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An explanatory model of maths achievement: Perceived parental involvement and academic motivation

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Abstract

Background: Although numerous studies have tried to explain performance in maths very few have deeply explored the relationship between different variables and how they jointly explain mathematical performance. **Method:** With a sample of 897 students in 5th and 6th grade in Primary Education and using structural equation modeling (SEM), this study analyzes how the perception of parents' beliefs is related to children´s beliefs, their involvement in mathematical tasks and their performance. **Results:** Perceived parental involvement contributes to the motivation of their children in mathematics. Direct supervision of students' academic work by parents may increase students' concerns about the image and rating of their children, but not their academic performance. In fact, maths achievement depends directly and positively on the parents' expectations and children's maths self-efficacy and negatively on the parents' help in tasks and performance goal orientation. **Conclusions:** Perceived parental involvement contributes to children's motivation in maths essentially conveying confidence in their abilities and showing interest in their progress and schoolwork.

Keywords: Parental involvement, self-efficacy, utility value, goal orientation, maths achievement.

Resumen

Un modelo explicativo del rendimiento en matemáticas: percepción de la implicación parental y motivación académica. **Antecedentes:** aunque numerosos estudios han tratado de explicar el rendimiento en matemáticas muy pocos han profundizado en la relación existente entre las diferentes variables que pueden explicar el rendimiento matemático, tomadas conjuntamente. **Método:** 897 estudiantes de 5º y 6º de Primaria y empleando análisis de ecuaciones estructurales se analizó cómo la percepción de las creencias de los padres se relaciona con las creencias de los hijos, su implicación en las tareas matemáticas y su rendimiento. **Resultados:** la percepción de la implicación parental contribuye a la motivación de sus hijos. La supervisión directa del trabajo académico de los estudiantes por parte los padres podría aumentar la preocupación de estos por la imagen y las calificaciones de sus hijos, pero esto no incrementa el rendimiento académico de los estudiantes. El rendimiento dependería directa y positivamente de las expectativas de los padres y la autoeficacia matemática de los estudiantes y negativamente de la ayuda de los padres en las tareas y de la orientación hacia metas de rendimiento. **Conclusiones:** la percepción de implicación parental percibida contribuye a la motivación de los niños en matemáticas, transmitiendo confianza en sus habilidades y mostrando interés en su progreso y trabajo escolar.

Palabras clave: implicación de los padres, autoeficacia, valor de utilidad, orientación de meta, rendimiento matemático.

Numerous studies have examined the determining factors of academic achievement in maths. Thus, the roles of both cognitive and affective-motivational (Miñano & Castejón, 2011; Miñano, Gilar, & Castejón, 2012) and contextual variables (Rosário, Lourenço, Paiva, Rodrigues, Valle, & Tuero-Herrero, 2012) have been studied.

Regardless of cognitive ability or previous knowledge, affective-motivational beliefs and strategic resources that students use to learn maths impact on their achievement. In addition to recognizing the role of parents in promoting the intellectual skills that children need in order to succeed at school, it is critically important to shed light on the multiple subtle ways in which parents affect achievement-beliefs and behaviors in their children. Parents' achievement-related beliefs and behaviors can have a profound influence on how children come to perceive their own abilities and the value of learning (Eccles, Roeser, Vida, Fredricks, & Wigfield, 2006).

The Expectancy-value Theory (EVT) also distinguishes between multiple components of value. Although four types of values for tasks have been defined, our study focused on mathematics utility value. Utility value, or usefulness, refers to how a task relates to current or future goals (Eccles & Wigfield 2002).

In addition to evaluating mathematics expectancy-value, we resort to the achievement goal theoretical framework to assess the purposes or reasons why an individual pursues an academic task and the meaning of achievement to the individual (Anderman & Wolters 2006). In this context, we were interested in discovering how parents' beliefs influence student's intention to focus on learning and understanding in mathematics classrooms

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–mastery goal orientation–. Students with higher mastery goals are theoretically expected to be more academically successful and empirical evidence for mathematics students has been found (Peklaj, Podlesek, & Pečjak, 2015).

Eccles' model posits that children's subjective appraisal of parents' beliefs plays a critical role in mediating the relationship between parents' beliefs and children's self-perception of competence in achievement-related domains. Thus parents provide social-emotional influences on children's motivation beliefs, which in turn influence children's educational performance.

