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Multiple Intelligences and EFL Learners' Writing Complexity, Accuracy, and Fluency from a Positive Psychology Perspective

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ABSTRACT

Despite strong arguments to posit Multiple Intelligences (MI) within positive psychology (PP), a notable gap remains in the existing literature in this regard. The present quantitative study aimed to address this shortcoming by examining the relationship between MI and Grammatical Complexity, Accuracy, and Fluency (CAF) in EFL learners' writing to support learners' engagement, enjoyment, and autonomy. For this purpose, 244 EFL learners between the age of 18 to 37 completed the Persian version of McKenzie's MI Inventory and an essay writing task. MI showed no significant relationship with accuracy and complexity; however, multiple correlation, regression, and partial correlation analyses indicated that while verbal and interpersonal intelligences significantly predicted fluency in writing, intrapersonal intelligence negatively predicted it, regardless of individuals' age and gender. The findings are hoped to enhance our understanding of the role of MI in language learning and performance, particularly in writing skill, and help L2 practitioners deliver more accurate, accommodating, and individualized writing instruction.

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1. Introduction

For nearly three decades, Positive Psychology (PP) has been evolving educators' understanding of how affective and sociopsychological variables interact with learners' cognition as well as emotions to boost (or hinder) learning. As a strengths-based approach, Positive Psychology basically focuses on how positive emotions, personality traits, and tendencies, including growth mindset, engagement, self-efficacy, autonomy, agency, resilience, well-being, grit, enjoyment, emotion regulation, academic buoyancy, mindfulness, etc. (Dewaele & Li, 2020; Fathi & Behzadpour, 2025; Fathi et al., 2025; Hajmalek & Madani, 2025; Li, 2020; Wang et al., 2021) create opportunities for enjoyable and efficient learning or even fulfilling other tasks, such as teaching. Therefore, PP offers the capacity to accommodate some of the preceding emotion-oriented research lines, including the relevance of Emotional Intelligence (EQ) to language learning, and update their methodologies, applications, and implications (for some examples see Gregersen et al., 2014; Li, 2020; Li & Xu, 2019; Sánchez-Álvarez, 2016; Shengyao et al., 2024). In fact, Bar-On (2010) argues that EQ must be recognized as an integral element in positive psychology.

However, despite the close affinity between theories of Multiple Intelligences (MI), famously introduced by Gardner (1983), and EQ research, and given the overlaps between their constructs, for instance interpersonal and intrapersonal skills/intelligences, MI has been rarely studied from a positive psychology perspective in language learning research. Drawing on students' strongest intelligences as a focal concern in MI-based language teaching approaches, seems to fit well within the strength-focused and learner-centered agendas (Seligman & Csikszentmihalyi, 2014) in PP. Tailored instruction based on learners' MI profiles can be hypothesized to contribute to their heightened engagement, L2 learning enjoyment, and academic buoyancy (Ryan & Deci, 2000). Furthermore, fostering learners' autonomy and agency requires their familiarity and reconciliation with their dominant intelligences. In general, although a few sporadic efforts to link MI and PP constructs can be spotted (e.g., Ahmadian & Ghasemi, 2017; Matera, 2023; Nowbakht & Fazilatfar, 2019), the connection remains largely neglected in the field of language teaching.

Writing, as a relatively neglected skill in second language learning, seems to particularly benefit from an MI-based approach from a PP perspective, since it may require deeper access to cognitive and affective capabilities of an individual as a more personalized activity with implications for learner autonomy. Previous research has already suggested promising effects for PP in Iranian EFL learners' L2 learning and writing performance (e.g., Feyz et al., 2025; Kahvand et al., 2025). One way of postulating writing ability is to address it in terms of complexity, accuracy, and fluency, as suggested in the CAF triad. Brumfit (1984) introduced fluency and accuracy as key components of the CAF framework, while Skehan (1996) further refined the framework by defining complexity as the third dimension. Generally speaking, complexity, including both grammatical (syntactic) and lexical, is defined as "learners' capacity to use more elaborate and complex target like language" (Skehan & Foster, 1997, p. 230). Accuracy, according to Housen and Kuiken (2009), is correctness, while fluency is introduced as effortless, smooth, and rapid use of language (Crystal, 1987). Several researchers, including Wolfe-Quintero et al. (1998) and Larsen-Freeman (2006), have proposed more detailed categories and patterns for measuring CAF, which have been widely adopted by researchers since their introduction. For example, Lambert and Kormos (2014) investigated the development

of EFL learners' writing abilities in terms of CAF aspects, utilizing Larsen-Freeman's profile. Similarly, Nosratinia and Razavi (2016) explored the interaction between creativity and CAF dimensions in EFL learners. Others have adopted the measurements proposed by Wolfe-Quintero et al., (e.g., Alghizzi & Alshahrani, 2020) in order to research CAF in L2 writing.

Today, many educators consider MI an indispensable principle to be taken into account when designing and delivering various types of education, including L2 teaching. Given that the practical application of Gardner's theory has brought about significant changes in contemporary foreign language education, there is an urgent need to investigate the essence of this theory and explore potential ways to implement it in educational practices (Khyzhniak et al., 2021). It is also remarked that there is a dearth of research investigating the connection between MI and the performance of EFL learners in writing tasks (Wahidah & Nanning, 2023). The current study aimed to address this knowledge gap by considering the possible connection between MI and L2 writing skills, defined in terms of grammatical complexity, accuracy, and fluency, in the hopes of offering deeper insights into the nature of the construct to EFL learners and teachers. From a PP perspective, it is argued that when learners are aware of their dominant language-boosting intelligences, it can enhance their interest and motivation to participate in learning activities, considering their psychological and cognitive profiles. This awareness may also assist participants in the educational process to plan their practices more effectively and improve their ability to offer more accurate and individualized instruction in their writing courses.

