Educación XX1
ISSN: 1139-613X · e-ISSN: 2174-5374

Homework amount, time spent, and time management: a latent profile analysis in secondary education

Cantidad de deberes, tiempo dedicado y gestión del tiempo: un análisis de perfiles latentes en educación secundaria

Susana Rodríguez [1]
Tania Vieites [1]
Carolina Rodríguez-Llorente [1*]
Antonio Valle [1]
José Carlos Núñez [2]

[1] University of A Coruña, Spain
[2] University of Oviedo, Spain
* Corresponding author. E-mail: carolina.rodriguez.llorente@udc.es

How to reference this article:

Rodríguez, S., Vieites, T., Rodríguez-Llorente, C., Valle, A., & Núñez, J. C. (2025). Homework amount, time spent and time management: a latent profile analysis in secondary education. *Educación XX1*, *28*(1), 155-177. https://doi.org/10.5944/educxx1.39364

Date received: 01/01/2024
Date accepted: 04/06/2024
Published online: 07/01/2025

ABSTRACT

Previous research suggests that the amount of homework done, the time spent on it, and even how that time is managed, are not positively related to better academic performance when taken individually. Therefore, the main purpose of this study is to identify student profiles, defined on the basis of the amount of homework students complete, the time they spend doing it, and their management of that time. The aim is to determine the various

combinations with respect to participants' behavioral engagement in academic tasks performed at home, incorporating a person-centered perspective rather than taking the variables independently. Once potential profiles are identified, defined and characterized, the aim is to determine differences at an affective-motivational and cognitive level, and in terms of academic performance. The sample comprised 1935 students in compulsory secondary education (ESO) from 22 schools in Galicia and Asturias. Three behavioral involvement profiles were identified according to their level of involvement: medium-high, medium, and low. In turn, these three profiles were differently related to intrinsic motivation, anxiety, approach to learning, and academic performance. Specifically, the higher the level of behavioral engagement, the higher the intrinsic motivation, the lower the homework anxiety, the deeper the homework approach, and the better the academic performance. In conclusion, we discuss the need to consider at least these three behavioral engagement variables—amount of homework completed by the student, time spent, and time management—in light of the profiles identified in the study in order to be able to ensure optimal personal homework work conditions and good academic achievement.

Keywords: homework, secondary education, profiles, student behavior, student motivation, cognitive style

RESUMEN

La investigación pasada sugiere que la cantidad de deberes realizados, el tiempo dedicado a los mismos o, incluso, la gestión del tiempo, no se relacionan positivamente con un mayor rendimiento cuando se toman individualmente. Por ello, el principal propósito de este estudio es identificar perfiles de estudiantes, definidos en base a la cantidad de deberes escolares que realizan, el tiempo que dedican a realizarlos y la gestión de ese tiempo. Se trata de comprobar las diversas combinaciones que se dan dentro de las y los participantes con respecto a la implicación conductual en las tareas académicas realizadas en el hogar, integrando una perspectiva centrada en la persona y no tomando las variables de forma independiente. Una vez identificados, definidos y caracterizados potenciales perfiles, se pretende averiguar cuáles son sus diferencias a nivel afectivo-motivacional y cognitivo y también con respecto al rendimiento académico. La muestra está integrada por 1935 estudiantes de Educación Secundaria Obligatoria (ESO) pertenecientes a 22 centros educativos de Galicia y de Asturias. Se han identificado tres perfiles de implicación conductual según su nivel de implicación: media-alta, media y baja. A su vez, estos tres perfiles se relacionan de manera diferente con la motivación, la ansiedad, el enfoque de trabajo y el rendimiento académico. En concreto, y en general, cuanto mayor es el nivel de implicación conductual mayor es la motivación intrínseca, menor la ansiedad ante los deberes, más profundo el enfoque de trabajo sobre los mismos y mayor el rendimiento académico. Como conclusión, se discute la necesidad de tomar en cuenta, al menos, estas tres variables de implicación conductual –cantidad de deberes realizados, tiempo dedicado y gestión del tiempo– según los perfiles encontrados para ser capaces de

asegurar condiciones óptimas personales de trabajo en los deberes y un buen rendimiento académico.

Palabras clave: deberes, enseñanza secundaria, perfil del alumno, conducta del alumno, motivación, estilo cognitivo

INTRODUCTION

The quality of students' behavioral engagement with homework is fundamental in explaining school success. However, examining the relationship of each component element with academic performance has often produced contradictory results. For example, various studies looking at time spent on homework have found it to be a relatively unimportant factor in academic performance (Valle, Pan, Núñez, et al., 2015), whereas other studies have found it to be an important—albeit sometimes negative and sometimes positive—aspect (Kalenkoski & Pabilonia, 2017).

Most of these studies used a variable-based approach, and the disparate results are one reason why more recent studies have adopted a person-centered approach (Estévez et al., 2023; Valle et al., 2019). Such an approach allows the complexity of the associations between diverse variables to be evaluated and provides a broader explanation of the possible interactions between them (Lanza & Cooper, 2016). In addition, by emphasizing the individual, this approach facilitates the identification of homogeneous student profiles who present similar characteristics in a range of variables (Hickendorff et al., 2018). This approach has been increasingly adopted in educational psychology research (see, e.g., Estévez et al., 2023; Xu, 2022).

Interest in the present study lies in using a person-centered approach to determine the types of profiles that can be found via a combination of the amount of homework that students are set by their teachers, the time they spend doing that homework, and the management of that time—which refers to the effort and quality of student dedication in qualitative terms (Valle et al., 2019). Once these profiles are identified, the study aims to determine which are more effective and less effective, in affective-motivational and cognitive terms, related to the homework process, and in terms of academic performance.