In line with the predictions of Expectancy-value Theory (EVT), the positive association between parents' evaluation of their children's academic skills and children's perception of such abilities has received empirical support (e.g., Simpkins, Fredricks, & Eccles, 2015). Importantly, it has been suggested that the association between children's self-perception of ability and their performance could be mediated by these parents' evaluations (Tiedemann, 2000).

As a social cognitive theory, achievement goal theory asserts that both school and family contexts contribute to the goal orientations that students adopt (Maehr, 2001). Relatively little research has examined the association between parental variables and classroom goal orientations (Chan & Chan, 2007; Kim, Schallert, & Kim, 2010). However, Friedel, Cortina, Turner, and Midgley (2007) argue that parental goal orientations could be better predictors of middle school students' goal orientation than teacher goal orientations.

Gutman (2006) conducted a mixed methods study and found that children from mastery-oriented parents were more likely to report mastery-oriented goals themselves. The research seems to support a positive relationship between parental mastery goal orientation and support, and student mastery goal orientation and self-efficacy. Parental performance goal orientation and parental control were also related to student performance goal orientation –approach and avoidance–, lowered mastery goals and reduced academic efficacy (Friedel et al., 2007).

In this study we assume that parental support is essential to students' academic success (Simpkins et al., 2015). However, additional work is needed to provide a more comprehensive understanding of how parents' maths support –parents' interest in children's progress, parents' expectations and parents' help in academic tasks– predicts children's motivational beliefs –maths self-efficacy and utility value–and classroom goal orientations (Chan & Chan, 2007; Kim et al., 2010) in elementary school. As both expectancy-value theory and achievement goal perspectives suggest, we expect a positive relationship between these children's motivational beliefs and approach goal orientations with academic achievement in maths (Peklaj et al., 2015).

Method

Participants

The sample consisted of 897 Spanish students from 13 public schools. Of the total, 50.2% were boys and 49.8% were girls, the ages ranged between 9 and 13 years old (M = 10.77); 437 of the participants were enrolled in the 5th grade of elementary school (223 boys and 213 girls) and 460 were enrolled in 6th grade of elementary school (227 boys and 233 girls).

Instruments

Parental involvement

Parental involvement was evaluated using the Family Involvement Questionnaire (González-Pienda & Núñez, 1994).

- *Interest in the progress of children*. This variable consists of nine items adapted from the Family Involvement Questionnaire, it is intended to measure the degree of involvement and interest of parents in what their children do at school (Cronbach α= .79).
- *Parents help with academic tasks*. Four items were used to measure the degree of supervision and help of parents in academic tasks performed by their children at home (Cronbach α = .64).
- *Parents' expectations* (Cronbach α = .73). The four items making up this dimension measure what parents think about the skills their children have for dealing with academic and non-academic situations.

Items in each of the dimensions have a Likert format with five response options ranging from 1 (totally false) to 5 (completely true).

Attitude toward mathematics

The IAM (Inventory of Attitudes toward Mathematics) was used to measure student attitudes toward mathematics.

- *Maths self-efficacy* (Cronbach's α= .75): assesses the degree of self-confidence to learn and do well at maths.
- *Maths utility value* (Cronbach's α = .60): assesses the extent to which students perceive the usefulness of the knowledge acquired in mathematics, especially for the future.
- *Performance goal orientation in maths* (Cronbach's α = .78): evaluates the motivation aimed at achieving top grades and being the best at mathematics.
- *Mastery goal orientation in maths* (Cronbach's α= .72): evaluates the motivation to learn and understand mathematical content for pleasure and personal satisfaction.

Items in each of the dimensions have a Likert format with five-response options ranging from 1 (totally false) to 5 (completely true).

Mathematics achievement

Academic achievement in mathematics was obtained from the scores achieved in this course: Poor, Fair, Good, Very Good and Excellent.

Procedure

The target variable data were collected during regular school hours by external staff, after obtaining the consent of the school directors and the students' teachers.