2. Literature review

2.1. Multiple intelligences

Challenging the traditional postulations of intelligence, Gardner's (1983) theory of Multiple Intelligences (MI) posits that intelligence is a diverse set of innate, yet culturally-based potentials that enable individuals to solve problems and meet their own needs. According to this theory, each person possesses all types of intelligences, although to varying degrees. Initially, he famously identified seven categories of intelligence including Linguistic, Logical-Mathematical, Spatial-Visual, Musical, Bodily-Kinesthetic, Interpersonal, and Intrapersonal. Later, he expanded his theory to include an additional category, the Naturalist intelligence and he mentioned the possibility of a ninth one, Existential intelligence (Gardner, 1993). Introducing MI, Gardner revolutionized the concept of intelligence as a single construct, which has largely affected the understanding and practices of second language teaching and learning ever since (Marefat, 2007). Armstrong (2009) put that theory into practice and described how teachers and students are engaged with MI in everyday education. Christison (1999) argued that MI-based teaching methods could be robust approaches in SLA, which enable learners and teachers to explore and activate their capabilities in learning languages in line with their dominant intelligences. Also, in the Iranian EFL context, several efforts have been made to depict the applicability of MI-based methods in teaching and learning English, particularly in the domain of writing (e.g., Sarani & Malmir, 2020; Shafiee, et al., 2020).

Since the introduction of MI theory, there have been numerous efforts to develop valid measurements and explore its impacts on education. For instance, Akbari and Hosseini (2008) examined how various categories of intelligence influence learning strategies among second language learner. Saeidi (2009) further investigated the effects of MI-based Focus on Form on grammatical knowledge and writing

applications. Moheb and Bagheri (2013) noted a positive correlation between MI and writing strategies, although no intelligence type was found as a strong predictor. Saadatmanesh (2014) reported a positive link between linguistic intelligence and student achievement in second language learning. Esmacili et al. (2014) found mixed results regarding the relationship between MI and writing ability. Ahour and Abdi (2015) identified significant correlations between MI and vocabulary learning strategies. Derakhshan and Faribi (2015) reported a controversial relationship between MI and English learning outcomes. Shayeghi and Hosseini (2015) confirmed a positive correlation between intelligences and grammatical accuracy, particularly for linguistic intelligence. Rostami and Soleimani (2015) revealed a significant positive relationship between MI and essay types among TEFL students. Nemat Tabrizi (2016) found that all MI types correlated with reading comprehension, with verbal-linguistic intelligence being the most predictive. Shafiee et al. (2020) observed varied intelligence contributions to L2 writing aspects, while Sarani and Malmir (2020) identified verbal, interpersonal, intrapersonal, and logical intelligences as significant predictors of pragmatic performance in speech acts among EFL learners. Finally, Hajmalek and Sabouri (2025) explored the possible connection between musical intelligence and L2 pronunciation.

2.2. CAF triad

Writing performance in the present study was postulated using the CAF framework, which has been used as one of the most prominent criteria for estimating performance and proficiency of L2 since 1990s (Housen & Kuicken, 2009). In the mid-seventies, some of the scholars in the field of L2 learning acknowledged the lack of a standard yardstick for L2 promotion (Larsen-Freeman, 2009). Larsen-Freeman resorted to what Hunt had already proposed for L1 in 1970. Hunt (1970) defined T-unit as “one main clause plus any subordinate clause or non-clausal structure that is attached to or embedded in it” (p.4). In 1998, Wolfe-Quintero et al. declared that although elements such as learners' production reflect their progress, there is not any standard measurement for systematically estimating that. Wolfe-Quintero et al. (1998) introduced T-unit, error free T-unit, and clause lengths as a way to calculate fluency in writing development.

Brumfit (1984) was the first one who used the dichotomy of fluency and accuracy, and complexity was introduced later in 1996 by Skehan, who asserted CAF as dimensions of proficiency for the first time. CAF components are now assumed as:

Complexity refers to the relative difficulty by which language components get processed and performed (Housen & Kuiken, 2009). Complexity, per se, refers to language characteristics such as rules of structure, syntax, lexis, morphology and phonology (Wolfe-Quintero et al., 1998). There are two types of complexity; syntactic and Lexical. Alghizzi (2017) expresses that there are two main categories in measuring syntactic complexity. The first category is analyzing sentences according to two different units: T-unit (terminal unit) and C-unit (communicative unit). A C-unit is a unit which has no verb but it has a communicative value. On the other hand, lexical complexity is measured based on finding how complex and advanced the vocabulary items used by a learner are (Wolfe-Quintero et al., 1998).

Accuracy shows how well the learner produces language according to the rule system of target language (Skehan, 1996). According to Wolfe-Quintero et al. (1998), accuracy is the ability of using error-free language in written or spoken communication.

Fluency is learners' global language proficiency in terms of ease, smoothness, and native-likeness (Housen & Kuiken, 2009). Housen et al. (2012) viewed fluency as the ease with which a learner produces L2.

It should be mentioned that CAF framework has received some criticism as well. It has been argued that due to the multi-dimensional and multi-componential nature of CAF constructs, they cannot be explained in a single definition, which are usually rather vague and too general (Housen & Kuiken, 2009). Another criticism is about challenges in determining the exact linguistic and psycholinguistic factors in defining and theorizing them (Alghizzi, 2017).

To measure CAF components, there are various measurements presented by different scholars. Larsen-Freeman (2006), for instance, measures CAF indices as:

"Fluency (average number of words per t-unit, a t-unit being a minimal terminal unit or independent clause with whatever dependent clauses, phrases, and words are attached to or embedded within it), grammatical complexity (average number of clauses per t-unit), accuracy (the proportion of error-free t-units to t-units)", (p.597).

Wolfe-Quintero et al. (1998) have also provided categories and subcategories for measuring these constructs as seen in Table 1.

