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NORM SAMPLE STRATIFICATION AND SOCIOECONOMIC STATUS: EXAMINATION OF LANGUAGE DEVELOPMENT ACROSS EDUCATION AND INCOME

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NORM SAMPLE STRATIFICATION AND SOCIOECONOMIC STATUS: EXAMINATION OF LANGUAGE DEVELOPMENT ACROSS EDUCATION AND INCOME

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ABSTRACT

NORM SAMPLE STRATIFICATION AND SOCIOECONOMIC STATUS: EXAMINATION OF LANGUAGE DEVELOPMENT ACROSS EDUCATION AND INCOME

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The norm samples that are developed in Westernized countries are typically created using a routine process in test development that involves stratification of a range of independent variables. However, this method of creating norm-referenced samples may be discriminatory against individuals from low SES. Because SES is generally stratified by category, according to U.S. Census demographics, any such sample developed in this manner is likely to be appropriate only for individuals within the "average" SES range. The present study was interested in investigating the appropriateness of norm samples for lower SES individuals by examining whether individuals from lower SES backgrounds would perform significantly differently on a measure of language development than those from higher SES backgrounds. It was hypothesized that the mean receptive language score on a test of language development for the lower SES group based on maternal education or family income would be significantly and meaningfully lower than the score for the higher SES group based on maternal education. Independent-samples t-tests were conducted to compare language development scores in the higher SES group and the lower SES group. Overall, contrary to what was predicted, findings of this study did not support the hypothesis that the lower SES group based on annual family income and or maternal education would be significantly and meaningfully lower than the mean language development score for the higher SES group based on annual family income and or maternal education. However, when examining English Learners alone and when dividing the higher and lower SES

groups at $65,000 for annual family income and 14 years for maternal education a significant difference between the groups was found. As such, it seems plausible that the stratification of SES by sampling across the range as a way of controlling for presumed differences to create middle-class representation is likely to be discriminatory for lower SES individuals and may require a different procedure to assure fairness and equity in testing.

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TABLE OF CONTENTS

LIST OF TABLES

Chapter 1
Introduction

Socioeconomic status (SES), whether measured by income, education level, or occupational status, is among the strongest determinants of disparities in educational outcomes. Research has established that there are significant gaps in achievement of students from low-SES backgrounds and students from middle to high-SES backgrounds (Sirin, 2005). Determining students' level of achievement on tests of learning, knowledge and development is an essential component of Specific Learning Disability (SLD) identification. The most widely used SLD classification systems, including the discrepancy model, the Response to Intervention model (RTI) and the alternative research-based procedures for SLD identification, take into account student achievement on a variety of standardized assessment (Alfonso & Flanagan, 2018). Given that differences in SES are associated with disparities in achievement, it follows that students from low-SES backgrounds are more likely to be diagnosed with an SLD than their higher-SES peers (Blair & Scott, 2002). The results of a study by Sullivan and Bal (2013), which utilized a sample of 18,000 students, support the supposition that low-income students are at an elevated risk for being identified as having an SLD. The notion that low-income students are diagnosed with SLDs at a higher rate than their peers possibly as a result of factors associated with their family's SES is disconcerting, particularly because the Individuals with Disabilities Education Improvement Act (IDEA, 2004) explicitly warns that, when considering a student for SLD diagnosis, the learning difficulties of that student must not be primarily the result of economic disadvantage (Alfonso & Flanagan, 2018). Currently, it is difficult to prove that an individual's level of achievement on standardized assessment is primarily the result of their economic

disadvantage rather than other potential contributing factors. Thus, we cannot yet quantify how many students are inappropriately being assessed as SLD as a result of their economic situation.

Literature Review

Ordinarily, assessments of knowledge and development are standardized based on systematic stratification of demographic variables that reflect that current population, including gender, age, geographic region, and education, occupation, or both (Cicchetti, 1994). A score yielded from an standardized assessment is said to be acceptable when similarity exists between the individual who was tested and the standardization sample (Groth-Marnat, 2009). Because individuals from low-SES backgrounds are included in representative standardization samples of standardized assessments, it is assumed that the norms that are generated during standardization are appropriate for individuals belonging to all SES backgrounds. However, this assumption disregards the unique developmental experience of individuals from low-SES backgrounds. Given that growing up in an economically disadvantaged environment negatively impacts the cognitive development of children, and consequently their academic performance, the norms that are yielded from current stratification techniques appear inappropriate. Additionally, there are disproportionately high rates of ethnically, culturally and linguistically diverse individuals in the low-SES population, which would also likely imbalance the normative data. The consequence of including all SES groups in the sample is that the norms produced will likely adequately estimate the academic performance of middle-SES individuals, while underestimating the performance of low-SES individuals and overestimating the performance of high-SES individuals. Researchers that study the

effect of SES on academic and cognitive development have proposed a threshold hypothesis, which explains that until SES reaches a particular middle level, development is noticeably affected but after that point, only individual differences in ability affect further development (Votruba-Drzal, Miller, & Coley, 2016). The literature on the threshold effect regarding SES and development did not provide any specific cutoff for the threshold, however there are some indications that this threshold lies closely above the poverty line (Duncan, Magnuson, & Votruba-Drzal, 2014).

The Standards for Educational and Psychological Testing assert that fairness is, "a fundamental validity issue and requires attention throughout all states of test development and use" (p. 49; AERA, APA, & NCME, 2014). Thus, in order for a test to be deemed 'fair' it must be an equally valid assessment for all subgroups of test takers, including individuals from low-SES backgrounds (Ortiz, 2018). If students from low-SES families are routinely identified as having an SLD as a result of factors related to their disadvantaged backgrounds, then the manner in which low-SES students are assessed and identified for SLD would be considered discriminatory. If students with low-SES parents are being assessed in a discriminatory manner, standardized assessments should be altered to promote a higher standard of fairness by accounting for disparity issues.

