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Review

Parental involvement on student academic achievement: A meta-analysis

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ABSTRACT

This paper is a quantitative synthesis of research into parental involvement and academic achievement through a meta-analysis of 37 studies in kindergarten, primary and secondary schools carried out between 2000 and 2013. Effect size estimations were obtained by transforming Fisher's correlation coefficient. An analysis has also been conducted of the heterogeneity of the magnitudes grouped according to different moderator variables, and a study of the publication bias affecting meta-analytical studies. The results show that the parental models most linked to high achievement are those focusing on general supervision of the children's learning activities. The strongest associations are found when the families have high academic expectations for their children, develop and maintain communication with them about school activities, and help them to develop reading habits.

Contents

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1. Introduction

Parental involvement is an individual right and responsibility for families, and a social need. It is generally accepted that without the positive cooperation of family and school, it is not possible to reach the high standards set for educational outcomes by a demanding society.

In a very general sense, we could consider parental involvement as the active participation of parents in all aspects of their children's social, emotional and academic development. In a different dimension, parental involvement concerns a wide range of issues, such as parental expectations about their children's academic future, control over homework, the extent to which they become involved in helping children to learn for school assignments or to do the homework, or the frequency with which parents are physically present at school. Some of these concepts correspond to behaviors that can be promoted, or that depend on a personal parental decision. Others, such as expectations, are effects associated with third variables, which are the real causes, giving a spurious spin to the apparent correlation between parental involvement and educational achievement.

In any case, if parental involvement is considered as a lever to promote the academic achievement of children, the nature of the independent variable and the extent of its potential to affect educational outcomes becomes a research topic in itself. For example, the way in which parental involvement is related to curricular aspects was studied by Fan (2001), Sheldon and Epstein (2002), Gordon and Cui (2012), and also by Powell, Son, File, and Froiland (2012). Its behavioral consequences were addressed by McNeal (2001), Epstein and Sheldon (2002), Sheldon and Epstein (2005), Roopnarine, Krishnakumar, Metindogan, and Evans (2006), Van Campen and Romero (2012), and by Walters (2013). And how cognitive factors modulate this relationship was analyzed by Domina (2005), Gonzalez and Wolters (2006), Oyserman, Brickman, and Rhodes (2007), Hoang (2007), and by Brown, McBride, Bost, and Shin (2011).

Many studies have broached other aspects associated with parent participation, such as its influence as a protective factor in vulnerable groups, or the extent of its influence in minors (Chen & Gregory, 2010; Grant & Wong, 2004; Hango, 2007; Jeynes, 2005a; Lee & Bowen, 2006; Somers et al., 2011; Strayhorn, 2010; Trask-Tate & Cunningham, 2010), the effectiveness of programs specifically aimed at fomenting parental involvement (Jeynes, 2010; Mattingly, Prislin, McKenzie, Rodriguez, & Kayzar, 2002), possible ways to encourage it (LaRocque, Kleiman, & Darling, 2011; Padgett, 2006), the perception different members of the educational community have of its implications and nature (Anderson & Minke, 2007; Barnyak & McNelly, 2009; DePlanty, Coulter-Kern, & Duchane, 2007; Hornby & Lafaele, 2011; Tekin, 2011) or the most effective types of participation (Park, Byun, & Kim, 2011; Pomerantz, Moorman, & Litwack, 2007).

The trigger for many of these studies was the concept of parental involvement as a driver of students' educational achievement or, at least, as a catalyst or multiplier of other relevant causes. The wide range of topics covered and the nuances of these studies show us that parental involvement is a multifaceted and multidimensional phenomenon. It involves conceptual difficulties for researchers and organizational problems for school administrators. This great complexity makes it difficult for a single study to address all angles of this question. Different studies have focused on individual aspects of this phenomenon, sometimes with different and diverging results, making meta-analysis the ideal tool to synthesize across the group and to obtain an overall perspective of the causal chain linking the incumbent variables. The main achievements to be expected from these meta-analytical studies are: to establish the extent to which the involvement of families in the education of their children can contribute to improving their educational outcomes; to determine the magnitude of its effects and how the alternative ways of understanding its nature can affect the outcomes. For these reasons, the findings of this kind of study may be useful for teachers, parents, and policy-makers alike.

This paper is a quantitative synthesis of the research carried out in this line in the form of a meta-analysis encompassing 37 studies published in the first 13 years of this century. These studies analyze the link between parent participation in their children's education and variables related to the students' academic achievement. In this way, this work continues the line of research of similar previous studies.

1.1. Previous meta-analytical studies

There are ten quantitative syntheses in the literature of meta-analytical reviews and a meta-synthesis that study aspects of the relationship between parent participation and their children's academic achievement.

In 2001, Fan and Chen published "*Parental involvement and students' academic achievement: a meta-analysis*" with the objective of synthesizing the quantitative research carried out to that date. It includes 25 studies published between 1982 and 1997. The results confirm the relation between parent participation and academic achievement (magnitude of effect 0.25), with a special relevance of parents' academic expectations (magnitude of effect 0.40). The relationship was found to be much stronger when academic achievement is measured globally (0.33) than by areas of knowledge (all less than 0.2).

Mattingly et al. (2002), performed a synthesis entitled "*Evaluating evaluations: The case of parent involvement programs*" including 39 research studies carried out from 1969 to 1998, related to the evaluation of different programs of participation of parents of children from kindergarten to secondary school. They did not find evidence supporting a relationship between interventions to promote parent participation and an improvement in the students' learning.