Table 1. Measures of syntactic complexity, lexical complexity, accuracy, and fluency
(Reproduced from Alghizzi & Alshahrani, 2020, p.429)

Constructs	Measures
Syntactic Complexity	sentence complexity ratio (C/S), T-unit complexity ratio (C/T), complex T-unit ratio (DC/C), dependent clause ratio dependent clause per T-unit (DC/T) coordinate phrases per clause (CP/C), coordinate phrases per T-unit (CP/T), sentence coordination ratio (T/S), complex nominals per clause (CN/C), complex nominals per T-unit (CN/T), and verb phrases per T-unit (VP/T)
Lexical Complexity	Density: (LD) Sophistication: lexical sophistication-I (LS1), lexical sophistication-II (LS2), verb sophistication-I (VS1), corrected VS1 (CVS1), verb sophistication-II (VS2) Variation: number of different words (NDW), NDW (first 50 words) (NDWZ), NDW (expected 50) (NDWERZ), NDW (expected sequence 50) (NDWESZ), type/token ratio (TTR), mean segmental TTR (50) (MSTTR), corrected TTR (CTTR), root TTR (RTTR), bilogarithmic TTR (LogTTR), uber index (Uber), lexical word variation (LV), verb variation-I (VV1), squared VV1 (SVV1), corrected VV1 (CVV1), verb variation II (VV2), noun variation (NV), adjective variation (AdjV), adverb variation (AdvV), modifier variation (ModV)
Accuracy	Frequency: errors (E), error-free T-units (EFT), and error-free clauses (EFC) Ratio: errors per word (E/W), errors per T-units (E/T), errors per clauses (E/C), error-free T-units per ratio (EFT/T), error-free T-units per word (EFT/W), error-free T-units per sentence (EFT/S), error-free clause ration (EFC/C), error-free clauses per T-unit (EFC/T), error-free clauses per sentence (EFC/S)
Fluency	Frequency: words (W), sentences (S), clauses (C), and T-units (T)

Ratio: mean length of sentences (W/S), mean length of clauses (W/C), and mean length of T-units (W/T)

A number of studies have been conducted using these proposed frameworks. For example, Pourdana and Behbahani (2011) studied the impact of three task types on complexity, accuracy, and fluency in learners. In 2015, Yang and Sun studied the development of CAF in multilingual learners. Nosratinia and Razavi (2016), conducted a study on the interaction of creativity in learners and CAF in the language through Larsen-Freeman's profile (2006). Ahmadpour and Yousefi (2016) investigated the effectiveness of mobile-assisted language learning in writing performance of learners in terms of complexity, accuracy, and fluency. Alghizzi (2017) worked on the effect of text types, time scales proficiency level, and learning environment on CAF in writing. Aghazade and Soleimani's (2020) research focused on the effects of electronic portfolios and writing complexity, accuracy, and fluency. Alghizzi and Alshahrani (2020) worked on the effects of genre approach on CAF indices in reaction writing among Saudi EFL learners. Divsar et al. (2023) investigated the effects of factors such as age of arrival, residence length, input types, and parents' educational background on oral fluency, accuracy, complexity, and pronunciation in immigrant children in Canada.

2.3. Empirical studies on the interplay of MI with complexity, accuracy, and fluency

Although there has been considerable research on the relationship between MI and language proficiency, covering complexity, accuracy, and fluency, to the best knowledge of the researchers none of them has particularly focused on CAF triad and its connection with MI.

Marefat (2007), for instance, explored the relationship between EFL students' MI profiles and their writing products, utilizing Mackenzie's (1999) MI Inventory, concluding that kinesthetic, interpersonal, and existential intelligences were significant predictors of writing quality. Razmjoo (2008) examined the relationship between MI and language proficiency, but reported no significant correlation. Ahmadian and Hosseini's (2011) results revealed a significant correlation between MI and writing performance, with linguistic intelligence as the strongest predictor. Zarei and Mohseni (2012) investigated the relationship between MI and grammatical and writing accuracy. They found grammar accuracy related to both intrapersonal and interpersonal intelligences, while writing accuracy was significantly predicted by intrapersonal intelligence. Salehi (2012) studied the relationship between MI and achievement in foreign language learning, concluding that no significant relationship existed. Saeidi and Karvandi (2014) examined the relationship between MI and performance on reasoning-gap writing tasks in intermediate EFL learners, finding a significant positive correlation between task performance and logical, interpersonal, and intrapersonal intelligences. Palenzuela Perez and Ruz (2014) studied the link between intrapersonal intelligence and student motivation, identifying a significant relationship that suggested intrapersonal intelligence aids in self-awareness and strategy development. Sajjadi Rad et al. (2014) investigated the relationship between MI and writing skills reporting no significant correlation between the variables. Alizadeh et al. (2016) studied 30 advanced EFL learners using the MIDAS questionnaire and found that interpersonal and intrapersonal intelligences positively

correlated with writing complexity and quality, particularly in female students. Zeraatpishe et al., (2019) examined the effects of MI-oriented writing tasks on fluency, accuracy, and organization, using Mackenzie's (1999) Inventory and concluded that MI-oriented tasks enabled students to utilize their intellectual resources effectively, enhancing fluency and organization. Xu (2021) investigated the impact of MI feature-based task teaching on speaking competency through CAF components, finding significant improvements across all indices. Nahak et al. (2023) focused on the effect of intrapersonal intelligence on descriptive paragraph writing, demonstrating that intrapersonal intelligence strategies can enhance students' writing skills. Salehi et al. (2024) reported significant relationships between EFL learners' interpersonal and intrapersonal intelligences and their speaking abilities, indicating the importance of these intelligences in oral proficiency.

3. Purpose of the study

Given this disparity in previous findings on the relationship between MI and L2 learning, especially writing, and dearth of research on this connection from a positive psychology perspective, the present study set out to explore the interplay of Gardner's intelligences with grammatical complexity, accuracy, and fluency in the writing of Iranian EFL learners and observe if any of them could predict CAF indices. To that aim the following questions were posed:

1. Which of the Multiple Intelligences best predicts grammatical complexity, accuracy, and fluency in Iranian EFL learners' writing?
2. Do gender and age moderate the relationship between Multiple Intelligences and grammatical complexity, accuracy and fluency in Iranian EFL learners' writing?

