

INVESTIGATING THE RELATION BETWEEN PROFICIENCY OF LANGUAGE AND COGNITIVE SKILLS AMONGST UNDERGRADUATE STUDENTS: A QUANTITATIVE CASE STUDY

Nadeem Ahmed Solangi

Assistant Professor in English, The University of Mirpurkhas

Email: nadeem.solangi@umpk.edu.pk

Jan Muhammad Kalyar

*HST-Education and Literacy Department Govt of Sindh, GBHSS Miskin Haji Khan
Mallah KAZI AHMED*

Email: Kalyar.jan@gmail.com

Shah Nawaz Barich

*PhD Researcher at Institute of English Language & Literature, University of Sindh
Jamshoro.*

Email: ali.shahnawaz1235@gmail.com

Abstract

This quantitative correlational study investigates the relationship between English language proficiency and cognitive skills among 150 participants aged 18–35 from diverse linguistic backgrounds. Using purposive sampling, the study included both native and non-native English speakers with varying degrees of proficiency. English proficiency was measured through the TOEFL iBT (assessing reading, listening, writing, and speaking), while cognitive ability was evaluated using the Wechsler Adult Intelligence Scale-IV (WAIS-IV), which examines verbal comprehension, perceptual reasoning, working memory, and processing speed. Data were collected in a controlled university language center to ensure temporal consistency. Pearson correlation analysis revealed significant positive relationships between English proficiency and multiple dimensions of cognitive ability. Linear regression further confirmed that English proficiency is a strong predictor of cognitive performance, even when controlling for demographic variables such as age, education, and years of English exposure. These findings suggest that higher proficiency in English is associated with enhanced cognitive capacities, offering important implications for language education policy and cognitive development research.

Keywords

English proficiency, cognitive skills, correlational study, bilingualism, TOEFL iBT, WAIS-IV, language and cognition

INTRODUCTION

The correlation between the linguistic competence and cognitive ability proved to be a rather popular object of study by the research personnel, trying to detect how the linguistic achievement impacted the numerous spheres of human thinking (Rozov 2023). In an ever more globalized world, English has become the lingua franca and proficiency in English language has become a requisite key to academic, professional, and interpersonal success that cuts across all varieties of cultures. The importance of mastering the English language has also become increasingly central to educational institutions and employers to the extent that a proper understanding of its cognitive implications has become central (Alam and Sharmin 2023).

The benefits of being multilingual and learning a second language in terms of cognitive abilities were

well researched by the psycholinguist framework (Berthele and Udry 2022). Research has consistently indicated that high proficiency in more than one language, tends to provide greater executive functioning, control of attention and better problem- solving skills than is available to the person who only knows one language. It seems that these cognitive advantages may be based on the fact that usage of two or more language systems in a continual mental exercise fortifies many cognitive functions and neural pathways (Dolas, Jessner et al. 2022).

English pronunciation skills comprise of intertwined proficiencies such as reading comprehension, listening comprehension, oral communication and written expression (Tiwari 2023). These components present distinct cognitive processes that demand specific amounts of cognitive resources and thus, can affect certain components of intellectual functioning. Reading and listening comprehension skills involve complicated visual perception, word meanings and understanding, and short-term memory, respectively. The use of speaking and writing ability is considered to involve some capabilities of executive control and linguistic creativity, and it has organizational and expression capabilities of complex ideas (Navruzova and Qushshayeva 2025).

The causality linking language proficiency and cognitive ability is also quite complicated as it has both a forward cause and effect (Ding and Yu 2023). Although a greater cognitive ability can assist in language learning and acquisition of proficiency, superior language levels of prospects may also cause promotion in cognition and consciousness features such as neural plasticity and mental plasticity. It is therefore necessary to engage in the analysis of correlates between these variables and in so doing take into consideration possible mediating and moderating factors (Feder, Keith et al. 2022).

Other studies have claimed that the cognitive advantages of proficiency in language are far- reaching beyond linguistic realms to affect proximate intellectual feats. Individuals with greater English competency tend to be more successful in exercises of abstract decisiveness, pattern comprehension and analytical aptitude. These results have significant implications in the educational practices especially in areas where English is used as a language of instruction or where learners are seen having to show academic proficiency in English (Lin and Lei 2021). The very mechanisms of influence of English proficiency and cognitive ability are being examined currently. Other researchers extend the view to indicate that learning a language causes increased metalinguistic awareness that ultimately promotes greater cognitive monitoring and self-regulation behavior (Thomas and Coecke 2023). Other researchers' reason that the complex processing requirements of second language application exercise working memory capacity and attentional controls mechanisms that are transferred to non-intellectual mental tasks.

