Revista de Psicodidáctica, 2020, 25 (2), 158–165

psicodidáctica

Revista de Psicodidáctica

www.elsevier.es/psicod

Original

Reading rate in Spanish-speaking students: A meta-analysis☆

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ARTICLE INFO

Article history:
Received 28 July 2019
Accepted 15 January 2020
Available online 2 March 2020

Keywords:
Elementary school
Meta-analysis
Reading fluency
Reading rate
Spanish
Secondary school.

ABSTRACT

Reading rate is a measure related to reading comprehension, especially in languages with a transparent orthography such as Spanish. In spite of its potential for the follow-up of student reading learning or for the detection of dyslexia, there are few references that indicate the *reading speed* in Spanish in the different grades. In this work a meta-analysis is carried out to synthesize the available information and to detect which variables influence the *reading speed*. In this meta-analysis 45 publications are located that offer 113 measures of reading aloud and 54 of silent reading. The grade accounts for around 70% of the variance of *reading rate* results. The results are very heterogeneous and none of the variables chosen as moderators can explain this heterogeneity. However, moderator analysis show results that indicate a lower *reading speed* in Spanish American students than in Spanish students, lower *speed* in *correct word per minute* measurements than in *word per minute measurements*, and differences, at least in the early Elementary courses, according to the term in which the measurement is made. The meta-analysis offers the combined *reading rate data aloud and silently* from the first Elementary Education course to High School Juniors. In a few cases, these references can be broken down by terms. In comparison with other sources, it is surprising that those obtained here indicate slower *speeds* than those estimated in English.

Velocidad lectora en alumnado hispanohablante: un meta-análisis

Palabras clave:
Educación primaria
Educación secundaria
Español
Fluidez lectora
Meta-análisis
Velocidad lectora.

RESUMEN

La *velocidad lectora* es una medida relacionada con la comprensión lectora, especialmente en idiomas con una ortografía transparente como el español. A pesar de su potencial para el seguimiento del aprendizaje lector del alumnado o la detección de la dislexia, existen pocas referencias que indiquen la *velocidad lectora* en español en los distintos cursos escolares. En este trabajo se realiza un meta-análisis para sintetizar la información disponible y detectar qué variables influyen en la *velocidad lectora*. En él se localizan 45 publicaciones que ofrecen 113 medidas de lectura en voz alta y 54 de lectura silenciosa. El curso da cuenta de en torno al 70% de la varianza de los resultados de *velocidad lectora*. Los resultados son muy heterogéneos y ninguna de las variables elegidas como moderadores alcanza a explicar esta heterogeneidad. No obstante, se encuentran resultados que indican una menor *velocidad lectora* en el alumnado hispanoamericano que en el alumnado español, menor *velocidad* en mediciones de *palabras correctas por minuto* que en mediciones de *palabras por minuto*, y diferencias, al menos en los primeros cursos de primaria, según el trimestre en que se realiza la medición. El meta-análisis ofrece los datos combinados de *velocidad lectora en voz alta y silenciosa* desde el primer curso de Educación Primaria hasta el primer curso de Bachillerato. En unos pocos casos, estas referencias se pueden desglosar por trimestres. En la comparación con otras fuentes sorprende que las obtenidas aquí indican *velocidades* más lentas que las que se estiman en inglés.

PII of original article:S1136-1034(20)30002-2.
☆ Please cite this article as: Ripoll Salceda JC, Tapia Montesinos MM, Alonso GA. Velocidad lectora en alumnado hispanohablante: un meta-análisis. Revista de Psicodidáctica, 2020;25:158–165. https://doi.org/10.1016/j.psicod.2020.01.002
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Introduction

We consider *reading rate* as the amount of written information that people can process in a given time. The amount of information is usually measured according to the number of words, syllables or letters that are processed. Since 19th century (Venezky, 2002), scientific research of reading considered sometimes the *reading speed* as a variable of interest and other times as a mean to know more about the processes that make reading possible. Currently, reading fluency includes three main components: accuracy, *speed* and prosody (expression) (Hudson, Lane, & Pullen, 2005) and it is common to find studies in which reading fluency is the combination of accuracy and *speed* or just *reading rate*.