4. Research methodology

4.1. Participants

For the purpose of this study, a sum of 244 students, enrolled at the intermediate level in six private language institutes in Tehran, were recruited. The sample was drawn from a total of 34 different intact classes, comprising 3 to 16 students each. Initially, 392 students were targeted; however, based on the punctually returned responses, a total of 159 female and 85 male ($N_{total} = 244$) valid cases were identified for inclusion in the final cohort after screening for incomplete or unengaged responses, reflected in the length of writings produced or a constant pattern of response on the MI inventory. The majority of participants, that is 220 individuals, held educational qualifications ranging from high school degree to master's degree, while 13 participants were still enrolled in high school and 11 were either Ph.D. candidates or holders. The participants were all between 18 and 37 in age, with an average of 24.33.

4.2. Instrumentation

All participants were enrolled in courses where American English File 3 (Third Edition) was being taught as the primary instructional material, classifying them as intermediate EFL learners based on the institutes' placement tests and progress charts. As for instruments, a Persian translation of McKenzie's (1999) MI Inventory, validated by Haj Hashemi & Bee Eng (2010) was used to outline participants' profile of multiple intelligences. The translated version was preferred in order to ensure intermediate learners' full comprehension, cooperation, and fidelity. Similar to the original inventory, the translated MI scale consists of nine sections, corresponding to

the nine Naturalist, Musical, Logical, Existential, Interpersonal, Kinesthetic, Verbal, Intrapersonal, and Visual intelligences in that order, each containing 10 items with a dichotomous response option (yes/no), in which learners' score on each intelligence type is determined by counting their positive responses. Therefore, the survey covered all eight intelligences as previously identified by Gardner, as well as a potentially ninth one, that is, existential intelligence. The reliability of the questionnaire was estimated as $r = .90$ based on Cronbach's Alpha, in the present study.

Along with the MI inventory, a writing task was administered to the participants, who were asked to express their opinions on a general topic within a 100- to -150-word limit over a 45-minute period. To choose a relatable and appealing writing topic, two IELTS experts reviewed various Task 2 topics from Cambridge practice test series and online resources. The options were first narrowed down to five topics and after discussing the merits of each option, one prompt was finalized after slight adjustments to ensure its applicability to intermediate EFL learners. The required length of the writing task was also moderated, in order to aim for a balance between eliciting enough material to work with and avoiding feasibility issues. The writing prompt is reproduced in figure 1 below.

Do you think social media and messenger apps such as Instagram, Twitter (X), Telegram, WhatsApp, etc., have made you closer to your friends and family or more isolated and alone? Why? (Explain in about 100 to 150 words).

Figure 1. The Writing Task Topic

In order to analyze the CAF indices in participants' writing, a rating scale based on the profile developed by Larsen-Freeman (2006) was employed. This profile, which has been one of the most-widely used and trusted indices of CAF, uses the T-unit as a basis for analysis, which is defined as a unit of language that begins with a main clause and includes any subordinate clauses that are attached to it. The identification of complexity, accuracy, and fluency indices was based on the following formulae:

- *Complexity*: The total number of clauses is divided by the total number of T-units.
- *Accuracy*: The proportion of error-free T-units is calculated as a percentage of the total number of T-units.
- *Fluency*: The average number of words per T-unit is calculated by dividing the total number of words by the total number of T-units.

To implement these formulae, it is essential to accurately identify and count T-units, clauses, error-free T-units, and words, which requires a set of detailed guidelines. In this study, Polio's (1997) guidelines, updated by Polio and Shea (2014), served as a framework for the systematic determination of T-units (See Appendix A for detailed guidelines).

4.3. Data collection procedure

Prior to the main phase of the study, a pilot study was conducted to refine the data collection and analysis procedures, ensuring the clarity and accuracy of the research design and methods. To conduct the piloting phase, a sample of 30 students with similar conditions to the target population were approached to complete the MI

questionnaire and do the writing task. The responses were copied and rated by two English teachers, who were instructed to assess them according to Polio and Shea's (2014) guidelines in a briefing session. To ensure inter-rater reliability, ratings were cross-checked and found to be highly consistent, indicating a high level of agreement ($r = .99$) among the raters. Any disagreements were discussed and resolved between the raters in order to ensure the most accurate coding, and after the intensive training session, the inter-rater reliability was once again estimated. As a result, the main rater was deemed reliable and was entrusted to complete the remaining writing assessments in the main phase. During the pilot phase, it was determined that punctuation rules would be left out, despite their inclusion in the error guide. This decision was made based on the observation that a majority of students had not received adequate training in this regard and their inclusion would lead to a less-than-accurate representation of their CAF indices.

For the main phase of the study, although all participants had been placed at the same level of proficiency through a placement test or completion of previous levels at their respective institutes, a subset of 40 participants were given a proficiency test to control for potential effects on the results as not all the institutes agreed to an additional proficiency test administration. The results confirmed the homogeneity of the participants.

To gather information on the portions of MI in individuals, the Persian version of Mackenzie's (1999) MI Inventory was administered to the participants within a 30-minute time frame. Following a brief break, they were presented with the chosen writing topic for the study and tasked with completing it within a maximum of 45 minutes. Upon data collection process, which was completed over the course of two months, the MI questionnaires were rated by counting yes answers for each intelligence as instructed by its manual. The writing tasks were then screened for suitability and the ones which fell between 90 to 170 words in length, offered proper readability, and were completed with apparent task devotion were selected, comprising 244 responses out of 392 total submissions. Adhering to Larsen-Freeman's (2006) CAF profile, for complexity calculation, the number of clauses and T-units, for accuracy, the number of error-free T-units and total T-units, and for fluency, the number of words and total T-units were recorded in the final writing tasks following Polio (1997) and Polio and Shea's (2014) guidelines (See appendix B for a sample). The ratings were inserted into an Excel file and the process ended with a final check to ensure the accuracy of ratings. In order to ensure intra-rater consistency, 20% of the papers were rerated for CAF indices after a period of three weeks by the same rater.