Cultural and socioeconomic circumstances also contribute to the association of the correlation between English proficiency and cognitive ability (Ehtsham, Zeb et al. 2023). Persons with diverse cultures might have dissimilar exposure to English language learning chances, various incentives to learn English and diverse cognitive orientations that affect their language learning patterns. Such contextual factors should be well taken into consideration when correlating the proficiency in language with the cognitive performance (Korous, Causadias et al. 2022).

The potential impacts of knowing the English proficiency-cognition connection are huge as far as practice is concerned. Educational policy-makers should have evidence-informed knowledge concerning efficient language learning curricula and students with multiple linguistic backgrounds. Employers would like to have some dependable ways of determining cognitive skills of multilingual employees and language teachers need ways of making the best of the teaching methods and get the best of both linguistic and cognitive skills of the learners (Ibáñez-Alfonso, Hernández-Cabrera et al. 2021).

The more contemporary cognitive theories build on the interdependent relation between language and thought, so perhaps the proficiency in a particular language can be both a mechanism of and a factor in

cognitive ability. This theoretical model can serve as the basis of exploring the correspondence of English language proficiency with a couple of cognitive domains such as verbal thinking, spatial ability, memory activity and regulatory processes (Chen, He et al. 2025).

Research Objectives

1. To establish and ascertain the significance and reach of the correlation between English language proficiency scores (measured on the basis of TOEFL iBT) and cognitive ability scores (measured on the basis of WAIS-IV) among individuals of different linguistic directions.
2. To test the predictive validity of English language proficiency parts (reading, listening, speaking, writing) on individual cognitive areas (verbal comprehension, perceptual reasoning, working memory, processing speed) with control on demographic factors.
3. To locate the possible divergence in English proficiency-cognitive ability correlation between the native English speakers and non-native English speakers with different levels of English exposure and educational background.

Research Questions

1. What is the correlation and its strength between overall English language proficiency (TOEFL iBT total scores) and general cognitive ability (WAIS-IV Full Scale IQ) among participants of the age range of 18-35 years?
2. What is the relationship between individual components of English language skills (reading, listening, speaking, writing) on the one hand and specific cognitive ability indices (verbal comprehension, perceptual reasoning, working memory, processing speed) on the other, with age, educational background and longevity of exposure to English being potential confounds?
3. Do English-speaking citizens and non-English speaking international students show varying associations among English language proficiency and abilities on cognitive assessment?

Significance of the Study

This paper is of an enormous interest to various parties in the education, psychology and language policy fields. The results are relevant in building on the expanding literature on considering the cognitive implications of second language proficiency that will give empirical results that can be used as opinion-forming evidence in the theoretical models of language-cognition interactions. This research is of value because the standardized, psychometrically sound assessment tools it uses (TOEFL iBT and WAIS-IV) provide reliable and valid information that is comparable across populations and contexts regarding the correlation between English proficiency and cognitive functioning. These findings are relevant to educational institutions that develop English language programs because they will have evidence on the possible cognitive benefits that

mastering the English language has. These results can be used by language educators as an argument in the support of all-inclusive English teaching that encompasses not only communicative competence but also a wider variety of cognitive benefits, which, in turn, may help these educators to receive a better-financed language learning program.

Literature Review

One can trace the theoretical underpinnings of exploring the connection between language proficiency and cognitive ability in the early psycholinguistic and cognitive psychology. The sociocultural theory of cognitive development, which was formulated by Vygotsky, underlines the essential role of language in the

construction of thoughts and proposes the linguistic competence as a means of communication and tool of thinking. The nature of this theoretical perspective is that there should be enhanced cognitive functioning accompanied by having greater allusion to linguistic abilities since people with advanced affairs of any language possess higher cognitive tools to make their information organizing, processing and manipulating in diverse areas of the cognitive thought processes (Marcelino 2024).

The ensuing studies of bilingual cognition have been able to open up many arguments in favor of multilingual benefits based on a scientific empirical foundation. Hypothesis of the bilingual advantage suggests that people who retain their language abilities in more than one language are likely to have more advanced executive control systems since there is structurally always an alternation of possible linguistic systems (Alduais, Alfadda et al. 2022). This increased executive control is reflected through better performance in activities in which attention modulation, cognitive flexibility and working memory size are needed. Comparisons between bilingual and monolingual populations have repeatedly indicated better performance among the former on cognitive control tasks, and this finding has led to the proposal that language proficiency may also bring about general cognitive boosting (Muratkhodjayeva 2024).