Data analysis

After verifying that the distribution of the variables can be considered normal enough to allow the use of the maximum

likelihood procedure (see Table 1), a structural equation analysis, using the computer program AMOS 18 was employed to contrast a hypothesized model predicting the incidence of perceived parental involvement on mathematics motivation and achievement. In addition to chi-square (χ^2) and its associated probability (p), the information provided by the goodness-of-fit index (GFI), the comparative fit index (CFI) and the root mean square error of approximation (RMSEA) were used. The model fits well when GFI > .90, CFI > .95, and RMSEA ≤ .05.

Results

Preliminary analysis

Table 1 details the means, standard deviations, skewness, kurtosis, and bivariate correlations between the measures. All three aspects of the students' perceptions of parental involvement, parents' interest in children's progress, parents' help with academic tasks and parents' expectations, were associated with maths self-efficacy (r = .26, r = .17 and r = .42, p<.01, respectively) and maths utility value (r = .26, r = .16 and r = .23, p<.01, respectively). Both maths self-efficacy and utility value correlated with performance (r = .22 and r = .25, p<.01, respectively) and mastery goals orientation in maths (r = .68, and r = .35, p<.01, respectively). Maths achievement was positively correlated with parents' expectations, parents' interest in progress, maths self-efficacy, maths utility value and mastery goal orientation (r = .28, r = .13, r = .28, r = .09 and r = .19, p<.01, respectively).

The correlation between maths achievement and parents' help with academic tasks was less important and negative (r = -.07, p<.05). Performance goal orientation was the only motivational construct that did not seem to correlate with maths achievement (see Table 1).

Testing a hypothesized structural model

Based on the literature reviewed, we hypothesized a positive influence of perceived parental involvement *–parents' interest in children progress, parents' expectations and parents help in academic tasks–* on students' motivational beliefs *–maths self-efficacy and utility value–*. In addition, we expected to find a positive relationship between these student's motivational beliefs and *mastery* and *performance* goal orientation. Consistent with the predictions of the EVT, we initially hypothesized a direct positive relationship between perceived parental involvement and *maths academic achievement*. As both expectancy-value theory and achievement goal perspectives suggest, we assume a positive relationship between these children's motivational beliefs and approach goal orientations with maths academic achievement. In Figure 1 the relationships expressed in the formulation of the hypothesis producing the model to be contrasted are made explicit.

The evaluation of the proposed model was performed at two different times. First, the analysis of the degree of global fit of the model in order to verify the extent to which it correctly reproduces the relations in the matrix of empirical data. Second, once the model fit, we proceeded to analyze the hypothesized relationships between the variables that made up the model.

The extent to which a hypothesized model fits or adequately describes the sample data is of primary interest in structural equation modeling. In general, the results obtained from the contrast of the hypothesized model (Figure 1) revealed a lack of fit of this model. Specifically, the data showed a $\chi^2_{(8)}$ value of 69.583 and probability value (0.000) which indicates that the data matrix generated by the hypothesized model is significantly different from the empirical data. In general, the data provided by AMOS seem to indicate that the model shows some lack of fit, despite the fact that some of the statistics indicate accepting the model as it was formulated (CFI = .903; GFI = .981).

Consequently, the following step was to analyze the sources of poor fit and re-specify the model in an attempt to eliminate these problems. As some expert researchers in this type of methodology advise, modifications in the original model should be justified not only at a statistical level (the change significantly improves the fit of the model), but also for theoretical and practical reasons (Byrne, 2001). First we omitted the relationship between parents'

Table 1
Descriptive statistics and intercorrelations among variables (N = 897)

	1	2	3	4	5	6	7	8
1. Interest in progress	–							
2. Help task	.534**	---						
3. Parents expectations	.514**	.261**	---					
4. Self-efficacy	.269**	.172**	.420**	---				
5. Utility	.266**	.164**	.238**	.315**	---			
6. Performance goal	.088**	.130**	.140**	.225**	.253**	---		
7. Mastery goals	.270**	.172**	.347**	.681**	.357**	.244**	---	
8. Achievement	.130**	-.076*	287**	.281**	.096**	-029	.191**	---
M	4.155	3.513	4.100	4.040	4.547	3.921	3.711	3.412
SD	0.590	0.817	0.542	0.755	0.7143	1.069	.858	1.270
skewness	-0.906	-0.306	-0.692	-0.891	-0.1773	-0.896	-0.498	-0.429
kurtosis	0.893	-0.309	1.175	0.790	3.154	-0.035	-0.183	-0.910