This will provide an understanding of how teachers should be setting homework that best fits the different profiles, and therefore improve how they deal with diversity. This will help provide quality homework that manages to be tailored to the affective-motivational, cognitive, and behavioral differences between students.

BEHAVIORAL ENGAGEMENT WITH HOMEWORK

Doing homework—tasks that teachers set for students to complete outside the classroom (Cooper, 1989)—is associated with a series of benefits, such as a positive

impact on academic performance (Özyildirim, 2022) and on school engagement (Vieites et al., 2023). However, this impact largely depends on the students' behaviors when doing their homework (Rodríguez et al., 2020).

Homework engagement refers to the students' efforts and persistence when doing it (Regueiro, 2018). When students are engaged in homework tasks, they complete more of the tasks that teachers set them in class (Estévez et al., 2018); they are also more effective at managing their time doing homework, avoiding possible distractions, and staying focused until they finish (Valle et al., 2019). In addition, students who are highly engaged in homework tasks will spend a certain amount of time on that work (Özyildirim, 2022). Although there is no consensus about the number of hours spent on homework that best explains its positive effects on learning (see, e.g., Kalenkoski & Pabilonia, 2017; Valle, Pan, Núñez, et al., 2015), the 2012 PISA report showed that Spanish adolescents spent more than six hours a week on homework, 2.9 percentage points above the Organization for Economic Cooperation and Development (OECD) mean, but did not necessarily perform better in these tests (OECD, 2013).

This has led various studies to note the importance of studying the variables of behavioral engagement with homework in combination in order to determine what specific combination of time spent and time management is most beneficial (Valle et al., 2019; Xu, 2022). For example, Estévez et al. (2023) examined secondary school students and identified four profiles resulting from combinations of these two homework engagement variables. Two were defined as more adaptive for effective time management, with differences in time spent. There were similar results from Valle et al. (2019) using a sample of primary-school students.

In addition, time spent on homework and time management are positively related to the amount of homework set by the teacher that students complete (Núñez et al., 2015; Rodríguez et al., 2020). However, to the best of our knowledge, no studies have explored profiles that combine these three variables.

Affective-motivational and cognitive engagement with homework

When students decide to engage with homework tasks, as well as directing their behavior towards doing these tasks, they also demonstrate specific affective and emotional states and ascribe them a certain value (Regueiro, 2018). In this regard, students who are motivationally and emotionally engaged with their homework show interest in and positive attitudes towards their homework (Xu, 2018), perceive its usefulness, and are intrinsically motivated to do it (Suárez et al., 2019).

Intrinsic motivation towards homework tasks exhibits particularly strong positive relationships with time management, the amount of homework completed from what has been set, and time spent—in that order (Estévez et al., 2018; Rodríguez et

al., 2020). Recent studies have explored differences in students adopting intrinsic motives for doing homework. They found that students with an effective behavioral engagement profile—better time management and more mean time spent—demonstrated higher values in this variable (Estévez et al., 2023; Flunger et al., 2017).

Anxiety, as an affective component present in homework execution, is also related to students' behavioral engagement with the tasks (Flunger et al., 2017). More specifically, when secondary-school students do more homework, spend more time on it, and manage the time better, they demonstrate less homework-related anxiety (Regueiro et al., 2016). In the study by Estévez et al. (2023) there were differences between students who spent approximately the same amounts of time doing homework, with those who managed their time better demonstrating lower levels of anxiety. Despite that, this variable has not yet been sufficiently well-explored in secondary education in relation to the other variables noted above.

In addition, students are also cognitively engaged in homework, managing the personal and contextual resources available to them to complete their tasks, such as adopting a specific approach to the work (Valle et al., 2016). In this regard, students who adopt deeper approaches when doing homework—such as doing so with the goal of learning—manage the time they spend better, but do not necessarily spend more time on their homework (Valle, Pan, Regueiro, et al., 2015).

Homework and academic performance

Nowadays, there is sufficient empirical evidence showing that homework generally has a positive impact on secondary-school students' academic performance, with larger effects than are seen in primary-school students (see, e.g., Magalhães et al., 2020; Özyildirim, 2022). However, this relationship is influenced by a variety of personal and contextual variables (Xu, 2018). Among those variables, students' behavioral engagement with homework has been identified as a key element in explaining performance (see, e.g., Rodríguez et al., 2019)—understood as the knowledge and abilities demonstrated by the student in school subjects, operationalized as a final mark, score, or grade (González-Pienda, 2003).

Looking at the overall effect of behavioral engagement variables on school performance, efficient secondary-school students—with profiles indicating good use of homework time, regardless of actual time spent—achieve higher academic grades than students who do not make the best use of this time (Valle et al., 2019; Xu, 2022). Given that the amount of homework completed out of what was set by the teacher also has a positive impact on performance (Rodríguez et al., 2019), it would be interesting to explore the effects of profiles of behavioral engagement with homework considering the three variables in combination.

THE PRESENT STUDY

With the aim of determining inter-individual differences in homework effects, the study adopted a person-centered approach, considering the variables involved in the process of doing homework together rather than independently (Flunger et al., 2017; Xu, 2022). The study had two main objectives: (a) to identify different possible student profiles based on *behavioral engagement* with homework—the proportion of homework completed from what was set by the teacher, the amount of time spent, and time management—in a sample of students in compulsory secondary education; and (b) to analyze the differences between the identified behavioral engagement profiles in *affective-motivational engagement*—intrinsic motivation and anxiety—, *cognitive engagement*—a deep learning approach—, and *academic performance*.

The last aim of the study is to contribute to the design of homework policies that are tailored to the characteristics of secondary-school students. One reason for studying this population is that, compared to primary-school students, those in secondary education usually have more freedom and autonomy to decide where and when to focus on their homework and are more able to manage themselves (Xu, 2012).