Jeynes performed four meta-analyses in 2003, 2005b, 2007, and 2012. The first one, "*A meta-analysis: The effects of parental involvement on minority children's academic achievement*" analyzes 21 studies published between 1988 and 1999 with the aim of determining the impact of overall and specific parent participation (communication, supervision of schoolwork,

parental expectations, reading encouragement outside the classroom, leisure activities, parental style and affection) on the performance of students of six ethnic minority groups during compulsory education in the U.S. The results show that parental participation globally affects the academic achievement of students belonging to any minority group. It concluded that parent participation has a significant and positive effect on students of all races at all academic levels although identified differences in the intensity of the relation were mediated by the ethnic affiliation, with effect sizes ranging from 0.22 to 0.62.

In 2005, Jeynes presented the synthesis "*A meta-analysis of the relation of parental involvement to urban elementary school student academic achievement*" studying the relation between parent participation and academic achievement of students of primary education in urban areas in 41 studies published between 1969 and 1999. The most relevant result was the influence of parent participation on students' performance (0.74), and its consistency throughout the different analyses in spite of differences in ethnic minorities or gender. The meta-analysis of Jeynes, 2007, "*The relationship between parental involvement and urban secondary school student academic achievement*" which includes 52 studies published between 1972 and 2002, once again confirmed the positive influence of parent participation on academic achievement of secondary school students (0.46).

Erion (2006) synthesized 37 studies published till 2004 about parent tutoring effectiveness. The average effect size was 0.55 for group design studies and a Percentage of Nonoverlapping Data (PND) of 94% for single-subject design studies. Only in the case of group design studies was there a significant difference, produced by a training feature, namely, duration of sessions.

In 2008, Patall, Cooper, and Robinson (2008) published "Parent involvement in homework: A research synthesis". In this synthesis there were 14 studies in the US and Canada from 1987 till 2004. They concluded that "the overall effect of parent involvement in homework was small and often not significant" (p. 1087), but there were differences associated with grade level, type of parent involvement or subject matter.

The Sénéchal and Young (2008) meta-analysis was about the impact of parent involvement on children's reading acquisition. The 16 studies included were published between 1970 and 2005, and all had a control group. The largest effect size (0.65) was associated with programs that trained parents to teach their children to read.

In 2009, Hill and Tyson published "*Parental involvement in middle school: a meta-analytic assessment of the strategies that promote achievement*", with the goal of determining if parent participation affects academic achievement and the types of participation related to it. The study is based on students in the first cycle of secondary education and uses 50 quantitative studies published between 1986 and 2006. Its main conclusions once again confirm the existence of a positive relationship between parent participation and academic achievement. Though the global effect size was really small, although statistically significant (0.04), the detailed analysis of results shows a very high heterogeneity among effect sizes when expressed as a function of the operationalization of parental involvement. The authors also show that the dimension "academic socialization" shows the strongest association with achievement (0.39) and that "helping with homework" has the greatest negative effect on achievement (–0.11). Here we have two results, the global effect size of 0.04 and this last negative value, worth to comment in greater depth. In the Discussion and conclusions section we suggest a possible explanation.

The last survey published by Jeynes, in 2012 "*A meta-analysis of the efficacy of different types of parental involvement programs for urban students*" again focuses specifically on programs of parent participation for students in urban areas. It synthesizes 51 studies published between 1964 and 2006, with the aim of studying the relation between parent participation programs and academic achievement in students from kindergarten to secondary school. The results show a smaller effect size in the educational levels of kindergarten and primary school (0.29) than in the secondary education stage (magnitude of effect 0.35).

As we can observe, the meta-analyses carried out until now can be classified into two main groups. On the one hand, we have those of a more general nature that study the overall relation between spontaneous parent participation and academic achievement, such as the one by Fan and Chen (2001), Jeynes (2005b, 2007) and even that of Jeynes (2003) that study the effect of parental involvement in different ethnic groups. On the other hand, we have the meta-analysis based on the evaluation of programs of parent participation, such as those of Mattingly et al. (2002), Erion (2006), Patall et al. (2008), Sénéchal and Young (2008), Hill and Tyson (2009), and Jeynes (2012). All these studies, except Mattingly et al. (2002), have been included in the meta-synthesis by Wilder (2014).

The reviews show a significant, although moderate, association between parent participation and children's academic results. Only the conclusions of the study by Mattingly et al. (2002) do not seem to reflect exactly this. It can also be seen how the estimated magnitude of effect can vary as a function of certain moderator variables, such as the type of measure of academic achievement considered, definition of the variable parent participation, and the educational level or the ethnic groups involved.

1.2. Scope and goals of this meta-analysis

In the light of this abundance, one might question the motive for performing yet another meta-analysis and the scope of the one presented here. This meta-analysis is of the more general type, as it aims to study the overall impact of parent participation on achievement in all the studies carried out with students of kindergarten, primary and secondary education between 2000 and 2013.

The limited time range of the research shows a more homogeneous theoretical conceptualization of parent participation at school. The research conducted prior to the period considered shows a wider conceptual diversity as illustrated by the studies of Epstein (1986, 1987, 2001), Epstein and Dauber (1991), or Hoover-Dempsey and Sandler (1995, 1997).

As Fan and Chen (2001) explained, most studies consider a) overall parent participation, b) the different dimensions of communication with children on school issues, c) homework (parental supervision of school issues), d) parental expectations, e) reading with children, e) parental attendance and participation in school activities, and f) the type of family. Hence, we consider that the most accurate approach to the construct "parent involvement" is the one that takes into account its multidimensionality; consideration of parent participation as a holistic term that combines perspectives of both behavioral and psychological aspects, as Chen and Gregory (2010) explain.