Disparities in Educational Outcomes Based on SES

The field of research exploring SES and its relation to educational outcomes has conclusively established that a positive relationship exists between SES and student achievement (Sirin, 2005). Families of a higher SES can access social connections and afford products and services that academically benefit their children, whereas children of

low-SES families lack the resources and connections to attain the same benefits (Sirin, 2005). The achievement gap describes the disparity between academic, developmental, and cogntive achievement in culturally, linguistically and racially marginalized and low-income students and all other students (Caro, 2009). A study by Hale, Naglieri, Kaufman, and Kavale (2004) compared academic scores of students from varying SES backgrounds. The study identified students as being from a low-SES background based on their eligibility for free school lunches. The National School Lunch Program (NSLP) utilizes the federal poverty guidelines in order to determine student eligibility for free lunches (Harwell & LeBeau, 2010). The results of the study revealed that students from low-income families performed worse on tests of reading and math then their higher SES peers. Research supports the notion that the achievement gap, as it relates to SES, is revealed early in a child's life (Entwisle & Hayduk, 1982; Hertzman, 1994; Hertzman & Weins, 1996) and continues to accelerate as the child moves forward through their educational experience (Bast & Reitsma, 1998; Caro, 2009; DiPrete & Eirich, 2006). As a results of developing weaker academic skills when compared with their higher SES peers, students coming from low SES families are less likely to be selected for the college preparatory track (Condron, 2007; Davies & Guppy, 2006; Krahn & Taylor, 2007; Maaz, Trautwein, Lüdtke, & Baumert, 2008) and are more likely to drop out of school early (Alexander, Entwisle, & Kabbani, 2001; Battin-Pearson et al., 2000; Rumberger, 2004; Schargel, 2004). Additionally, students coming from low SES backgrounds are less likely to successfully enter the job market or work towards high-education degrees (Alexander, Entwisle, & Olson, 2007; Cabrera & La Nasa, 2001; Kerckhoff, Raudenbush, & Glennie, 2001).

Due to the educational outcomes associated with being raised in a low SES setting researchers often regard poverty as a high-risk environment that shifts the normal curve of achievement to the left. A report from the National Research Council (NRC, 2002) explained that plotting the academic achievement of a sample comprised of students that vary due to individual differences in ability and environmental differences that diverge within an average or low risk range would result in a normal distribution, with Specific Learning-Disabled (SLD) students representing the left tail section of the distribution. The NRC report asserted that high-risk environments, such as being raised in a low-SES setting, shifts the whole achievement curve to the left resulting in an increase in SLD identification (O'Connor & Fernandez, 2006). Given that 4% of children currently enrolled in the nation's schools and half of all children receiving special education services are classified as having a Specific Learning Disability (SLD), understanding and accurately identifying SLDs is an essential endeavor for the field of school psychology (Pullen, 2016; Pullen, Lane, Ashworth, & Lovelace, 2017). Individuals should be classified as having SLD when they experience difficulties with specific cognitive processes and academic achievement, whilst possessing otherwise normal intellectual functioning (Büttner & Hasselhorn, 2011). Traditionally, SLD was identified when students unexpectedly underachieved on academic, cognitive and developemtal tasks (Fletcher, Morris, & Lyon, 2006). A poor performance was, and is, considered unexpected when it cannot be explained by the individual's intellectual disability, a sensory impairment, an emotional disturbance, cultural deprivation, limited English proficiency, insufficient instruction and environmental or economic disadvantages (Cortiella & Horowitz, 2014). Psychologists currently adhere to the Individuals with

Disabilities Education Improvement Act (IDEA, 2004), which requires that psycho-education evaluations include a variety of assessment methods, as standardized tests alone are not sufficient to indicate a disorder. Nevertheless, standardized academic assessments play a vital role in the detection of SLDs. The two most widely used classification systems, ICD-10 and DSM-V, both point to unexpected poor academic performance as a fundamental indicator of the presence of an SLD (American Psychiatric Association, 2013; World Health Organization, 1992). Therefore, the process for evaluating whether an individual has an SLD typically includes a measure of achievement in the areas of reading, written expression and mathematics (Büttner & Hasselhorn, 2011).

SES vs. Race

It is important to note that belonging to a particular ethnicity and SES bracket does not directly cause individuals to have poorer academic, cognitive and linguistic outcomes; rather, the qualities that delineate social-class differences have impacted individuals' achievement (Harry & Klingner, 2007; Neito, 2010; Rothstein, 2004). Indicators of SES are strongly correlated with race and ethnicity (Williams, Priest, & Anderson, 2016). According to the US Census Bureau from 2010, rates of college graduation, an indicator of SES level, are approximately twice as high for White citizens when compared to Black and Hispanic citizens. Similar disparities are evidenced when examining data on median household income. For every dollar of income Whites receive Hispanics earn 70 cents and blacks earn 59 cents (US Census Bureau 2014). Williams Priest and Anderson (2016) contend that the income discrepancy that exists among races

and ethnicities in the US underestimates the true wealth disparities between racial and ethnic groups. Net worth is a measure of wealth that more accurately represents an individual's affluence because it takes into account family assets and possessions in addition to income. According to the 2014 US Census Bureau Blacks own 6 cents and Hispanics own 7 cents for every dollar of wealth that Whites own. This suggests that there is a higher representation of linguistically diverse individuals in the low SES group in the US compared to other SES groups in the US.

Language

Multiple studies have provided evidence that children from low-SES families and children who come from bilinguals or non-English speaking families have different language trajectories than children from middle-SES, monolingual English-speaking homes (e.g., Brooks-Gunn, Rouse, & McLanahan, 2007; Hernandez, Denton, & Macartney, 2007). Since language appears to be one of the key cognitive systems impacted by SES, researchers have been interested in investigating exactly how SES influences the development of language. A recent study investigated the relationship between brain morphometry and socioeconomic variables in 1099 typically developing individuals between the ages of 3 and 20 (Noble et al., 2015). The results of the study supported previous research in that family income and parental education was shown to explain individual variation in independent characteristics of brain structural development, in regions that are vital for the development of executive functions, language and memory (Noble et al., 2015). Noble, McCandliss and Farah (2007) found that SES accounted for over 30% of the variance in performance on tasks that assessed

language. These results align with the results of a seminal study which found that on average the vocabulary knowledge of a 3-year-old raised in a professional family is more than double that of a child whose parents receive welfare (Hart & Risley,1995). Studies examining the relationship between SES and language development found that children from low SES backgrounds typically have lower levels of both receptive and expressive language when compared with their higher SES peers (Arriaga, Fenson, Cronan, & Pethick, 1998; Hart & Risley, 1995, 2003; Locke, Ginsborg, & Peers, 2002; Qi, Kaiser, Milan & Hancock, 2006). Researchers have employed the Peabody Picture Vocabulary Test (PPVT) to assess the language gap between middle and low SES children. These studies revealed that middle and low SES children differ by 0.75 to 1 standard deviation on the PPVT (Noble, Norman, & Farah, 2005; Qi, Kaiser, Milan, & Hancock, 2006). A study that utilized the Clinical Evaluation of Language Fundamentals Assessment-Preschool (CELF-P) in a sample of low-SES preschoolers found that over half of the participants scored at least one standard deviation below the mean, which indicated over half the sample met criteria for at least a moderate language impairment (Locke, Ginsborg, & Peers, 2002).

