Journal of Research in Language & Translation
Issue No. 2 Vol. 6 (2026)

الدور الوسيط للوعي الصرفي وطلاقة القراءة في العلاقة بين الوعي الفونولوجي والمفردات: تحليل المسار

اميره الحربي

جامعة أم القرى
مكة المكرمة، المملكة العربية السعودية
asauharbi@uqu.edu.sa

https://orcid.org/0009-0004-8466-4089

https://doi.org/10.33948/JRLT-KSU-6-2-6

Received: 28/07/2025; Revised: 26/07/2026; Accepted: 10/09/2026

الملخص

يتضمن تطور مهارات القراءة والكتابة المبكرة في اللغة العربية تفاعلاً بين عدد من القدرات اللغوية، ولا سيما الوعي الصوتي، والوعي الصرفي، وطلاقة القراءة، والمعرفة بالمفردات. وعلى الرغم من أن الدراسات السابقة تناولت هذه المهارات كلًّا على حدة، فإن اهتمامًا أقل وُجِّه إلى كيفية تفاعلها معًا خلال المراحل المبكرة من اكتساب القراءة والكتابة. هدفت الدراسة الحالية إلى فحص ما إذا كان الوعي الصرفي وطلاقة القراءة يتوسطان العلاقة بين الوعي الصوتي والمفردات لدى تلاميذ الصف الأول الابتدائي الناطقين باللغة العربية.

شملت الدراسة 110 من طلاب الصف الأول الابتدائي (59 طالبة و51 طالبًا، تراوحت أعمارهم بين 6.11 و7.20 سنوات) من خمس مدارس ابتدائية في منطقة مكة المكرمة بالمملكة العربية السعودية. وكان جميع المشاركين من الناطقين الأصليين باللغة العربية. واستخدمت الدراسة تحليل المسار ضمن نمذجة المعادلات البنائية (SEM) لاستقصاء العلاقات بين متغيرات الدراسة.

أظهرت النتائج وجود ارتباطات إيجابية بين الوعي الصوتي، والوعي الصرفي، وطلاقة القراءة، والمفردات، حيث تراوحت معاملات المسار المعيارية بين (0.36) و(0.40). كما كانت كلٌّ من المسارات المباشرة وغير المباشرة في نموذج الوساطة ذات دلالة إحصائية ($p < .001$). وعلى وجه الخصوص، أظهر الوعي الصوتي إسهامًا غير مباشر في تنمية المفردات من خلال الوعي الصرفي وطلاقة القراءة، مما يشير إلى أن هاتين المهارتين تؤديان دورًا مهمًا في التطور المبكر للمفردات.

وتقدم هذه النتائج مزيدًا من الأدلة على أن تطور مهارات القراءة والكتابة في اللغة العربية يتشكل من خلال عمليات لغوية مترابطة، وليس من خلال مهارات منفصلة. كما تؤكد أهمية تنمية الوعي الصوتي والوعي الصرفي جنبًا إلى جنب مع طلاقة القراءة خلال السنوات الأولى من التعليم. ويمكن أن تستفيد الدراسات المستقبلية من فحص هذه العلاقات في بيئات تعليمية مختلفة وعبر فئات عمرية متنوعة.

KSU-JRLT

Journal of Research in Language & Translation
Issue No. 2 Vol. 6 (2026)

جامعة الملك سعود
King Saud University

The Mediating Role of Morphological Awareness and Reading Fluency in the Relationship Between Phonological Awareness and Vocabulary: A Path Analysis

Amirah Alharbi

Umm Al-Qura University,
Makkah, Kingdom of Saudi Arabia
asauharbi@uqu.edu.sa

https://orcid.org/0009-0004-8466-4089

https://doi.org/10.33948/JRLT-KSU-6-2-6
Received: 28/07/2025; Revised: 26/07/2026; Accepted: 10/09/2026

Abstract

Early literacy development in Arabic involves the interaction of several linguistic abilities, particularly phonological awareness (PA), morphological awareness (MA), reading fluency (RF), and vocabulary knowledge. Although previous research has examined these skills individually, less attention has been given to how they work together during the early stages of literacy acquisition. The present study examined whether MA and RF mediate the relationship between PA and vocabulary among Arabic-speaking first-grade learners. The study included 110 first-grade students (59 female and 51 male; age range = 6.11–7.20 years) recruited from five primary schools in Makkah region, Saudi Arabia. All participants were native speakers of Arabic. Structural equation modelling (SEM) path analysis was used to investigate the relationships among the study variables. The findings showed positive associations among PA, MA, RF, and vocabulary, with standardised path coefficients ranging from .36 to .40. Both direct and indirect pathways in the mediation model reached statistical significance ($p < .001$). In particular, PA demonstrated an indirect contribution to vocabulary through MA and RF, suggesting that these skills play an important role in early vocabulary development. The results provide further evidence that literacy development in Arabic is shaped by interconnected linguistic processes rather than isolated skills. They also highlight the importance of supporting phonological and morphological abilities alongside reading fluency during the early years of instruction. Future research may benefit from examining these relationships across different educational settings and age groups.

Keywords: Arabic literacy development; morphological awareness; phonological awareness; reading fluency; vocabulary development

Introduction

Reading holds a central place in language arts for learners, ranking just behind listening and speaking in importance (Pamuk et al., 2023). As a complex cognitive and linguistic process, reading enables learners to acquire knowledge and engage with a wide range of written content. It also plays a crucial role in supporting ongoing learning and academic development (National Reading Panel, 2000; Rasinski, 2004). In addition, reading during leisure time plays an important role in developing students' literacy skills and reading motivation (Kumar et al., 2025), and serves as a productive way for students to spend their free time (Banna, 2019). When teaching reading, the ultimate goal is not just to facilitate the recognition and memorisation of target words and how to write them (Elhoweris, 2017). As a complex mental process, reading extends beyond decoding and recognising letters and words to include numerous skills that many readers do not possess. Reading fluency (RF) is a key component of reading development that reflects efficient and accurate word recognition and supports reading comprehension (National Reading Panel, 2000; Rasinski, 2004).

Building RF can be understood as strengthening the relationship between the oral expressive side of language and the written side (i.e., between the spoken and the written symbols), focusing on accuracy in pronunciation, vocal intonation, and coherent expression of the intended meaning. Achieving RF is widely considered an important condition for comprehension of target reading material. A learner who acquires RF will be able to automatically link orthographic form with phonological representation (Tortorelli & Truckenmiller, 2023). The ability to accurately map sounds to written symbols – phonological decoding – is a fundamental process in learning to read. Thus, phonology has become an important independent subfield of the linguistic sciences.

The development of RF depends on supporting underlying linguistic skills, particularly phonological and orthographic awareness, which enable learners to engage effectively with written material (Ahmed et al., 2023). Readers must be aware of the internal structure of words and understand that they are divided into sounds which can be recombined to form new words. This includes the ability to recognise the sounds of letters. Awareness of such phonetic input is an indicator of a successful reading process and its subsequent development (Eissa, 2017). When students begin to learn the various aspects of reading, especially associating the symbols or letters with certain sounds and memorising those symbols and sounds, they rely on phonetic methods to decode the words and text.

The study contributes to research on early literacy development by exploring the mediating roles of MA and RF in the relationship between PA and vocabulary among young Arabic-speaking learners. Although PA and MA have been widely studied in relation to literacy development, previous research has examined these skills either as independent predictors or within limited interactional contexts, rather than within an integrated structural framework, particularly in Arabic (e.g., Mahfoudhi et al., 2010; Saiegh-Haddad & Geva, 2008; Schiff & Saiegh-Haddad, 2018). However, relatively few studies have examined how these skills interact simultaneously within a unified analytical framework, particularly when considering the role of RF in early literacy development. The present study applies structural equation modelling (SEM) path analysis to investigate how PA, MA, RF and vocabulary interact in Arabic-speaking first-grade learners. The findings may help to clarify how multiple linguistic skills jointly support early literacy development in Arabic and may also inform early classroom assessment and instruction. The next section reviews relevant literature on PA, MA, RF, and vocabulary development. This is followed by the methodology section, which outlines the participants, instruments, and analytical procedures. The results section presents the findings of the path analysis, and the discussion interprets these findings in light of previous research.

The paper concludes with a conclusion section outlining the main contributions of the study, followed by limitations and recommendations for future research.