This meta-analysis is based on the relationship between parent participation and academic performance of their children. More specifically, it aims to respond to two research questions:

(1) What is the strength of the relationship between parental involvement and academic achievement?
(2) What are the potential characteristics of studies that moderate the effects of this relationship?

2. Methodology

2.1. Study selection

The search for studies that include an analysis of the association between parent participation and academic achievement was conducted using the main bibliographic databases of the scientific literature in this field (ERIC, *Psych Info*, and *Sociological Abstracts*). The key words (taken from the corresponding thesauri) used in the initial exploration were «*parental involvement*», «*parent participation*», «*parental support*», «*family involvement*», «*household*», «*academic achievement*» and «*educational outcomes*». In the different searches, the descriptors were used in various combinations, but limited in time to studies published between 2000 and 2013, with the purpose of giving some continuity to syntheses performed previously by aforementioned authors such as Fan and Chen (2001), Mattingly et al. (2002), Jeynes (2003, 2005b, 2007, 2012), and Hill and Tyson (2009).

After the initial search, in which more than 5000 studies of different types were filtered (books, doctoral theses, articles, research reports etc.), 308 studies were selected for their apparent association with the research object of this study. However, after studying these in detail it was possible to fine tune the selection, to rule out for this study those with insufficient quantitative data, not related to academic achievement or those with design and methodology-related problems. After this second selection, 39 research studies were considered, mainly published in scientific journals, as a base for our meta-analysis.

These 39 studies fulfilled four inclusion criteria. First, they had to be published between 2000 and 2013, as mentioned previously. They also had to include some measure of parent participation in their children's education not defined as part of any specially designed program or by a 'Parent's School' program. Third, the research should target school children from kindergarten to the end of compulsory education. Finally, it should study the relationship between parent participation and academic achievement by means of calculating the correlation coefficients or estimates of regression models. By applying these four criteria, the sample compiled from these 39 studies was composed of 80,580 students and families.

It is noteworthy that, in spite of authors such as Fan and Chen (2001), previous meta-analyses tend to rule out research based on *path analysis* or *structural equation models* owing to the complexity of the relations established between the variables studied. However, it was decided to include this kind of study in the present meta-analysis, considering exclusively the direct effects of the variable parent participation on academic achievement, avoiding in this way problems derived from a possible indirect effect of the variables. In this same line, many studies only included regression models, so their exclusion could increase the sampling error and, consequently, affect the generalizability of results. Hence, here we opted to include those studies which, although not providing the correlation matrix, presented multiple or multilevel regression models. A total of 9 of the articles exclusively provided regression models, but 2 of these were ruled out to adapt these to the estimation.[1] In consequence, the *final number of studies included in this meta-analysis was 37*.

Since a study can analyze the effect of parent participation on more than one response variable, verify its influence in different populations, or analyze the effect of different indicators on the parent participation of the same dependent variable, each of these effects were considered as independent analytical units. Hence, from the 37 articles selected, 86 correlation coefficients and 22 beta coefficients were compiled and, consequently, a total of 108 effect sizes have been calculated.

[1] In these cases, the imputation procedure proposed by Peterson and Brown (2005): $r = \beta + 0.05\lambda$ has been applied to the beta coefficients, where λ takes a value of 1 when β is positive and of 0 when β is negative. From this imputation method it is possible to obtain more accurate estimates of the effect sizes than if missing effect sizes are computed as zeros or observed means. This procedure also reduces the sampling error, allowing a greater number of studies to be included. It is noteworthy that this imputation technique can be used for beta coefficients with values in the interval from –0.5 to 0.5.

2.2. Codification of studies

For each effect size, the associated sample size was recorded. Next, the independent variable was coded according to the following categories:

(1) *General description of parent participation*. This includes a general measure of familial participation defined by the researcher and estimated as a combination of several specific measures.
(2) *Communication with children on school issues*. Frequency with which parents talk about school issues with their children.
(3) *Homework (parental supervision of schoolwork)*. Frequency with which parents supervise or help with their children's homework.
(4) *Parental expectations*. Maximum level of studies parents expect for their children.
(5) *Reading with children*. Frequency and regularity with which parents read with their children.
(6) *Parental attendance and participation in school activities*. Frequency with which parents physically attend the school to participate in school-related activities.
(7) *Parental style*. Parental attitude at home oriented toward supporting and helping their children. Existence of rules to deal with homework and leisure time distribution.

Regarding the dependent variable, studies were coded about the use or not of a standardized measure of academic achievement. About the type of academic skill considered, 7 categories were used, namely:

(1) general achievement,
(2) mathematics,
(3) reading,
(4) sciences,
(5) social studies,
(6) foreign language,
(7) other curricular subject (art, music, etc.).

Finally, several moderator variables of effect size were considered, such as educational level, type of population, and type of publication. To represent the educational stage on which the study was focused, the following codification was used: 1 = kindergarten, 2 = primary education, 3 = secondary education, 12 = kindergarten and primary education, 13 = kindergarten and secondary education, 23 = primary and secondary education, and 123 = kindergarten, primary and secondary education. Population types were classified as: 1 = general population and 2 = specific population groups (groups of people with special educational needs, at risk of exclusion, inequalities or discrimination). In addition to the identification data of the study (author/s, year, title etc.), the following types of publications were identified: 1 = articles, 2 = books, 3 = doctoral theses, 4 = research reports, and 5 = other types of publications. We didn't consider country of origin or cultural background as a moderator variable, even when we are aware of the big cultural differences among populations coming from Egypt, Korea, US, Greece or Mexico, as appears at our primary study sample. The biggest amount of the studies comes from the USA, with another group of seven from very different origins. However, we don't have a big enough number of studies corresponding to every other cultural background. With only one sample for each background, it is difficult to elucidate which part is produced by the country specific sample and which by its corresponding cultural background.