METHOD

Study design

This was an empirical study, performed using an associative strategy (Ato et al., 2013), as it aimed to examine the functional relationship between a set of variables. It used a non-experimental design with the objective of classifying groups (predictive study) and comparing the groups in various external variables (comparative study).

Participants

The sample comprised 1935 students (51.2% girls) in compulsory secondary education attending 22 schools (15 state-funded, 7 private or independent) in Galicia and Asturias (regions in the north of Spain). At the time the study was performed 550 participants (28.4%) were in the first year of secondary education, 488 (25.2%) were in the second year, 429 (22.2%) were in the third year, and 468 (24.2%) were in the fourth year.

The sample selection process was as follows. Firstly, all the secondary schools in the two regions were invited to participate in the study. Schools who agreed to

participate then sent letters to the families of the students to be involved seeking their consent. This meant that the participating students had the consent of their families, as well as agreeing to participate themselves. Data was produced from those students with consent who were in class at the time of the evaluation.

Variables and instruments

The variables related to students' behavioral and affective-motivational engagement with homework were assessed using the Homework Survey (*Encuesta sobre los Deberes Escolares*, EDE), a questionnaire that has been used in various studies into homework (see, e.g., Valle et al., 2019). The scale uses a Likert-type response with five options to measure the following variables:

- *Behavioral engagement with homework*: information was collected about the amount of homework students do compare to what the teachers set, the time they spend on the homework, and whether they effectively manage that time:
  - *Amount of homework done compared to what teachers set*: this is assessed with the response to a single item, «How much of the homework that the teachers set you do you normally complete?» Responses are: 1 = none of it, 2 = a little, 3 = half, 4 = almost all, 5 = all of it.
  - *Time spent on homework:* this is assessed with the item, «How much time do you usually spend doing homework each day?» The responses are: 1 = less than 30 minutes, 2 = between 30 and 60 minutes, 3 = between an hour and an hour-and-a-half, 4 = between an-hour-and-a-half and two hours, 5 = more than 2 hours.
  - *Management of homework time:* this is assessed with the response to the item, «When I start to do my homework, I concentrate and I don't think about anything else until I have finished». The responses range from 1 (never) to 5 (always).
- *Affective-motivational engagement with homework:* this area of engagement was assessed using information about intrinsic motivation and anxiety associated with homework collected using the EDE subscales for each variable. These subscales use a five-point Likert-type scale from 1 (completely false) to 5 (completely true).
  - *Intrinsic motivation*: to determine whether students' motivations when they do homework are linked to enjoyment, satisfaction, and learning, their intrinsic motivation is assessed using eight items: e.g., «Doing homework helps me to understand what is being taught in class». The reliability of the scale is adequate (α = .86; ω = .88; AVE = .52), as is the

structural validity (χ^2 = 179.998, *p* <.001; CFI = .988; TLI = .981; SRMR = .028).

- *Anxiety:* students' levels of homework-related anxiety are measured using four items: e.g., «Just thinking about doing homework makes me nervous». Despite the small number of items in the scale, the data indicate adequate reliability (α = .79; = .82; AVE = .63) and adequate structural validity (χ^2 = 69.014, *p* <.001; CFI = .987; TLI = .960; SRMR = .031).

Students' cognitive engagement with homework was measured by applying the Study Process Inventory [*Inventario de Procesos de Estudio*] (IPE) (Rosário et al., 2006). The specific variable chosen for the study was the adoption of a deep learning approach by the students when they did their homework:

— *Deep learning approach to homework:* how students approach their homework and the strategies they use to do it are assessed using six items: e.g., «Before starting my homework, I usually think about whether I am sure about what we were taught in class, and if I'm not, I review the lesson before I start my homework.» The responses are given on a five-point Likert-type scale ranging from 1 (completely false) to 5 (completely true). Both reliability (α = .83; ω = .83; AVE = .55) and structural validity (χ^2 = 32.579, *p* <.001; CFI = .982; TLI = .966; SRMR = .027) are adequate.

Academic performance was assessed using the students' mean grades in Spanish and Mathematics. The responses ranged from 1 to 5 (1 = Fail, 2 = Pass, 3 = Good, 4 = Very good, 5 = Outstanding). These two subjects were chosen because they are common to all four school years and they are the most important in the secondary school curriculum.

Procedure

Data were collected during class time, with the prior agreement of the teachers, school management, the students, and their families. The questionnaires were applied at a single time point and the participants completed their responses individually, without a time limit. In compliance with the University of A Coruña Ethics Committee, and the ethical principles of the Helsinki Declaration, the data were only used for statistical purposes, and each student's responses were confidential and anonymous.

Data analysis

The data were analyzed using a variety of analytical techniques depending on the study objective. Firstly, the descriptive statistics, correlations, and measures of normality were calculated for the measures taken. Secondly, to address the first objective, we performed a Latent Profile Analysis (LPA) using MPlus, version 7.11 (Muthén & Muthén, 1998-2012). In line with commonly established recommendations for LPA (Lanza et al., 2003), the best model was selected based on data from the Lo-Mendell-Rubin likelihood ratio test (LMRT) (Lo et al., 2001), the Akaike information criterion (AIC), Schwarz's Bayesian information criterion (BIC), and the sample-size-adjusted BIC (SSA-BIC), along with the entropy values and the size of each subgroup. The *p* value associated with the LMRT indicates whether the solution with more classes ($p < .05$) or less classes ($p > .05$) has a better fit to the data. The AIC, BIC, and SSA-BIC are descriptive indices of fit, with lower values indicating better fit for the model. Small classes (containing less than 5% of the sample) are often considered spurious, and may indicate that there are too many profiles in the model (Hipp & Bauer, 2006). The accuracy of classification of the selected model was assessed by calculating the *posteriori* probability and the entropy value. This statistic ranges between zero and one, with values closer to one indicating better classification accuracy.