Literature Review

Phonological Awareness

Phonological awareness (PA) is often described as an umbrella term referring to a learner's ability to perceive and manipulate the sounds of their language (Eissa, 2013). The development of PA typically begins with sensitivity to larger sound units, for example, syllables and rimes, and gradually advances to finer distinctions, such as phonemes (Carroll et al., 2003). Such awareness and manipulation demand sensitivity to different units of sound, including words, syllables, onsets, rime, or phonemes (Abdul Khalik, 2014; Eissa, 2017). Syllable awareness is the ability to segment a word into its constituent syllables (e.g., 'recess' can be segmented into two syllables: 're' and 'cess'), while phoneme awareness entails sensitivity to individual phonemes, which are the smallest units of sound (e.g., 'recess' [/ˈriːsɛs/] consists of five phonemes: /r/, /iː/, /s/, /ɛ/, and /s/). Therefore, PA is considered an underlying cognitive-linguistic skill that is crucial for reading in all languages (Carroll et al., 2003; Eissa, 2014). Gillon (2007) investigated PA and its role in language development and literacy, reporting that PA is essential for developing reading and writing skills, as it requires the recognition and manipulation of sounds in words. The author examined theoretical frameworks and practical applications, emphasising the role of PA in predicting future reading achievement. The findings suggest early educational interventions targeting PA to improve literacy results in children, highlighting the importance of these skills for decoding and reading speed.

Existing literature has underscored the role of PA in the development of morphological awareness (MA), especially in primary school students (Sparks & Deacon, 2013). For example, Cunningham and Carroll (2015) reported that the phonological processing skills of English-speaking children at ages 4–6 predicted their MA 3 years later. Phonology is considered the basis of initial morpheme recognition (Deacon & Kirby, 2004).

Vocabulary Learning

Studies have identified a strong relationship between the distinct but related constructs of MA and vocabulary, both of which are involved in reading development (Kuo & Anderson, 2006; McBride-Chang et al., 2008; Shankweiler et al., 1995). Vocabulary growth takes place when a learner works to extract meaning from the text they are reading (Nagy & Anderson, 1984). Readers who can use morphological analysis to infer word meanings can acquire a larger vocabulary through independent reading than less-skilled readers.

Morphological Awareness as a Mediator

As a type of metalinguistic awareness (Tong et al., 2011; Zhang et al., 2019), MA makes it possible to reflect on and manipulate the morphemic structure of words. Some researchers have identified MA as a skill that supports learners in developing their reading abilities (Chow et al., 2005; McBride-Chang et al., 2005; Oliveira et al., 2020; Sparks and Deacon, 2013). It can also act as a mediator between PA and vocabulary learning (Zhang et al., 2019). In reading, MA can help learners gain information from semantics, phonetics, and syntax, all of which are considered important paths to understanding meaning (Cheng et al., 2018; Justi et al., 2023).

Expanding on this comprehension, knowledge of morphology (i.e., MA) the capacity to identify and utilise morphemes (the smallest elements of meaning in a language) is also vital

for the development of literacy. Carlisle (2010) explored how MA impacts reading comprehension and vocabulary growth. The research indicates that a strong understanding of morphological patterns can assist children in deciphering difficult words and enhancing their vocabulary. The importance of MA grows for deciphering unfamiliar words, as texts become more complex. As stated by Carlisle (2010), instruction on morphemes can improve both reading speed and understanding, particularly for students who struggle with reading. Children can better navigate challenging texts through the comprehension of word-formation techniques, resulting in enhanced literacy results.

Several studies indicate that PA and MA are closely related components of literacy development (Deacon & Kirby, 2004; Saiegh-Haddad, 2017). MA has also been shown to contribute to vocabulary development and reading comprehension (Kieffer & Lesaux, 2012; Sparks & Deacon, 2013). Together, these findings suggest that understanding both phonological and morphological structure supports children's ability to learn new words and develop literacy skills. Supporting this view, Lee et al. (2023) conducted a large-scale meta-analysis and reported moderate positive associations between MA and several literacy-related skills, including PA, vocabulary, word reading, and reading comprehension. However, relatively few studies have examined how PA and MA jointly contribute to vocabulary development through mediation models.

Some studies have reported that MA accounts for unique variance in vocabulary outcomes (McBride-Chang et al., 2008). For example, Sparks & Deacon (2013) found that MA in second grade uniquely explained 14.9% of the variance in third-grade vocabulary, even after controlling for the effects of PA. Similarly, Desrochers et al. (2018) observed that MA predicted single-word reading among second-grade English learners. In contrast, Manolitsis et

al. (2017) detected no contribution of first-grade MA to word RF assessed at the end of the first grade or in the second grade.

Most pioneering studies on the role of morphological units in reading acquisition were conducted primarily in English and assumed that the contextual processes involved in word recognition are sensitive to internal morphological structure. Building on this line of research, some scholars (e.g., Abu-Rabia, 2007; Abu-Rabia et al., 2003; Cunningham & Carroll, 2015; Sparks & Deacon, 2013) have advanced the hypothesis that individuals with reading difficulties may exhibit morphological deficits. Conversely, other studies (Casalis, 2001; Elbro & Arnbak, 1996) have shown that children with significant phonological deficits can develop compensatory strategies based on the use of morphological information. Knowledge of morphological structure may then facilitate dictionary access for learners with reading difficulties. According to Fracasso et al. (2016), both PA and MA are mutually supportive and jointly contribute to reading and comprehension outcomes.

The relationship between early phonological knowledge and reading development has been widely investigated. Research consistently demonstrates that phonological processing skills play a pivotal role in becoming a proficient reader, particularly among children in the pre-literacy stage. At this stage, children must learn how speech can be broken down into progressively smaller units down to phonemes, and to map these units onto written representations (Abdul Khalik, 2014; Clayton et al., 2019; Eissa, 2017; Torgesen et al., 1994; Milankov et al., 2021; Nithart et al., 2011).

Reading Fluency as a Mediator

Involving the coordination of perceptual and print-to-sound translation processes, RF is more complex than simple decoding measures (Fuchs et al., 2001). Silverman et al. (2013)

suggested that reading accuracy and fluency develop concurrently in early childhood but follow independent trajectories from the fourth grade onward.

A study of Greek primary school students by Giazitzidou and Padeliadu (2022), controlling for non-verbal intelligence, vocabulary, and PA, showed that inflectional, derivational, and compounding morphology exerted small but significant effects on word, text, and silent RF in second grade. In fifth grade, derivational and inflectional morphology continued to influence text and silent RF. Among children with dyslexia, inflectional and derivational morphology exhibited moderate to large effects on text and word RF in second grade only. Overall, their results suggest that morphological skills support RF in both the early and later primary school years, although for children with reading difficulties, these effects appear strongest in second grade. Similarly, Görgen et al. (2021) reported that inflectional and derivational morphology made a modest but distinct contribution to silent RF among third- and fourth-grade German-speaking children. Although some of the studies cited here include participants with dyslexia or reading difficulties, they are discussed only to provide a theoretical context for the relationship between morphological skills and RF. The present study, however, focuses exclusively on typically developing children.

Although extensive research has established strong links between PA, MA, RF, and vocabulary in Indo-European languages, such as English, French, and German (Casalis & Louis-Alexandre, 2000; Fielding-Barnsley & Purdie, 2005; González & del Rosario, 2000; Siok & Fletcher, 2001; Tong et al., 2011), much less is known about how these relationships operate in Semitic languages, such as Arabic, which are characterised by non-linear morphology and deep orthography (Taha & Saiegh-Haddad, 2017). Prior studies in Arabic literacy have produced mixed findings regarding whether PA or MA plays the dominant role in vocabulary growth and reading development (Bin Sawad et al., 2022; Schiff & Saiegh-

Haddad, 2018), and few studies have examined how these skills interact simultaneously within a single model (Bin Sawad et al., 2022). To the best of the author's knowledge, relatively few studies in Arabic have examined a mediation model integrating PA, MA, RF, and vocabulary using structural equation modelling (SEM). Although previous Arabic research has highlighted the role of PA, MA, and reading development (e.g., Saiegh-Haddad & Geva, 2008; Schiff & Saiegh-Haddad, 2018; Vaknin-Nusbaum & Saiegh-Haddad, 2020; Yassin et al., 2020), limited research has tested a comprehensive SEM model incorporating all these variables simultaneously. This research gap limits understanding of whether theoretical models of literacy development derived from Indo-European languages can be validly applied to Arabic, and whether Arabic's morphologically rich system alters the pathways through which early literacy skills support vocabulary development.

Phonological and MA in Arabic Literacy Development

Arabic offers a distinctive setting for examining early literacy development because it relies on a root-and-pattern morphological system and includes extensive derivational and inflectional structures. As a result, PA and MA are especially important for Arabic-speaking children, as they develop word recognition, reading ability, and lexical knowledge. In contrast to languages with more concatenative and transparent morphology, Arabic learners must interpret consonantal roots and morphological patterns at the same time, which increases the processing demands placed on them during reading. Research involving Arabic-speaking learners has repeatedly shown that PA is fundamental to early reading acquisition (Abu-Rabia, 2002; Saiegh-Haddad, 2003). Skills such as phoneme segmentation, blending, and manipulation have been identified as reliable predictors of word reading accuracy and broader early literacy performance (e.g. Abu-Rabia, 2002; Saiegh-Haddad, 2003; Tibi & Kirby, 2018). These results suggest that recognising and working with the sound structure of spoken language

helps children connect sounds to written forms, particularly during the first stages of reading instruction, when core decoding abilities emerge.