In English, the correlation between reading comprehension and *reading rate* is 0.65 if we measure the *reading speed* using a list of words and 0.48 if we use word reading in context (García & Cain, 2014). As well, a correlation of 0.67 was found between the number of *words read correctly per minute* (CWpM) and comprehension test (Reschly, Busch, Betts, Deno, & Long, 2009). For transparent orthographies, the correlation between *reading rate* and reading comprehension is 0.60 in younger groups and 0.48 for older groups (Florit & Cain, 2011). Further, in this type of orthography, the correlation between *reading rate* and reading comprehension is greater than the relationship between reading accuracy and reading comprehension since the domain of the alphabetic code is reached quite rapidly at the earlier ages (Borleffs, Maassen, Lyytinen, & Zwarts, 2018). In Spanish, high levels of accuracy in word reading are reached at the beginning of elementary education. On the other hand, *reading rate* continues developing throughout that stage (Castejón, González-Pumariega, & Cuetos, 2015). In line with the above, poor performance in *reading rate* seems to be the most relevant deficit of dyslexic students of Spanish orthography or other transparent orthographies such as Italian or German (Serrano & Defior, 2008).

It seems to be a reciprocal influence between CWpM and reading comprehension, with stronger effects from *reading rate* to comprehension than from comprehension to *reading rate* (Little et al., 2017). In addition, interventions for improving *reading rate* or reading fluency also produce improvements in reading comprehension in students with learning disabilities (Stevens, Walker, & Vaughn, 2017), however, these improvements seem to be mitigated in medium or long term follow-up measures (Suggate, 2016) and are not linear relations: increases of more than 35–90 words per minute do not contributed to reading comprehension improvement of students in 2nd and 4th grade of elementary education with low *reading rate* (O'Connor, 2018). It should be noted that reading comprehension depends not only on decoding written input but also on linguistic comprehension (Nation, 2019).

The Spanish Curriculum establishes that at the end of elementary education, students must be able to read aloud different types of texts according to their age, with appropriate *speed,* fluency and intonation, to decode all kinds of words accurately and quickly or to read silently, with the appropriate *speed*, texts of different complexity (Real Decreto, 126/2014, of February, 28th). On the other hand, the modulation of the voice in reading was the only reference about *speed* or fluency for secondary education (Real Decreto, 1105/2014, of December 26th).

However, there is a considerable lack of knowledge about the *speed* Spanish speakers of different ages read. One reason may be that *reading rate* is measured in different ways. The instruments usually used are lists of words or unconnected pseudowords or texts. We can measure how much time it takes to read the stimuli (for example, seconds spent reading a text, or average milliseconds used to read each word) or the quantity of material to be read in a given time (for example, number of *words read per minute* (WpM) or *words correct per minute* (CWpM). Keep in mind that reading can be done aloud or silently.

Another reason is that there are no general references of *reading rate*. There are several reading tests that provide measurement *reading speed*, but these are only valid for the assessments made with the materials of each test. Instead, in English, there are compiled references, such as those of Hasbrouck and Tindal for oral reading (1992, 2006, Hasbrouck and Tindal, 20172017), which have been obtained data of different references and are divided by trimester within each grade. In silent reading it is common (Hiebert, Samuels, & Rasinski, 2012) to use the references of Taylor (1965), made with data from 12143 students, collected in the mid-twentieth century. They only include data from participants with at least 70% of understanding a text.

In Spanish we have some r*eading rate* references published by the Ministry of Public Education of Mexico (Secretaría de Educación Pública de México, 2010), whose origin they do not specify and seems to have been elaborated artificially, due to the regularity of their ranges. It is also possible to find a reference data attributed to the Ministry of Education of Chile (Red Educacional Crecemos, 2012), also, of uncertain origin. Another set of references are the *Proves Pedagògiques* Galí (Català, 2013), which offer references of each school term of *reading speed* in Spanish, with insufficient methodological information.

There is an unpublished meta-analysis of Brysbaert (2019) that indicates that the average oral *reading rate* for adults, in English, is 183 WpM. And the average silent *reading rate* is 238 WpM for non-fiction and 260 WPM for fiction texts. In this meta-analysis, some studies in Spanish with adult readers are also included. Six studies on *reading* aloud *rate* offer a combined result of 191 WpM and another six studies on silent *reading rate* give a combined result of 278 WpM. Brysbaert does not provide references for these studies.

With the objective of organizing the available information about r*eading rate* of Hispanic American students of elementary and secondary education, a meta-analysis of the studies that offer *reading rate* data aloud or silent is carried out. A primary aim of the present study was to estimate the average of *reading rate* reached in each grade and in each school trimester, both in reading aloud and in silent reading. A further aim was to provide information about some elements that could affect *reading rate* such as: type of study, time of assessment, country, type of school, type of test, type of measure or reading with aids.