4.4. Data analysis

In this quantitative correlational study, first, inter-rater and intra-rater reliabilities were calculated using correlation coefficients. The predictability of CAF indices in EFL learners' writings was checked by first running multiple correlations and then by using regression analysis in SPSS. Also, partial correlations between MI and each of CAF indices, separately controlling for the effects of gender and age, were conducted, as partial correlation allows for the inclusion of both interval and dichotomous variables as covariates.

5. Results

5.1. Reliability checks

The inter-rater reliability was calculated separately for the computations of Total T-Units, Error-Free T-Units, Clauses, and Word counts, based on the results of 30 ratings in the pilot phase. Given the training and briefing period, the results demonstrated exceptionally high inter-rater consistency, with an average Cronbach's alpha coefficient of .99 and an inter-class correlation coefficient of .99. Intra-rater consistency, based on 20% of the main data (48 random writing tasks) was also estimated at $r = .99$, which confirms the accuracy of the coding scheme and its application to the data.

5.2. Proficiency effects

In order to ensure that proficiency was not at play as a confounding variable, separate partial correlations were conducted between each intelligence type on one hand and complexity, accuracy, and fluency on the other, based on the 40 proficiency test administrations. The results indicated that all of the coefficients in the "none" section of the partial correlation table, which ignores the effect of proficiency on CAF scores, are largely similar to those in the original correlation columns. In other words, no significant change is observed when proficiency is introduced as a mediating variable. Therefore, since the results of the partial correlations, controlling for proficiency showed no significant differences, it can be concluded that the proficiency level of the students who participated in the exam did not have an impact on the results of this study. Hence, it was inferred that proficiency was not a confounding factor here and the analyses for this particular sample could be carried out in the absence of proficiency.

5.3. Predictability of CAF indices based on MI

In order to check the predictive power of MI on CAF indices, initially, three multiple correlation analyses were conducted between MI and each of the CAF indices independently. Table 2 below, summarizes the correlational analyses.

Table 2. *Summary of Multiple Correlation between Mis and CAF*

		m1	m2	m3	m4	m5	m6	m7	m8	m9
Complexity	Pearson Corr.	.077	-.005	-.071	.120	.082	.010	.124	-.063	-.109
	Sig. (2-tailed)	.228	.939	.271	.062	.204	.875	.053	.328	.090
Accuracy	Pearson Corr.	-.068	.026	.089	-.027	-.014	-.093	.087	.003	.017
	Sig. (2-tailed)	.289	.688	.166	.671	.826	.150	.176	.958	.788
Fluency	Pearson Corr.	-.054	.014	-.096	.095	.164*	.072	.205**	-.092	-.082
	Sig. (2-tailed)	.405	.831	.135	.139	.010	.264	.001	.151	.202
	N	244	244	244	244	244	244	244	244	244

As evident in Table 2, no significant correlation was located between any of the

intelligences and grammatical complexity on one hand and accuracy on the other. However, a significant correlation of $r = .164$, $p = .010$ was located between interpersonal intelligence (M5) and fluency, with a rather small effect size, according to Cohen's (1988) guidelines. Also, a second significant correlation was found between verbal intelligence (M7) and fluency, with $r = .205$, $p = .001$, again with a rather small effect size. Therefore, based on the correlation analyses, only fluency was taken into account in order to check the predictability of CAF based on MI and a linear regression analysis was run. Due to the type of the research, a simultaneous regression type was opted and first, the assumptions were checked, beginning with the normality of standardized residuals. Normality probability plot of the regression standardized residuals presented in figure 2, presents a relatively straight diagonal line which is laid from bottom left to the most right on the top, while not many deviations are observable. Therefore, normality assumption of the regression standardized residuals was met.

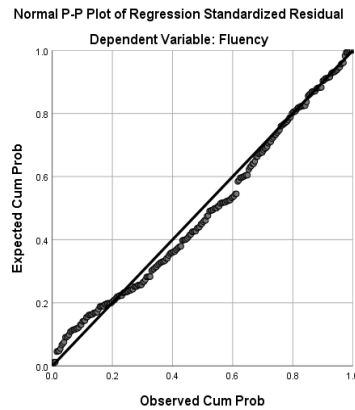


Figure 2. The Normality Probability Plot of the Regression Standardized Residuals of Multiple Intelligences and Fluency

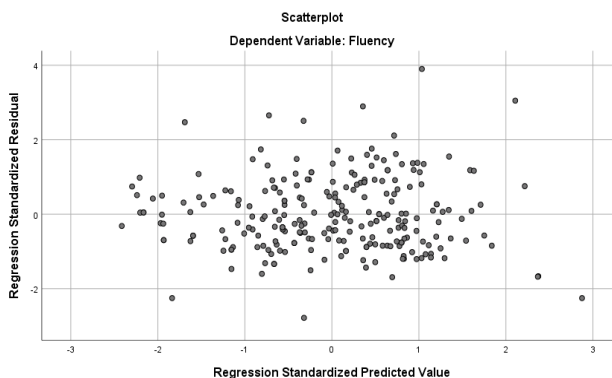


Figure 3. The Scatterplot of the Standardized Residuals of Multiple Intelligences and Fluency

In order to check the homoscedasticity assumption, the scatterplot of the standardized residuals was produced as presented in figure 3. The graph indicates a rectangular type form, in which most points are concentrated around 0 line. There were a few negligible outliers on the scatterplots of the standardized residuals which are located outside the rectangular cluster of the data in the center. Since there is a systematic pattern to residuals with relatively few deviations from a centralized rectangle, it is assumed that there is no violation of a homoscedasticity.

In the model summary box presented in Table 3, the value of R square remarks that 12.6% of variance in fluency as the dependent variable is explained by the model, and the ANOVA results in Table 4 prove to be significant at $p < .000$. Therefore, it was concluded that the model did predict fluency based on MI.