At the same time, increasing attention has been given to the contribution of MA to literacy development in Arabic. Because roots and patterns are central to the formation of words, MA supports vocabulary growth, word recognition, and reading comprehension beyond what phonological skills alone can explain (Abu-Rabia & Siegel, 2003; Saiegh-Haddad & Geva, 2008; Saiegh-Haddad & Schiff, 2024; Tibi, 2010). Evidence indicates that children who can identify and manipulate morphemic elements are better able to interpret word meanings and decode words that contain complex morphological structures.

Research also points to the important roles of both PA and MA in Arabic literacy development (Saiegh-Haddad & Geva, 2008). In English PA tends to play a stronger role at the beginning of reading instruction, whereas MA tends to become increasingly important as reading develops (Deacon & Kirby, 2004). Cross-linguistic work in Arabic suggests similarly important, but more nuanced, patterns in how PA and MA contribute to literacy (Saiegh-Haddad & Geva, 2008). This emerging developmental picture highlights the importance of studying these skills together. Nevertheless, many earlier studies have examined PA and MA separately when predicting reading or vocabulary outcomes. Although some work has modelled direct and indirect pathways among PA, MA, vocabulary, and reading (e.g., Carlisle, 2010; Kieffer & Lesaux, 2012), integrated models that include PA, MA, RF, and vocabulary together particularly for Arabic first graders are still limited.

In addition, RF has rarely been included in comprehensive models of Arabic literacy development, even though fluent reading increases contact with written language and contributes to vocabulary growth. Consequently, the relationships among PA, MA, RF, and

vocabulary remain insufficiently examined, especially within integrated analytical frameworks, such as path analysis.

Overall, prior research confirms the importance of PA and MA for literacy acquisition in Arabic, yet more work is needed to clarify how these abilities interact in shaping early vocabulary development and whether RF acts as a mediating factor. The present study responds to this need by exploring both direct and indirect links between PA and vocabulary through MA and RF in first-grade Arabic-speaking children.

Objective and Hypotheses

The objective of the present study was to use path analysis to examine the mediating roles of MA and RF in the relationship between PA and vocabulary.

Hypothesis 1: Positive associations exist among PA, vocabulary, MA, and RF.

Previous research has widely acknowledged that PA, vocabulary, MA, and RF are critical factors for literacy development (Bowers & Newby-Clark, 2002; Kirby et al., 2012). PA supports children's ability to detect and manipulate sounds in words and facilitates reading acquisition (Kirby et al., 2012). Emerging vocabulary depth serves to improve access to and comprehension of words, while MA supports students' internal representations of word segments, origins, and meanings, thus supporting both RF and comprehension (Bowers & Newby-Clark, 2002). Given the interrelated nature of these skills and their established contributions to reading development, positive associations between PA, vocabulary knowledge, MA, and RF are expected.

Hypothesis 2: MA mediates the relationship between PA and vocabulary.

Vocabulary acquisition is affected not only by PA but also by MA. PA assists individuals in decoding and identifying sounds in words, while MA facilitates the understanding of internal word structures and meanings via morphology and derivations. Because PA and MA are interrelated, MA is expected to serve as a bridge that allows learners not only to sound out words phonetically, but also to build their lexical knowledge by understanding how words are constructed. Thus, it is expected that the relationship between PA and vocabulary development will be mediated by MA, given that MA remains essential to understanding how PA predicts vocabulary development.

Hypothesis 3: RF mediates the relationship between PA and vocabulary.

The ability to read accurately and efficiently is of critical importance for developing both vocabulary and comprehension. PA supports RF by facilitating the effective decoding and recognition of words, which enhances comprehension skills and the acquisition of new vocabulary. Skilled readers are more likely to encounter and comprehend novel words during reading, suggesting that fluency may mediate the association between PA and vocabulary acquisition. The author thus predicts that RF will act as a mediator in the PA–vocabulary relationship, as it is expected that PA has an impact on fluency, while fluency in turn supports vocabulary acquisition.

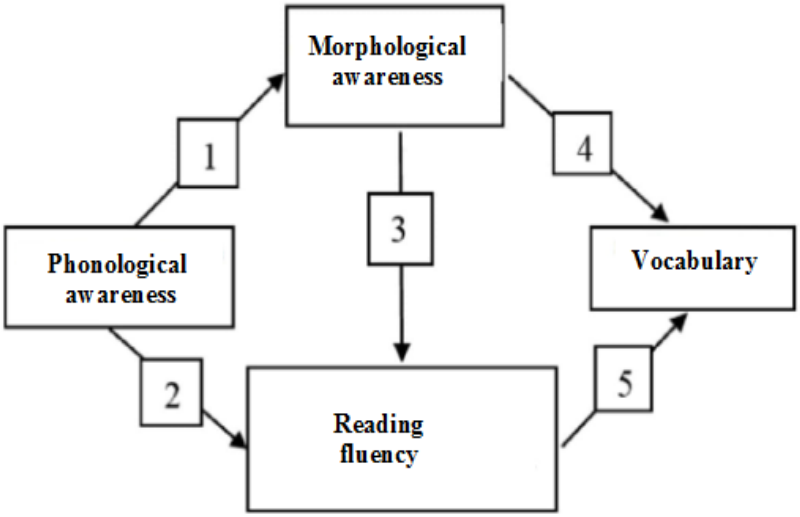
Methods

Model

Following a literature review, a mediating effect model has been constructed to examine the mediating roles of MA and RF in the PA–vocabulary relationship using path analysis. A path model is a statistical technique used in SEM to represent relationships between variables. Both direct and indirect effects are depicted in the path model, which shows how one variable

(e.g., PA) influences another (e.g., vocabulary) either directly or indirectly through mediating variables (e.g., MA and RF). Researchers in various fields, such as education and psychology, use path models to analyse the intricate relationships between various variables (Kline, 2015). This path model is visualised in Figure 1.

Figure 1
Hypothesised Path Model



Participants

A total of 120 first-grade students (65 female, 55 male; age range, 6.11–7.20 years) from five primary schools in Saudi Arabia were initially recruited for this study. The inclusion criteria required children to demonstrate normal intellectual functioning and to come from Arabic-speaking families. Participants were recruited from schools serving broadly comparable communities in order to minimise large differences in home literacy exposure. Although 120 students were initially recruited, complete data were available for 110 participants; 10 cases were excluded due to missing data on one or more study measures.

All participants were right-handed. Taking handedness into account helps minimize differences in cognitive research, ensuring that findings are not affected by variations in brain

function (Oldfield, 1971). Right-handedness was recorded to maintain sample consistency, although it was not treated as an explanatory variable in the study. The restriction to right-handed participants may limit the generalisation of the findings.

Data Collection Tools

This study employed commonly used measures of early literacy translated and adapted for Arabic, including word reading efficiency, morphological judgement, rhyme recognition, phoneme deletion, phoneme blending, and picture vocabulary naming (e.g., Carlisle, 2000; Goswami & Bryant, 1990; Yopp, 1988). RF, MA, and vocabulary assessment tasks were systematically translated and adapted to Arabic to ensure construct equivalence rather than direct translation. Item selection was guided by age-appropriate lexical frequency, phonological transparency, and morphological clarity. The RF task included measuring the high frequency of early acquired words to assess decoding speed rather than vocabulary knowledge. The MA task used base-derived word pairs with unrelated distractors, for example (/dars/ ‘lesson’, /yadrus/ ‘he studies’, and /dars/, /yanːm/ ‘he sleeps’). Finally, the vocabulary task employed picture-based items representing highly familiar, concrete concepts. Specialists in Arabic linguistics and early literacy reviewed all items to confirm that they were suitable for young Arabic-speaking learners. All tasks were piloted prior to the main study, and minor revisions were made based on observed child responses, including replacing ambiguous items, clarifying instructions, and reducing task length to minimise fatigue. Example questions are provided in Appendices A–F.

All tasks were administered individually in a quiet setting, lasting approximately 30 minutes. Practice items were provided before each task. Each response received either 0 or 1 point. Considering phoneme deletion, responses were considered correct if the target phoneme was accurately removed, and the resulting form was phonologically acceptable in Arabic.

Rhyme recognition items were presented in Modern Standard Arabic (MSA) to minimise dialectal variation. In the vocabulary task, only correctly produced target words were scored as correct, and no partial credits were awarded.

Reading Fluency

In this study, RF was measured using a word-reading efficiency test adapted to Arabic by the author, which consisted of 30 words in three columns arranged on a square card. Children were instructed to read the words column-by-column as quickly and accurately as possible, skipping any words they could not read. The task was timed for one minute, and the score represented the number of words read correctly within the time limit.

The children were also informed that they could use their finger to keep track of their place in the column and that they should continue reading until instructed to stop. Each column in the word list began with a simple single-syllable word, such as ‘bear’ (دُبْ) and ‘stop’ (قِفْ) to ensure accessibility for early-grade learners.