To determine the accuracy of the coding system, all the studies were codified by three independent codifiers, revealing 97% agreement among them.

2.3. Statistical analysis

The *effect size* was calculated from the transformation of Fisher's correlation coefficient

$$Z_r = \frac{1}{2} ln\left(\frac{1+r}{1-r}\right) \tag{1}$$

where the standard error of Z_r corresponds to:

$$SE_{Z_r} = \frac{1}{\sqrt{N-3}} \tag{2}$$

After estimating the magnitude of the individual effect of each study, the *mean size of the mean effect* is the weighted mean of the sizes of the individual effects.

$$\overline{ES} = \frac{\sum (w_i ES_i)}{\sum w_i} \tag{3}$$

The weighting is justified by the positive relationship between the accuracy of the effect size and the size of the sample. The weight of a given study is determined by:

$$w_i = \frac{1}{SE_i^2} \tag{4}$$

And the standard error of the mean effect size:

$$SE_{\overline{ES}} = \sqrt{\frac{1}{\sum w_i}} \tag{5}$$

Finally, the statistical significance of this effect size was determined from the Wald test:

$$Z = \frac{\overline{ES}}{SE_{\overline{ES}}} \tag{6}$$

Effect size interpretation is referred to the normal distribution. An effect size of 1 is one standard normal deviate, and means that the average academic achievement of students with parents involved in their education is one standard deviation higher than that of students whose parents are not involved. It also means that about 84% of students of this latter group achieved below the average of the first group. Cohen (1969) established three categories for effect size: 0.20–0.30, "small"; around 0.50 "medium"; and 0.8 and beyond "large". Baumert, Lüdtke, and Trautwein (2006) considered any effect size greater than 0.3 as "large".

Together with the estimation of effect size and its significance, the heterogeneity of the effect sizes provided by the primary studies included in this meta-analysis was studied by means of Cochran's Q test. This statistic follows a Chi-squared distribution, with N – 1 degrees of freedom, where N = the number of studies.

$$Q_{total} = \sum_{j=1}^{k} \sum_{i=1}^{n_j} w_{ij} \left(ES_{ij} - \overline{ES} \right)^2 \tag{7}$$

In the same way, the contribution of different factors associated with the studies to the differences observed between the effect sizes was also estimated. This was done by studying the heterogeneity between the subgroups that comprise the categories established by these moderator variables:

$$Q_{between} = Q_{total} - Q_{within} \tag{8}$$

where,

$$Q_{within} = \sum_{j=1}^{k} \sum_{i=1}^{n_j} w_{ij} \left(ES_{ij} - \overline{ES_j} \right)^2 \tag{9}$$

When estimating the significance of between-group heterogeneity, $Q_{between}$ was considered to follow a Chi-squared distribution, with k – 1 degrees of freedom, where k = number of categories of the moderator variable.

3. Results

Table 1 summarizes the variables which, together with the correlation coefficients or beta-coefficients have been taken from the studies that form part of the sample.

Table 2 presents the mean of the effect sizes in the relation between parent involvement at school and the children's academic achievement, the standard error associated with the mean and its confidence interval, all considered globally and broken down by the moderator variables of interest. As a consequence, some categories include a very small number of studies. The number of studies considered to be a sufficient number is related to the significance of the associated effect. For example, in the case of 'Reading with children', only four studies were included, but the associated error was small and, as a consequence, the results are statistically significant. On the contrary, only two studies took 'science' as a dependent variable, with a relatively large error, to the effect that results are not statistically significant. Because of this, the negative sign associated with its effect cannot be adequately interpreted. Interestingly, '*Parental attendance and participation in school activities*', being one of the categories with the largest number of studies, has a very small effect, and also, because of the error size, is nonsignificant. In consequence, we cannot conclude that parent involvement is not important for achievement in science, but we can conclude that when parent involvement implies only attendance and participation in school activities, it does not significantly affect the children's academic achievement.

As can be observed, the average effect size for all studies is 0.124, which is statistically significant at a confidence interval of 99%. This represents a positive association between a greater parental involvement and better academic results. However, it is important to specify that this magnitude is considered to be small (following the criteria of Cohen, 1969) or, at best, moderate (following the criterion of Baumert et al., 2006) in its practical significance. Even so, a strong parental involvement (one standard deviate above the mean), for a given student, could be the difference between school failure and success.

Table 1
Descriptive analysis of the sample of studies as a function of the moderator variables.