To address the second objective, following the guidance from Vermunt and Magidson (2021), the AUXILIAR option, with «e-setting», was selected in the same Latent Profile Analysis model to examine the relationship between the identified profiles and the dependent variables (intrinsic motivation, anxiety, deep learning approach, academic performance). Where the χ^2 indicated statistically significant differences between classes or profiles, we performed pairwise mean comparisons. Effect sizes were interpreted using the criteria established by Cohen (1988), according to which, $d = 0.20$ indicates a small effect, $d = 0.50$ indicates a medium effect, and $d = 0.80$ indicates a large effect.

RESULTS

Descriptive analysis and correlations

Table 1 shows the descriptive statistics, skewness, and kurtosis for the study variables along with the correlations between them. The values for asymmetry and kurtosis indicate that the variables follow a normal distribution (Finney & DiStefano, 2013).

Table 1
Means, standard deviations, skewness, kurtosis, and correlation matrix

	1	2	3	4	5	6	7
1. Homework amount	–						
2. Time spent	.41*	–					
3. Time management	.38*	.17*	–				
4. Intrinsic motivation	.41*	.25*	.37*	–			
5. Anxiety	-.14*	-.01	-.18*	-.07*	–		
6. Deep learning approach	.30*	.18*	.26*	.42*	-.07*	–	
7. Academic performance	.35*	.12*	.21*	.19*	-.21*	.10*	–
M	4.08	3.14	3.22	3.44	1.64	3.04	2.65
SD	1.03	1.15	1.07	0.82	0.79	0.52	1.29
Skewness	-1.12	-0.08	-0.25	-0.51	1.55	-0.38	0.24
Kurtosis	0.47	-0.80	-0.50	-0.04	2.47	4.84	-1.25

Note. Measurement scale for variables: 1 minimum, 5 maximum. *$p < .01$.

Table 1 indicates that the correlations between the variables in the study were statistically significant—except for the relationship between time spent on homework and anxiety. There were also positive relationships between the three variables used for the latent profile analysis—amount of homework done compared to what was set, time spent on homework, and management of homework time. In addition, these three variables were positively related with three of the external variables—intrinsic motivation, deep learning approach, and academic performance—and negatively related with anxiety.

Identifying profiles of behavioral engagement with homework

The latent classes were specified based on three variables: the amount of homework set that students completed, the time spent on homework, and management of homework time. The process involved successively evaluating models with increasing numbers of latent classes, stopping when a model produced no substantial improvements over the previous one based on the criteria used to assess the model fit. In this case, the process was stopped at a model with four latent classes. The results of model fit are shown in Table 2.

This stopping point was chosen for various reasons. Firstly, although the AIC, BIC, and SSA-BIC were lower than in the three-class model, the LMRT statistic was not statistically significant (LMRT = 2531.627; p = .119), indicating that the four-class model did not improve on the classification of the three-class model. Secondly, the three-class model is more parsimonious than the four-class model—the fourth class is merely a subgroup of one of the three classes in the previous model. Thirdly, the entropy value for the selected model was excellent, indicating excellent classification accuracy—of subjects within classes—from the three-class model. In fact, the probability of assigning subjects to classes was excellent, class 1 = 1.000, class 2 = 1.000, class 3 = .997.

Table 2
Results for the fit of the latent class models

	Latent class models		
	M2	**M3**	M4
AIC	15669.396	**15010.700**	12403.442
BIC	15725.074	**15088.650**	12503.664
SSA-BIC	15693.304	**15044.171**	12446.477
LMRT	1117.291	**645.377**	2531.627
(LMRT *p* value)	(.000)	**(.000)**	(.1192)
Entropy	.941	**.991**	1.000
NG *n*<5%	0	**0**	0

Note. M2 = Model with 2 latent classes, ... M4 = Model with 4 latent classes; AIC = Akaike Information Criterion; BIC = Schwarz's Bayesian Information Criterion; SSA-BIC = Sample-size-adjusted BIC; LMRT = Lo-Mendell-Rubin likelihood ratio test.

Description of profiles of behavioral engagement with homework

Table 3 shows the mean scores (direct and standardized), standard errors, and confidence intervals for the three homework behavioral engagement profiles. Figure 1 gives a graphical representation of the three profiles by standardized scores in the three variables (*Z* scores: *M* = 0, SE = 1).

To describe the profiles, we considered both direct scores (1 to 5) and standardized scores (between -0.5 and 0.5: moderate; between 0.5 and 1.0: high; between -1.0 and -0.5: low; greater than 1.0: very high; lower than -1.0: very low). Profile 1 was characterized by moderately high scores in the three behavioral engagement variables (particularly the amount of homework done out of what was set). This group can be considered to have effective behavioral engagement with homework, and we labelled them students with *medium-high engagement* (MHE Group). Based on their raw mean scores and their position on the Likert-type scales, the students in this group do all the homework their teachers set them, spend an hour and a half each day on homework, and almost always concentrate when doing homework. The group made up 42.07% of the total sample of students (41.36% were girls), with the following distribution by school year: 38.70% (1st year), 30.46% (2nd year), 16.71% (3rd year), 14.13% (4th year).