This type of timed word-reading task is widely used in early literacy research as an indicator of reading fluency, defined as efficient and accurate word recognition under time constraints (Fuchs et al., 1989; Good et al., 2002). The test-retest reliability of the measure was .87**,** indicating good stability over time.

The composite score was calculated as the total number of correctly read words across all three columns. As this measure is a count-based performance score with a bounded range typical of early-grade word reading tasks, small SDs were expected and do not indicate restricted variance for correlational or SEM analyses.

Morphological Awareness

In this study, an MA test was used to assess the children's knowledge of the morphological relationships between 40-word pairs. After being shown each word pair, the children were asked to judge whether the second word came from the first word (i.e., whether the meanings of the two words were related) using yes-or-no responses. For example, one example of a related word pair was 'player' (لاعب) and 'play' (لعب). The Cronbach's α value for the reliability of this MA test was .798.

Phonological Awareness

Three PA tests were administered: Phoneme Deletion, Rhyme Recognition, and Blending Phonemes. In the Phoneme Deletion test (10 items), the children were asked to delete the initial sound of a word, which resulted in a non-word. For example, when removing the /m/ sound from the word 'moon', the answer would be /oon/. In the Rhyme Recognition test (10 items), the children listened to two words and were asked whether the word pair rhymed based on having the same ending sound (e.g. همس – شمس, /hæms/ – /ʃæms/, sun – whisper). Each child gave a yes-or-no response. Finally, the Blending Phonemes test (10 items) required children to synthesise or blend distinct sounds into a word (e.g. /p/ /l/ /a/ y/ for 'play'). The Cronbach's α values for the internal consistency of the three PA tests were .83, .85, and .82, respectively.

The MSA phoneme inventory was used to construct the PA tasks; hence, all stimuli were selected from high-frequency MSA vocabulary familiar to early-grade Arabic learners. Saudi Arabian children are exposed to both spoken Arabic dialects and MSA at school; therefore, the test items were chosen to minimise dialect-specific pronunciation. The chosen target phonemes were phonemically stable across Arabic dialects (e.g. /b/, /m/, /t/, /k/, /s/). The instructions and stimuli were presented orally in MSA to ensure consistency in phoneme representation across the participating children.

Vocabulary

Vocabulary was measured using a vocabulary knowledge test based on a set of 12 numbered picture cards developed by the author. The children were asked to look at each picture and complete the name of the corresponding number by supplying the missing letters. Responses were scored as 1 or 0 points for correct or incorrect answers, respectively, for a maximum score of 12 points. This test is consistent with early grade assessments designed to minimise fatigue and maintain attention among young learners. The Cronbach's α value for the internal consistency of the vocabulary test was .88. While the vocabulary test required children to complete missing letters, their successful performance primarily depended on recognising the pictured object and retrieving the corresponding lexical item rather than on spelling skills alone. At the first-grade level, such tasks are commonly interpreted as reflecting lexical knowledge through the integration of semantic and orthographic representations, including form meaning mapping and lexical retrieval processes (Nation, 2001; Ouellette, 2006; Perfetti & Hart, 2001). Research suggests that vocabulary knowledge interacts with phonological and orthographic processing in supporting word recognition and reading development.

Direct translations of standardised English instruments are not always appropriate for Arabic due to differences in orthographic structure, phonological transparency, and morphological complexity; therefore, the tasks were translated and adapted to MSA to reflect the expected literacy level of first grade Arabic learners. Item selection prioritised high-frequency vocabulary, transparent morphological structure, and age-appropriate lexical familiarity.

The adapted tasks were piloted prior to the main study with a small group of students to evaluate their clarity, developmental appropriateness, and task difficulty. Observations

during piloting led to several small changes, including clearer instructions and shorter tasks to minimise fatigue. Together, these steps helped ensure that the tasks were suitable for first-grade Arabic-speaking learners. However, formal evidence of convergent validity based on correlations with external standardised benchmarks was not collected, partly because of the limited availability of equivalent standardised Arabic measures for this age group.

Finally, the vocabulary score represents a bounded count of correctly identified lexical items rather than a continuous scale. Because the measure consisted of a limited number of developmentally appropriate items suitable for first-grade learners, relatively small SDs were expected and do not necessarily indicate limited variability for correlational or SEM analyses. Early literacy studies commonly employ brief tasks to minimise fatigue and maintain attention, particularly among young children whose lexical knowledge is still developing. Even with a relatively small SD, the measure captures meaningful differences in vocabulary ability, supporting the appropriateness of the statistical analyses.

Data Collection

Written consent form was obtained from the participants' parents prior to data collection. A letter introducing the purpose of the study was sent to the parents to explain that their children's participation was entirely voluntary and that they could terminate their participation at any time. The parents were further informed that all data collected would be anonymised and that their children's responses would remain confidential. Ethical approval was obtained from the Biomedical Research Ethics Committee of Umm Al-Qura University (approval no. HAPO-02-K-012-2025-01-2467).

Data Analysis

Descriptive statistics were calculated using M and SD. Pearson correlations were used to examine relationships among the variables. The goodness of fit of the proposed model was tested using chi-square values (χ^2), normed chi-square index (χ^2/df), root-mean-square error of approximation (RMSEA), and comparative fit index (CFI), based on SEM guidelines suggested by Hu and Bentler (1999) and Kline (2015). Path analysis was conducted using AMOS software (v. 18, IBM SPSS).

Indirect mediation effects were tested using AMOS bootstrapping procedures with 5,000 resamples and bias-corrected 95% confidence intervals (CIs). Bootstrapping was employed because indirect effects do not follow a normal sampling distribution and require resampling-based inference rather than traditional parametric tests. An indirect effect was considered statistically significant when the 95% CI did not include zero, which allowed accurate estimations of the specific indirect pathways from PA to vocabulary through MA and RF, and their sequential mediation effect.

Results

Descriptive Statistics

Descriptive statistics including M and SD were computed for each variable. Univariate normality was assessed by examining the skewness and kurtosis values for each scale. All values fell within the suggested range (±3), supporting the assumption of normality. The results are presented in Table 1. Although early-grade assessments typically yield relatively narrow score ranges, the distributions approximate normality, with no evidence of extreme skewness, kurtosis, or ceiling effects. The observed standard deviations and score ranges indicate sufficient variability for subsequent correlational and SEM analyses.

Table 1

*Descriptive Statistics for the Study Variables (*N = *110)*

Variable	M	SD	Range	Skewness	Kurtosis
Reading fluency	22.00	2.50	19–24	−0.310	0.166
Morphological awareness	32.28	4.50	29–40	−0.344	0.181
Phonological awareness	20.10	3.50	17–23	0.138	−0.756
Vocabulary	10.33	1.20	8–11	0.382	−0.572

Note. M = mean; SD = standard deviation.

Intercorrelations

Table 2 presents the intercorrelations among the study variables. All variables were significantly and positively correlated, with correlation coefficients ranging from .322 to .387 (all $p < .001$), indicating moderate associations among PA, MA, RF, and vocabulary and supporting Hypothesis 1.

Table 2

*Intercorrelations Among the Study Variables (*N = *110)*

VARIABLE	M	SD	1	2	3	4
RF	22.00	2.50	–			
MA	32.28	4.50	.322*	–		
PA	20.10	3.50	.354*	.325*	–	
VOCABULARY	10.33	1.20	.344*	.387*	.369*	–

Note. M = mean; SD = standard deviation; RF = reading fluency; MA = morphological awareness; PA = phonological awareness. *$p < .001$.

Path Analysis

Path analysis was performed to test a mediation effect model in which PA directly and indirectly predicted vocabulary through the mediating roles of MA and RF. Table 3 presents the goodness-of-fit indicators for the proposed path model and the acceptable ranges for model fit.

Table 3

Model Fit Indices for the Proposed Path Model

Fit Index	Obtained Value	Acceptable Range
χ^2 (*df*), *p*	χ^2 (40) = 52.00, $p = .097$	$p > .05$
χ^2/df	1.30	< 3.00

CFI	0.97	≥ 0.90
TLI	0.97	≥ 0.90
RMSEA	0.05	≤ 0.08
GFI	0.98	≥ 0.90

Note. χ^2 = chi-square; *df* = degrees of freedom; CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root-mean-square error of approximation; GFI = goodness of fit index.

Figure 2 presents the standardised path coefficients of the proposed mediation model, showing the direct relationships between PA, MA, RF, and vocabulary, where PA significantly predicted both MA and RF. In addition, MA significantly predicted RF and vocabulary, while RF significantly predicted vocabulary. The path coefficients of the model are presented in Table 4.

PA showed positive effects on both MA (β = .36) and RF (β = .40), indicating that higher levels of phonological awareness are associated with higher levels of morphological awareness and reading fluency within the model. In addition, MA showed positive effects on both RF (β = .39) and vocabulary (β = .40), suggesting that morphological awareness is associated with both reading fluency and vocabulary development. RF also showed a positive effect on vocabulary (β = .37), indicating that higher reading fluency is associated with stronger vocabulary performance.