Initially, it is considered that the school year and each trimester influence on the *reading rate* because it is evident there is a progression since a *speed* of 0 WpM, which is before learning to read, until 191 or 278 WpM that adults might be reading (Brysbaert, 2019).

Regarding geographical origin, different international assessments have shown that Spanish students show a near-average performance in reading competence, while the performance of students from other Latin American countries is significantly lower (Mullis, Martin, Foy, & Hooper, 2017; OCDE, 2016), it seems to be related to the economic level. This leads us to think that the results of *reading rate* in Spain are higher than the Spanish-speaking countries of America. Students from families with a higher socio-economic level usually attend private and charter schools (private schools subsidized by public administrations). According to Gil (2013) or Urquijo, García, and Fernandes (2015), it is expected that students from private and charter schools will show better results in *reading rate*. This could be due to the better stimulation and availability of educational resources in families with a higher socio-economic level.

It is common that in meta-analysis the effect sizes are smaller when measurements are made with standardized tests than when administered tests are designed by researchers, for example, in interventions to improve reading comprehension in Spanish (Ripoll & Aguado, 2014). This usually happens in intervention studies,

because standardized scores tend to be less related to the skills trained during the intervention. In this case, it is not expected that there are differences since the way of assessment is similar, both in standardized measures and in other types of tests.

The measures in CWpM are equal to the measures in WpM if the student does not make reading errors. If there is an error, the results in CWpM are lower. Thus, the *speed* measurements in CWpM are expected to be lower than those in WPM, especially in the lower grades. However, the scores in CWpM are more comprehensive since they consider accuracy as well as *speed*. Finally, it can be foreseen that the aids given by those who administered the test, such as correcting the misread words, providing the words that the participants cannot read or allowing them to prepare the reading before performing the speed measurement, produce better results.

Method

Different data from *reading rate* aloud or in silent from studies from Spanish-speaking students of elementary and secondary education are used in this meta-analysis. The study follows the instructions of PRISMA (Moher, Liberati, Tetzlaff, & Altman, 2009).

Inclusion and exclusion criteria

We selected studies that meet the following characteristics: (a) the participants attend from first to twelfth grades (elementary education, secondary education, high school junior, vocational training equivalents) and have Spanish as their native language; (b) assess the *reading rate using* some printed or electronic text, written in Spanish; (c) the data offered allow to calculate the average r*eading rate* in WpM or CWpM of students of the same school year and also its standard deviation; and, (d) published in Spanish or English, on any date. We exclude those studies in which: (a) some selection of the sample is made based of their reading ability; and, (b) students with visual problems.

Search of the literature databases

First, there is a literature search through DIALNET, IRESIE, REDALYC, ERIC and PsycINFO databases. Search terms such as *lectura velocidad*, *¨palabras por minutoör fluidez lectora* are used in hispanoamerican databases. In English databases, the terms *reading speed* is used, adding the keyword *spanish* or restricting the results to studies conducted in Spanish. Table 35 of the supplementary material displays the list of the keywords used in each case. Further, we search tests of reading in catalogues of companies that offer psycho-pedagogical tests in Spanish, specifically, TEA, EOS, CEPE and Pearson. We also made a search in the bibliography of Vademecum of psycho-pedagogical tests (Asensi & Lázaro, 1979).

On the other hand, we ask for relevant information or data from their studies to 16 authors who have published on this subject. In all these cases we offered the possibility of providing other references that could meet the inclusion criteria. In addition, we added studies located incidentally, because they are previously known by the authors of the meta-analysis or because they are located in a non-systematic search with generalist search engines.

Selection

After removing duplicates, we proceed to select those that meet the inclusion criteria. Each reference is examined, independently, by two people who value it as “accepted”, “doubtful” or “rejected”. The initial agreement between the reviewers is assessed by the Cohenś kappa, between 0.66 and 0.81. After analyzing some cases of discrepancy and clarifying the inclusion criteria, the procedure is repeated, reaching agreements between 0.91 and 1.