SES and Norm Sample Stratification

Since measures of academic, linguistic and cognitive achievement are vital in determining if students meet criteria for Specific Learning Disability, it is of utmost importance that students' performances on assessments of achievement are evaluated in an accurate, nondiscriminatory manner (Ortiz, 2002). One way of ensuring that individuals' performances are evaluated adequately is by utilizing appropriate normative

samples. A normative sample of a standardized test is ordinarily deemed appropriate if (a) the normative sample adequately represents the general population (b) the normative sample includes demographic variables similar to that of the individual being assessed with the standardized test (c) the normative sample has accounted for the impact of demographic variables on normal variation in test performance (Ortiz, 2018; Heaton, Ryan, & Grant, 2009). In both of their work, Ortiz and Heaton asserted that most normative samples fail to meet these standards. Specifically, most normative samples do not include adjustment for demographic characteristics, such as low-SES, of the individual being considered (Heaton, Ryan, & Grant, 2009).

Normative samples that are developed in Westernized countries, including the United States, are commonly based on predominantly middle class, Caucasian, individuals with some college education (Heaton, Ryan, & Grant, 2009; Hestad, 2016). Heaton and Ortiz, as well as many other researchers in the field of psychological and neuropsychological testing, assert that using norms that do not adequately include the demographic variables similar to that of the individual being assessed is a violation of the assumption of comparability in assessment (Heaton, Ryan, & Grant, 2009, Cole, 2013). As Salvia and Ysseldyke (1991) expounded, when we test an individual, we assume that they are similar to those whom the standardization was based. Thus, using commonly available normative data to assess an individual from a low-SES background is a major hindrance to adequate assessment and can ultimately result in incorrect educational decisions. To remedy this issue, Heaton and his colleagues recommend using adjusted norms based on varying demographic variables. Using adjusted norms or specialized subgroup norms provides psychological examiners with greater confidence when

assessing similar subgroup populations (Dana, 2000). This is particularly important when the subgroup being assessed generates scores that are meaningfully different from the normal standardization group (Groth-Marnat, 2009), which is true of low-SES individuals.

Another potential problem with the normative samples utilized for standardized testing is that SES is often defined and measured in a variety of ways. The standardized tests that currently exist utilize different measures of SES for their normative sample, including parental education, income level, or a combination of these factors. There is no current consensus among researchers concerning the measurement of SES for normative samples.

Socioeconomic status (SES) is one of most extensively researched variables in the study of assessment. Despite being one of the most widely and long researched variables in the field of psychology, researchers have not settled on a common method for empirically measuring SES (Bornstein & Bradley, 2003). For almost a century, the operational definition of SES has evolved to reflect the societal changes that have occurred since the variable was first studied. Originally, SES was measured using fathers' education level and occupation (Sirin, 2005). In recent years, a number of factors are considered when measuring SES including family income, parental education level, parental occupation, and measures of family structure (Sirin, 2005). Currently, different combinations of these factors have been used to measure SES, achievement and development. It is generally agreed upon that SES indicates an individual's hierarchical ranking in terms of their access to societal status and commodities such as power and wealth (Mueller & Parcel, 1981). The individual variables that comprise SES are

distinctive in that they each measure a unique aspect of SES. Parental income is used as a measure of SES because it indicates the economic and social resources that are available to the family (Sirin, 2005). Another common measure of SES is parental education, which is highly correlated with income in the United States (Sirin, 2005; Hauser & Warren, 1997). The third most frequently used measure of SES is occupation, which is typically determined by the income and education needed to attain the occupation in question (Sirin, 2005).

Although demographics, such as SES are represented in normative samples, given the association between SES and various types of development, this form of representation may not be equitable for evaluating individuals from low SES backgrounds. Test creators hope to create a fair standardized assessment by controlling for factors, such as race, ethnicity and SES. However, the race of an individual does not necessarily or directly impact the developmental experiences of that person. However, research does indicate that as opposed to race, SES does impact the developmental experience of an individual (Harry & Klingner, 2007). Thus, representing race and SES in a similar manner in normative samples, typically accomplished by mirroring the U.S. census population parameters, may not be appropriate for low SES individuals and may violate the assumption of comparability in assessment.

The variable of SES, like race, is typically stratified categorically rather than treated as a continuous variable in norm samples**.** The assumption is that the singular set of norms that result from this method of sampling will be generalizable to the whole population and that the population is relatively homogenous. Although viewing demographic variables, such as SES, as categorically stratified variables is common, using this

approach makes precise norms less attainable for subgroups of the population (Shuttleworth-Edwards, 2019). Thus, the development of more precise norms would likely result from treating SES as a continuous variable rather than stratifying SES categorically in normative samples.

Chapter 2
Present Study

Research has consistently demonstrated that socioeconomic status (SES) is a powerful determinant of many outcomes particularly those related to overall academic attainment. In addition, measures of learning, knowledge and development via standardized testing are vital in determining a wide range of educational services and programming including whether a student may have a disability. Thus, it is imperative that students' performances on standardized, norm-referenced assessments are evaluated in an accurate, nondiscriminatory manner. The normative samples of standardized tests that are developed in Western countries are invariably based on an aggregation of individuals who come from a variety of different backgrounds and levels of SES. As such, when grouped together in this fashion, it is fair to say that what becomes average performance on a test is predicated in large part on the comparison to a standard that represents the "average" level of SES. Since that level is comprised of high, low, and middle SES individuals, the sample will necessarily reflect the SES of the middle group and it is this group to which all subsequent examinees, whether from high or low SES backgrounds, will be compared. The use of the "average" SES for any given age does not equate the experiences and development of individuals who were raised in homes where the SES was at the lower end as compared to those at the higher end. There is no intrinsic difference in SES, rather, it is a function of circumstance, much like an English learner may have had very little exposure to English in their lifetime while a child of the same age may have had a much greater experience with and exposure to English. Thus, it may be beneficial to view the impact of SES on standardized test performance as a variable that requires some type of control for differences that are not captured simply by

aggregating those differences into a group average. The current study seeks to fill the gap in the literature of whether individuals from lower SES families, might result in important differences in performance that are currently being overlooked due to the categorical and proportional representation of SES utilized in current test norm samples.