Table 3

Description of profiles of behavioral engagement with homework

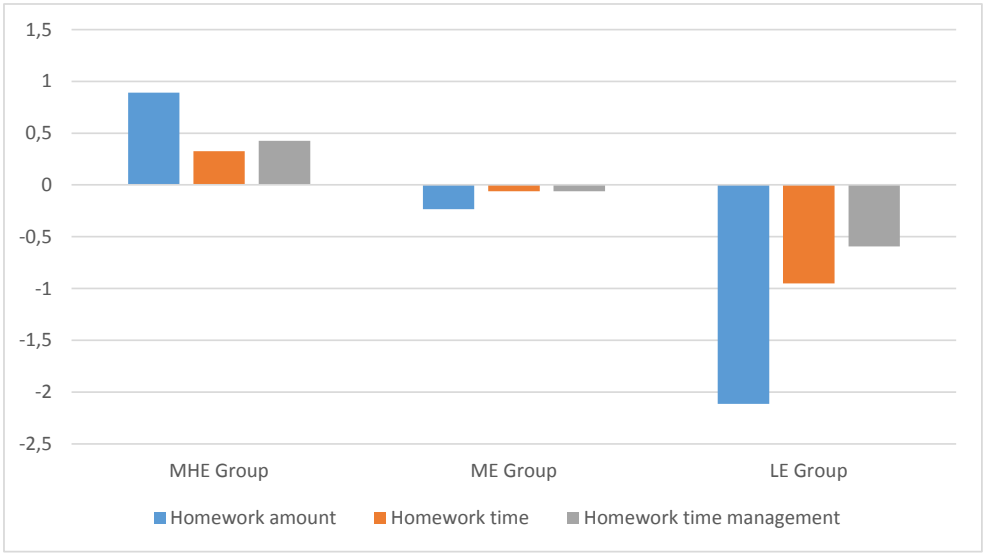
	Direct mean scores (Z scores)	*Standard Errors*	Confidence intervals	
			LCI 5%	UCI 5%
Profile 1 (class 1: n = 814; 42.07%)				
Homework amount	5.00 (0.89)	0.00 (0.00)	4.99(0.89)	5.00(0.89)
Time spent	3.53 (0.33)	0.04 (0.03)	3.44(0.28)	3.62(0.38)
Time management	3.63 (0.43)	0.03 (0.04)	3.54(0.37)	3.72(0.49)
Profile 2 (class 2: n = 229; 11.83%)				
Homework amount	1.88 (-2.11)	0.02 (0.02)	1.82(-2.15)	1.94(-2.08)
Time spent	2.09 (-0.95)	0.07 (0.07)	1.90(-1.06)	2.27(-0.84)
Time management	2.43 (-0.59)	0.07 (0.08)	2.26(-0.72)	2.60(-0.46)
Profile 3 (class 3: n = 892; 46.10%)				
Homework amount	3.85 (-0.23)	0.01 (0.01)	3.82(-0.25)	3.88(-0.22)
Time spent	3.08 (-0.06)	0.04 (0.03)	2.98(-0.11)	3.17(-0.01)
Time management	3.05 (-0.06)	0.03 (0.04)	2.97(-0.12)	3.13(-0.00)

Profile 2 was characterized by very low scores in the amount of homework done, and moderately low scores in time spent and time management. This group may be considered to have a relatively ineffective profile of behavioral engagement with homework, and we called these students with *low engagement* (LE Group). The students in this group do little of the homework their teacher set them, spend on average half an hour a day on their homework, and almost never or very rarely concentrate on their homework. The LE group made up 11.83% of the student sample (46.4% were girls), distributed by school year as follows: 15.72% (1st year), 18.34% (2nd year), 27.07% (3rd year), 38.87% (4th year).

Profile 3 was characterized by moderate scores in the three behavioral engagement variables. They may be considered moderately effective and are students with *medium engagement* (ME Group). In other words, students with these profiles do almost all of the homework they are set, spend between an hour and an hour and a half on their homework and only occasionally concentrate while doing it. The group made up 46.10% of the sample (51.33% were girls), distributed by school year as follows: 23.88% (1st year), 23.32% (2nd year), 27.02% (3rd year), 25.78% (4th year).

Figure 1

Graphical representation of the homework behavioral engagement profiles (Z scores)



Relationship between behavioral engagement profiles and external variables—affective-motivational variables, deep learning approach, and academic performance

Table 4 shows the descriptive statistics (means and errors of estimation) for the four dependent variables in each behavioral profile.

Table 4

Descriptive statistics for intrinsic motivation, anxiety, deep learning approach, and academic performance for each of the three profiles

	Intrinsic motivation		Anxiety		Deep learning approach		Academic performance	
	M	S.E.	M	S.E.	M	S.E.	M	*S.E.*
MHE Group	3.722	0.026	1.513	0.025	3.163	0.018	3.203	0.043
ME Group	3.294	0.026	1.770	0.029	3.006	0.017	2.293	0.039
LE Group	2.802	0.055	1.816	0.057	2.773	0.037	1.935	0.071

Note. M (Mean), S.E. (Standard Error), MHE (Medium-high Engagement), ME (Medium Engagement), LE (Low Engagement).

Tests of equality of means between classes (behavioral profiles) using multiple imputations based on posterior probability (with 2 degrees of freedom for the total test and 1 degree of freedom for the pairwise tests) demonstrated statistically significant differences between groups in the four external variables. Overall, there were statistically significant differences for intrinsic motivation (χ^2 = 277.228, p < .001, d = 0.818), anxiety (χ^2 = 54.941, p < .001, d = 0.342), a deep learning approach (χ^2 = 103.521, p < .001, d = 0.476), and academic performance (χ^2 = 337.783, p < .001, d = 0.919). The differences for intrinsic motivation and academic performance were large, the differences for a deep learning approach were moderate, and for anxiety they were small. Finally, as Table 5 shows, within each dependent variable, the three pairwise comparisons were statistically significant, except for anxiety, where the comparison between the low and moderately engaged groups was not statistically significant (χ^2 = 0.520, p > .05).