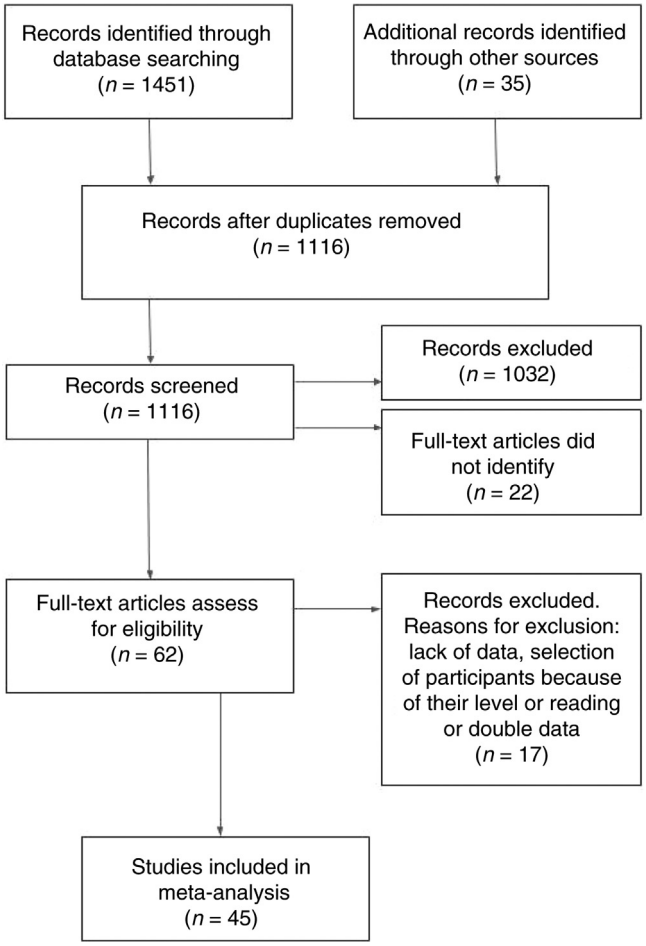

Figure 1. Flowchart of the process of identification and selection of studies.

The final decision on 35 doubtful references is taken during the search phases of the full text (which in some cases is not localized) and coding. Figure 1 provides additional information on the number of references that were excluded in each phase of the selection.

Coding

Studies were coded by the authors of the meta-analysis, using coding system to classify the information in a table. Two people, independently, coded each reference. The agreement index for each pair of coders is calculated using Cohen’s kappa in categorical variables and in variables with intraclass correlation, using model 2 of the Intraclass correlation program (http://www.obg.cuhk.edu.hk/ResearchSupport/StatTools/IntraclassCorrelation_Pgm.php). In those variables with a kappa less than 0.9, we reviewed some discrepancies and after a second coding is carried out, the agreements are between 0.9 and 1. The intraclass correlation is between 0.95 and 1. The discrepancies existing after the second coding phase are resolved by consensus between the two people who had coded the reference.

The following data are obtained from each study: identification data, type of publication, number of participants, assessment trimester, country, type of school, type of test, type of reading, *speed* measurement, test aids, average *speed* and its standard deviation. There are no lost data, since the categories: assessment trimester, type of school, type of test and test aids include an option of the type “no data is offered”. For the other categories, the lack of data implies the exclusion of the meta-analysis.

Effect size and analysis

The meta-analysis used a random-effect model, following the procedures described by Botella and Sánchez (2015). The average *reading rate* measured with WpM or CWpM is used as the effect size. In some cases it is necessary to calculate the *speed* from individual data of the participants. In those cases, non-reading students are considered as participants with a speed of 0 WpM or CWpM. Data that indicates *speeds* higher than 400 WpM are eliminated, since this exceeds the range to which a competent adult would read and would indicate that the participant has skipped parts of the text (Rayner, Schotter, Masson, Potter, & Treiman, 2016). This only happens in silent reading measures, and we excluded 313 cases from a set of tests in which 19237 participants are assessed. Some students of 6th grade of elementary education with an average speed of 25 WpM in silent reading is also excluded, when they have an average of 121 WpM in reading aloud.

The variance is estimated as the quotient of the sample variance between its size, while the inter-study variance is estimated with the DerSimonian & Laird procedure. The moderator analysis is carried out with a mixed effects model, estimating separately the between-study variance. The significance of the a posteriori comparisons is corrected with the Bonferroni method. The meta-regression is carried out with a set of Meta-Essentials spreadsheet (Suurmond, van Rhee, & Hak, 2017).

There are no theoretical reasons to believe that there may be a publication bias, however, the type of publication is considered as a moderator to check if the studies published in peer-reviewed journals offer different results than those of other publications.