Given the association between SES and various developmental (e.g., language) and educational (e.g., achievement) factors, structuring a normative sample in the traditional manner appears to present numerous problems, in particular, the idea that averaging SES within a diverse group creates a fair standard by presumably eliminating the effect of these SES differences. This seems rather illogical given that research on the relationship of SES to developmental and educational outcomes is a more linear association and that it does not appear to be a variable where its impact is equalized among individuals simply by averaging across the entire range. The literature in this regard seems to suggest that it is much more likely that low SES individuals will display less development or have lower educational achievement than individuals with high SES. If so, then use of a de facto, aggregated middle SES standard, as is common practice in test development, would not seem to reflect the knowledge base that points out performance differences directly as a result of one's SES. The purpose of this study is to examine this previously established relationship and evaluate the extent to which use of SES as a single, stratification variable without regard to differences between high and low groups, might have discriminatory effects on standardized test performance.

This study will utilize language development as the independent variable given that linguistic development, particularly receptive vocabulary, is an ability that continues

to grow with age and does not demonstrate a plateau effect until well late into adulthood (Verhaeghen, 2003). Moreover, language development has been shown to be particularly sensitive to differences in SES (Hart & Risley, 2004). And finally, a recent test, the Ortiz PVAT (Ortiz, 2018) has been developed in which the use of exposure-based norms provides a valid measurement of receptive vocabulary in both native English speakers and English learners alike which eliminates the need to separate individuals on this basis and permits their aggregation into a single group. These factors make use of receptive language an ideal developmental variable with which to examine potentially variable performance that can be attributed directly to SES differences without the confounds typically associated with differences in English language development. Differences in test performance that are directly attributable to differences in level of SES would suggest that normative samples are in fact biased against lower SES individuals. Demonstrating a more nuanced impact of SES on test performance would contribute to the research that would challenge the notion that SES is a variable that researchers control in normative samples by the current method of aggregating various levels across the SES spectrum.

Chapter 3
Hypotheses

Given the assumption that stratification along various categories of SES is sufficient for the purposes of testing, it would be logical to conclude that if a sample were grouped by SES and assessed using a measure of receptive language development the scores of the higher and lower SES group would be approximately equal. It has been argued, however, that the developmental differences experienced by lower-SES individuals are not adequately controlled by broad categorical grouping within a normative sample when maternal education or family income are used equivalently as proxies for SES. Therefore, it was hypothesized that:

1) the mean receptive language score for the lower SES group based on maternal education would be significantly and meaningfully lower than the mean for the higher SES group based on maternal education;

2) the mean receptive language score for the lower SES group based on annual family income would be significantly and meaningfully lower than the mean for higher SES group based on annual family income.

Chapter 4
Methods

Procedures

Recruitment was initiated after approval was obtained from St. John's University's Institutional Review Board. The author assessed participants using a standardized, norm-referenced measure of receptive language acquisition which was presented on a laptop computer. Participants were instructed to complete the assessment while sitting at a desk in a room free of distractions. Participants were provided headphones to reduce any external sounds that may be distracting to the participant. Parents of participants were asked to complete a form which will provide consent for the assessment. Parents were asked to provide demographic information, including their level of income and maternal education level and the age when their child was first exposed to English language learning.

Participants

Participants in this study included 25 school aged children, including 15 non-native English speakers and 10 monolingual, native-English speakers, between the ages of 2.5 and 18. Participants were recruited through social media websites including Facebook and LinkedIn via posts asking for participants, as well as word of mouth leading to a convenience sample.

Instruments

The Ortiz PVAT is a receptive vocabulary assessment that utilizes dual norms (English Speaker norms and English Learner norms that control for English exposure)

which allows for the evaluation of individuals from all language backgrounds. The Ortiz PVAT was intentionally designed to combat a major issue that occurs when testing English Learners, which is that each individual English Learner has experienced a different level of English language exposure (Ortiz, 2018). The Ortiz PVAT provides control for English language exposure to generate a score that enables evaluators to compare an English Learner to other English Learners with the same amount of exposure to the English language (Ortiz, 2018). Thus, when examining the effect of SES on performance, the Ortiz PVAT controls specifically for variance that might otherwise be attributable to language exposure and developmental language differences above and beyond SES. Regarding SES, the Ortiz PVAT does not control for SES in the same manner and instead relies on the more conventional approach used for other stratification variables, that is, sampling a range of individuals with various levels of SES but without specific norms for these levels. This allows for the measurement of the effect of SES where the variance that might be attributed to language to be effectively controlled. The assessment is presented in a digital format with fully computerized administration and scoring, with built in basal and ceiling. The Ortiz PVAT provides pre-recorded audio for target word presentation with neutral voicing and pronunciation, as well as ecologically valid visual stimuli of real objects and actions. The results of the Ortiz PVAT reveal whether an individual English vocabulary performance is within normal limits or indicates a language problem or disorder.

Chapter 5
Results

All statistical analyses were conducted using IBM SPSS Statistics software version 26 to test all hypotheses. An alpha level of .05 was used for all statistical tests unless otherwise noted.

Descriptive Information

A total of 25 participants, ages 2.5 to 18, completed the Ortiz PVAT assessment (*M*= 8.84). 15 of the participants were identified as English Learners and 10 participants were identified as English Speakers. Participants were identified as English Learners of they met the following criteria: 1) The language the examinee first learned to speak was only English 2) The language used in the home prior to entering school was only English 3) The language used for instruction at school, if and when attended, was English only, or English within a dual-language/dual-immersion program. If these criteria were not met participants were identified as English Learners. Participants' maternal education ranged from maternal education achievement of 3rd grade (3 years of formal education) through master's level (18 years of formal education) with a median of 14. Participants' annual family income ranged from $35,000 to $160,000, with a median income of $80,000. Descriptive information on the participants' age, maternal education level, annual family income and Ortiz PVAT is displayed in Table 1.