Figure 2

Standardised Path Coefficients (All Paths Significant at p < *.001)*

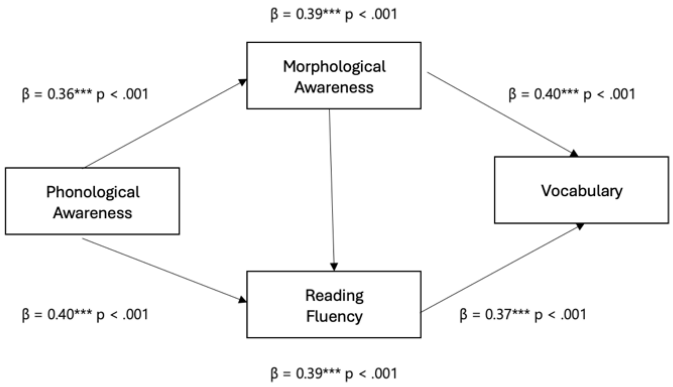


Table 4

Standardised Path Coefficients for the Proposed Mediation Model

PATH	β
PA → MA	0.36
PA → RF	0.40
MA → RF	0.39
MA → VOCABULARY	0.40
RF → VOCABULARY	0.37

Note. PA = phonological awareness; MA = morphological awareness; RF = reading fluency; β = standardised path coefficient. All paths were significant at $p < .001$.

Relationships

Table 5 presents the standardised total, direct, and indirect estimates, which were all significant ($p < .001$). Indirect effects were tested using bias-corrected bootstrapping with 5,000 resamples in AMOS software. Mediation was considered significant when the 95% CI did not include zero. The standardised estimates reported in Table 5 represent the decomposition of the total indirect effect of PA on vocabulary through MA and RF.

Table 5

Bootstrapped Indirect Effects

INDIRECT PATHWAY	STANDARDISED β	95% CI (LL)	95% CI (UL)
PA → MA → VOCABULARY	0.12	0.05	0.21
PA → RF → VOCABULARY	0.09	0.04	0.16
PA → MA → RF → VOCABULARY	0.06	0.03	0.11
TOTAL INDIRECT EFFECT	0.27		

Note. PA = phonological awareness; MA = morphological awareness; RF = reading fluency; β = standardised path coefficient; CI = confidence interval; LL = lower limit; UL = upper limit. Indirect effects are significant at $p < .05$ if the 95% CI does not include zero.

The significant indirect effects further confirm that both MA and RF mediate the relationship between PA and vocabulary. The total indirect effect (β = .27) indicates that a substantial portion of the relationship between PA and vocabulary operates through these mediating variables.

Discussion

The findings of this study show significant and positive relationships among PA, MA, RF, and vocabulary, supporting Hypothesis 1. This pattern aligns with previous research demonstrating close strong links between phonological skills, vocabulary development, and early reading performance (Carlisle, 2010; Chen et al., 2009; Gillon, 2007; Kieffer & Lesaux, 2012; Liu et al., 2017; McBride-Chang et al., 2008; Muller & Brady, 2001; Nagy et al., 2014). Similarly, Lee et al. (2023) reported moderate positive associations between morphological knowledge and vocabulary development. In particular, the findings indicate a strong and positive PA MA relationship, suggesting that children with stronger phonological processing skills also demonstrate greater sensitivity to morphological structure. This relationship may reflect the shared metalinguistic foundations underlying early literacy development, especially in a morphologically rich language such as Arabic.

The results further indicate that MA mediates the PA and vocabulary relationship, supporting Hypothesis 2. In practical terms, children with high levels of PA tended to demonstrate strong morphological skills, which were associated with better vocabulary performance. This finding is consistent with previous work suggesting that morphological

knowledge facilitates vocabulary growth by enabling learners to interpret word structure and derive meaning relationships (Sparks & Deacon, 2013). At the same time it is plausible that PA and MA develop in parallel as components of broader metalinguistic awareness, influenced by increasing exposure to written language and structured language inputs.

A similar pattern emerged for RF, which was found to mediate the relationship between PA and vocabulary, in line with Hypothesis 3. Children with stronger phonological skills demonstrated greater RF, which was associated with higher vocabulary performance. This result can be interpreted in light of the lexical quality hypothesis (Perfetti, 2007), which proposes that efficient word recognition depends on well specified lexical representations integrating phonological, orthographic, and semantic information. When lexical representations are of higher quality, word recognition becomes more automatic, which may support vocabulary development through increased exposure to print. In this sense, RF may reflect broader processing efficiency or familiarity with written language, both of which can facilitate vocabulary growth.

The mediation analysis also revealed meaningful indirect pathways linking PA to vocabulary through both MA and RF. The total indirect effect of PA on vocabulary was significant ($\beta = 0.27$). Specific indirect pathways were also significant, including through MA (PA → MA → vocabulary, $\beta = 0.12$) and RF (PA → RF → vocabulary, $\beta = 0.09$). These results suggest that both MA and RF contribute to explaining the association between PA and vocabulary. However, given the cross-sectional design, these pathways should be interpreted as statistical associations rather than causal relationships. In addition, reciprocal or alternative developmental pathways cannot be ruled out.

These findings provide evidence that PA directly and indirectly associated with vocabulary development through MA and RF in Arabic-speaking beginning readers. The

results highlight the interconnected roles of phonological processing, morphological knowledge, and word reading efficiency in supporting early literacy and Arabic vocabulary development.

The findings of this study have important implications for educators, learners, and other stakeholders, including curriculum developers and teacher trainers. The significant relationships observed among PA, MA, RF, and vocabulary suggest that early literacy instruction should support multiple linguistic skills in an integrated manner rather than treating them as isolated components. For educators, this highlights the importance of combining phonological and morphological instruction with opportunities to develop reading fluency. PA activities may help learners become more sensitive to sound structures, whereas MA activities may strengthen understanding of word formation and meaning relationships. RF may, in turn, support more efficient word recognition and vocabulary growth. For learners, the development of these complementary skills may contribute to improved reading performance and vocabulary acquisition. For curriculum designers, policymakers, and teacher educators, the findings emphasize the value of instructional activities and assessment practices that address sound awareness, word structure analysis, and reading fluency as interconnected dimensions of early literacy development.

Conclusion

This study examined the relationships between PA, MA, RF, and vocabulary in Arabic-speaking first-grade learners using path analysis. The findings support the proposed hypotheses, and indicated that PA is significantly associated with vocabulary development both directly and indirectly through MA and RF. In particular, the results highlighted the roles of MA and RF as key mechanisms through which phonological skills are linked to early vocabulary growth. Consistent with prior work, PA appears closely tied to basic decoding and

early word-level reading, whereas MA and RF are more strongly related to vocabulary and fluent text reading. Together, these findings suggest that early literacy development is shaped by multiple interacting linguistic processes rather than by a single skill operating independently.

The findings contribute to the theoretical understanding of early literacy development by providing further evidence for the interconnected nature of phonological processing, morphological knowledge, and reading fluency in supporting vocabulary acquisition. While some previous studies have examined PA, MA, vocabulary, and reading outcomes together, integrated models that include PA, MA, RF, and vocabulary especially in Arabic remain limited. The present study contributes to this literature by exploring these skills within a single analytical framework and by clarifying how PA may influence vocabulary development both directly and indirectly through MA and RF during the early stages of reading acquisition.

From a pedagogical perspective, the results suggest that early literacy instruction may benefit from addressing these skills in an integrated manner. Supporting phonological processing, developing MA, and promoting RF should be viewed as complementary rather than isolated goals. Finally, the present findings provide a foundation for future research to explore how these relationships evolve over time and across different linguistic and educational contexts, and to test more comprehensive models of early Arabic literacy.

Limitations and Recommendations

This study has several limitations that should be taken into account when interpreting the findings. First, the cross-sectional design limits the ability to make strong conclusions about the relationships among MA, RF, PA, and vocabulary development. Although path analysis

can show statistical relationships between variables, it cannot determine causal effects or explain the direction of influence between these skills. Therefore, the results should be understood as associations rather than evidence of cause-and-effect relationships.

Another limitation concerns the characteristics of the sample. The participants were drawn from a relatively homogeneous group of Arabic-speaking children, which may limit the generalisability of the findings to learners from different linguistic, educational, or social backgrounds. In addition, only right-handed children were included in the study. While this helped maintain consistency in the sample, it may reduce the extent to which the findings apply to more diverse populations.

Given the cross-sectional and correlational nature of the study, the results should be interpreted as indicating relationships among variables rather than instructional effectiveness. It is also possible that alternative developmental patterns or reciprocal relationships exist among PA, MA, RF, and vocabulary, as these skills often develop together during early literacy learning.

To address these limitations and deepen our understanding of the relationships among PA, MA, RF, and vocabulary, future research should adopt longitudinal designs. Tracking children over several years would allow researchers to examine the developmental changes in these relationships and determine whether their strength or nature shifts over time. Studies incorporating larger and more diverse samples are also needed to enhance the generalisability of the findings.