Results

Forty-five studies meet the selection criteria. These studies offer 113 effect size of the reading loud and 54 effect size of the silent reading. The list of these effect size, the forest plots of the effects of each grade and the references to the studies from which they were obtained can be found in the supplementary material. The results of *reading* aloud *rate* and silent *reading rate* are analyzed separately, mainly because 14 of the effect size located in silent reading are calculated with the same samples as other 14 of the effect of reading aloud.

Reading aloud

The 113 effect size found are published between 1988 and 2018. Of this, 31.9% are in journals with a peer review system and the rest come from thesis, test, reports and monographs. The average number of participants per study is 2299,5 with a range between 14 and 33063. The 45.1% of the effect size come from studies conducted in different types of schools, 33.6% in public schools, 8.8% in charter schools, 7.1% in private schools and 5.3% unknown type of school. 61% of the samples come from Spain, from different communities such Andalucía, Madrid, Extremadura, Navarra, Canarias and Cantabria. The remaining samples come from American countries. Depending on the number of samples, the groups are international (from Colombia and Mexico), from Chile, Nicaragua, Honduras, Peru, Cuba, Argentina, Mexico, United States of América and Ecuador.

In 67.3% of cases, the *reading rate* assessment is performed with a standardized test using 11 different tests. In 88.5% of cases, WpM is measured and the rest of the test measured CWpM. 28.3% of the effect size is calculated with some kind of help during the reading, such as being able to look the text before the measurement or the examiner can indicate the correct word in case of a reading error. In the rest, no aid is reported.

Table 1
Combined results from reading aloud

Grade	*K*	*ES*	*CI*	*Q*	I^2
1 st Grade EE	13	48.67	38.65-58.7	1329.35**	99.01
2nd Grade EE	21	72.96	69.7-76.21	14907.49**	99.87
3rd Grade EE	18	84.59	78.79-90.39	937.3**	98.19
4th Grade EE	13	104.48	97.15-111.81	792.07**	98.48
5th Grade EE	11	113.84	104.29-123.38	490.99**	97.96
6th Grade EE	11	124.38	113.88-134.88	846.82**	98.82
7th Grade SE	9	134.34	121.9-146.77	274.17**	97.08
8th Grade SE	5	135.87	126.13-145.62	43.71**	90.85
9th Grade SE	4	143.23	130.35-156.1	61.96**	95.16
10th Grade SE	4	164.01	153.41-174.6	99.53**	96.99
11th Grade SE	2	161.35	143.78-178.92	18.84**	94.69

Note. E = elementary education, SE = secondary education, K = number of studies ES = effect size, CI = confidence interval.
** $p < .01$.

Results by grade and moderators

When analyzing the results per grade, two groups are excluded: Escurra (2003) because we found an atypically low result during a quickly checking per grade, and the group of 12th grade of Cuetos, Arribas, and Ramos (2016) for being the only sample for that grade. Table 1 shows the combined results obtained in each grade. A meta-regression with the grade as an independent variable and the *reading rate* as a dependent variable finds that the grade explains 74.5% of the systematic variance of the *speed*, with an increase in *reading rate* as the grade increases ($\beta = 0.86$, $p < .01$). There are significant differences between 1st and 2nd grade, 2nd and 3rd ($p < .0045$), and 3rd and 4th grade when we compared consecutive grades.

The Q and I^2 statistics indicate that the effect size collected for each grade show high heterogeneity, so a moderator analysis is performed in each of the grades, except in those cases where it is not possible, because there is no minimum of two studies that allow us grouping into at least two different values of the variable of interest. Supplementary materials display more detailed information with the results of each of the significant differences found.

Type of publication

There is no minimum number of studies peer-reviewed articles to perform the analysis in 8th, 9th, 10th and 11th grade. In the 5th and 6th grade of elementary education, there is a significant difference, being *reading rate* higher in studies located in publications not reviewed by peers (test, monographs, thesis, etc.).

Assessment moment

There is only a minimum number of studies between 1 st grade and 4th grade for the fall term, in 3rd grade and 4th grade for the winter term, and between 1 st grade and 6th grade for the spring term. There are significant differences in 1 st, 2nd, 3rd and 4th grade. In the first and second grade the *reading rate* measured in the spring term is significantly higher than that measured in the fall term. In 2nd grade, there is higher *reading rate* in studies that do not report the moment in which the tests were administered than in those of the fall term. The fifth-grade *reading rate* is higher in studies that do not report the term in which the assessment is carried out than in those carried out in the spring term. In 3rd grade any comparison becomes significant.