Table 1
Description of Participants

Variables	N	Minimum	Maximum	Mean	Median	Std. Dev
Age	25	2	18	8.84	8	4.58
Maternal Education	25	3	18	13.84	14	3.74
Annual Family Income	25	35,000	160,000	85,200	80,000	40168.39
Ortiz PVAT SS	25	88	125	101.96	98	9.76

Participants were placed in the lower SES group, based on maternal education level, if the participant's mother achieved less than 14 years of formal education. Participants were placed in the higher SES group, based on maternal education level, if the participant's mother achieved 14 years of formal education or more. A cutoff of 14 years of formal education was chosen in order to balance the number of participants in the higher and lower SES groups. The median maternal education level achieved for the lower SES group was 12 years of school. The median maternal education level achieved for the higher SES group was 17 years of school. Participants were placed in the lower SES group, based on annual family income level, if the participant's annual family income was $70,000 or less. Participants were placed in the higher SES group, based on annual family income level, if the participant's annual family income was more than $70,000. A cutoff of $70,000 annual family income was chosen in order to balance the number of participants in the higher and lower SES groups. The median annual family income for the lower SES group was $50,000. The median annual family income for the higher SES group was $100,000.

Hypothesis 1: Effect of maternal education on language.

To investigate the hypothesis that language development scores for the lower SES group operationalized via maternal education would be significantly lower than the scores for higher SES group, an independent-samples t-test was conducted. The results revealed that there was not a significant difference in the scores for the lower SES group and the higher SES group based on maternal education level ($t(23) = .875$, $p = .391$). The results are presented in Table 2.

Table 2

Mean Standard Score According to Maternal Education

	M-ED	N	Mean	SD	t	df	p
Ortiz PVAT SS	>= 14 Mean =10.91	12	103.62	9.76	.875	23	.391
	< 14 Mean=15.08	13	100.17	9.94			

Hypothesis 2: Effect of family income on language

To investigate the hypothesis that language development scores for the lower SES group operationalized via annual family income would be significantly lower than the scores for higher SES group, an independent-samples t-test was conducted. The results revealed that there was not a significant difference in the scores for the lower SES group and the higher SES group based on annual family income $t(23)=-.300$, $p = .767$. The results are presented in Table 3.

Table 3

Mean Standard Score According to Annual Family Income

	AFI	N	Mean	SD	t	df	p
Ortiz PVAT SS	= < $70,000 Mean=$53,333.33	12	102.58	9.99	-.300	23	.767
	> $70,000 Mean=$118,461.54	13	101.38	9.98			

Based on prior research SES is measured using either maternal education or annual family income. The assumption is that either maternal education or annual family income alone is an appropriate proxy measure for SES. If maternal education and annual family income are both adequate measures of SES there must be a strong association

between the two. Results of a Pearson correlation indicated that there was a significant positive association between maternal education and annual family income, ($r(23) = .53$, $p = .007$).

When examining all participants together, English Learners and English Speakers as one group, there was no difference found on language development scores as had been hypothesized. At this point, there was some concern regarding the sample characteristics which may have resulted in differences in the overall maternal education and family income as a function of English Learner status. The English Speaker participants earned a median family income of $100,000 annually, whereas the English Learner participants earned a median family income of $65,000 annually. The median maternal education achieved by the English Speaker participants' mothers was 17 years, whereas the median maternal education achieved by the English Learner participants' mothers was 13. To further analyze the present study's hypotheses English Learner participants were disentangled from English Speaker participants.

First, English speakers alone were analyzed. The ages of participants in the English Speakers group ranged from 2 to 17 years of age with an average age of 8.20. The maternal education level of the English Speaker participants ranged from 11 years of formal education to 18 years of formal education with a median of 17 years of maternal education. The annual family income of the English Speaker participants ranged from 40,000 to 160,000 with 100,000 being the median annual family income. English Speaker participants were placed in the lower SES group, based on maternal education level, if the participant's mother achieved less than 14 years of formal education. English Speaker participants were placed in the higher SES group, based on maternal education level, if the participant's mother achieved 14 years formal education or more. The division between the higher and lower SES groups at 14 years of education was chosen as this was

the cutoff that was used when analyzing all participants together. English Speaker participants were placed in the lower SES group, based on annual family income, if the participant's family earned an annual family income of $70,000 or less. English Speaker participants were placed in the higher SES group, based on annual family income, if the participant's family earned an annual family income of more than $70,000. The division between the higher and lower SES groups at $70,000 annual family income was chosen as this was the cutoff that was used when analyzing all participants together. Descriptive information on the English Speaker participants' age, maternal education level, annual family income and Ortiz PVAT is displayed in Table 4.

Table 4

Description of English Speaker Participants

Variables	N	Minimum	Maximum	Mean	Median	Std. Dev
Age	10	2	17	8.20	6	5.43
Maternal Education	10	11	18	16	17	2.45
Annual Family Income	10	$40,000	$160,000	$111,000	$100,000	43575.24
Ortiz PVAT SS	10	90	113	99.6	97.5	6.47

To investigate the hypothesis that language development scores for the lower SES group operationalized via maternal education would be significantly lower than the scores for higher SES group in English Speaker participants only, an independent-samples t-test was conducted. The results revealed that there was not a significant difference in the scores for the lower SES group and the higher SES group based on maternal education t(8)=-.491, p = .636. The results are presented in Table 5.

Table 5

Mean Standard Score According to Maternal Education

	M-ED	N	Mean	SD	t	df	p
Ortiz PVAT SS	>= 14	8	100.13	7.22	-.491	8	.636
	Mean = 17. 13						
	< 14	2	97.50	.70			
	Mean = 11.5						

To investigate the hypothesis that language development scores for the lower SES group operationalized via annual family income would be significantly lower than the scores for higher SES group in English Speaker participants only, an independent-samples t-test was conducted. The results revealed that there was not a significant difference in the scores for the lower SES group and the higher SES group based on annual family income t(8)=-.491, p = .636. The results are presented in Table 6.