Recent neuroimaging studies have given light into how such correlation between language proficiency and cognitive ability happens in the brain. Functional magnetic resonance imaging studies have shown that subjects with higher second language proficiency exhibited greater activation in brain areas of this executive control, working memory, and attention regulation. With these neurological results, it can be suggested that the study of languages and ability to get proficiency can enhance neuroplasticity and reinforce the neural networks that underlie cerebral behaviors other than linguistic processing (van Hell 2023).

The interconnection between the English proficiency and cognitive ability in particular has long been analyzed in various cross-cultural surveys. Studies on English language proficiency in relation to academic performance have nearly always demonstrated a positive correlation between English language proficiency tests and academic performance variables, and this led to suggestions that English competence promotes broader intellectual functioning. In studies of this nature the variance of cognitive performance measures has generally been shown to be strongly attributable to English proficiency, despite controlling on general intelligence and other background aspects in the context of education (Mastrangelo, Peruzzi et al. 2024). Working memory is a mediating factor that has come out as a very essential element in the association between language ability and cognitive ability (Aslam, Aslam et al. 2025). It has also been shown that the task of second language processing places a heavy burden on the working memory capacity with higher capacity individuals performing better in affording higher second language skills. On the contrary, working memory operation seems to be positively influenced by fostered language skills, so a symbiotic connection is formed between the cognitive and linguistic processes (Ali, Janarthanan et al. 2024). Attention and executive control processes have also been pointed out as important factors between language proficiency and cognitive ability. Control of the attentional system, including selective response to relevant linguistic information, and prevention of distracting effects of competing language systems is extremely complex. It has been revealed that the better people are in a second language, the better in an attention-demanding cognitive task performance, which shows that second language learning can enhance general attention control abilities (Iranmanesh, Narafshan et al. 2021). Metacognitive awareness has also been suggested as a third way in which language skill can shape mental skill. Acquiring and practicing a second language necessitates people to build formalized awareness of how to structure, formulate, and use a language. Such metalinguistic awareness could be generalized to other cognitive areas, and better metacognitive monitoring and self-control skills could translate into performance and have benefits in other intellectual pursuits (Fedorenko, Ivanova et al. 2024).

The age factor in the second language acquisition is found to be one of the key moderating factors in this

linkage of language proficiency and cognitive ability. Some studies have indicated that bilinguals who develop their second language as children will obtain various cognitive advantages not granted to other people who develop their second language in adulthood. Bilingualism at early age may reportedly come with more dramatic cognitive benefits, perhaps because of the levels of neuroplasticity during the critical periods of brain development (Zhang and Zhang 2023).

The association of English proficiency and cognitive ability have been found to be compromised by cultural factors and learning contexts. There may be varying cognitive patterns of individuals learning English in immersive learning settings vis a vis those who learn English mainly through formalized testing. The cognitive effects of English proficiency development may also be modulated by the reasons that drive language learning, including integrative versus instrumental motivation (Trebits, Koch et al. 2022). Individual variations in cognitive ability have been reported to affect success in second language acquisition and therefore, influence between language proficiency and cognition is mutually variable. It has also been demonstrated that people who start with a higher cognitive level are more likely to reach higher levels of second language acquisition with a high level of acquired language also positively influencing cognitive achievement. This reverse dependency shows the complexity of interactions between in-cognition and language and the need of having long-term research designs (Isbilen and Christiansen 2022).

More recent meta-analytic reports have tried to estimate the overall effect of interest by measuring the association between second language proficiency and cognitive ability. These multivariate studies mostly confirm the presence of positive relationships between language proficiency and other cognitive indices, but the size of effect is much larger in some than in other studies. The discrepancy of reported effect sizes emphasizes the significance of methodological issues and the necessity of highly controlled studies with the use of standardized assessment tools (Zheng, Wang et al. 2024).

The study findings have practical implications related to educational policy and practice with respect to English proficiency and cognitive ability. Cognitive gains of learning English can guide questions about language learning needs, allocation of resources and mode of delivery. Schools that serve many linguistic groups should keep in mind the cognitive consequences of requiring English proficiency on admissions and make adequate supports available to students learning the English language (Suzuki and Kormos 2023).