Country

There is no minimum number of studies from American countries that let us analyze this variable in 10th and 11th grade.

Significant differences are found in all elementary grades except in 1 st grade. In all cases, the *reading rate* achieved in studies conducted in Spain in higher that those conducted in American countries.

Type of school

There is only a few data from 1 st grade of charter schools, 1 st, 3rd, and 4th grades of private schools, and from public schools up 8th grade. In 1 st grade of elementary education there is a significant difference according to the type of school, but none of them is significant. In 6th and 7th grade, there are also significant differences between the studies carried out in public school and those carried in different type of schools. In 6th grade the r*eading speed* is higher in public schools, while in 1 st grade it is higher in studies carried out in different types of schools.

Type of test

This moderador can be analyzed only up to 7th grade because of the lack of a minimum number of studies carried out with non-standardized tests in later grades. Only a significant difference is found in the 2nd grade of elementary education, with a greater *reading rate* in studies that use non-standardized tests.

Type of measurement

We found only a sufficient number of studies to include measurements in CWpM from 1 st to 4th grade. Of these, a significant difference is found in the first three grades, the *reading rate* measured in words per minute being greater.

Reading aids

There is only a minimum number of studies in which participants have received help between 1 st and 6th grade. There are no significant different depending on whether the student receives or not assistance in the assessment. In all cases where there are significant differences between different moderators, the intra-category homogeneity tests, or at least one of the possible values of the moderator show significant results, showing that none of the possible moderators analyzed can explain alone the heterogeneity of effect size.

Silent reading

The 54 effect size obtained are published between 1994 and 2011: 79.6% come from test and reading assessment tests and the remaining 20.4% come from a peer-reviewed studies. The average number of participants per study is 606.3 with a range between 43 and 3060. A total of 59.3% of the effect size come from studies conducted in different types of school, 18.5% in public schools and the type of school is unknown in the remaining effect size. The majority of the samples come from Spain, being from different regions (66.7%). The remaining samples come from American countries: 13% from Peru and 20.4% from an international study conducted in Colombia and Mexico.

In all cases the *reading rate* is assessed with a standardized test: ECLE, Bisquerra Reading Efficiency tests, ENI, Batería EVALUA or INVE. The measure used is always WPM and in no case help is provided during the administration of the tests.

Results per grades and moderators

When analyzing the results per grades, the group of 12th of Bisquerra (1994) is excluded because it is the only sample collected for that grade. Table 2 shows the combined results obtained in each of the grades. A meta-regression with the grade as the independent variable and the *reading rate* as the dependent variable finds that the grade explains 68.8% of the systematic variance of the *reading rat*e, with an increase in *speed* as the grade increases ($\beta = 0.83$, $p < .01$). In the comparisons between consecutive grades there is only a significant difference between 1st and 2nd grade of elementary education ($p = .0004$).

Table 2
Combined results for silent reading

Grade	*K*	*ES*	*CI*	*Q*	I^2
1 st Grade EE	2	30.48	9.56-51.4	19.44**	94.86
2nd Grade EE	3	78.97	48.52-109.43	450.58**	99.56
3rd Grade EE	4	95.16	75.81-114.5	275.95**	98.91
4th Grade EE	7	124.79	107.36-142.22	752.82**	99.20
5th Grade EE	7	137.15	127.66-146.63	221.7**	97.29
6th Grade EE	6	154.99	134.34-175.64	1079.6**	99.54
7th Grade SE	7	180.32	162.7-197.93	516.59**	99.03
8th Grade SE	6	176.24	166.24-186.23	146.52**	96.59
9th Grade SE	6	182.02	173-191.05	107.59**	95.35
10th Grade SE	3	199.8	107.2-227.02	35.67**	94.39
11th Grade SE	2	186.31	138.79-233.84	45.26**	97.79

Note. EE = elementary education, SE = secondary education, K = number of studies, ES = effect size, CI = confidence interval.
** $p < .01$.

Again, there is a significant and very high heterogeneity between the effect size obtained in each grade so that a moderator analysis is performed to detect variables that can explain it. More information about these analyzes can be found in the supplementary materials of the article. An analysis of moderators is no possible in 1 st grade, 10th grade nor 11th grade, because there is no minimum number of studies. There is no moderator analysis of the moment of assessment because none of the studies provide that information, nor of the type of test, which is always standardized test, of the measure, which is always words per minute, of the reading aid during the administration of the test, since no study indicates that it is provided, nor of the type of publication since in no grade there is minimum of two studies in peer-reviewed publications.