Table 6

Mean Standard Score According to Annual Family Income

	AFI	N	Mean	SD	t	df	p
Ortiz PVAT SS	= < $70,000 Mean = $45,000	2	97.50	.70	-.491	8	.636
	> $70,000 Mean = $133,750	8	100.13	7.22			

No significant differences were found between the higher and lower SES group for the English Speaker participants, however there was a large imbalance in the number of participants in the higher and lower SES group, which may have affected the analysis by reducing its statistical power. Therefore, new cutoffs were chosen to divide the lower and higher SES groups of English Speakers in order to more equally balance the number of participants in both groups as much as possible. The cutoff value was shifted from 14 years of maternal education to 17 years of maternal education. According to the new cutoffs participants were placed in the lower SES group, based on maternal education level, if the participant's mother achieved less than 17 years of formal education English Speakers participants were placed in the higher SES group, based on maternal education

level, if the participant's mother achieved 17 years formal education or more. Although the cutoff of 17 years of formal education balanced the number of participants in the higher SES group and the lower SES group as much as possible, the groups remained largely unbalanced. The years of maternal education among the English Speaker participants were 11, 12, 16, 17, 17, 17, 17, 17, 18, 18. When the cutoff is placed below 17 years of education, 3 participants are placed in the lower SES group while the 7 other participants are placed in the higher SES group. If the cutoff is shifted to 17 years of maternal education and below the groupings become 8 participants in the lower SES group and 2 the higher SES group, so 3 in one group and 7 in the other was the most balanced the groups could be.

New cutoffs were also chosen to divide the lower and higher SES groups of English Speakers, based on annual family income, in order to more equally balance the number of participants in both groups as much as possible. According to the new cutoffs, English Speaker participants were placed in the lower SES group, based on annual family income, if the participant's family earned an annual family income of less than $150,000. English Speaker participants were placed in the higher SES group, based on annual family income, if the participant's family earned an annual family income of $150,000 or more. The cutoff of $150,000 annual family income was chosen in order to completely balance the number of participants in the higher SES group and the lower SES group. When the cutoff of $70,000 annual family income was used the number of participants in the higher and lower SES groups was extremely unbalanced which reduced statistical power of the analysis.

To investigate the hypothesis that language development scores for the lower SES group operationalized via maternal education would be significantly lower than the scores for higher SES group in English Speaker participants only, an independent-samples t-test was conducted. The results revealed that there was not a significant difference in the scores for the lower SES group and the higher SES group based on maternal education t(8)=.705, p = .501. The results are presented in Table 7.

Table 7

Mean Standard Score According to Maternal Education

	M-ED	N	Mean	SD	t	df	p
Ortiz PVAT SS	>= 17	7	100.57	7.68	.705	8	.501
	Mean = 13						
	< 17	3	97.33	.58			
	Mean = 17.28						

To investigate the hypothesis that language development scores for the lower SES group operationalized via annual family income would be significantly lower than the scores for higher SES group in English Speaker participants only, an independent-samples t-test was conducted. The results revealed that there was not a significant difference in the scores for the lower SES group and the higher SES group based on annual family income t(8)=.278, p = .788. The results are presented in Table 8.

Table 8

Mean Standard Score According to Annual Family Income

	AFI	N	Mean	SD	t	df	p
Ortiz PVAT SS	< $150,000	5	100.20	8.53	.278	8	.788
	Mean = $78,000						
	> = $150,000	5	99.00	4.53			
	Mean = $154,000						

Next, English Learners alone were analyzed. The ages of participants in the English Learners group ranged from 3 to 18 years of age with an average age of 9.27. The maternal education level of the English Learner participants ranged from 3 years of formal education to 17 years of formal education with a median of 13 years. The annual family income of the English Learner participants ranged from 35,000 to 150,000 with a median of 65,000. Participants were placed in the lower SES group, based on maternal education level, if the participant's mother achieved less than 14 years of formal education. English Learner participants were placed in the higher SES group, based on maternal education level, if the participant's mother achieved 14 years of formal education or more. The division between the higher and lower SES groups was set at 14 years as this was the cutoff that was used when analyzing all participants together. English Learner participants were placed in the lower SES group, based on annual family income, if the participant's family earned an annual family income $70,000 or less. English Learner participants were placed in the higher SES group, based on annual family income, if the participant's family earned an annual family income of more than $70,000. The division between the higher and lower SES groups was set at $70,000 as this was the cutoff that was used when analyzing all participants together. Descriptive information on the English Learner participants' age, maternal education level, annual family income and Ortiz PVAT standard scores is displayed in Table 9.

Table 9
Description of English Learner Participants

Variables	N	Minimum	Maximum	Mean	Median	Std. Dev
Age	15	3	18	9.27	8	4.08
Maternal Education	15	3	17	12.40	13	3.83
Annual Family Income	15	$35,000	$150,000	$68,000	$65,000	27438.24
Ortiz PVAT SS	15	88	125	103.53	102	11.45

To investigate the hypothesis that language development scores for the lower SES group operationalized via maternal education would be significantly lower than the scores for higher SES group in English Learner participants only, an independent-samples t-test was conducted. The results revealed that there was a significant difference in the scores for the lower SES group and the higher SES group based on maternal education t(13)=2.831, p = .014, d= 1.55. The effect size indicates that the difference between the higher SES group and the lower SES group is approximately 1.5 standard deviations indicating a large effect size. The results are presented in Table 10.

Table 10

Mean Standard Score According to Maternal Education

	M-ED	N	Mean	SD	t	df	p	d
Ortiz PVAT SS	>= 14	5	116.20	7.59	2.831	13	.014	1.55
	Mean = 15.6							
	< 14	10	100.70	10.89				
	Mean = 10.8							

To investigate the hypothesis that language development scores for the lower SES group operationalized via annual family income would be significantly lower than the scores for higher SES group in English Learner participants only, an independent-samples t-test was conducted. The results revealed that there was not a significant difference in the scores for the lower SES group and the higher SES group based on annual family income t(13)=-1.015, p = .329. The results are presented in Table 11.

Table 11

Mean Standard Score According to Annual Family Income

	AFI	N	Mean	SD	t	df	p
Ortiz PVAT SS	= < $70,000 Mean = $55,000	10	103.60	10.73	-1.015	13	.329
	> $70,000 Mean = $94,000	5	110.40	15.08			

The division between lower and higher SES groups based on annual family income was set at $70,000 to replicate the same cutoff that was used when analyzing all participants together (English Speakers and English Learners) and although this division did not severely imbalance the number of participants in the higher and lower SES groups the groups could have been more evenly balanced, which would increase statistical power of the analysis. Thus, the cutoff was then set to 65,000, which more evenly balanced the number of participants in the higher and lower SES groups. Participants were placed in the lower SES group, based on annual family income, if the participant's family earned an annual family income of less than $65,000. Participants were placed in the higher SES group, based on annual family income, if the participant's family earned an annual family income of $65,000 or more.