** p<.01; * p<.05

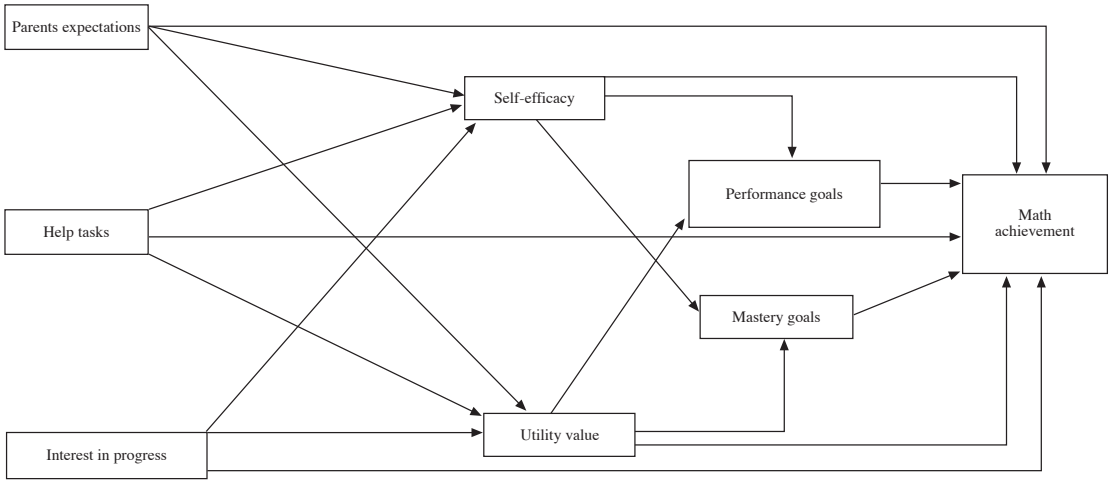

Figure 1. Initial hypothesized model

interest in children's progress and maths self-efficacy and between parents' help in task and maths utility value because hypothesized effects did not reach a minimum level of statistical significance. For the same reason, we omitted the relationships between parents' interest in children's progress, maths utility value and mastery goal with maths achievement.

Second, we included three suggested relationships in the model. First we included an important positive relation between self-efficacy and maths utility value. Estimating this parameter made us skip the direct relationship between parents' expectations and maths utility value because it did not reach a minimum level of statistical significance. We also included a positive suggested relationship between parents' help with task and performance goals. Finally, we include a third suggested relationship between parents' interest in children's progress and mastery goal orientation.

With this procedure of re-specification, we obtained a model that captures the important relationships and, at the same time, was as parsimonious as possible. The final model, following those modification, can be seen in Figure 2. Comparing this with Figure 1, the modifications made to the initially hypothesized model can be seen.

The data obtained about the degree of fit of the final model were better. All the statistics analyzed clearly indicate that the final model is plausible to correctly explain the relationships between the variables measured. Thus, $\div^2 = 17.46$; with 11 degrees of freedom, is not significant ($p = .095$), which indicates that there are no statistically significant differences between our model and the empirical data, and consequently, that we should accept the model. Furthermore, GFI and CFI indices reached optimal levels (.90 and >) at .995 and .990, respectively and the RMSEA value for the present model was .026, falling within optimal levels (<.05).