	Mean	Median	Standard deviation	Percentile		
				25	50	75
Sample size	1423.69	424.00	2670.91	209.00	424.00	1410.75
Moderator variables						
Type of parent involvement	**N**	**Percentage**				
General description of parent participation	37	34.26%				
Communication with children about school issues	6	5.56%				
Homework (parental supervision of schoolwork)	18	16.67%				
Parental expectations	8	7.41%				
Reading with children	4	3.70%				
Parental attendance and participation in school activities	21	19.44%				
Parental style	14	12.96%				
Measure of achievement	**N**	**Percentage**				
General achievement	51	47.22%				
Mathematics	22	20.37%				
Reading	19	17.59%				
Sciences	2	1.85%				
Foreign language	8	7.41%				
Other curricular subject (art, music etc.)	6	5.56%				
Type of achievement measure	**N**	**Percentage**				
Standardized	57	52.78%				
Non-standardized	49	45.37%				
Not specified	2	1.85%				
Educational level	**N**	**Percentage**				
Kindergarten	11	10.19%				
Primary education	33	30.56%				
Secondary education	55	50.93%				
Kindergarten and primary education	3	2.78%				
Primary and secondary education	6	5.56%				
Type of population	**N**	**Percentage**				
General	44	40.74%				
Specific	64	59.26%				
Type of publication	**N**	**Percentage**				
Article	93	86.11%				
Doctoral thesis	13	12.04%				
Others (dissertation etc.)	2	1.85%				

The effect size mean observed is lower than that found in other meta-analyses such as those performed by Jeynes (2003, 2005b, 2007, 2012), and is closer to the values taken from the study of Fan and Chen (2001).

Next, if we examine the values from Table 2 we can see that all of them are significant (except for the moderator variable parent participation and attendance at school activities) but the magnitudes of the effects reported do not exceed 0.224. So, all things being equal, the educational achievement of students whose parents get involved one standard deviation above the mean would be higher than 59% of the distribution.

Table 2 values include the effect size as a function of the different moderator variables. This in-depth analysis is important since, as shown by Q test in Table 3, a high heterogeneity has been observed among the effect sizes provided by the different studies. In this way, statistically significant differences in effect size were found as a function of the following moderator variables: definition of parent participation, the measure of academic achievement, the type of achievement, educational level, the type of publication and the type of population.

This heterogeneity in the effect size is shown in Fig. 1, which presents the individual magnitudes for each study together with their confidence intervals arranged in increasing order of size. The horizontal line across the graph shows the value of the mean effect size for the sample studied.

Different definitions of parental involvement show different effect sizes on students' achievements. The largest observed effect is linked to parental expectations, for which the mean effect size is 0.224. This result is congruent with other meta-analyses (Fan & Chen, 2001; Jeynes, 2005b, 2007), in which the parents' aspiration for their children also proves to show the strongest link with the academic results. In those cases the magnitude of effect was even larger than those obtained in this meta-analysis.

By contrast, with equally significant values at a confidence level of 99%, we find that parental supervision of schoolwork (homework) has very little influence, with an effect size of 0.024, along with attendance and participation in school activities, for which the effect size was not statistically significant. This may be surprising if we compare the results with those in the study of Jeynes (2003), in which parental supervision of homework (0.72) and the parental attendance and participation at the school (0.51–0.62) are two of the types of parent participation with the greatest effect on the students' academic performance. By contrast, Hill and Tyson (2009) found a negative magnitude of effect related with help with homework (–0.11).

Table 2
Means of effect size between parent participation and involvement at school and academic achievement.

	Mean effect size	Standard error	Lower limit	Upper limit	Z	p	N
Global	0.124	0.003	0.119	0.129	48.719	<0.01	108
Type of parent involvement							
General description of parent participation	0.167	0.004	0.160	0.175	43.382	<0.01	37
Communication with children about school issues	0.200	0.007	0.187	0.214	28.426	<0.01	6
Homework (parental supervision of schoolwork)	0.024	0.007	0.011	0.038	3.597	<0.01	18
Parental expectations	0.224	0.018	0.188	0.260	12.120	<0.01	8
Reading with children	0.168	0.016	0.137	0.199	10.697	<0.01	4
Parental attendance and participation in school activities	0.010	0.006	–0.003	0.022	1.531	>0.01	21
Parental style	0.130	0.009	0.113	0.147	14.90	<0.01	14
Measure of achievement							
General achievement	0.142	0.003	0.136	0.148	45.961	<0.01	51
Mathematics	0.063	0.008	0.047	0.079	7.846	<0.01	22
Reading	0.084	0.007	0.071	0.097	12.932	<0.01	19
Sciences	–0.013	0.037	–0.086	0.060	–0.343	>0.01	2
Foreign language	0.045	0.013	0.020	0.071	3.484	<0.01	8
Other curricular subject (art, music etc.)	0.391	0.020	0.351	0.431	19.291	<0.01	6
Type of achievement measure							
Standardized	0.146	0.003	0.139	0.152	44.158	<0.01	57
Non-standardized	0.091	0.004	0.083	0.099	22.441	<0.01	49
Not specified	0.326	0.046	0.237	0.415	7.159	<0.01	2
Educational level							
Kindergarten	0.050	0.011	0.029	0.071	4.736	<0.01	11
Primary education	0.125	0.006	0.114	0.136	22.356	<0.01	33
Secondary education	0.138	0.003	0.132	0.144	44.867	<0.01	55
Kindergarten and primary education	–0.050	0.016	–0.080	–0.019	–3.182	<0.01	3
Primary and secondary education	0.091	0.018	0.055	0.126	4.992	<0.01	6
Type of population							
General	0.134	0.004	0.126	0.143	31.141	<0.01	44
Specific	0.119	0.003	0.113	0.125	37.578	<0.01	64
Type of publication							
Article	0.104	0.003	0.098	0.110	34.196	<0.01	93
Doctoral thesis	0.150	0.007	0.136	0.164	21.631	<0.01	13
Others (dissertation etc.)	0.194	0.006	0.181	0.207	30.216	<0.01	2

It has also been found that communication with children about school activities is the factor with the second largest effect on the students' academic results, with a mean effect size of 0.2. Finally, and in coincidence with the findings of other previous meta-analyses (Jeynes, 2003, 2005b), reading with children (0.168), overall parent participation (0.167), and parental style (0.130) are all variables with an important influence.