To investigate the hypothesis that language development scores for the lower SES group operationalized via annual family income would be significantly lower than the scores for higher SES group in English Learner participants only, an independent-samples t-test was conducted. The results revealed that there was a significant difference

in the scores for the lower SES group and the higher SES group based on annual family income t(13)=-2.875, p = .013, d=1.51. The effect size indicates that the difference between the higher SES group and the lower SES group is approximately 1.5 standard deviations indicating a large effect size. The results are presented in Table 12.

Table 12

Mean Standard Score According to Annual Family Income

	AFI	N	Mean	SD	t	df	p	d
Ortiz PVAT SS	<$65,000	6	96.83	6.91	-2.875	13	.013	1.51
	Mean = $46,666.66							
	>=$65,000	9	111.89	11.43				
	Mean = $82,222.22							

Chapter 6

Discussion

The purpose of the current study was to determine if participants from low SES backgrounds, based on annual family income and maternal education level, would perform significantly different on a standardized, norm-referenced task of general language development. When examining the participants, those from lower SES backgrounds, based on maternal education level, did not perform significantly differently on the test of language development as compared to individuals from higher SES backgrounds. Additionally, the participants did not perform significantly differently on the test of language development on the basis of annual family income. It is likely that the lack of any significant difference in the performance of the lower and higher SES group was because the lower SES group in the study may not have had a sufficient range in terms of sampling and which resulted in the lower SES group having relatively high maternal education and family income levels. For example, the median annual family income of all participants was $80,000 and the median years of maternal education was 14 years of education. According to a report from United States Census Bureau, 53.6% of the households in the United States earned less than $75,000, the medium income across the US was $68,703 in 2019 (Semega, Koller, Shrider, & Creamer, 2020). According to a Pew Research study, middle-income for a three-person household ranges from about $40,100 to $120,400 annually (Horowitz, Igielnik, & Kochhar, 2020). Thus, most of the participants that were included in the study's sample would be considered in the middle to high SES range. The lack of wide variability between participant scores on the test of

language development is also likely an effect of the largely homogenous sample. All the participants scores fell within the average range or higher.

After examining all participants together, post hoc analyses were conducted to verify whether a significant difference in performance could be found between the higher and lower SES groups among English Speaker participants alone and English Learner participants alone. English Speakers participants were separated from English Learners to determine whether English Speakers alone from lower SES backgrounds, based on maternal education level or annual family, performed significantly differently on the test of language development than English Speakers from higher SES backgrounds. The analyses indicated that the English Speaker participants did not perform significantly differently on the basis on annual family income or maternal education. The English Speaker participants were originally analyzed using the same cutoffs that originally divided the lower and higher SES groups when examining all participants together (14 years for maternal education and $70,000 for annual family income). However, at these cutoffs the higher and lower SES groups became pointedly imbalanced, thus the cutoffs were adjusted to attempt to better balance the higher and lower SES groups. The new cutoffs were set at 17 years of education for maternal education and $150,000 for annual family income. These cutoffs are extremely high in terms of years of education and annual family income and do not reflect the division between high and low SES groups according to US population demographics. The analyses conducted with the English Speaker at the new cutoffs indicated that participants' performance did not vary significantly due to their placement in the lower SES group based on maternal education or annual family income. The lack of a statistically significant finding between English

Speaker participants was likely because on average the English Speaker participants in the study came from families that were very high earning and highly educated. For comparison, among the English Speaker participants, the average annual family income was $111,000 and the median income was 100,000 and the average maternal education level was 16 years of formal education, and the median was 17 years of formal education.

In similar fashion, English Learner participants were examined separately as a group to determine whether English Leaners with lower SES backgrounds, based on maternal education level or annual family income, performed significantly different on the Ortiz PVAT than English Learners from higher SES backgrounds. When the higher and lower SES groups of English Learners were divided, as before, at $70,000 annual family income, the higher and lower SES groups were imbalanced in terms of number of participants in each group and a significant difference between the higher and lower SES groups was not found. However, when the higher and lower SES groups of English Learners were divided at the $65,000 threshold for the purposes of balancing the numbers of participants in each sample, performance differed. The results of the analyses indicated that English Learner participants from lower SES backgrounds, based on maternal education level, did perform significantly lower (SS=100.70) on the Ortiz PVAT than English Learner participants from the higher SES group (SS=116.20). Similarly, the English Learner participants from the lower SES group (SS=96.83), based on annual family income, performed significantly lower than the higher SES group (SS=111.89) of English Learners. These findings suggest that SES does not appear to impact English Learner performances until annual family income and maternal education is lowered to a particular threshold. Specifically, these results indicate that when English Learners'

family incomes dip below $65,000 or their mothers' education does not reach 14 years of formal education individuals become at risk for their SES impacting their performance on tasks of receptive language. The present study did not find to necessary to continue to lower of the cutoffs below $65,000 as the shift from no significance to significance occurred at the $65,000 mark, indicating this was the location of the threshold where SES begins to impact performance.

Although there was a significant difference between the higher and lower groups at $65,000 annual family income and 14 years of maternal education, the lower SES group still performed within the average range and did not score in a range that would leave them vulnerable for LD identification. This is likely because the Ortiz PVAT controls for exposure to English language. Had Ortiz PVAT not used norms that controlled for English language exposure the scores earned by the lower SES group of English Learners would likely have been lower.

The US Census Bureau recently reported that the median household income for those who have attained an associate degree, which is equal to 14 years of education, is $65,000. This report from the US Census Bureau aligns with the findings from this study and supports the notion that income or education can be used interchangeably to establish SES for a household or family. Based on the findings from this study it is exactly below this point ($65,000 annual family income and or 14 years of education) that language development begins to be impacted by SES for English Learners. Table 14 displays the median household income based on educational attainment of the household head in 2018 according to the US Census Bureau (US Census Bureau, 2019).