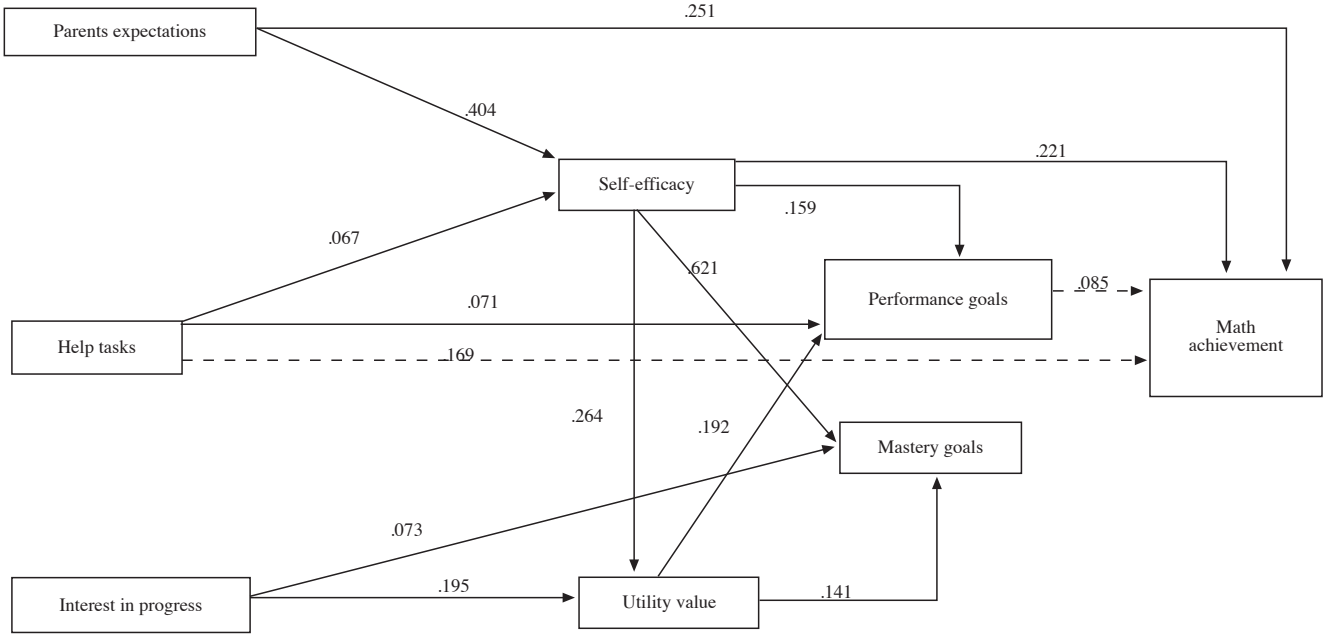

Figura 2. Re-specified model
Note: Continuous lines indicate positive significant causal effect and dashed line indicate negative significant causal effect

As our initial proposal suggested that parents' expectations explain maths self-efficacy (b = .40, p<.001). Parents' help can also have a positive impact on maths self-efficacy in their children (b = .06, p<.05), although to a lesser extent. However, neither parents' expectations nor parents' help in task seem to directly influence the maths utility value. The influence of this parameter is possibly indirect and may be affected by the estimated relationship between maths self-efficacy and maths utility value (b = .26, p<.001) In fact, only parents' interest in children's progress maintains a positive direct effect on utility value assigned to mathematics (b = .19, p<.001).

Moreover, while parents' expectations had a positive impact on children's maths achievement(b = .25, p<.001), parents' help in academic task had a negative direct relationship with maths achievement (b = -.16, p<.001). The correlations obtained suggest the direct negative effect found leads us to assume that parents help with academic task may be more important as the performance of the children suffers.

The mastery as performance goal orientation is finally positively explained by the maths perceived self-efficacy (b = .62, p<.001 and b = .15, p<.001, respectively) and maths utility value (b = .14, p<.001 and b = .19, p<.001, respectively). However, neither maths utility value nor mastery goal orientation seem to sustain meaningful relationships with maths achievement. The structural equation analysis allowed us to also suggest some positive impact of parents' interest in children progress on mastery goal orientation in maths (b = .07, p<.050) and of parents help with task on performance goals (b = .07, p<.050). In summary, maths achievement depends directly and positively on the parents expectations (b = .25, p<.001) and children maths self-efficacy (b = .22, p<.001); while parent's help in tasks (b = -.19, p<.001) and performance goal orientation in maths (b = -.08, p<.05) explain achievement negatively. Predictors explain 15% of maths achievement variance.

Discussion

The results of this study support previous findings that seem to suggest that the family mainly influences the personal circumstances of the student (self-efficacy and utility value, in this case), which are the variables most directly linked to academic performance (Álvarez, Suárez, Tuero, Núñez, Valle, & Regueiro, 2015; Valle et al., 2015). Although there is a consensus about the importance of parental involvement in students' academic success (Eccles, 2007), there are still some ambiguities in the literature about the type of parental behaviors that contribute to school success (Fan & Williams, 2010). This study using multivariate causal modeling techniques supports the prediction that children are more confident in their chances of doing well when they believe their parents trust their abilities and that the utility value attributed to mathematics may depend on the interest parents show in what their children do at school, their difficulties and academic progress.