Differences in mean effect size are also found when academic achievement is measured globally or by means of some specific aspect of it. Hence, the response variables in which parent participation seems to have the greatest incidence are, in decreasing order of importance, curricular subjects such as art and music, etc. (0.391), academic achievement (0.142), reading (0.084), mathematics (0.063), and foreign languages (0.045). On the other hand, the mean effect size is not significant for science subjects. This larger correlation between parent participation and global measures of academic achievement or in other curricular subject matters coincides with the results reported in the meta-analysis of Fan and Chen (2001), in which the effect sizes take values of 0.40 and 0.30, respectively.

In studies including a standard measure of academic achievement, the mean effect size (0.146) is higher than the one observed in studies using non-standardized measures (0.091). Hence, as already demonstrated in the studies of Jeynes (2007,

Table 3
Heterogeneity study of results within moderator variable groups.

	Q_{total}			Gl	p
Global	4607.521			127	0.000
	Q_{total}	Q_{within}	$Q_{between}$	Gl	p
Kind of parent participation	4607.521	3792.578	814.943	6	0.000
Achievement measure	4607.521	4255.486	352.035	5	0.000
Type of achievement measure	4607.521	4476.298	131.223	2	0.000
Educational level	4607.521	4410.780	196.742	4	0.000
Type of population	4607.521	4599.171	8.350	1	0.004
Type of publication	4607.521	4430.737	176.784	2	0.000

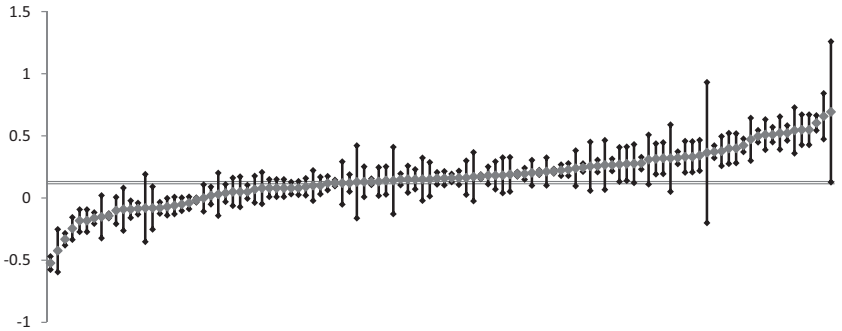

Fig. 1. Effect size and confidence interval for each individual study. Note: The horizontal line that crosses the graph represents the mean value of the effect sizes.

2012), the association between parental involvement and academic results would be a little stronger in studies that use standardized measures of students' achievement.

With regard to Kindergarten, Primary and Secondary education levels, the largest effect is for secondary education (0.138) followed by primary education (0.125). For kindergarten however, the magnitude of the mean effect is 0.05. These results are in concordance with those of the meta-analysis of Jeynes (2012).

The type of population is another aspect that moderates the relation between the considered variables. In studies that take into consideration the general population the mean effect size (0.134) is higher than in cases that consider specific population groups (0.119). In accordance with this, in the studies of Jeynes (2005b, 2007) there is also a slight decrease in the effect size when considering exclusively research that works with specific populations.

Finally, differences have been found in the magnitude of the effect sizes in relation to the type of publication. For studies published in scientific journals (0.104) the magnitude of the effect size is lower than when the research forms part of doctoral theses (0.15), or other publications such as dissertations or research reports (0.194).

Publication bias is almost certainly one of the major methodological problems associated with meta-analyses and research reviews. The differences described in relation to publication type could affect the publication bias, since in this meta-analysis most of the effect sizes considered came from studies published in prestigious scientific journals.

It had been well established that studies showing non-significant results are not easily published, and that their results are usually excluded from quantitative reviews of research results. Moreover, the significance of the effect is sensitive to the sample size, so, studies with larger samples usually obtain significant results regardless of the magnitude of the effect. It is, therefore, important to study the relation between the magnitude of the effect and the sample size. A positive correlation between the sample size of the study and the magnitude of the effect could be an indicator of the presence of publication bias.

Fig. 2 represents the association between sample sizes and the magnitudes of effect observed in this meta-analysis. Each point on the scatter diagram represents the correlation between the magnitude of the individual effect (represented on the *y* axis) and the sample size of the study (on the *x* axis). Examination of this graph reveals that there is no significant asymmetry in the representation of the studies situated on the part of the graph that represents studies with the smaller sample sizes and smaller effect size. It can also be observed how these correlations become more similar in studies with a greater number of subjects.

The correlation between the magnitude of the effect and sample size for the group of studies is almost zero. This can be taken as an indicator of the absence of publication bias.

4. Discussion and conclusions

This meta-analysis has been performed on a set of 37 primary studies carried out between 2000 and 2013 that include students of kindergarten, primary and secondary education describing spontaneous parental participation not articulated through specific programs. This synthesis of research studies does not appear to be affected by methodological artifacts such as publication bias.

The strongest associations between type of parental involvement and academic achievement were found when parents have high academic expectations for their children, develop and maintain communication with them about school activities and schoolwork, and promote the development of reading habits. These findings are consistent with the previous meta-analytical literature, and suggest that the most effective modality of parent involvement has to do with accompanying and supervising children's main school goals, which are to study and to learn. In any case, it is important to note the smaller magnitude of the effects detected in this meta-analysis.