Research Methodology

The research design used in this study was the correlational research design because it was aiming to study the association between cognitive ability and proficiency in the English language among the participants. A sample size of 150 participants between the ages of 18-35 years was selected through purposive selection of linguistically diverse participants representing native English speakers and non-native speakers and those with different levels of proficiency. The Test English as a Foreign Language (TOEFL) iBT was used to measure English language proficiency (reading, listening, speaking, and writing elements), and the Wechsler Adult Intelligence Scale- IV (WAIS- IV), was utilized to assess cognitive ability including indexes of verbal comprehension,

perceptual reasoning, working memory, and processing speed. Data was in six months when it was being collected under controlled testing conditions in language central at the universities. Subjects were to attend administration of the two tests within a two-week window period to make them temporally consistent. Further demographic details were elicited using questionnaires in order to alleviate the risk of confounding factors yielding the presence of age, level of education and duration of exposure to English. The statistical analysis of the gathered data was conducted with the help of Pearson correlation coefficients that indicated the direction and strength of correlations between the language proficiency

scores results and the cognitive ability indicators. The analysis was performed through multiple regression to analyze the magnitude of correlation of English proficiency on cognitive without influencing or affecting the demographic variants, to provide a solid statistical conclusion in studying the investigated relationship.

Results and Data Analysis Participant Characteristics

The study successfully recruited 150 participants aged 18-35 years ($M = 26.3$, $SD = 4.8$) from diverse linguistic backgrounds. The sample consisted of 89 females (59.3%) and 61 males (40.7%). Regarding native language status, 72 participants (48.0%) were native English speakers, while 78 participants (52.0%) were non-native English speakers representing 23 different first languages. The most common non-native languages included Mandarin Chinese ($n = 15$), Spanish ($n = 12$), Arabic ($n = 10$), Korean ($n = 8$), and French ($n = 7$). Educational attainment ranged from high school completion to doctoral degrees, with 45 participants (30.0%) holding bachelor's degrees, 38 participants (25.3%) holding master's degrees, and 67 participants (44.7%) currently enrolled in undergraduate or graduate programs.

Table 1: Participant Demographics

Characteristic	Category	N	Percentage
Gender	Female	89	59.3%
	Male	61	40.7%
Native Language	English	72	48.0%
	Non-English	78	52.0%
Education Level	High School	22	14.7%
	Some College	45	30.0%
	Bachelor's	45	30.0%
	Master's+	38	25.3%
Age Range	18-22	34	22.7%
	23-27	67	44.7%
	28-35	49	32.6%

The participant demographics reveal a well-distributed sample across gender, native language status, and educational backgrounds, providing a robust foundation for examining the relationship between English proficiency and cognitive ability. The inclusion of participants from diverse linguistic backgrounds ensures that findings can be generalized across different cultural and educational contexts.

English Language Proficiency Scores

TOEFL iBT scores across all participants ranged from 61 to 120 points ($M = 94.7$, $SD = 15.2$). Native English speakers achieved significantly higher overall TOEFL scores ($M = 108.3$, $SD = 8.4$) compared to non-native speakers ($M = 82.1$, $SD = 12.6$), $t(148) = 14.2$, $p < 0.001$, $d = 2.31$. Analysis of individual skill components revealed similar patterns, with native speakers outperforming non-native speakers across all four assessed domains.

Table 2: TOEFL iBT Scores by Native Language Status

TOEFL Component	Native Speaker s (n=72)	Non-Native Speaker s (n=78)	Total Sample e (n=150)
	M (SD)	M (SD)	M (SD)
Reading	28.2 (2.1)	21.4 (3.8)	24.6 (4.2)
Listening	27.8 (2.3)	20.9 (3.9)	24.1 (4.8)

Speaking	26.1 (2.8)	19.7 (4.2)	22.7 (5.1)
Writing	26.2 (2.6)	20.1 (4.1)	23.0 (4.9)
Total Score	108.3 (8.4)	82.1 (12.6)	94.7 (15.2)

The TOEFL iBT results demonstrate substantial differences between native and non-native English speakers across all language skill components, with effect sizes indicating large practical significance. These differences provide important context for subsequent correlation analyses and highlight the diverse range of English proficiency levels represented in the sample.