Table 3. Model Summary Box in Regression between MI and Fluency

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.355 ^a	.126	.092	4.246

a. Predictors: (Constant), m9, m2, m5, m8, m3, m6, m1, m7, m4
Dependent Variable: Fluency

Table 4. ANOVA^a Table of Multiple Regression between MI and Fluency

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	606.595	9	67.399	3.738	.000 ^b
1 Residual	4218.872	234	18.029		
Total	4825.467	243			

a. Dependent Variable: Fluency

b. Predictors: (Constant), m9, m2, m5, m8, m3, m6, m1, m7, m4

The next step was to check which variable included in the model contributed to the prediction of fluency. This can be traced in the coefficients presented in Table 5.

Table 5. Coefficients Table of Multiple Regression between Multiple Intelligences and Fluency

Model	Standardized											
	Unstandardized				95.0%				Collinearity			
	Coefficients		Coefficients		Confidence		Interval for B		Correlations		Statistics	
	Std.		Beta		Lower		Upper		Zero-Part		Tolerance	
	B	Error		t	Sig.	Bound	Bound	order	al	Part	ance	VIF
(Constant)	17.379	2.262		7.682	.000	12.922	21.837					
m1	-.203	.170	-.085	-1.196	.233	-.537	.131	-.054	-.078	-.073	.740	1.351
m2	-.081	.152	-.035	-.533	.595	-.381	.219	.014	-.035	-.033	.854	1.170
m3	-.189	.155	-.082	-1.219	.224	-.495	.117	-.096	-.079	-.074	.821	1.218
m4	.138	.155	.066	.892	.373	-.167	.443	.095	.058	.055	.685	1.459
m5	.342	.153	.150	2.241	.026	.041	.643	.164	.145	.137	.832	1.202
m6	.142	.171	.056	.830	.408	-.195	.478	.072	.054	.051	.823	1.215

m7	.553	.147	.265	3.754	.000	.263	.843	.205	.238	.229	.748	1.337
m8	-.537	.244	-.152	-2.198	.029	-1.018	-.056	-.092	-.142	-.134	.783	1.277
m9	-.309	.167	-.128	-1.853	.065	-.637	.019	-.082	-.120	-.113	.779	1.283

a. Dependent Variable: Fluency

It is evident in Table 5 that there are three significant p values; interpersonal intelligence (M5) is significant at $p = .026$, while for verbal intelligence (M7), $p = .000$ and, for intrapersonal intelligence (M8), $p = 0.029$, with Beta values of .150, .265, -.152, respectively. As the largest Beta value is the best predictor, this means that verbal intelligence makes the strongest unique contribution to explaining fluency. The next best predictor of fluency is intrapersonal intelligence, followed by the third best predictor, interpersonal intelligence. However, it must be noted that first, based on the reported beta values, all these three intelligences only explain a modest portion of the variance in fluency. Second, as the beta for M8 features a negative value, it can be argued that intrapersonal intelligence negatively predicts writing fluency among EFL learners.

5.4. The moderating effects of age and gender

As for the second research question, the effects of age and gender, as moderating factors in the study, are investigated. It should be noted that since Multiple Intelligences proved no significant correlation with complexity and accuracy, naturally, investigating the moderating effects of gender and age on them were counted out.

First, to explore the effect of gender on the correlation of MI and fluency, a partial correlation with gender as a covariate was conducted between them. As it could be expected from the results so far, the only significant correlations between intelligences and fluency exist in interpersonal intelligence (M5) with p value of .010 and verbal intelligence (M7) with p value of .001. The value of correlation coefficient for interpersonal intelligence and fluency correlation disregarding gender effect was $r = .164$, while after introducing the effect of gender, $r = .163$. Therefore, it was inferred that gender does not make any significant change on the correlation between interpersonal intelligence and fluency. On the other hand, the value of correlation between verbal intelligence and fluency, excluding the effect of gender, was $r = .205$, while, its counterpart after including the moderating effect of gender was $r = .240$. In this case, the reported value has slightly changed but not significantly.

Similarly, to examine the moderating effect of age, a partial correlation controlling for the effect of age on the interaction of intelligences with fluency was conducted. All in all, Interpersonal intelligence (M5) with $r = .164$ and significance level of .010, as well as verbal intelligence (M7) with correlation coefficient of $r = .205$ and $p < 0.001$ were found to be significant. To examine the effect of age on the interaction of Multiple Intelligences with fluency, these values were compared with their significance levels after controlling for age. However, no significant changes were observed. Therefore, it is concluded that age and gender did not have significant moderating roles in the relationship between MI and CAF indices.

6. Discussion

The present study was an attempt to investigate the relationship between Multiple Intelligences and Iranian EFL learners' writing CAF with the possible mediating role

of gender and age, from a positive psychology perspective. Among all nine intelligences, verbal and interpersonal, intelligences were found to positively predict fluency, while intrapersonal intelligence was a negative predictor; however, all with rather small effect sizes. The results of the second research question indicated that gender and age did not have a significant impact on the interplay between MI and grammatical complexity, accuracy, and fluency. Interestingly, verbal intelligence, as a closely affiliated category with language skills, was found to only predict fluency rather than accuracy or complexity. This indicates that verbally intelligent individuals probably rely on this potential to make use of their linguistic resources to keep the language flowing. The same applies to individuals with higher levels of interpersonal intelligence, arguably related to communication skills. However, it seems that higher degrees of intrapersonal intelligence had a reverse relationship with learners' writing fluency. This might be attributed to higher levels of self-consciousness and self-monitoring in interpersonally-intelligent learners, who might feel the need to channel their limited cognitive and operating memory capacities towards accuracy rather than fluency, based on the arguments in trade-off hypothesis (Skehan & Foster, 2012).