According to our analysis, other family behaviors such as supervision and control of homework and parental attendance of school activities do not appear to be especially related to the children's academic achievement. Hence, one could

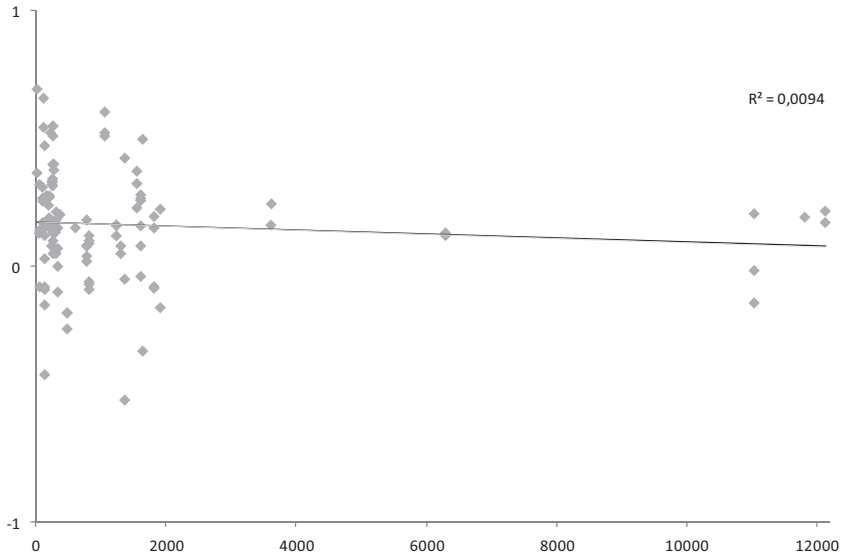

Fig. 2. Relation between effect size and sample size of the studies analyzed.

perhaps deduce that the need that some children have for help with homework, or for parents to participate in school activities, is especially important when the child presents some kind of difficulty (either in learning, behavior, socialization, etc.), and this situation would have a negative effect on school results, even with the parents' collaboration and participation. This explanation was previously suggested, for example, in the meta-synthesis conducted by Wilder (2014), but we probably need a more general hypothesis to orient future research.

It can also be observed that the most positive relation between parent participation and academic achievement is detected when global measures of academic achievement are considered and when it is estimated by standardized measures. The only exception to this corresponded to very specialized academic subjects, such as art or music. This was, also, the case for the meta-analysis of Fan and Chen (2001), which found a stronger relationship between parental involvement and academic achievement if the measure of the latter was of a more general type, such as grade point average, or combined grades in several academic areas.

In spite of the results of this meta-analysis, we still need to explain their meaning, and how our findings relate with previous studies. At this point, we must attempt to find out why, in some relationships we, and other authors, find negative values for the correlations, or very low values that seem to be counterintuitive. That is the case with the global effect for parent participation and academic achievement (0.04), or the negative value for "helping with homework" in Hill and Tyson (2009) for example, among others.

We must also establish why the intensity of the association is different in our results compared with previous studies. It is, also, unclear why the greatest influence of parental involvement is repeatedly found to be on overall achievement compared to more specific subjects, such as maths or foreign language. We will also reflect upon the different nature of the parental involvement, when operationalized as parent's expectations.

Some paradoxical results found in most of the analyzed studies can be explained by the complex nature of the construct 'parental involvement'. It stands to reason that for a given student, the higher the involvement of his/her parents, the better his/her educational achievement will be. But at the same time, it is possible that in a given set of students the less able ones need stronger parent involvement to succeed at school.

If this were the case, one would expect that the lower the academic achievement of the students, the higher the probability of the parents' presence at the school, or of their direct or indirect involvement in the school-related activities of their children. This apparent paradox is found in many other phenomena. Any causal relation is counterfactual (Holland, 1986; Rubin, 1974, 2005; West & Thoemmes, 2010), and the observed data do not necessarily reflect the actual causal chain, because each observed datum is just the observed part of the whole causal relationship. Fig. 3 shows how the actual, though not observable, data and the observed data behave. We can consider that students with higher latent ability would have steeper slopes for the function relating the parent involvement scale with student's academic achievement. Of the infinite set of possible values throughout that function, only one point can be observed. So, the observed pairs of values of parent involvement scale and student academic achievement must necessarily pertain to different students. This would explain the apparent paradox of the observed values in the correlation of both variables, when academic achievement is measured through the achievement in specific subjects, such as mathematics or a foreign language.

This can, also, explain the variations in the intensity of the correlations observed in different studies, even meta-analyses.

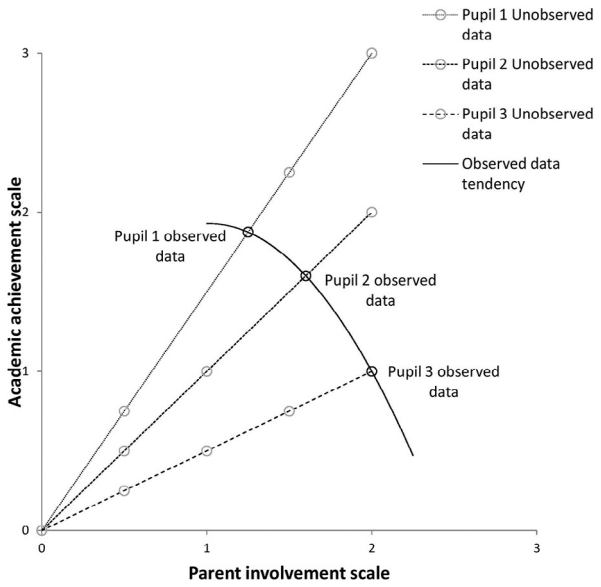

Fig. 3. Counterfactual relations between parent involvement and academic achievement.