In addition, although the RF and vocabulary measures were conceptually informed by widely used early literacy assessment paradigms, formal evidence of convergent (criterion-related) validity through correlations with established external benchmarks was not collected

in the present study. Specifically, the RF task was designed following principles similar to timed word recognition measures, such as the TOWRE, while the vocabulary task drew on features commonly used in picture-based receptive vocabulary assessments, such as the PPVT. Because the equivalent standardised Arabic measures appropriate for first-grade learners are limited, direct statistical comparison with externally validated instruments was not feasible within the scope of the current study. Consequently, the absence of formal convergent validity evidence should be considered when interpreting the findings. Future research should examine criterion-related validity by correlating scores from the adapted measures with standardised literacy assessments, curriculum-based measures, or teacher ratings of reading and vocabulary ability.

In addition, the measure used to assess vocabulary in this study, a picture-based task requiring children to supply missing letters, may introduce task impurity. Although the task was designed to assess lexical knowledge, performance also depends on developing spelling and orthographic abilities. This consideration is especially relevant for first-grade learners, whose lexical and orthographic skills are still developing and may not yet be clearly separable. As a result, the vocabulary measure used in this study may capture a broader combination of lexical and orthographic knowledge rather than reflecting oral vocabulary alone. Future studies may benefit from replicating these results using an exclusively oral vocabulary assessment, such as picture naming or definition tasks, to determine whether the same pattern of relationships emerges across different measurement formats. If comparable results are obtained, confidence in the robustness of the findings would increase; however, differences in outcomes may suggest that part of the effect relates to the orthographic characteristics of the task.

Finally, future research may benefit from examining these relationships across different linguistic and instructional contexts. Variations in instructional practices or structural features of the target language may help explain the inconsistencies reported in earlier research regarding the strength of associations between PA and vocabulary development. Investigations conducted in multilingual or bidialectal environments may further clarify how these literacy components interact under diverse language exposure conditions.

Declaration of Generative AI and AI-Assisted Technologies

During the preparation of this manuscript, ChatGPT (GPT-4) was used in limited sections solely for language editing and proofreading to improve clarity and readability. The tool was not used to generate research data, conduct statistical analyses, interpret findings, or develop the theoretical framework. The author remains fully responsible for the study design, data analysis, interpretation of results, and all final content presented in the manuscript.

Bio

Dr. Amirah Saud Alharbi is an Assistant Professor of Bilingualism and Linguistics at Umm Al-Qura University, Saudi Arabia. She holds a PhD in Bilingualism and Linguistics from Bangor University, United Kingdom. Her research interests include bilingualism, second language acquisition, phonetics and phonology, bilingual language processing, psycholinguistics, and applied linguistics.

References

Abdul Khalik, A. S. (2014). The effectiveness of a phonological awareness training intervention on phonological working memory of children with intellectual disabilities. *Psycho-Educational Research Reviews*, *3*(1), 50–55. https://perrjournal.com/index.php/perrjournal/article/view/368

Abu–Rabia, S. (2002). Reading in a root-based-morphology language: The case of Arabic. *Journal of Research in Reading*, *25*(3), 299-309.

Abu-Rabia, S. (2007). The role of morphology and short vowelization in reading Arabic among normal and dyslexic readers in grades 3, 6, 9, and 12. *Journal of Psycholinguistic Research*, *36*(2), 89–106. https://doi.org/10.1007/s10936-006-9035-6

Abu-Rabia, S., Share, D., & Mansour, S. M. (2003). Word recognition and basic cognitive processes among reading disabled and normal readers of Arabic. *Reading and Writing*, *16*, 423–442. https://doi.org/10.1023/A:1024237415143

Abu-Rabia, S., & Siegel, L. S. (2003). Reading skills in three orthographies: The case of trilingual Arabic–Hebrew–English-speaking Arab children. *Reading and Writing, 16*(7), 611–634. https://doi.org/10.1023/A:1025838029204

Ahmed, Y., Kent, S. C., & Keller-Margulis, M. (2023). Reading-to-Writing Mediation model of higher-order literacy. *Frontiers in Psychology*, *14*, 1033970. https://doi.org/10.3389/fpsyg.2023.1033970

Banna, A. E. S. (2019). The effects of multiple intelligences training program on improving reading comprehension skills of reading of the disabled primary six students. *Psycho-Educational Research Reviews*, *8*(1), 64–69. https://perrjournal.com/index.php/perrjournal/article/view/194

Bin Sawad, N., Law, J. M., Tibi, S., & Boese, K. (2022). Arabic metalinguistic knowledge predicts reading comprehension: A scoping review. *Frontiers in Communication*, *7*. https://doi.org/10.3389/fcomm.2022.984340

Bowers, P. G., & Newby-Clark, E. (2002). The Role of Naming Speed within a Model of Reading Acquisition. Reading and Writing: An Interdisciplinary Journal, 15, 109-126. http://dx.doi.org/10.1023/A:1013820421199

Carlisle, J. F. (2000). Awareness of the structure and meaning of morphologically complex words: Impact on reading. *Reading and Writing: An Interdisciplinary Journal*, *12*(3-4), 169–190. https://doi.org/10.1023/A:1008131926604

Carlisle, J. F. (2010). Effects of instruction in morphological awareness on literacy achievement: An integrative review. Reading Research Quarterly, 45(4), 464–487. https://doi.org/10.1598/RRQ.45.4.5

Carroll, J. M., Snowling, M. J., Stevenson, J., & Hulme, C. (2003). The development of phonological awareness in preschool children. *Developmental Psychology, 39*(5), 913–923. https://doi.org/10.1037/0012-1649.39.5.913

Casalis, S. (2001). Morphological awareness and phonological awareness in the onset of literacy. *Research on child language acquisition*, 209-223.

Casalis, S., & Louis-Alexandre, M. F. (2000). Morphological analysis, phonological analysis and learning to read French: A longitudinal study. *Reading and Writing*, *12*(3-4), 303–335.

Chen, X., Hao, M., Geva, E., Zhu, J., & Shu, H. (2009). The role of compound awareness in Chinese children's vocabulary acquisition and character reading. *Reading and Writing*, *22*, 615–631. https://doi.org/10.1007/s11145-008-9127-9

Cheng, Y., Wang, J., & Wu, X. (2018). The role of morphological awareness in Chinese children's reading comprehension: The mediating effect of word reading fluency. *Acta Psychologica Sinica*, *4*, 413–425.

Chow, B. W.-Y., McBride-Chang, C., & Burgess, S. (2005). Phonological processing skills and early reading abilities in Hong Kong Chinese kindergartners learning to read English as a second language. *Journal of Educational Psychology*, *97*(1), 81–87. https://doi.org/10.1037/0022-0663.97.1.81

Clayton, F. J., West, G., Sears, C., Hulme, C., & Lervåg, A. (2019). *A longitudinal study of early reading development: Letter-sound knowledge, phoneme awareness and RAN, but not letter-sound integration, predict variations in reading development*. *Scientific Studies of Reading, 23*(2), 91–107. https://doi.org/10.1080/10888438.2019.1622546

Cunningham, A. J., & Carroll, J. M. (2015). Early predictors of phonological and morphological awareness and the link with reading: Evidence from children with different patterns of early deficit. *Applied Psycholinguistics*, *36*(3), 509–531. https://doi.org/10.1017/S0142716413000295

Deacon, S. H., & Kirby, J. R. (2004). Morphological awareness: Just "more phonological"? The roles of morphological and phonological awareness in reading development. *Applied Psycholinguistics*, *25*(2), 223–238.

Desrochers, A., Manolitsis, G., Gaudreau, P., & Georgiou, G. (2018). Early contribution of morphological awareness to literacy skills across languages varying in orthographic consistency. *Reading and Writing: An Interdisciplinary Journal, 31*(7), 1695–1719. https://doi.org/10.1007/s11145-017-9772-y

Eissa, M. A. (2013). The effectiveness of a phonological awareness training intervention on pre-reading skills of children with mental retardation. *Psycho-Educational Research Reviews*, *2*(2), 11–21. https://perrjournal.com/index.php/perrjournal/article/view/377

Eissa, M. A. (2014). The effect of a phonological awareness intervention program on phonological memory, phonological sensitivity, and metaphonological abilities of preschool children at-risk for reading disabilities. *Psycho-Educational Research Reviews*, *3*(2), 71–83. https://perrjournal.com/index.php/perrjournal/article/view/359

Eissa, M. A. (2017). Are phonological awareness intervention programs effective for children with disabilities? A systematic review. *Psycho-Educational Research Reviews, 6*(3), 11–23. https://perrjournal.com/index.php/perrjournal/article/view/259

Elbro, C., & Arnbak, E. (1996). The role of morpheme recognition and morphological awareness in dyslexia. *Annals of Dyslexia*, *46*(1), 209–240. https://doi.org/10.1007/BF02648177

Elhoweris, H. (2017). The impact of repeated reading intervention on improving reading fluency and comprehension of Emirati students with learning disabilities. *Psycho-Educational Research Reviews*, *6*(2), 36–48. https://perrjournal.com/index.php/perrjournal/article/view/274

Fielding-Barnsley, R., & Purdie, N. M. (2005). Teachers' attitude to and knowledge of metalinguistics in the process of learning to read. Asia-Pacific Journal of Teacher Education, 33(1), 65–76.