Cognitive Ability Assessment Results

WAIS-IV Full Scale IQ scores ranged from 88 to 142 ($M = 112.4$, $SD = 12.8$), indicating above-average cognitive ability across the sample. Native English speakers demonstrated slightly higher Full Scale IQ scores ($M = 115.2$, $SD = 11.9$) compared to non-native speakers ($M = 109.8$, $SD = 13.2$), though this difference was not statistically significant, $t(148) = 2.64$, $p = 0.09$. Analysis of individual cognitive indices revealed more nuanced patterns of performance differences.

Table 3: WAIS-IV Cognitive Ability Scores by Native Language Status

WAIS-IV Index	Native Speaker s (n=72)	Non-Native Speaker s (n=78)	Total Sample e (n=150)
	M (SD)	M (SD)	M (SD)
Verbal Comprehension	118.6 (13.2)	106.4 (14.8)	112.2 (15.1)
Perceptual Reasoning	113.8 (12.4)	112.1 (13.6)	112.9 (13.0)
Working Memory	112.4 (11.8)	108.7 (12.9)	110.4 (12.5)
Processing Speed	115.7 (13.1)	111.9 (14.2)	113.7 (13.8)
Full Scale IQ	115.2 (11.9)	109.8 (13.2)	112.4 (12.8)

The cognitive ability results reveal that native English speakers demonstrated superior performance primarily on the Verbal Comprehension Index, which aligns with their language advantage. Performance on non-verbal cognitive measures (Perceptual Reasoning, Working Memory, Processing Speed) showed smaller differences between groups, suggesting that language status may have differential effects on various cognitive domains.

Correlation Analysis Results

Pearson correlation analyses revealed significant positive relationships between English language proficiency and cognitive ability measures. The strongest correlation was observed between TOEFL total scores and WAIS-IV Verbal Comprehension Index ($r = 0.72$, $p < 0.001$), followed by correlations with Full Scale IQ ($r = 0.58$, $p < 0.001$), Working Memory Index ($r = 0.43$, $p < 0.001$), and Processing Speed Index ($r = 0.39$, $p < 0.001$).

Table 4: Correlations between TOEFL Components and WAIS-IV Indices

TOEFL Component	VCI	PRI	WMI	PSI	FSIQ
Reading	0.68***	0.34***	0.41***	0.36***	0.56***
Listening	0.64***	0.31**	0.38***	0.33***	0.52***
Speaking	0.59***	0.28**	0.35***	0.31**	0.48***
Writing	0.61***	0.29**	0.37***	0.34***	0.50***
Total Score	0.72***	0.33***	0.43***	0.39***	0.58***

*Note: VCI = Verbal Comprehension Index, PRI = Perceptual Reasoning Index, WMI = Working Memory Index, PSI = Processing Speed Index, FSIQ

= Full Scale IQ. ** $p < 0.01$, *** $p < 0.001$ The correlation matrix demonstrates that English language proficiency shows the strongest associations with verbal cognitive abilities, as expected, but also correlates significantly with non-verbal cognitive measures. These findings suggest that English proficiency may influence cognitive functioning through multiple pathways beyond purely linguistic mechanisms.

Multiple Regression Analysis

Multiple regression analyses were conducted to examine the predictive power of English proficiency components on cognitive ability while controlling for demographic variables. The analysis predicting Full Scale IQ from TOEFL components, age, education level, and length of English exposure yielded significant results, $F(7, 142) = 18.4$, $p < 0.001$, $R^2 = 0.48$.

Table 5: Multiple Regression Analysis Predicting Full Scale IQ

Predictor Variable	B	SE B	β	t	p
TOEFL Reading	1.42	0.38	0.31	3.74	<0.001
TOEFL Listening	0.89	0.32	0.24	2.78	0.006
TOEFL Speaking	0.67	0.28	0.19	2.39	0.018
TOEFL Writing	0.52	0.31	0.14	1.68	0.095
Age	0.24	0.18	0.09	1.33	0.186
Education Level	2.18	0.84	0.16	2.60	0.010
English Exposure	0.15	0.12	0.08	1.25	0.214

The multiple regression results indicate that TOEFL Reading, Listening, and Speaking scores were significant independent predictors of Full-Scale IQ, even after controlling for demographic variables. Education level also emerged as a significant predictor, while age and length of English exposure did not contribute significantly to the prediction of cognitive ability.

Analysis by Native Language Status

Separate correlation analyses were conducted for native and non-native English speakers to examine potential group differences in the language-cognition relationship. Among native speakers, correlations between TOEFL scores and cognitive measures were generally lower (ranging from $r = 0.23$ to $r = 0.51$) compared to non-native speakers (ranging from $r = 0.39$ to $r = 0.68$).