Controlling for different slopes can be done through experimental design, or by including the right covariates in the model. Interestingly, when the meta-analysis selection criteria included only experimental or quasi-experimental studies (Fan & Chen, 2001; Jeynes, 2005b; Sénéchal & Young, 2008), or in the studies that controlled covariates such as children's intelligence (Topor, Keane, Shelton, & Calkins, 2010; Zellman & Waterman, 1998), the correlations were always positive. In this line, Wilder (2014) says: "For example, after controlling for a child's ability, socio-economical status and ethnicity, Zellman and Waterman's (1998) findings indicated a significant positive correlation between parental in-school involvement and student reading scores. Additionally, after controlling for children's intelligence, Topor et al. (2010) argued that parental involvement was significantly related to academic performance and children's perception of cognitive competence" (p. 378). In the compiled studies that were not experimental or did not inform of statistical control of important covariates, the probability of observing negative correlations was higher, as in the cases of Patall et al. (2008) or Hill and Tyson (2009).

This counterfactual nature of the phenomenon could also explain why the more global operationalization of the parental involvement and academic achievement constructs gives a higher value for the correlation coefficient. In this case, we can think of a bundle of vectors for each student, with each vector, in turn, representing an academic topic. For the most able students, the bundle of vectors will have a very steep slope, and because they need less parental help, his/her vectors will be all together, close to the vertical axis and the observed points closer to the origin of coordinates. However, the bundle for the less able students would be closer to the horizontal axis and further from the origin, given that these students need more parental help. For every student, the more difficult subjects, such as maths and foreign languages, would have the flatter lines. In consequence, when we compute the average vector for each student the average of coordinates of the observable points would send the mean vector away from the horizontal axis and closer to the vertical one.

Another question that must be addressed concerns the relationship between parental expectations and student academic achievement. Anyone concerned about education would like to know which manipulable variables have the greatest effect on educational performance. But, unfortunately, it seems that the largest effects are associated with variables outside the scope of administrators or policy makers. That is the case with parental expectations.

On this issue, our results are congruent with those of Wilder (2014). For Wilder, the strongest relationship was found between parental expectations and educational achievement. Wilder suggests that "parental expectations reflect parents' beliefs and attitudes toward school, teachers, subjects, and education in general. As children are likely to harbor similar attitudes and beliefs as their parents, having high parental expectations appears vital for academic achievement of children" (p. 392). Especially the last sentence would seem to induce that parental expectations are a manipulable variable. However, we should seriously consider the possibility of both variables, parents' and children's expectations, to be simultaneously caused by a third variable or variables, such as the socio-economic and cultural background of the family. For example, Jeynes (2003) studied this relationship, among others, in six academic minority groups in the U.S. school system, and although there was a positive relation regardless of ethnicity and academic level, he could identify differences in the intensity of the relation.

We could hypothesize the existence of a link between the two issues, cultural background and parental expectations. Certainly, these are the kinds of variables that do not allow direct educational intervention, but something can be learned from this analysis. Cultural background, the variable that is really coded under the tag of 'ethnic group', is a complex and

interrelated set of values about the role of the individual in life, the ideal image of adulthood, the importance of family, how the family is conceived, the roles of children within the family, permitted behaviors within and without the household, the extent to which the education and the school are effective means to attain social promotion for the individual and the family, and, of course, expectations about the academic performance of children. So, parental aspiration and expectations for educational achievement of their children are different kinds of variables than parents' supervision of children at home.

More able students coming from affluent families tend to get better grades and to have parents with greater expectations for them. At the same time, the other students tend to have lower grades and parents with lower expectations. This is how a positive value correlation comes to be observed, with a slope of the same sign as the unobserved values. This way we can explain why we found this correlation so often and why its sign is always positive.

It still remains to be established if a variable such as parental expectation is worth including in any individual or meta-analytical study, given its nature. Certainly, it looks more like a passive attitude of parents rather than an active behavior. However, given the strength of the relationship found, and its constant presence in almost every study analyzed, we could wonder if there is any way to influence it through specific interventions, aimed at improving parents' perceptions of their children, and of the possibilities offered by education for the bettering of their children's life. A possible goal for a future meta-analysis would be to focus on studies of this type.

In the light of the remaining results of this study, and in accordance with most of the literature reviewed, it can be concluded that the most successful parent involvement in relation to children's performance corresponds to a pattern of parental participation. This would be aimed at fomenting the children's academic achievement and at developing basic skills such as reading. Parent participation has the greatest influence on global measures of achievement, and becomes more important as the children enter the later stages of compulsory education.

The sample of primary studies included in this meta-analysis shows a variety of cultural contexts (USA Mexico, Korea, Egypt, Iceland, Greece, Cambodia, Arabs in Israel …). This cultural origin variety of the primary studies sample is, in a certain way, a warrant about the transcultural stability of the observed relations, although the numbers do not allow us to differentiate between effects due to the cultural background and those due to national origin.

A very important conclusion can be reached for the methodological aspects of the meta-analysis related with parent involvement. A great number of studies related with this topic are based on observational data. This approach is prone to produce paradoxical results due to the counterfactual nature of the underlying relations. If this is the case, a conclusion can be advanced from our meta-analysis: whenever differences in the slope are observed, this should be managed by means of a control variable or an experimental design. And, whenever a meta-analysis is to be carried out, a clear distinction must be made between experimental and non-experimental studies, and among those with covariates aimed to control differences in slope, such as intelligence, general ability, previous achievement, and others.

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