Table 13
Median Household Income Based on Educational Attainment of Household Head

Educational Attainment of Household Head	2018 Median Household Income
All education levels	$64,761
Less than 9th grade	$26,875
Some high school	$29,204
High school or equivalent	$46,073
Some college, no degree	$57,807
Associate degree	$65,647

When developing the Ortiz PVAT, Ortiz evaluated whether SES impacted performance above and beyond the control in place for the effect of English language exposure and the other stratification variables. The Technical Manual (Ortiz, 2018) reported that participants were divided into 4 categories based on Parental Education Level (PEL) including: no high school, high school, some college, college degree. The performance of individuals in these groups were evaluated for potential mean differences for both the native English speaking and the English learner norm samples. The results of their analysis on the English-speaking norm sample revealed an overall main effect for SES only between the group with the lowest PEL and the group with the highest PEL (Ortiz, 2018). Analysis of the English learner norm sample revealed a main effect for SES- the two lowest PEL groups and the PEL with some college education. Although the difference in the performance was very small (partial eta squared = .01 and .018 respectively) it did indicate that SES was having a stronger effect at the lower half of the SES range. This is also consistent with research that has suggested a threshold hypothesis related to the effect of SES on academic and cognitive development which has shown that until SES reaches a particular middle level, development is markedly affected but after that point, only individual differences in ability affect further development

(Votruba-Drzal, Miller, & Coley, 2016). These results, combined with the results from the present study, as well as with the extant literature on the developmental differences associated with SES, suggest that the impact of SES is more complex and requires more attention than test developers have previously assumed, particularly for individuals in the lower ranges.

Limitations

There are several important limitations of note in this study. An obvious one is the small size of the sample that was used. Only 25 participants were used in the study. Given that the study took place during the Covid-19 pandemic and that the study required face-to-face data collection, many potential participants declined to participate in the study. The small sample size that was collected for the study did not permit a great deal of generalization or the discovery of many significant findings. Another key limitation of the study was that the lower SES group in the study may not have been low enough to reveal significant findings regarding the effect of SES on the Ortiz PVAT when examining all participants together as one group and when examining the English Speaker participants only. The median annual family income of the lower SES group when examining all participants together (English Speakers and English Learners) was $50,000 and the median annual family income of the lower SES group when examining English Speakers only (at the 150,000 cutoff) was $78,000. Had the annual family income of the low SES group been notably lower the harmful effects of poverty on receptive language test performance may have been further revealed. Additionally, the English Speaker group had low variability when it came to maternal education level. The

majority of the participants' mothers in the English Speaker group possessed over 15 years of formal education. If a larger sample size were used, with a wider range of SESs a greater variability in performance among participants, more impactful results may have been revealed. A limitation of the study that likely restricts its generalizability is the geographical location where participants were collected. Participants were sampled in the New York and New Jersey area where the median household income is higher than the median household income of much of the of the country (Bureau, 2020). However, the cost of living in New York and New Jersey is also higher when compared to much of the country according to the Council for Community and Economic Research (2021). Therefore, the cutoff value where SES begins to impact performance on standardized tests could be lower in other areas of the country. The $65,000 threshold that was indicated in this study may be specific to the New York/ New Jersey geographic region. Another limitation of the study is that information on the number of members in participant households was not collected. Participants' SES level is impacted by the number of individuals in a household. For example, the number of parents earning income in a household and the number of children in the household that are financially provided for impacts the SES of the entire household.

Implications for School Psychology

While the impact of SES on receptive language when controlling for English language exposure was not indicated in English Speakers participants this outcome was likely due to the overall high earning and highly educated sample that was collected. However, prior research as well the English Learner group in study suggest that SES does

impact receptive language performance at and below a certain income level and maternal education level. This notion aligns with previous research that has suggested a threshold hypothesis, which advises that when SES dips below a certain point, SES impacts academic and cognitive development, but until that point only individual differences in ability affect development (Votruba-Drzal, Miller, & Coley, 2016). Thus, school psychologist may want to consider evaluating students from lower-SES background in a manner than does not use the standard norms that currently exist. When using the standardized measures that currently exist to evaluate students, school psychologist should be aware that the low performance of low-SES students may be due to their economic disadvantage rather than an SLD.

This study warrants the discussion for further research. Future studies may want to examine the performance of a wider range of lower SES participants on tests of language development than was utilized in this study. Studies that use participants from a wider range of SESs may reveal significant results between higher and lower SES English Speaker groups at a certain threshold. Future studies may want to focus the sampling of participants that come from families that earn above and below $65,000 annually for family income and 14 years for maternal education level as the present study identified that participant scores are impacted below these thresholds in the case of English Learners. Additionally, future studies may want to collect information on the number of members in participants' households as this variable impacts the SES of a participant.

School psychologists should also be aware of the impact of SES on tests that do not control for English Language exposure when testing English Learner students. If a

test controls for language exposure it is also likely controlling for a great deal of variance that may be attributed to SES. Since English Learners are overrepresented in the low SES population by utilizing norms that control for English language exposure, they help ensure that low SES English Learners are not being incorrectly identified as having an LD as a result of their English Learner status. Most if not all tests that school psychologists use do not control for language variance so the difference in scores between low SES and high SES students would likely be even more magnified in the tests that school psychologists commonly use.

Future researchers and test developers of assessments might also want to consider creating categorical groupings for normative samples along the SES continuum rather than aggregating them together as they currently do. As the findings of this study and others suggest, there may be a SES threshold where above that point students can be appropriately assessed using existing norms, however below that point students should be assessed using alternative norms that consider their actual or more precise categorical level of the SES (US Census Bureau, 2019). For example, future research of test development may want to create categorical groupings for the normative sample that occur at intervals of annual family income within the range below $65,000. In this way, it might be less discriminatory and fairer to compare examinees whose families earn, say $30,000 annually, against other examinees whose families also earn approximately $30,000 annually and so forth.

In summary, the data suggest annual family income and maternal education level does impact language development of English Learners when families earn less than $65,000 annually and achieve less than 14 years of maternal education. The lack of an

income and educational threshold for English Speaker participants may have resulted due to the restricted range among monolingual English-speaking participants. This limitation of the study, as well as the small sample size, likely hindered the potential finding of the study. In combination with previous studies examining the appropriateness of standard normative samples for low SES individuals, this study suggests that the standard method of developing normative samples is discriminatory. Future studies should investigate the performance of a wider range of low SES individuals on standardized assessments and explore the use of categorical groupings for normative samples.

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