Table 5
Multiple comparisons

	χ^2	*p* <	*d*
Intrinsic motivation			
MHE *vs* LE	225.261	< .001	1.049
MHE *vs* ME	132.989	< .001	0.582
LE *vs* ME	64.529	< .001	0.494
Anxiety			
MHE *vs* LE	23.579	< .001	0.304
MHE *vs* ME	45.352	< .001	0.331
LE *vs* ME	0.520	.471	-----
Deep learning approach			
MHE *vs* LE	89.147	< .001	0.611
MHE *vs* ME	42.287	< .001	0.319
LE *vs* ME	32.266	< .001	0.344
Academic performance			
MHE *vs* LE	229.882	< .001	1.063
MHE *vs* ME	241.074	< .001	0.811
LE *vs* ME	19.168	< .001	0.264

Note. MHE (Medium-High Engagement), ME (Medium Engagement), LE (Low Engagement).

DISCUSSION AND CONCLUSIONS

The results obtained allow us to identify three groups of students who show different profiles of behavioral involvement with homework—medium-high engagement, medium engagement, and low engagement—based on the different combinations of how much of their set homework they complete, the time they spend on it, and how they manage this time. These results are not entirely consistent with results from previous research (e.g., Estévez et al., 2023; Valle et al., 2019; Xu, 2022), although those studies did not consider the amount of homework completed. Therefore, it seems as though including the proportion of set homework students complete produces a clearer differentiation between the profiles than considering solely time spent and time management (Estévez et al., 2023).

The data from our study suggest that doing *all the homework* set by the teacher, spending on average *an hour and a half* doing it, and *managing the time well* (the MHE group) was the most effective and adaptive combination. And it was this Medium-high Engagement group who had the highest levels of intrinsic motivation towards homework, who adopted the deepest learning approach, who achieved the best academic performance, and who had the lowest levels of homework-related anxiety.

In contrast, doing *only some of the set homework*, spending on average *half an hour* on it, and *ineffectively managing this time* is the least adaptive, least effective approach (LE group). This low engagement group includes the participants demonstrating the lowest intrinsic motivation, a shallower learning approach, the lowest levels of performance, and the highest levels of homework-related anxiety.

We also found a Medium Engagement profile (ME group), characterized by doing *almost all the set homework*, spending *between an hour and an hour-and-a-half* each day on homework, and *only partially managing this time*. This profile had lower scores than the moderate-high group and higher scores than the low engagement group in intrinsic motivation, academic performance, and use of a deep learning approach, whereas in anxiety, this group scored higher than the MHE group and lower than the LE group.

Considering the results of the study, students' levels of behavioral engagement may be linked to a specific pattern of affective-motivational and cognitive variables and performance. In this regard, intrinsic motivation towards homework, working in a focused manner when doing it, and academic performance may be associated with moderate to high engagement with homework. Previous studies have demonstrated a profile of students who complete more homework and achieve higher grades in mathematics (Xu & Núñez, 2023). Adopting a deep learning approach to homework (Valle, Pan, Regueiro, et al., 2015) would increase the perceived value of the tasks, and contribute to better management of the homework process, generally

associated with better results (Magalhães et al., 2020). In addition, low levels of anxiety were only seen in the most behaviorally engaged students (the MHE group), who had the highest levels of intrinsic motivation and who adopted the deepest study approaches to their homework. In contrast, the other two profiles—characterized by moderate and low levels of intrinsic motivation and deep learning approach—did not exhibit differences.

Lastly, it is worth noting that the combination of suitable behavioral engagement and a deep learning approach to homework was associated with better academic performance and lower levels of homework-related anxiety. This means that not spending much time on homework is no guarantee of effectiveness, especially if the time is not well managed. In short, when students are interested in doing homework with the aim of learning, and when they believe that it is useful in that aim, that leads to greater engagement, and fundamentally, better quality (Rodríguez et al., 2020).

Hence it seems that students with various motivational profiles towards homework characterized by mastery-oriented motivation or a combination of goals demonstrate greater behavioral engagement towards their homework than students whose profiles indicate low levels of goal-oriented motivation or motivation aimed at avoiding learning or performance (Regueiro et al., 2016). In contrast, students with low levels of motivation towards homework are less behaviorally engaged and exhibit more anxiety related to it (Regueiro et al., 2016). In line with previous research, our study reiterates how important it is for secondary-school students to have high behavioral engagement, moderate levels of motivation, and low levels of anxiety to ensure quality engagement.

It seems clear that intrinsically oriented motivation will help students to maintain their own sense of personal efficacy in the face of failure, protect them against negative factors such as anxiety, and facilitate higher levels of cognitive engagement. This will lead to better academic performance.

The results of our study have educational implications for both families and teachers. For teachers, the study reaffirms the need to tailor the tasks they set to the diverse range of students, considering the three profiles the study identified. This may begin with helping students plan how they will use their time when doing homework, especially the low engagement group, but also students with medium engagement. In addition students might be motivated by helping them to understand the value of the homework activities they are set (Valle & Rodríguez, 2020), again especially in the two lower engagement groups. Help for students in the medium-high engagement group should be aimed at maintaining this behavioral engagement, for example by offering positive motivating feedback (Fong et al., 2019) or by varying the types of homework tasks being set (Valle & Rodríguez, 2020).

