for readers to know who participated in the study.

As in all research, there is a possibility that some information is shared by a child about doing serious harm to themselves or others. If keeping information obtained in this study private would immediately put them or someone else in danger, the investigators would release that information to protect them or another person.

YOUR RIGHTS TO PARTICIPATE, SAY NO, OR WITHDRAW:
Participation in this research project is completely voluntary. You and your child have the right to say no. You or your child may change your minds at any time and withdraw from the study. You and your child may also choose not to answer specific question or to stop participating at any time.

COSTS AND COMPENSATION FOR BEING IN THE STUDY:
It does not cost anything to participate in this study. As an appreciation of your time, you will be entered into a raffle for a chance to win a $50 gift card. Your child will be given a $10 gift card as an appreciation of their time.

CONTACT INFORMATION FOR QUESTIONS AND CONCERNS:
If you have concerns or questions about this study, such as scientific issues, how to do any part of it, or to report an injury, please contact the researchers, Ramzi Hasson, by phone: 313-283-6056; email: hassonra@msu.edu or Dr. Jodene G. Fine, by phone: 517-884-0443; email: finej@msu.edu; 439 Erickson Hall, East Lansing, MI, 48824. If you have questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Michigan State University's Human Research Protection Program at 517-355-2180, Fax 517-432-4503, or e-mail irb@msu.edu or regular mail at 202 Olds Hall, MSU, East Lansing, MI 48824.

DOCUMENTATION OF INFORMED CONSENT

The Association between Acculturation and Intellectual Assessment among Arab American Adolescents

Please select a box, fill in your child's name, and sign below.

- ☐ **Yes**, my child _____ may participate in this research study.
  Please Print Child's Name

- ☐ **No**, my child _____ may not participate in this research study.
  Please Print Child's Name

_____ _____
Signature Date

PLEASE PRINT:

_____

Circle One: Mother Father Other_____ Parent/Guardian Name

APPENDIX E: CHILD ASSENT FORM

Study Title: The Association between Acculturation and Intellectual Assessment among Arab American Adolescents

This is a research study and you do not have to take part. You are being asked to take part in this study because you identified yourself as being of Arab descent. In this study, the researchers hope to learn about how the experience of Arab American youth influences performance on cognitive tests. About 80 adolescents will participate in this study.

What will happen if I take part in this study?
If you agree to be in this study, you will complete a survey and undergo a cognitive assessment that takes between 60 to 90 minutes. The surveys will ask about your culture, family, and language background. An adult will either read the questions to you or you can complete the survey by yourself. The surveys are for research purposes only, and the results will not be shared with you, your teachers, or your parents.

Are there any risks to me or my privacy?
Some of the survey questions and the direct assessment may make you feel uncomfortable. You may skip any question. We will do our best to protect the information we collect from you. We will give you an ID code and not use your name. The completed surveys and tests will be kept secure and separate from information which identifies you. Only a small number of researchers will have access to the surveys. Names and information that might identify you will not be used if the study is published or presented at scientific meetings.

Are there benefits?
There is no direct benefit to you. Your participation in this study may help us how to best assess children from immigrant backgrounds.

Can I say "No"?
Yes, you do not have to complete a survey or the testing. If you choose not to be in this study you will not lose any of your regular benefits.

Are there any payments or costs?
It does not cost anything to participate in this study. To thank you for your time, you will be given a $10 gift card.

Who can answer my questions about the study?
You can talk with the study researcher about any questions, concerns, or complaints you have about this study. Contact the study researchers: Ramzi Hasson, by phone: 313-283-6056; email: hassonra@msu.edu or Dr. Jodene Fine, by phone: 517-884-0443; email: finej@msu.edu; 435 Erickson Hall, East Lansing, MI, 48824.

If you wish to ask questions about the study or your rights as a research participant to someone other than the researchers please call the Michigan State University's Human Research

Protection Program at 517-355-2180, Fax 517-432-4503, or e-mail irb@msu.edu or regular mail at 202 Olds Hall, MSU, East Lansing, MI 48824.

Assent

PARTICIPATION IN RESEARCH IS VOLUNTARY.

You have been given copies of this consent form to keep. If you wish to be in this study, please sign below.

Date	Participant's Signature for Assent
Date	Person Obtaining Assent

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