From a PP perspective, the findings also offer a number of worthwhile insights. It can be argued that EFL learners with higher degrees of interpersonal and verbal intelligences probably demonstrate increased fluency due to their heightened engagement in interactional tasks such as writing and their ability to sustain their well-being in language performance. They seem to be able to overcome their inhibitions and anxiety and keep the language flowing. However, learners with higher degrees of intrapersonal intelligence might need more help in balancing their self-consciousness with facilitating components of positive psychology to overcome fears of failure and obsessional need for correctness.

The results of this study are consistent with some previous findings and diverge from others. They seem to complement Marefat's (2007) findings, who found that interpersonal, kinesthetic, and existential intelligences best predict writing product in general. These results also supplement Ahmadian and Hosseini's (2011) findings, who reported a significant correlation between MI and writing performance, with verbal intelligence as the best predictor. Moreover, while Zarei and Mohseni (2012) reported that grammatical accuracy was related to intrapersonal and interpersonal intelligences, with intrapersonal intelligence introduced as a predictor of writing accuracy, the present study found no predictive power for MIs on writing fluency. In contrast with their study, the results here found intrapersonal and interpersonal intelligences related to fluency, rather than accuracy. Furthermore, the present findings might be seen as congruent with Saeidi and Karvandi (2014) who found interpersonal, intrapersonal, and logical intelligences correlated with writing performance in reasoning-gap tasks. This research also corroborates Alizadeh et al. (2016), who reported that interpersonal and intrapersonal intelligences positively correlated to writing quality. Similarly, Nahak et al., (2023) reported positive effects for intrapersonal intelligence on descriptive paragraph writing. The results of this study also corroborate Zaker and Azizpour's (2025) findings, who had already found a positive correlation between interactional competence (IAC) and fluency, given that IAC is highly dependent on both verbal and interpersonal intelligences.

In contrast with the present findings, Razmjoo (2008) reported no relationship between MI and language proficiency. However, the results partially corroborate Razmjoo in that no significant role was found for gender. The results of this investigation were also incongruent with Salehi and Gerami (2012), who reported no

relationship between MI and achievement scores in writing and also contradict Sajjadi Rad et al. (2014) who found no relationship between MI and writing skills. Exploring the link between Emotional Intelligence and CAF indices in EFL learners' oral production, Abdolrezaipoor (2018) found no connection between EQ and fluency, while a positive correlation was located between EQ and complexity as well as accuracy. Assuming a partial overlap between EQ and MI, the results of the present study, which found verbal and interpersonal intelligences related to fluency, call for a revisit to such previous findings. In the same line of argument, the results are more compatible with Khooei (2014), who found interpersonal (along with stress-management) skills in an EQ framework related to oral fluency, while intrapersonal skills were related to complexity.

7. Conclusion

The present research adopted a PP standpoint to examine whether any significant correlation exists between Multiple Intelligences and the CAF indices in writing and how gender and age might moderate that relationship. The results of multiple regressions showed that none of the intelligences could predict complexity and accuracy. However, it was revealed that three of the intelligences, including verbal, intrapersonal, and interpersonal, can predict fluency in writing. Through partial correlations, it was confirmed that neither gender nor age had any moderating roles. It could be concluded that the presence of verbal and interpersonal intelligences, regardless of gender and age, is related to improvements in EFL learners' writing fluency, while high levels of intrapersonal intelligence might interfere with it. These findings can be seen within a PP framework, where learners' wellbeing is connected with the ways they manage their resources to engage in language tasks.

These results could have several implications for curriculum developers, course book writers, and task designers, as well as L2 teachers and their trainers, who need to design, develop, and integrate activities that foster learners' effective intelligences to improve and boost their learning outcomes and experiences, especially in writing. From a PP point of view, when learners are made aware of their dominant language booster intelligences in writing, it might increase their interest and motivate them to engage in learning activities in view of their psychological profiles. It also helps L2 educators to plan their practices accordingly and foster individualized, autonomous, motivating, and enjoyable learning experiences for learners.

The present study, similar to any other research effort, faced a number of limitations. First, punctuation was excluded from the CAF rating process, which could have affected the findings. Furthermore, data collection in the present study solely relied on a single administration of the writing task, which could be argued to be an underrepresentation of the participants' writing skills. It is suggested that future research can collect writing samples from several occasions and of a variety of topics or task types, in order to reflect a more accurate measure of learners' writing abilities. Due to the number of writing tasks in the present study, it was not possible for both raters to check all the submitted papers after the piloting phase. Therefore, it was tried to ensure the accuracy of rubric implementation by the sole rater in the training and briefing sessions of the pilot phase. The present study also delimited itself to a certain MI questionnaire and CAF rating rubric. Further studies can explore other possibilities in this regard and replicate the procedure using updated MI frameworks and CAF measurements. Future researchers can also adopt a qualitative or mixed-methods approach to observe the effects of L2 learners' dominant intelligences on the strategies

they might employ in order to enhance their learning experience, motivation, autonomy, and agency in developing writing skills. Another viable line of research in a PP framework, is investigating the possibility of designing and delivering MI training in order to boost learners' specific intelligences and observing the effects on their well-being, resilience, emotion regulation, and academic buoyancy.

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Appendix A

Guidelines for T-Units, Clauses, Errors, and words

Polio's (1997) Guidelines:

T-Units

a. A T-unit is defined an independent clause and all its dependent clauses.

b. Count run-on sentences and comma splices as two T-units with an error in the first T-unit.

ex: My school was in Saudi Arabia, it was the best school there.

T	/	T
1 error		error-free

If several comma-splices occur in a row, count only the last as error free.

c. For sentence fragments, if the verb or copula is missing, count the sentence as 1 T-unit with an error. If an NP is standing alone, attach it to the preceding or following T-unit as appropriate and count as an error. If a subordinate clause is standing alone, attach it to the preceding or following S and count it as 1 T-unit with an error.

d. When there is a grammatical subject deletion in a coordinate clause, count the entire sentence as 1 T-unit.

ex: First we went to our school and then went out with our friends.

e. Count both "so" and "but" as coordinating conjunctions. Count "so that" as a subordinating conjunction unless "so" is obviously meant.

f. Do not count tag-questions as separate T-units.

g. Count S-nodes with a deleted complementizer as a subordinate clause as in: I believe that A and (that) B = 1 T-unit.

h. But, direct quotes should be counted as:

John said, "A and B."