When it comes to implications for families, we know that out of the various forms of parental involvement in homework—autonomy support, content support, control, frequency of involvement, or a combination of different types—only autonomy support has a significant positive effect on children's academic performance (Xu et al., 2018). Families need to be able to encourage their children's autonomy in relation to managing the amount of time they need to properly do their homework and to reducing this time by managing it more effectively. In general terms, given that parental control is not usually a suitable strategy (e.g., Núñez et al., 2015), families should help their children to develop skills for autonomy, such as moving progressively from external regulation—by parents—to full self-regulation by the children. To do that, it is essential to help families involve themselves properly in supporting their children's autonomy when it comes to doing homework. One way to do this may be training sessions for parents that could be given in schools (Suárez et al., 2022).

LIMITATIONS

Although the results of our study indicate clear theoretical and practical implications, there are some limitations that mean the results must be considered with some caution, as well as some lines of future research that will allow the phenomenon being studied to be examined more deeply and current potential biases to be addressed. One clear limitation was some variables being measured using a single item. There is also a clear bias in taking solely self-reported measures. Future studies can minimize this limitation by using other measurement procedures. It would also be interesting to measure the variables qualitatively, and capturing the opinions of other agents in the homework process, such as the family and the teachers. This would contribute to improving on the results of the present study, and in consequence, on the way homework is set.

ACKNOWLEDGEMENTS

This study was developed within the framework of two research projects (Ref.: EDU2017-82984-P and Ref.: PID2021-125898NB-100) funded by the Spanish Ministry of Science and Innovation. We are also grateful for the funding received by two of the authors through the FPI (PRE2018-084938) and FPU (FPU18/02191) programs.

REFERENCES

Ato, M., López, J. J., & Benavente, A. (2013). Un sistema de clasificación de los diseños de investigación en psicología. *Anales de Psicología, 29*(3), 1038-1059. https://doi.org/10.6018/analesps.29.3.178511

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Lawrence Erlbaum.

Cooper, H. (1989). *Homework*. Longman. https://doi.org/10.1037/11578-000

Estévez, I., Regueiro, B., Rodríguez, S., Piñeiro, I., Souto, A., & González-Sanmamed, M. (2018). Why students of Secondary Education complete more homework? *European Journal of Investigation in Health, Psychology and Education*, *8*(1), 15-21. https://doi.org/10.30552/ejihpe.v8i1.222

Finney, S. J., & DiStefano, C. (2013). Nonnormal and categorical data in structural equation modeling. In G. R. Hancock & R. O. Mueller (Eds.), *Structural equation modeling: a second course* (pp. 439-492). Information Age Publishing Inc.

Flunger, B., Trautwein, U., Nagengast, B., Lüdtke, O., Niggli, A., & Schnyder, I. (2017). A person-centered approach to homework behavior: students' characteristics predict their homework learning type. *Contemporary Educational Psychology*, *48*, 1-15. https://doi.org/10.1016/j.cedpsych.2016.07.002

Fong, C. J., Patall, E. A., Vasquez, A. C., & Stautberg, S. (2019). A Meta-Analysis of Negative Feedback on Intrinsic Motivation. *Educational Psychology Review*, *31*(1), 121-162. https://doi.org/10.1007/s10648-018-9446-6

González-Pienda, J. A. (2003). El rendimiento escolar. Un análisis de las variables que lo condicionan. *Revista Galego-portuguesa de Psicoloxía e Educación, 8*(7), 247-258. https://ruc.udc.es/dspace/handle/2183/6952

Hickendorff, M., Edelsbrunner, P. A., McMullen, J., Schneider, M., & Trezise, K. (2018). Informative tools for characterizing individual differences in learning: Latent class, latent profile, and latent transition analysis. *Learning and Individual Differences*, *66*, 4-15. https://doi.org/10.1016/j.lindif.2017.11.001

Hipp, J. R., & Bauer, D. J. (2006). Local solutions in the estimation of growth mixture models. *Psychological Methods*, *11*(1), 36-53. https://doi.org/10.1037/1082-989X.11.1.36

Kalenkoski, C. M., & Pabilonia, S. W. (2017). Does high school homework increase academic achievement? *Education Economics*, *25*(1), 45-59. https://doi.org/10.1080/09645292.2016.1178213

Lanza, S. T., & Cooper, B. R. (2016). Latent Class Analysis for Developmental Research. *Child Development Perspectives*, *10*(1), 59-64. https://doi.org/10.1111/cdep.12163

Lanza, S. T., Flaherty, B. P., & Collins, L. M. (2003). Latent class and latent transition analysis. In J. A. Schinka & W. F. Velicer (Eds.), *Handbook of psychology: research methods in psychology* (pp. 663-685). John Wiley & Sons, Inc.

Lo, Y., Mendell, N. R., & Rubin, D. B. (2001). Testing the number of components in a normal mixture. *Biometrika*, *88*(3), 767-778. https://doi.org/10.1093/biomet/88.3.767

Magalhães, P., Ferreira, D., Cunha, J., & Rosário, P. (2020). Online vs traditional homework: a systematic review on the benefits to students' performance. *Computers & Education*, *152*, 1-17. https://doi.org/10.1016/j.compedu.2020.103869

Muthén, L. K., & Muthén, B. O. (s. f.). *Mplus user's guide (6th ed.)*. Muthén & Muthén.