Parents' child-specific beliefs such as perceptions of the child's abilities or expectations for the child's achievement have been acknowledged as primary determinants of children's own ability perceptions and performance (see e.g., Eccles, 2007). Besides the indirect influence of parents' expectations on children's maths achievement also found in previous research (e.g., Tiedemann, 2000), our results allow us to affirm a major significant direct relationship between perceived parents' expectations and maths achievement.

According to the expectancy-value model, achievement is directly influenced by the individual's self-efficacy expectations and the inherent value of the academic task (Wang & Tsai, 2016). However, our results do not allow us to confirm this direct link between the utility value and achievement in maths; which leads us to suggest that effective expectancy beliefs have a strong influence on achievement, while value beliefs may have stronger influence on other performance variables such as choice, effort, and persistence in achievement tasks (Trautwein, Marsh, Nagengast, Lüdtke, Nagy, & Jonkmann, 2012). In this regard, it should be remembered that, whereas the utility value has been associated with multiple aspects of academic success, relationships between utility value and maths achievement are mixed (see e.g., Gilbert, Musu-Gillette, Woolley, Karabenick, Strutchens, & Martin, 2014). As recently suggested for mathematics, it seems likely that any effect of utility on test performance will become nonsignificant when ability beliefs are included in the analysis (Gilbert et al., 2014).

On the other hand, results from path analysis suggest that self-efficacy is related directly to task value. Students with high self-efficacy find mathematics classes more useful, important and valuables. As Marsh and Craven (2006) suggested interventions aimed at improving mathematics skills alone would not be as effective as those that simultaneously aim to improve mathematics skills and perceptions of mathematics ability, and our results support this view. In response to this set of relationships it seems appropriate to recommend that educators encourage students and provide them with a basis to form and express positive self-efficacy expectations.

Clearly, both self-efficacy in mathematics and the utility value positively explain the adoption of student achievement goals. Results support the hierarchical model of achievement motivation of Elliot (1997) which suggested that individuals with high perceived competence are inclined to adopt mastery and performance-approach goals. Wigfield and his colleagues discussed ways in which children´s values might relate to their goal orientation suggesting students' values are related significantly to both mastery and performance goals (Wigfield, Anderman, & Eccles, 2000). An academic task perceived to be instrumental to the pursuit of personally-valued future goals would have a consequence on the following achievement goals that students adopt (Miller & Brickman, 2004).

As for the relationship between performance approach goals and academic success, our finding is not consistent with previous longitudinal research that has shown that a prior performance approach goal orientation is a positive predictor of subsequent academic success (Durik, Lovejoy, & Johnson, 2009). The negative link between performance goal orientation and rating assigned by the maths teacher coincides however with other work carried out in samples of elementary school such as Paulick, Watermann and Nücklesc (2013) who showed a negative reciprocal relationship between performance approach goals and subsequent achievement. As the authors suggested, it is possible that the changes associated with the transition to secondary school may have a particularly strong impact on performance approach goals.

While students with higher mastery goals are theoretically expected to be more academically successful and empirical evidence for mathematics students has been found (Gilbert et al., 2014), our results are consistent with the findings of longitudinal

studies, which have shown that mastery approach goals did not predict subsequent achievement (Durik et al., 2009).

Considering the results, parents contribute to the motivation of the children in mathematics essentially conveying confidence in their abilities and showing interest in their progress and schoolwork. Specifically, we found that trust in the ability of children to cope with homework, to learn from their mistakes or to achieve what is proposed could explain the perceived self-efficacy in mathematics. At this point, our results suggest that showing interest in children's progress can also contribute to the adoption of mastery goals in mathematics. These types of feedback and parental attitude could make a more effective contribution to the motivation of their children than most direct help with academic tasks in terms of supervision of homework or study time at home (Regueiro, Suárez, Valle, Núñez, & Rosário, 2014).

In fact, besides being negatively related to academic performance, direct supervision of children's academic work by parents could influence the promotion of a performance goal orientation. Parents monitoring a child's homework and study may make children more concerned about being judged by their parents.