1 T-unit 1 T-unit

i. Assess the following type of structures on a case-by-case basis:

If A, then B and C.

As a result, A or B.

j. Count T-units in parentheses as individual T-units.

Clauses

a. A clause equals an overt subject and a finite verb. The following are only one clause each:

He left the house and drove away.

He wanted John to leave the house.

b. Only an imperative does not require a subject to be considered a clause.

c. In a sentence that has a subject with only an auxiliary verb, do not count that subject and verb as a separate clause (or as a separate T-unit. (e.g. John likes to ski and Mary does too; John likes to ski, doesn't he?; John is happy and Mary is too)

Error Guidelines

a. Do not count spelling errors (including word changes like "there/their").

b. Be conservative about counting comma errors; don't count missing commas between clauses or after prepositional phrases. Comma errors related to restrictive/non-restrictive relative clauses *should* be counted. Extraneous commas should also be considered errors.

c. Base tense/reference errors on preceding discourse; do not look at the sentence in isolation.

d. Don't count British usages as errors, (e.g. "in hospital," "at university," collective nouns as plural).

e. Be lenient about article errors from translations of proper nouns.

f. Don't count errors in capitalization.

g. Count errors that could be made by native speakers (e.g. between you and I).

h. Do not count register errors related to lexical choices (e.g. lots, kids).

i. Disregard an unfinished sentence at the end of the essay.

Word Count

a. Count contractions as one word whether correct or not.

b. Count numbers as one word.

c. Count proper nouns in English and in other languages as they are written.

d. Do not count hyphenated words as single words. (e.g. well-written = 2 words)

e. Don't include essay titles in word count.

f. Count words as they are written, even if they are incorrect. (e.g. alot = 1 word)

Polio and Shea's (2014) guidelines for coding errors (Modified from Polio, 1997):

1. Whole sentence is incomprehensible, intended structure is not clear, or more than five errors. *And in the same time you might be sometime answered other people any questions.*
2. Missing subject *But sometime you might have you own secret that can't tell anybody except one person.*
3. Missing verb *When he thinks he have to something, he does it finally even very difficult thing that other people give up.*
4. Missing verb complement or object or required prepositional phrase. *and I'm missing now.*
5. Verb phrase problem: Wrong tense/aspect or misformed tense/aspect. Also wrong participle in a participle clause. Attempt at something passivelike where it does not belong.
I have been studied there for eight months.
It can be reduce the accident rate.
6. Preposition problem (missing, extra, wrong) *And my brother-in-law graduated in MSU 10 year ago,*
7. Sentence fragment *I have five members. My parents (father, mother), younger sister, younger brother, and me.*
8. Run-on sentence (Count the error in the first T-unit.) *As time goes by and having more sense of being a part of this campus, I love to enjoy the great service provided by school such as gyms, libraries, labs in departmental building, all of them are well-organized and convenient for faculty and students to have a better living and do academic research.*
9. Problem with relative clause formation including wrong relative pronoun, reduced relative clause (use of infinitive instead of participle), or resumptive pronoun *It is the place that we enjoy in it.*
10. Wrong modal or addition of modal where not needed *Every day we can get many useful information from him.*
11. Incorrect formation of passive voice including get passive (must be obviously passive) *The building built by the construction company.* (as opposed to something like: *The building which is sat on the hill*)
12. SV agreement *She has the religion of buddism which mean she is a buddist.*
13. Wrong pronoun or possessive determiner (including reflexive) and *it/there*. *That's the reason why I don't like them.* (*them refers to father*)
14. Quantifier-noun agreement (much/many, this/these) or other quantifier problems (a few/few); not including singular plural *There are little students comparing MSU.*
15. Problematic comparative or superlative formation *In recent reseach, the capital of Korea, Seoul, is the worst clean city in the world.*
16. Singular/plural error (including making mass nouns plural) *Because there are all kinds of store around it.*
17. Negation problem (including missing *do*) *So, my father couldn't study no more*
18. Wrong, extra, or missing article (for frequent English proper nouns, require appropriate article use but not for foreign words) *From the middle of September to the end of November, it was a very nice scenery.*
19. Wrong lexical item (including conjunctions, phrasal verb) *Also, we have many green and colorful flowers in the yeard. [meaning on campus]*
20. Wrong word form (e.g., adjective for noun) or wrong derivational formation.
He has much patient.
It is very crowdy.
21. Word order problem *How did you stay for 13 hours every day in school?*
22. Missing or extra word not included above *I was really tired of routine work, stay late evening.*
23. Severe punctuation error (not including run-on, don't include capitalization, be very lenient with comma errors) Include possessives such as "My brothers house" or contraction problems such as *its/it's*. *That why, I have a time to do my work.*
24. Gerund/infinitive *I had such a great experience to study there.*
25. Other including genitive? *My university's friend* (for my university friend)

Appendix B

Sample Writing Task

014 T-units = 6
 Error-Free T-units = 4
 clauses = 9
 words = 123

WRITING

Full Name:

Institution:

Do you think social media and messenger apps (such as Instagram, Twitter, Telegram, WhatsApp...) have made you closer to your friends and family or more isolated and alone? Why? (Explain in about 100 to 150 words)

1 I think social media and messenger app have both positive and negative effects on people's relationships and lives.

2 On one hand, they can help people stay in touch with their friends and family who live far away. They can share their thoughts and feelings. 3 They can help 4 people improve communication 5 with their partners, children and healthcare professionals by using different tools such as self-help apps, images, texts and video chats.

5 On the other hand, they can also make people more isolated and alone if they compare themselves to others, spend too much time online or neglect their offline 8 interactions.

6 But I prefer to use social media and messenger apps in moderation and balance them with face-to-face 9 communication and meaningful activities.