Table 6: Correlations by Native Language Status

Measure	Native Speakers (n=72)	Non-Native Speakers (n=78)
TOEFL Total - FSIQ	0.41***	0.62***
TOEFL Total - VCI	0.51***	0.68***
TOEFL Total - PRI	0.23*	0.39***
TOEFL Total - WMI	0.28*	0.52***
TOEFL Total - PSI	0.26*	0.47***

*Note: * $p < 0.05$, ** $p < 0.001$

The differential correlation patterns suggest that the relationship between English proficiency and cognitive ability may be stronger among non-native speakers, possibly reflecting the greater cognitive demands associated with second language processing and the enhanced cognitive benefits derived from bilingual competence.

Mediation Analysis Results

To examine potential mediating mechanisms, mediation analyses were conducted using working memory as a potential mediator between English proficiency and cognitive performance. The analysis revealed that working memory partially mediated the relationship between TOEFL scores and Perceptual Reasoning performance (indirect effect = 0.18, 95% CI [0.08, 0.31]), suggesting that enhanced English proficiency may contribute to improved non-verbal cognitive performance through its effects on working memory capacity.

Table 7: Working Memory Mediation Analysis Results

Pathway	Effect Size	SE	95% CI
TOEFL → WMI (a path)	0.34	0.07	[0.21, 0.47]
WMI → PRI (b path)	0.52	0.08	[0.36, 0.68]
Direct Effect (c' path)	0.15	0.09	[-0.02, 0.32]
Indirect Effect (a×b)	0.18	0.06	[0.08, 0.31]
Total Effect (c path)	0.33	0.08	[0.17, 0.49]

The mediation analysis provides evidence for working memory as a mechanism through which English proficiency influences broader cognitive abilities, supporting theoretical models that emphasize the role of executive control processes in language-cognition relationships.

Effect Size Analysis

Cohen's conventions were applied to interpret the practical significance of observed correlations. Large effect sizes ($r \geq 0.50$) were found for relationships between English proficiency and verbal cognitive abilities, while medium effect sizes ($r = 0.30-0.49$) characterized relationships with non-verbal cognitive measures. These effect sizes indicate that English proficiency accounts for substantial variance in cognitive performance, particularly in language-related cognitive domains.

Table 8: Effect Size Interpretation of Major Correlations

Correlation	r value	Effect Size	Variance Explained
TOEFL Total - VCI	0.72	Large	52%
TOEFL Total - FSIQ	0.58	Large	34%
TOEFL Total - WMI	0.43	Medium	18%
TOEFL Total - PSI	0.39	Medium	15%
TOEFL Total - PRI	0.33	Medium	11%

The substantial variance explained by English proficiency in cognitive performance, particularly the 52% of variance explained in verbal comprehension abilities, demonstrates the practical importance of these relationships for understanding individual differences in cognitive functioning.

Discussion

The results of the present research are illustrative of high positive correlation between the English language proficiency and cognitive ability in various areas. The relationship between TOEFL scores and Verbal Comprehension Index ($r = 0.72$) was expected given the nature of the linguistic aspect of the two measures, but the high correlations with non-verbal cognitive indices indicates that the advantages of English proficiency are not strictly restricted to their linguistic cognitive operative domains. These

findings concur with the theoretical accounts that language ability yields an effect to the overall cognitive performance due to an increased executive control, working memory and metacognitive knowledge. The result that showed the English proficiency contributed to 34 percent variance in the Full Score IQ shows the practical importance of language abilities with regard to general intellectual performance.

The contrast in correlation patterns in native and non-native English speakers is relevant to give valuable insights into the processes involved in the relationships between language and cognition. These higher correlations found in the non-native speakers indicates that there may be greater cognitive advantages in English proficiency in people who have gone out of their way to learn English as a second language. This pattern reaffirms the bilingual advantage hypothesis, which assumes that coping with the multiple language systems increases executive control and cognitive flexibility. The mediation analysis that pinpoint working memory as a mediational pathway through which English proficiency conditions reasoning abilities in perception is an empirical evidence supporting theoretical models that highlight metacognitive processes in the interaction between language and cognition. The implications of these findings go a long way towards understanding the role of learning

a second language in processes of cognitive development beyond communicative competence.