Núñez, J. C., Suárez, N., Rosário, P., Vallejo, G., Valle, A., & Epstein, J. L. (2015). Relationships between perceived parental involvement in homework, student homework behaviors, and academic achievement: differences among elementary, junior high, and high school students. *Metacognition and Learning*, *10*(3), 375-406. https://doi.org/10.1007/s11409-015-9135-5

OECD. (2013). *PISA 2012 Results: what makes schools successful (v. 4)*. OECD Publishing. https://doi.org/10.1787/9789264201156-en

Özyildirim, G. (2022). Time spent on homework and academic achievement: a meta-analysis study related to results of TIMSS. *Psicología Educativa*, *28*(1), 13-21. https://doi.org/10.5093/psed2021a30

Regueiro, B. (2018). *Metas académicas, deberes escolares y aprendizaje en estudiantes de secundaria* [Doctoral thesis, University of A Coruña]. Repositorio Institucional de la Universidade da Coruña. http://hdl.handle.net/2183/21560

Regueiro, B., Núñez, J. C., Valle, A., Piñeiro, I., Rodríguez, S., & Rosário, P. (2016). Motivational profiles in high school students: differences in behavioural and emotional homework engagement and academic achievement. *International Journal of Psychology*, *53*(6), 449-457. https://doi.org/10.1002/ijop.12399

Rodríguez, S., Núñez, J. C., Valle, A., Freire, C., Ferradás, M. del M., & Rodríguez-Llorente, C. (2019). Relationship between students' prior academic achievement and homework behavioral engagement: the mediating/moderating role of learning motivation. *Frontiers in Psychology*, *10,* 1047. https://doi.org/10.3389/fpsyg.2019.01047

Rodríguez, S., Piñeiro, I., Regueiro, B., & Estévez, I. (2020). Intrinsic motivation and perceived utility as predictors of student homework engagement. *Revista de Psicodidáctica (English ed.)*, *25*(2), 93-99. https://doi.org/10.1016/j.psicoe.2019.11.001

Rosário, P., Mourão, R., Núñez, J. C., González-Pienda, J. A., & Solano, P. (2006). Escuela-familia: ¿Es posible una relación recíproca y positiva? *Papeles del Psicólogo*, *27*(3), 171-179. http://hdl.handle.net/1822/11908

Suárez, N., Fernández, E., Regueiro, B., Rosário, P., Xu, J., & Núñez, J. C. (2022). Parental Involvement in Homework During Covid-19 Confinement. *Psicothema*, *34*(3), 421-428. https://doi.org/https://doi.org/10.7334/psicothema2021.532

Suárez, N., Regueiro, B., Estévez, I., Ferradás, M. del M., Guisande, M. A., & Rodríguez, S. (2019). Individual precursors of student homework behavioral engagement: the role of intrinsic motivation, perceived homework utility and homework attitude. *Frontiers in Psychology*, *10*, 941. https://doi.org/10.3389/fpsyg.2019.00941

Valle, A., Pan, I., Núñez, J. C., Rosário, P., Rodríguez, S., & Regueiro, B. (2015). Deberes escolares y rendimiento académico en Educación Primaria. *Anales de Psicología*, *31*(2), 562-569. https://doi.org/10.6018/analesps.31.2.171131

Valle, A., Pan, I., Regueiro, B., Suárez, N., Tuero, E., & Nunes, A. R. (2015). Predicting approach to homework in Primary school students. *Psicothema*, *27*(4), 334-340. https://doi.org/10.7334/psicothema2015.118

Valle, A., Piñeiro, I., Rodríguez, S., Regueiro, B., Freire, C., & Rosário, P. (2019). Time spent and time management in homework in elementary school students: a person-centered approach. *Psicothema*, *31*(4), 422-428. https://doi.org/10.7334/psicothema2019.191

Valle, A., Regueiro, B., Núñez, J. C., Rodríguez, S., Piñeiro, I., & Rosário, P. (2016). Academic goals, student homework engagement, and academic achievement in elementary school. *Frontiers in Psychology*, *7*, 463. https://doi.org/10.3389/fpsyg.2016.00463

Valle, A., & Rodríguez, S. (2020). *MITCA: homework implementation method*. Servicio de Publicaciones. Universidad de A Coruña. https://doi.org/10.17979/spudc.9788497496360

Vermunt, J. K. & Magidson, J. (2021). How to perform three-step Latent Class Analysis in the presence of measurement non-invariance or differential item functioning. *Structural Equation Modeling: A Multidisciplinary Journal, 28*(3), 356-364. https://doi.org/10.1080/10705511.2020.1818084

Vieites, T., Díaz-Freire, F. M., Rodríguez, S., Rodríguez-Llorente, C., & Valle, A. (2023). Effects of a homework implementation method (MITCA) on school engagement. *European Journal of Psychology of Education*. https://doi.org/10.1007/s10212-023-00743-z

Vieites, T., Regueiro, B., Rodríguez-Llorente, C., & Morado, T. (2023). Cantidad y calidad del tiempo dedicado a los deberes escolares en alumnado de Educación Secundaria. Un análisis de perfiles latentes. *Revista de Investigación Educativa*, *41*(2), 439-454. https://doi.org/https://doi.org/10.6018/rie.544491

Xu, J. (2012). Predicting students' homework environment management at the secondary school level. *Educational Psychology*, *32*(2), 183-200. https://doi.org/10.1080/01443410.2011.635639

Xu, J. (2018). Reciprocal effects of homework self-concept, interest, effort, and math achievement. *Contemporary Educational Psychology*, *55*, 42-52. https://doi.org/10.1016/j.cedpsych.2018.09.002

Xu, J. (2022). More than minutes: A person-centered approach to homework time, homework time management, and homework procrastination. *Contemporary Educational Psychology*, *70*, 1-12. https://doi.org/10.1016/j.cedpsych.2022.102087

Xu, J., Du, J., Wu, S., Ripple, H., & Cosgriff, A. (2018). Reciprocal effects among parental homework support, effort, and achievement? An empirical investigation. *Frontiers in Psychology, 9*(2334), 1-10. https://doi.org/10.3389/fpsyg.2018.02334

Xu, J., & Núñez, J. C. (2023). Homework purposes in eighth grade students: Identifying student profiles and their relationship with homework effort, completion, and cchievement. *Psicothema*, *35*(2), 111-118. https://hdl.handle.net/11162/247570