The primary limitation of this study is our measure of self-reported motivational beliefs. We nevertheless feel that these survey responses provide valuable information regarding student motivation. Another important limitation is that the study does not address previous academic achievement and that the study was conducted as a cross-sectional survey. Longitudinal studies involving parents and children with the same and additional constructs are called for.

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References

Álvarez, A., Suárez, N., Tuero, E., Núñez, J.C., Valle, A., & Regueiro, B. (2015). Implicación familiar, autoconcepto del adolescente y rendimiento académico [Family involvement, adolescent self-concept and academic achievement]. *European Journal of Investigation in Health, Psychology and Education, 3*(5), 293-311. doi: 10.1989/ejihpe.v5i3.133

Anderman, E.M., & Wolters, C.A. (2006). Goals, values, and affect: Influences on student motivation. In P. A. Alexander & P. H. Winne (Eds.), *Handbook of Educational Psychology* (2nd ed., pp. 369-389). Mahwah, NJ: Lawrence Erlbaum.

Byrne, B.M. (2001). *Structural equation modeling with AMOS: Basic concepts, applications, and programming*. Mahwah, NJ: Lawrence Erlbaum.

Chan, W., & Chan, S. (2007). Hong Kong Teacher Education Students' Goal Orientations and their relationship to perceived parenting styles. *Educational Psychology: An International Journal of Experimental Educational Psychology, 27*(2), 157-172. doi: 10.1080/01443410601066636

Durik, A.M., Lovejoy, C.M., & Johnson, S.J. (2009). A longitudinal study of achievement goals for college in general: Predicting cumulative GPA and diversity in course selection. *Contemporary Educational Psychology, 34*(2), 113-119. doi: 10.1016/j.cedpsych.2008.11.002

Eccles, J.S. (2007). Families, schools, and developing achievement related motivations and engagement. In J.E. Grusec & P.D. Hastings (Eds.), *Handbook of socialization* (pp. 665-691). New York: Guilford Press.

Eccles, J.S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology, 53*(1), 109-132. doi:10.1146/annurev.psych.53.100901.135153

Eccles, J., Roeser, R., Vida, M., Fredricks, J.A., & Wigfield, A. (2006). Motivational and achievement pathways through middle childhood. In L. Balter & C.S. Tamis-LeMonda (Eds.), *Child psychology: A handbook of contemporary issues* (2nd ed., pp. 325-355). New York: Psychology Press.

Elliot, A.J. (1997). Integrating the "classic" and "contemporary" approaches to achievement motivation: A hierarchical model of approach and avoidance achievement motivation. *Advances in Motivation and Achievement, 10*(7), 143-179.

Fan, W., & Williams, C.M. (2010). The effects of parental involvement on students' academic self-efficacy, engagement and intrinsic motivation. *Educational Psychology: An International Journal of Experimental Educational Psychology, 30*(1), 53-74. doi: 10.1080/01443410903353302

Friedel, J., Cortina, K.S., Turner, J.C., & Midgley, C. (2007). Achievement goals, efficacy beliefs and coping strategies in mathematics: The roles of perceived parent and teacher goal emphases. *Contemporary Educational Psychology, 32,* 434-458. doi: 10.1016/j.cedpsych.2006.10.009

Gilbert, M.C., Musu-Gillette, L.E., Woolley, M.E., Karabenick, S.A., Strutchens, M.E., & Martin, W.G. (2014). Student perceptions of the classroom environment: Relations to motivation and achievement in mathematics. *Learning Environments Research, 17,* 287-304. doi: 10.1007/s10984-013-9151-9

González-Pienda, J.A., & Núñez, J.C. (1994). *Cuestionario para la evaluación de la implicación de la familia en el proceso de escolarización de los hijos* [Questionnaire for the evaluation of the involvement of the family in the process of education of children]. Department of Psychology. University of Oviedo.

Gutman, L.M. (2006). How student and parent goal orientations and classroom goal structures influence the math achievement of African Americans during the high school transition. *Contemporary Educational Psychology, 31*(1), 44-63. doi: 10.1016/j.cedpsych.2005.01.004

Kim, J., Schallert, D.L., & Kim, M. (2010). An integrative cultural view of achievement motivation: Parental and classroom predictors of children's goal orientations when learning mathematics in Korea. *Journal of Educational Psychology, 102*(2), 418-437. doi: 10.1037/a0018676

Maehr, M.L. (2001). Goal theory is not dead-Not yet, anyway: A reflection on the special issue. *Educational Psychology Review, 13*(2), 177-185.