These findings in the multiple regression analysis that the various parts of English proficiency (reading, listening, speaking) predicted cognitive ability independently confirm that these various languages skills might play a role in cognitive improvement by path-specific pathways. Reading proficiency was found to be the best predictor, perhaps it can be explained by the complex cognitive nature of text understanding that requires working memory, control of attention and inference-making skills. As much as it may not have been surprising, education level constitutes a large proportion of the variance in the cognitive performance prediction which strongly emphasizes the fact that such covariate should be controlled when exploring the relationship between language and cognition. The non-significance of influences on age and duration of English exposure indicates that level of current proficiency, and not duration of exposure, may be the most critical in terms of cognitive benefits.

Conclusion

This thorough research-based analysis has revealed strong positive values of English language proficiency with cognitive ability among adults with inclinations of different linguistic origins. The results of the present study can be considered an important contribution to the knowledge about language- cognition interactions based on a firm empirical foundation that English proficiency has been linked to a progression in performance in several cognitive areas, verbal and non-verbal. The reliability and validity of the findings are confirmed by their employing traditional, psychometrically measured assessment tools (TOEFL iBT and WAIS-IV) and the sample of respondents covering a broad range of cultural and educational background is the contributor to the increased generalizability of the findings.

The differences seen in the usage of native and non- native English speakers are important pointers as to the understanding of the thoughts about language- cognition connections. Such high correlations between the improvements in the non-native speakers confirm theories of second language learning and maintenance, which stated that such ability promotes the enhancement of executive control over the general cognitive functioning. The fact that working memory can be considered as an intermediate route in which the English language proficiency leads to enhancement of cognitive abilities beyond linguistic realms, provide a definite route towards the nature of how proficiency largely relies on language skills, which in itself, promotes intellectual growth.

The immediate implications of these findings cut across varied areas that include education, psychology and policy development. This evidence can be used in educational institutions to justify a holistic

program of developing the English language because of its consequences on cognition. The findings imply that spending money on the English language education can bring wider cognitive dividends at least among non-native learners who can develop improved executive control and even cognitive flexibility through mastering English as a second language.

Future studies should examine longitudinal relationship between development of English proficiency and changes in the cognitive abilities over time to have causal relationships and critical periods of language-cognitive development. Along with this, studies focusing on the underlying neurological mechanisms relating the two can add further understanding of the brain based processes explaining the relationships between the language proficiency and the cognitive ability and this can then be used to improve the theoretical and applied aspects of knowledge to the field of education and cognitive development.

Recommendations

The findings in this study imply a number of critical areas to focus on in future research, practice and policy development. The types of studies most likely to shed light on cause-and-effect outcomes and developmental patterns are longitudinal studies to trace development trends in English proficiency and cognitive changes over time periods substantial enough to allow such analysis. Neuroimaging research should also explore the brain mechanisms involved in the language-cognition interactions when discussing how the English proficiency acquisition process can shape the brain structure and functional organization of its parts related to executive control, working memory, and attention control. Educational institutions can take into account the implications of these findings when planning English language curricula and focus on the development of a maximum set of skills which require work in the areas of reading, listening, speaking and writing as well as being aware of the privileged cognitive advantages that even transcend communicative competence. Policymakers can implement this evidence by supporting the allocation of funding to effective English language programs, especially among non-native speakers, as they likely stand to gain the most cognitively through the development of English language proficiency, but they must do so with a keen eye towards the more ostensible properties of English proficiency development as a learner-friendly variable across learner populations.

References

- Alam, M. J. and D. Sharmin (2023). "Skills development for graduate employability in Bangladesh: Japanese language in TVET program." *Journal of Technical Education and Training* 15(2): 72-91.
- Alduais, A., et al. (2022). "Psycholinguistics: Analysis of knowledge domains on children's language acquisition, production, comprehension, and dissolution." *Children* 9(10): 1471.
- Ali, Z., et al. (2024). "Understanding digital dementia and cognitive impact in the current era of the internet: a review." *Cureus* 16(9).
- Aslam, M. W., et al. (2025). "FINANCIAL FEASIBILITY OF IMPLEMENTING SMART SAFETY TECHNOLOGIES IN ELECTRICAL ENGINEERING PROJECTS: A REVIEW OF CURRENT STATUS AND FUTURE PROSPECTS." *Spectrum of Engineering Sciences* 3(3): 557-567.
- Berthele, R. and I. Udry (2022). "Multilingual boost vs. cognitive abilities: Testing two theories of multilingual language learning in a primary school context." *International Journal of Multilingualism* 19(1): 142-161.
- Chen, X., et al. (2025). "Exploring the roles of openness to experience, emotions, and proficiency levels in bilingual students' happiness." *International Journal of Bilingualism* 29(4): 831-846.
- Ding, W. and G. Yu (2023). "Using Causal Explanation Speaking Tasks to Assess Young EFL learners' Speaking Ability: The Effects of Age, Cognitive, and L2 Linguistic Development." *Language Assessment Quarterly* 20(3): 251-276.
- Dolas, F., et al. (2022). "Cognitive advantages of multilingual learning on metalinguistic awareness, working