Fracasso, L. E., Bangs, K., & Binder, K. S. (2016). The contributions of phonological and morphological awareness to literacy skills in the adult basic education population. *Journal of Learning Disabilities*, 49(2), 140–151. https://doi.org/10.1177/0022219414538513

Fuchs, L. S., Fuchs, D., & Hamlett, C. L. (1989). Effects of instrumental use of curriculum-based measurement to enhance instructional programs. *Remedial and Special Education*, *10*(2), 43–52.

Fuchs, L. S., Fuchs, D., Hosp, M. K., & Jenkins, J. R. (2001). Oral reading fluency as an indicator of reading competence: A theoretical, empirical, and historical analysis. *Scientific Studies of Reading*, *5*, 239–256. https://doi.org/10.1207/S1532799XSSR0503_3

Giazitzidou, S., & Padeliadu, S. (2022). Contribution of morphological awareness to reading fluency of children with and without dyslexia: Evidence from a transparent orthography. *Annals of Dyslexia*, *72*(3), 509–531. https://doi.org/10.1007/s11881-022-00267-z

Gillon, G.T. (2007). *Phonological awareness: From research to practice*. Guilford Press.

González, J. E. J., & del Rosario Ortiz González, M. (2000). Metalinguistic awareness and reading acquisition in the Spanish language. *Spanish Journal of Psychology*, *3*, 37–46. https://doi.org/10.1017/S1138741600005527

Good, R. H., Gruba, J., & Kaminski, R. A. (2002). Best practices in using dynamic indicators of basic early literacy skills (DIBELS) in an outcomes-driven model. In A. Thomas & J. Grimes (Eds.), *Best practices in school psychology IV* (pp. 699–720). National Association of School Psychologists.

Görgen, R., De Simone, E., Schulte-Körne, G., & Moll, K. (2021). Predictors of reading and spelling skills in German: The role of MA. *Journal of Research in Reading*, *44*(1), 210–227. https://doi. org/10.1111/1467-9817.12343

Goswami, U., & Bryant, P. (1990). *Phonological skills and learning to read.* Lawrence Erlbaum Associates, Inc.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Justi, F. R. d. R., de Oliveira, B. S. F., & Justi, C. N. G. (2023). The relationship between morphological awareness and word reading in Brazilian Portuguese: A longitudinal study. *Psicol. Refl. Crít.*, *36*, Article 4. https://doi.org/10.1186/s41155-022-00245-9

Kieffer, M. J., & Lesaux, N. K. (2012). Development of morphological awareness and vocabulary in Spanish-speaking language minority learners: A parallel process latent growth curve model. *Applied Psycholinguistics*, *33*, 23–54. https://doi.org/10.1017/S0142716411000099

Kirby, J. R., Deacon, S. H., Bowers, P. N., Izenberg, L., Wade-Woolley, L., & Parrila, R. (2012). Children's morphological awareness and reading ability. *Reading and Writing*, *25*, 389–410. https://doi.org/10.1007/s11145-010-9276-5

Kline, R. B. (2015). Principles and Practice of Structural Equation Modeling (4th ed.). Guilford Press.

Kumar, K. K., Chand, S. P., Ali, R., & Kumar, S. L. (2025). Investigating students' leisure-time reading preferences in upper primary classrooms in Fiji. *International Electronic Journal of Elementary Education, 17*(4). https://doi.org/10.26822/iejee.2025.396

Kuo, L., & Anderson, R. C. (2006). Morphological awareness and learning to read: A cross-language perspective. *Educational Psychologist*, *41*(3), 161–180.

Lee, J. W., Wolters, A., & Grace Kim, Y.-S. (2023). The relations of morphological awareness with language and literacy skills vary depending on orthographic depth and nature of morphological awareness. *Review of Educational Research*, *93*(4), 528–558. https://doi.org/10.3102/00346543221123816

Liu, D., Li, H., & Wong, K. S. R. (2017). The anatomy of the role of morphological awareness in Chinese character learning: The mediation of vocabulary and semantic radical knowledge and the moderation of morpheme family size. *Scientific Studies of Reading*, *21*(3), 210–224. https://doi.org/10.1080/10888438.2017.1278764

Mahfoudhi, A., Elbeheri, G., Al-Rashidi, M., & Everatt, J. (2010). The role of morphological awareness in reading comprehension among typical and learning disabled native Arabic speakers. *Journal of learning disabilities*, *43*(6), 500-514.

Manolitsis, G., Grigorakis, I., & Georgiou, G. (2017). The longitudinal contribution of early morphological awareness skills to reading fluency and comprehension in Greek. *Frontiers in Psychology*, *8*, 1793. https://doi.org/10.3389/fpsyg.2017.01793

McBride-Chang, C., Cho, J.-R., Liu, H., Wagner, R. K., Shu, H., Zhou, A., Cheung, H., & Muse, A. (2005). Changing models across cultures: Associations of phonological awareness and morphological structure awareness with vocabulary and word recognition in second graders from Beijing, Hong Kong, Korea, and the United States. *Journal of Experimental Child Psychology, 92*(2), 140–160. https://doi.org/10.1016/j.jecp.2005.03.009

McBride-Chang, C., Tardif, T., Cho, J., Shu, H., Fletcher, P., Stokes, S. F., Wong, A., & Leung, K. (2008). What's in a word? Morphological awareness and vocabulary knowledge in three languages. *Applied Psycholinguistics*, *29*(3), 437–462.

Milankov, V., Golubović, S., Krstić, T., & Golubović, Š. (2021). *Phonological awareness as the foundation of reading acquisition in students reading in transparent orthography*. *International Journal of Environmental Research and Public Health, 18*(10), 5440. https://doi.org/10.3390/ijerph18105440

Muller, K., & Brady, S. (2001). Correlates of early reading performance in a transparent orthography. *Reading and Writing: An Interdisciplinary Journal*, *14*, 757–799. https://doi.org/10.1023/A:1012217704834

Nagy, W. E., & Anderson, R. C. (1984). The number of words in printed school English. *Reading Research Quarterly*, *19*, 304–330.

Nagy, W. W., Carlisle, J. F., & Goodwin, A. P. (2014). Morphological knowledge and literacy acquisition. *Journal of Learning Disabilities*, *47*(1), 3–12. https://doi.org/10.1177/0022219413509967

Nation, I. S. P. (2001). *Learning vocabulary in another language*. Cambridge University Press.

National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction*. National Institute of Child Health and Human Development.

Nithart, C., Demont, E., Metz-Lutz, M.-N., Majerus, S., Poncelet, M., & Leybaert, J. (2011). *Early contribution of phonological awareness and later influence of phonological memory throughout reading acquisition*. *Journal of Research in Reading, 34*(4), 346–363. https://doi.org/10.1111/j.1467-9817.2009.01427.

Oldfield, R. C. (1971). The assessment and analysis of handedness: The Edinburgh inventory. Neuropsychologia, 9(1), 97-113.

Oliveira, M., Levesque, K. C., Deacon, S. H., & Mota, M. M. P. E. (2020). Evaluating models of how morphological awareness connects to reading comprehension: A study in Portuguese. *Journal of Research in Reading*, *43*(2), 161–179. https://doi.org/10.1111/1467-9817.12296

Ouellette, G. P. (2006). What's meaning got to do with it: The role of vocabulary in word reading and reading comprehension. *Journal of Educational Psychology*, *98*(3), 554–566. https://doi.org/10.1037/0022-0663.98.3.554

Pamuk, S., Alıcı, D., Aktaş, M., Selvi, H., & Uzun, N. B. (2023). An investigation of variables predicting the reading literacy in PISA 2018. *Psycho-Educational Research Reviews*, *12*(1), 338–349. https://doi.org/10.52963/PERR_Biruni_V12.N1.21

Perfetti, C. (2007). Reading ability: Lexical quality to comprehension. *Scientific Studies of Reading*, *11*(4), 357–383. https://doi.org/10.1080/10888430701530730

Perfetti, C. A., & Hart, L. (2001). The lexical basis of comprehension skill. In D. S. Gorfein (Ed.), *On the consequences of meaning selection: Perspectives on resolving lexical ambiguity* (pp. 67–86). American Psychological Association. https://doi.org/10.1037/10459-004

Rasinski, T. V. (2004). Creating fluent readers. *Educational Leadership*, 61(6), 46–51

Saiegh-Haddad, E. (2003). Linguistic distance and initial reading acquisition: The case of Arabic diglossia. *Applied Psycholinguistics*, *24*(3), 431–451.