Regarding the country, in 2nd and 3rd grade there is only one group with an American sample. In 4th and 6th grade, and 7th, 8th and 9th there are significant differences, with a higher *reading rate* in Spanish samples than in studies with American samples. With respect to the type of school, only moderators can be analyzed in 4th and 5th grade, comparing studies carried out in public schools with studies in different type of schools. A significant difference is found in 4th grade, with a greater reading speed in those studies carried out in different schools.

Discussion

With the literature search, 113 measurements of reading aloud and 54 in silent reading were found. The grade accounts for about 70% of the variance of the *reading rate* results. However, the results are very heterogeneous and none of the variables chosen as moderators can might explain the differences that occur between them. The differences are gradual and occurs mainly in the early grades, being significant differences that occur in reading aloud between 1 st grade and 4th grade and in silent reading between 1 st grade and 2nd grade. Furthermore, there are significant differences according to the trimester in which measurements are administered in reading aloud of the early grades. Most of the comparisons show that the *reading rate* of Spanish samples are significantly higher than those obtained from American samples. It is also found that in 1 st, 2nd and 3rd grade, the *reading* aloud *rate* is greater when measured in WpM than when measured in CWpM. The 161 and 164 WpM of reading aloud that are found as the faster *reading rate* in 7th and

Table 3
Comparison of the combined results of reading aloud with other references

Grade	Meta-analysis (IC)	SEP (Secretaría de Educación Pública de México, 2010)	MINEDUC (Red Educacional Crecemos, 2012)	*ORF* Norms[a] (Hasbrouck & Tindal, 2017)
1 st Grade EE	39-59	35-59	29-46	29 (30)[b]
2nd Grade EE	70-76	60-84	54-73	84 (86)
3rd Grade EE	79-90	85-99	76-99	97 (99)
4th Grade EE	97-112	100-114	97-124	120 (123)
5th Grade EE	104-123	115-124	120-149	133 (136)
6th Grade EE	114-135	125-134	143-177	145 (149)
7th Grade SE	122-147	135-144	154-193	
8th Grade SE	126-146	145-154	154-193[c]	
9th Grade SE	130-156	155-160		

Note. The references of MINEDUC (Ministry of Education) and ORF (oral reading fluency) Norms measure the speed in CWpM.
[a] The results corresponding to the second term of each grade are offered.
[b] In parentheses is the equivalente speed offered in Spanish according to the expansion rate proposed by Brysbaert (2019).
[c] The same result in 7th and 8th grade is found in the table consulted and in other sources that offer it.

Table 4
Comparison of the combined results of silent reading with Taylorś (1965)

Grade	Meta-analysis (confidence interval)	References of Taylor (1965)
1 st Grade EE	10-51	80 (82)[a]
2nd Grade EE	49-109	115 (118)
3rd Grade EE	76-115	138 (141)
4th Grade EE	107-142	158 (162)
5th Grade EE	128-147	173 (177)
6th Grade EE	134-176	185 (190)
7th Grade SE	163-198	195 (200)
8th Grade SE	166-186	204 (209)
9th Grade SE	173-191	214 (219)
10th Grade SE	107-227	224 (230)
11th Grade SE	139-234	237 (243)

[a] In parentheses there is the equivalent rate in Spanish according to the expansion range proposed by Brysbaert (2019).

10th grade are slower than the 191 WpM of *reading rate* for adults in Spanish, as Brysbaert (2019) concluded. Similarly, the 186 and 200 WpM that are achieved in those grades in silent reading are *speeds* lower than the 278 WpM that adults seems to reach.

Table 3 shows a comparison between the combined results of reading aloud, the references in Spanish discussed in the introduction and the latest version of the Hasbrouck and Tindal standards. Brysbaert (2019) states that the time it takes to read information in different languages is similar, regardless of the number of words written in each language and their length. Based on this idea, he proposes the possibility of comparing reading rates in two languages, matching them the average of an expansion index, based on the relationship between the number of words needed to express the same message in both languages. To compare the reading rate in Spanish and English, he proposes that each word in English should be considered to be equivalent to 1,025 words in Spanish.

As there are no references on silent reading available in Spanish different as those we included in this meta-analysis, Table 4 compares the results combined with Taylorś references (Taylor, 1965).