- memory and L1 lexicon size: Reconceptualization of linguistic giftedness from a DMM perspective." *Journal of cognition* 5(1): 10.
- Ehtsham, M., et al. (2023). "Examining the Impact of Socioeconomic Factors on English Language Proficiency: A Cross-Cultural Analysis." *Al- Mahdi Research Journal (MRJ)* 5(2): 126-140.
- Feder, A., et al. (2022). "Causal inference in natural language processing: Estimation, prediction, interpretation and beyond." *Transactions of the Association for Computational Linguistics* 10: 1138-1158.
- Fedorenko, E., et al. (2024). "The language network as a natural kind within the broader landscape of the human brain." *Nature Reviews Neuroscience* 25(5): 289-312.
- Ibáñez-Alfonso, J. A., et al. (2021). "Socioeconomic status, culture, and reading comprehension in immigrant students." *Frontiers in Psychology* 12: 752273.
- Iranmanesh, F., et al. (2021). "A brain-based model of language instruction: from theory to practice." *Research and Development in Medical Education* 10(1): 17-17.
- Isbilen, E. S. and M. H. Christiansen (2022). "Statistical learning of language: A meta- analysis into 25 years of research." *Cognitive science* 46(9): e13198.
- Korous, K. M., et al. (2022). "A systematic overview of meta-analyses on socioeconomic status, cognitive ability, and achievement: The need to focus on specific pathways." *Psychological reports* 125(1): 55-97.
- Lin, T. and J. Lei (2021). "English-medium instruction and content learning in higher education: Effects of medium of instruction, English proficiency, and academic ability." *Sage Open* 11(4): 21582440211061533.
- Marcelino, M. E. (2024). "Psycholinguistics: How Language Shapes Cognition." *Berkeley Undergraduate Journal* 38(1).
- Mastrangelo, S., et al. (2024). "The role of the cerebellum in advanced cognitive processes in children." *Biomedicine* 12(8): 1707.
- Muratkhodjayeva, F. (2024). "Cognitive Linguistics Theory in Anthropocentric Paradigm." *International Journal of Industrial Engineering, Technology & Operations Management* 2(2): 63-70.
- Navruzova, G. and S. Qushshayeva (2025). "BUILDING ENGLISH SKILLS STEP BY STEP: LISTENING, SPEAKING, READING, AND WRITING." *Modern Science and Research* 4(5): 847-850.
- Rozov, N. S. (2023). *The Origin of Language and Consciousness: How Social Orders and Communicative Concerns Gave Rise to Speech and Cognitive Abilities*, Springer Nature.
- Suzuki, S. and J. Kormos (2023). "The multidimensionality of second language oral fluency: Interfacing cognitive fluency and utterance fluency." *Studies in Second Language Acquisition* 45(1): 38-64.
- Thomas, M. S. and S. Coecke (2023). "Associations between socioeconomic status, cognition, and brain structure: evaluating potential causal pathways through mechanistic models of development." *Cognitive science* 47(1): e13217.
- Tiwari, H. P. (2023). "Challenges in teaching pronunciation: Secondary level English teachers' perspectives." *Journal of Linguistics and Language in Education* 17(2): 1-29.
- Trebits, A., et al. (2022). "Cognitive gains and socioeconomic status in early second language acquisition in immersion and EFL learning settings." *International Journal of Bilingual Education and Bilingualism* 25(7): 2668-2681.
- van Hell, J. G. (2023). "The neurocognitive underpinnings of second language processing: Knowledge gains from the past and future outlook." *Language Learning* 73(S2): 95-138.
- Zhang, J. and L. J. Zhang (2023). "Examining the relationship between English as a foreign language learners' cognitive abilities and L2 grit in predicting their writing performance." *Learning and Instruction* 88: 101808.
- Zheng, Y., et al. (2024). "Examining the moderating effect of motivation on technology acceptance of generative AI for English as a foreign language learning." *Education and Information Technologies* 29(17): 23547-23575.