Marsh, H.W., & Craven, R.G. (2006). Reciprocal effects of self-concept and performance from a multidimensional perspective: Beyond seductive pleasure and unidimensional perspectives. *Perspectives on Psychological Science, 1*(2), 133-163. doi: 10.1111/j.1745-6916.2006.00010.x

Miller, R.B., & Brickman, S.J. (2004). A model of future-oriented motivation and self-regulation. *Educational Psychology Review, 16*(1), 9-33. doi: 10.1023/B:EDPR.0000012343.96370.39

Miñano, P., & Castejón, J.L. (2011). Cognitive and motivational variables in the Academic achievement in language and mathematics subjects: A structural model. *Revista de Psicodidáctica, 16*(2), 203-230.

Miñano, P., Gilar, R., & Castejón, J.L. (2012). A structural model of cognitive-motivational variables as explanatory factors of academic achievement in Spanish Language and Mathemathics. *Anales de Psicología, 28*(1), 45-54.

Paulick, I., Watermann, R., & Nücklesc, M. (2013). Achievement goals and school achievement: The transition to different school tracks in secondary school. *Contemporary Educational Psychology, 38*(1), 75-86. doi: 10.1016/j.cedpsych.2012.10.003

Peklaj, C., Podlesek, A., & Pečjak, S. (2015). Gender, previous knowledge, personality traits and subject-specific motivation as predictors of students' math grade in upper-secondary school. *European Journal of Psychology of Education 30*(3), 313-330. doi:10.1007/s10212-014-0239-0

Regueiro, B., Suárez, N., Valle, A., Núñez, J., & Rosário, P. (2014). Homework motivation and engagement throughout compulsory education. *Revista de Psicodidáctica, 20*(1), 47-63. doi: 10.1387/RevPsicodidact.12641

Rosário, P., Lourenço, A., Paiva, O., Rodrigues, A., Valle, A., & Tuero-Herrero, E. (2012). Predicción del rendimiento en matemáticas: efecto de variables personales, socioeducativas y del contexto escolar [Prediction of Mathematics achievement: Effect of personal, socioeducational and contextual variables]. *Psicothema, 24*(2), 289-295.

Simpkins, S.D., Fredricks, J.A., & Eccles, J.S. (2012). Charting the Eccles' expectancy-value model from mothers' beliefs in childhood to youths' activities in adolescence. *Developmental Psychology, 48,* 1019-1032. doi: 10.1037/a0027468

Simpkins, S.D., Fredricks, J.A., & Eccles, J.S. (2015). Families, schools, and developing achievement related motivations and achievement. In J. E. Grusec & P. H. Hasting (Eds.). *Handbook of socialization: Theory and research* (pp. 614-636). New York: Guilford Press.

Tiedemann, J. (2000). Parents' gender stereotypes and teachers' beliefs as predictors of children's concept of their mathematical ability in elementary school. *Journal of Educational Psychology, 92*(1), 144-151. doi: 10.1037/0022-0663.92.1.144

Trautwein, U., Marsh, H.W., Nagengast, B., Lüdtke, O., Nagy, G., & Jonkmann, K. (2012). Probing for the multiplicative term in modern expectancy-value theory: A latent interaction modeling study. *Journal of Educational Psychology, 104,* 763-777. doi: 10.1037/a0027470

Valle, A., Regueiro, B., Rodríguez, S., Piñeiro, I., Freire, C., Ferradás, M., & Suárez, N. (2015). Motivational profiles as a combination of expectations of self-efficacy and academic goals in college students. *European Journal of Education and Psychology*, *8*(1), 1-8. doi: 10.1016/j.ejeps.2015.10.001

Wang, Y.L., & Tsai, C.C. (2016). Taiwanese students' science learning self-efficacy and teacher and student science hardiness: A multilevel model approach. *European Journal of Psychology of Education, 31*(4), 537-555. doi:10.1007/s10212-015-0285-2

Wigfield, A., Anderman, E., & Eccles, J. S. (2000, April). Relations among children's ability-related beliefs, achievement values, and achievement goals. Paper presented at *Annual meeting of the American Educational Research Association*, New Orleans, LA: AERA.