It is striking how all reading references in English except for reading aloud of 1 st grade, are above the confidence interval of the combined speeds in Spanish, especially taking into account that the beginners reading is slower in English than in Spanish (Seymour, Aro, & Erskine, 2003). On the other hand, there is considerable overlap between the confidence intervals obtained in the meta-analysis and SEP references.

Implications for practice and research

This meta-analysis offers references on *reading rate* in Spanish based on the combination of data obtained after a search limited to certain databases, companies, and authors, selecting and aggregation different *speed* measures, with different texts and in different conditions. Therefore, these references are better than other options of a general type (not linked to a specific text). Knowing the *reading rate* at which children and adolescents read in different grades can not only help us to detect students with learning disabilities in reading. It can also be useful for other issues, such as identifying the *reading rate* at which it would be reasonable to present the text in subtitles or computer programs for children, or to detect unreasonable proposals, which propose *reading rate* up to 1000 WpM without affecting the comprehension (for example, Buzan, 1998).

This review allows to identify that there is a lack on data about reading rate. On one hand, there is no data for students who are in Vocational Training. This should keep in mind since the increase in reading rate in the high grades of secondary education could be due to an improvement in their reading ability, but it could also be an effect of school dropouts of students with poor school performance towards professional initiation programs (Basic Professional Training in Spain). Something similar could happen in 11th grade, although, in this case, it might be doubtful because the data shows that reading rate was lower than those of 10th grade.

Another great lack is that there is no enough available data for a specific trimester of the school year. The significant differences between the *reading rate* in fall, winter and spring terms that we have found in the early grades of elementary education might warns us that *speed* indicators of reading aloud tests referred to a whole grade should be inadequate, especially with the younger students. Not enough data found to check if something similar happens in silent reading.

None of the moderators analyzed allows us to give a satisfactory explanation of the differences in *reading rate* observed between the different studies carried out with students of the same grade. This could be because the *reading rate* might be influenced by variables that have not been controlled, such as the specific text the students read, group or individual differences (socioeconomic level, practice of reading at school or outside of it) or that the differences are explained by the union of different elements. Some of the differences we found might indicate that, in *reading rate* assessments, it may be inappropriate to compare results in WpM with references in CWpM of vice versa, at least in the early grades of elementary education. We should also be careful when assessing students from American countries with standardized test in Spain of Spanish students with test standardized in America, because as we found, American countries tend to be significantly lower.

So, it should be very careful to use the benchmarks obtained in this meta-analysis as *reading rate* standards for the different grades. On the one hand, the combined results come from the data

Table 5
Proposal of normal speed range in different grades based on the *combined speed* and the median of the standard deviations

Grade	ES and median of the standard deviations Reading aloud	Range	ES and median of the standard deviations Silent reading	Range
1 st Grade EE	48.67 (23.27)	25-72	30.48 (22.8)	8-53
2nd Grade EE	72.96 (27.74)	45-101	78.97 (37.75)	41-117
3rd Grade EE	84.59 (26.05)	58-111	95.16 (37.26)	58-132
4th Grade EE	104.48 (29.16)	75-134	124.79 (40.95)	84-166
5th Grade EE	113.84 (30.99)	83-145	137.15 (42.82)	94-180
6th Grade EE	124.38 (29.38)	95-154	154.99 (49.6)	105-205
7th Grade SE	134.34 (33.93)	100-168	180.32 (49.32)	131-230
8th Grade SE	135.87 (35.28)	101-171	176.24 (51.42)	125-228
9th Grade SE	143.23 (31.71)	112-175	182.02 (48.36)	134-230
10th Grade SE	164.01 (26.88)	137-191	199.8 (51.39)	148-251
11th Grade SE	161.35 (24.27)	137-186	186.31 (47.22)	139-234

aggregation with characteristics that have produce some significant differences, such as the measure in WpM of CWpM, the term in the test was administered or the country of origin. However, separe data can be found in the supplementary materials of the cases in which significant differences are observed. On the other hand, the confidence intervals should not be confused with a typical rate range, but rather tell us that there is a high probability that a new study that meet the inclusion criteria established in the meta-analysis, offer a speed result that is within that range.

To be able to approach to a speed range that be considered normal or typical in each grade, a measure of dispersion of the results is necessary. A first approximation may be the median of the standard deviations obtained in the different studies, that is, the main point of the distribution of the standard deviations. This can be found in Table 5.

Acknowledgment

This research work has not received any specific financial support from public, private or non-profit institutions.

Conflict of interest

None.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.psicoe.2020.01.001.

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