Saiegh-Haddad, E. (2017). Impact of diglossia on word and non-word repetition among language impaired and typically developing Arabic native speaking children. *Frontiers in Psychology*, *8*. https://doi.org/10.3389/fpsyg.2017.02010

Saiegh-Haddad, E. (2018). MAWRID: A model of Arabic word reading in development. *Journal of Learning Disabilities*, *51*(5), 454–462.

Saiegh-Haddad, E., & Geva, E. (2008). Morphological awareness, phonological awareness, and reading in English–Arabic bilingual children. *Reading and Writing*, *21*(5), 481–504.

Saiegh-Haddad, E., & Schiff, R. (2024). Diglossic and orthographic features of reading comprehension in Standard Arabic: The primacy of the spoken language. *Reading Research Quarterly*. https://doi.org/10.1002/rrq.598

Schiff, R., & Saiegh-Haddad, E. (2018). Development and relationships between phonological awareness, morphological awareness and word reading in spoken and standard Arabic. *Frontiers in Psychology*, *9*. https://doi.org/10.3389/fpsyg.2018.00356

Shankweiler, D., Crain, S., Katz, L., Fowler, A. E., Liberman, A. M., Brady, S. A., & Shaywitz, B. A. (1995). Cognitive profiles of reading-disabled children: Comparison of language skills in phonology, morphology, and syntax. *Psychological Science*, *6*(3), 149–156.

Silverman, R. D., Speece, D. L., Harring, J. R., & Ritchey, K. D. (2013). Fluency has a role in the simple view of reading. *Scientific Studies of Reading*, *17*, 108–133. https://doi.org/10.1080/10888438.2011.618153

Siok, W. T., & Fletcher, P. (2001). The role of phonological awareness and visual-orthographic skills in Chinese reading acquisition. *Developmental Psychology*, *37*(6), 886–899.

Sparks, E., & Deacon, S. H. (2013). Morphological awareness and vocabulary acquisition: A longitudinal examination of their relationship in English-speaking children. *Applied Psycholinguistics*, *36*(2), 299–321. https://doi.org/10.1017/S0142716413000246

Taha, H., & Saiegh-Haddad, E. (2017). Morphology and spelling in Arabic: Development and interface. *Journal of Psycholinguistic Research*, *46*(1), 27–38. https://doi.org/10.1007/s10936-016-9425-3

Tibi, S. (2010). Developmental hierarchy of Arabic phonological awareness skills. *International Journal of Special Education*, *25*(1), 27–33.

Tibi, S., & Kirby, J. R. (2018). Investigating phonological awareness and naming speed as predictors of reading in Arabic. *Scientific Studies of Reading*, *22*(1), 70–84.

Tong, X., Deacon, S. H., Kirby, J. R., Cain, K., & Parrila, R. (2011). Morphological awareness: A key to understanding poor reading comprehension in English. *Journal of Educational Psychology*, *103*(3), 523–534. https://doi.org/10.1037/a0023495

Torgesen, J. K., Wagner, R. K., & Rashotte, C. A. (1994). *Longitudinal studies of phonological processing and reading*. *Journal of Learning Disabilities, 27*(5), 276–286. https://doi.org/10.1177/002221949402700503

Tortorelli, L. S., & Truckenmiller, A. J. (2023). Automaticity in writing in response to reading: Relations between oral reading fluency and compositional writing fluency in grades 3–5. *Reading & Writing Quarterly, 39*(2), 1–15. https://doi.org/10.1080/10573569.2023.2172757

Vaknin-Nusbaum, V., & Saiegh-Haddad, E. (2020). The contribution of morphological awareness to reading comprehension in Arabic-speaking second graders. *Reading and Writing: An Interdisciplinary Journal, 33*(10), 2413–2436. https://doi.org/10.1007/s11145-020-10048-y

Yassin, R., Share, D. L., & Shalhoub-Awwad, Y. (2020). Learning to spell in Arabic: The impact of script-specific visual-orthographic features. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.02059

Yopp, H. K. (1988). The validity and reliability of phonemic awareness tests. *Reading Research Quarterly*, *23*(2), 159–177. https://doi.org/10.2307/747800

Zhang, D., Koda, K., Leong, C. K., & Pang, E. (2019). Cross-lagged panel analysis of reciprocal effects of morphological processing and reading in Chinese in a multilingual context. *Journal of Research in Reading*, *42*(1), 58–79. https://doi.org/10.1111/1467-9817.12135

Appendices

Appendix A – Reading Fluency Task

اختبار كفاءة القراءة بالكلمات

التعليمات: اقرأ الكلمات بالترتيب، ولكن إذا وصلت إلى كلمة لا تستطيع قراءتها، قم بتخطيها وانتقل إلى الكلمة التالية:

مثال: دب، قف، قم، كتاب، احمر، كرة قدم.....

أسد قَلَمٌ مكة

كَتَبَ	رَسَمَ	حَفَرَ
وَلد	بِنْت	طَيْر

Administration procedure

The child is seated comfortably in a quiet room.

The examiner says:

‘Read the words in order. If you don’t know a word, skip it and go to the next one.’

The child reads aloud for **60 seconds**.

The examiner follows on a scoring sheet.

Scoring

Measure	**How to score**
Correct word	1 point
Misread word	0 point
Skipped word	0 point
Self-correction within 3 seconds	1 point

Total score = number of correct words read in 60 seconds.

Appendix B – Morphological Awareness Test

هل الكلمة الثانية مشتقة من الكلمة الأولى؟
انظر إلى الكلمتين. هل الكلمة الثانية من نفس عائلة الكلمة الأولى؟ ضع علامة (✓) في المكان الصحيح

مثال: كلمة: درس - يدرس (نعم)
كلمة: درس – ينام (لا)

الكلمة الاولى	الكلمة الثانية	نعم	لا
كتب	كتاب	☐	☐
لعب	لاعب	☐	☐
شرب	مشروب	☐	☐
علم	معلم	☐	☐
زرع	مزارع	☐	☐
بيت	باب	☐	☐
ولد	بنت	☐	☐

Administration procedure

Examiner says:

"Look at the two words. Are they from the same family? If yes, say yes. If not, say no."

No time limit. No help.

Scoring

Response	Score
Correct judgement	1 point
Incorrect judgement	0 point

Total score = number of correct answers (out of 40)

Appendix C – Phonological Awareness Test

اختبار التعرّف على السجع (القافية)
التعليمات (شفهيا)

سأقول لك كلمتين. هل تنتهيان بنفس الصوت؟ قل نعم أو لا

مثال:
قط — بط = نعم
فرس — خيل =لا

الكلمتان	نعم	لا
دار — نار	☐	☐
باب — ذباب	☐	☐
نور — دور	☐	☐
جمل — حمل	☐	☐
عين — غين	☐	☐
تفاح — مفتاح	☐	☐
كتاب — سحاب	☐	☐
ليل — جميل	☐	☐
قمر — شجر	☐	☐
كرسي — قلم	☐	☐
بحر — نهر	☐	☐
موز — بيت	☐	☐
شمس — أمس	☐	☐
صوت — حوت	☐	☐
رمل — جمل	☐	☐

Administration procedure

- Words are presented **orally only**.
- Examiner says:

‘Do these two words end with the same sound?’

Scoring

Response	Score
Correct	1 point
Incorrect	0 point

Total score = number of correct rhyme judgements

Appendix D – Vocabulary Test

اختبار المفردات بالصور

التعليمات:

انظر إلى الصورة واكتب الكلمة في المربعات

	الكلمة	الصورة
١	م---لم	
٢	كت....ب	
٣	طل.....ب	
٤	ق....م	
٥	ك.....ة	

الصور التي تناسب هذه الكلمات

- معلم
- كتاب
- طلاب
- قلم
- كرة

Child sees the picture and names it.

Scoring

Response	Score
Correct word	1 point
Incorrect / no response	0 point

Appendix E – Vocabulary Test

اختبار دمج الأصوات (Blending Phonemes)

التعليمات (شفهيًا)

سأقول الكلمة مفصّلة إلى أصوات اجمعها وقل الكلمة

مثال تدريبي:

ب/ /ي/ /ت/ ← بيت/

الكلمة	الأصوات
_____	/ق/ /ل/ /م/
_____	/ش/ /م/ /س/
_____	/ن/ /ا/ /ر/
_____	/ر/ /م/ /ل/
_____	/ج/ /م/ /ل/

Administration procedure

Examiner says the sounds slowly:

/b/ … /a/ … /t/

Child must say the whole word.

Scoring

Response	Score
Correct blended word	1 point
Incorrect	0 point

Total score = number of correct blended words

Appendix F – Phoneme Deletion

أولًا: اختبار حذف الصوت الأول(Phoneme Deletion)

التعليمات (شفهيًا)

سأقول لك كلمة احذف الصوت الأول وقل الكلمة من دونه

مثال تدريبي:

باب بدون ب = اب

الكلمة	الإجابة
نور	_____
سمك	_____
قلم	_____
نار	_____

Scoring

Response	Score
Correct blended word	1 point
Incorrect	0 point