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Economic preferences and cognitive abilities among teenagers in Spain

DATA DESCRIPTOR

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This dataset originates from *TeensLab*, a consortium of Spanish Universities dedicated to behavioral research involving Spanish teenagers. The dataset contains data from 33 distinct educational institutions across Spain, accounting for a total of 5,890 students aged 10 to 23 ($M = 14.10$, $SD = 1.94$), representing various educational levels such as primary school, secondary school, sixth form and vocational training. The main dimensions covered in this dataset include (i) economic preferences, (ii) cognitive abilities and (iii) strategic thinking. Additionally, a range of supplementary variables is included alongside socio-demographic factors, capturing data on aspects like physical appearance, mood and expectations, among others.

Background & Summary

Adolescence is a stage of major physical, psychological, emotional and social development, representing a crucial period in human life. The experiences, skills and habits that are accumulated during this stage have a permanent impact on human life. Therefore, understanding the behavior of individuals throughout this period is essential to supporting their development and ensuring their success in adulthood. Indeed, there is great interest in underlying motivations of adolescent behaviors for the design of public policies¹.

It is widely recognized that individual preferences and cognitive abilities are important determinants of real-life decision-making of adults in strategic and non-strategic situations²⁻⁶. To understand and predict adult behavior, it is essential to comprehend how their attitudes toward risk, social and time preferences, cognitive abilities, creativity, and other traits evolve, particularly in their younger years⁷⁻¹⁸.

The dataset presented here contributes to the literature on adolescence by eliciting using the tools of experimental economics-rich information on economic preferences, cognitive abilities, strategic thinking behavior and other information from a large set of adolescents in Spain. We conducted lab-in-the-field experiments in 33 different educational centers, accounting for a total of 5,890 observations of Spanish students. The centers belong to 19 different locations. A total of 20 of them are public and the rest are semi-private. In addition to socio-demographic details and other variables related to the individual, the data includes several sets of variables: economic preferences, cognitive abilities, strategic thinking and other additional measures.

Our dataset can contribute to future research on adolescents in at least two ways. First, it allows researchers to study adolescent decision-making and understand developmental causes of anomalous behavior. Second, it provides information on economic preferences, cognitive skills and other individual information, enabling exploring the extent to which these variables are sensitive to the class and school environment.

This dataset has been previously employed in the following studies: (i) An analysis of the relevance of monetary incentives, experimental tools and protocols to collect data in schools¹⁹, (ii) a study of the impact of visual aids in experimental lottery tasks to reduce inconsistency among adolescents²⁰, (iii) the development of time and risk preferences throughout the adolescence²¹, (iv) the dynamics of social preferences among girls and boys²²

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Welcome!
Before we begin, we want to thank you for your participation and inform you that all your responses will be kept confidential. This is a research project conducted by the Loyola Behavioral Lab, funded by the Andalusian Agency for International Development Cooperation, the Regional Government of Andalusia, and the Ministry of Science and Innovation.
As you will see, the instructions are very simple. It is very important that you pay close attention and fully understand the instructions.
If you require additional information, you can contact the research staff at Loyola University Andalusia involved in the project: Pablo Brañas Garza, Professor of Behavioral Economics, 957 22 21 00, pablob@uloyola.es. All personal data obtained in this study is confidential and will be processed in accordance with the Organic Law on Personal Data Protection and Guarantee of Digital Rights 3/2018.
CLICK ON THE CHECKBOX TO ACCEPT AND GO TO THE FOLLOWING SCREEN
<input checked="" type="checkbox"/> I consent to the processing of my data obtained in this study in accordance with the Spanish Organic Law on Personal Data Protection and Guarantee of Digital Rights 3/2018.

Table 1. Initial screen of the experiment.

and (v) the use of coordination devices among adolescents²³. These studies as well as information about the *TeensLab* can be found on our website (<https://loyolabehlab.org/teenslab/>).

Methods

Data acquisition. In conducting research with minors, adherence to legal frameworks and ethical guidelines is essential. Spanish law governing the protection of personal data of minors allows for data processing based on the consent of children over 14 years of age (Art. 7²⁴). Although our study included participants over 14, we obtained informed parental consent through a parental council that had approved the study, enabling the integration of the study into the school curriculum. This consent authorized participation and the anonymous sharing and use of data within the scientific community. In this way, parental consent is collected by the center itself at the beginning of the scholar-year where they present the activities planned, including this experiment. This strategy not only simplified the process but also facilitated scalability.

Participants were informed about the purpose of data processing, the confidentiality of their responses, and the legal framework governing their data. Teachers managed participant lists and assigned identification numbers to ensure confidentiality. All responses were recorded anonymously.

Informed consent was additionally obtained from all participants on the initial screen of the experiment. This mandatory screen provided essential information in compliance with data protection regulations. Table 1 presents a translation of this information, which includes the identity of the data controller and a description of the rights participants may exercise.

Our experiment was approved by the Ethical Committee of Universidad Loyola Andalucía (No. 20190318, 20200709 and 20230301) Furthermore, for 10-year-olds, it was also approved by the Bioethics Commission of the University of Barcelona (No. IRB00003099).

To mitigate issues related to non-standard samples and minimize missing data, we simplified response formats, predominantly using multiple-choice questions rather than open-ended ones. The design of the software required that participants could not skip questions. However, for potentially sensitive topics, they were allowed to choose the option “I would prefer not to answer”.

The participant pool was recruited through agreements with school headmasters, who agreed to integrate the experiment into their pedagogical curriculum and to carry it out as a classroom activity. Consequently, we achieved a high level of participation¹⁹. The experiments were conducted on-site at schools using an online platform named Social Analysis and Network Data (SAND; <https://sand.kampal.com>), enhancing data privacy control. This platform allows students to navigate and complete the experimental questionnaire, which is divided into several sections, on their devices (tablets, computers, or smartphones).

The questionnaire was administered entirely in Spanish. Due to the restrictive school policies on experiments involving real money, we used hypothetical rewards. However, it has been documented that the behavior of adolescents does not differ between incentivized and hypothetical payment schemes at least for risk and time preferences, suggesting the reliability of the findings^{25–31}.

Measurements. Table 2 contains all the tasks included in the study. Apart from basic information regarding the school (province, city and public/semi-private) and the class (stage, grade, group, class size), our dataset includes individual-level measurements for the following three behavioral dimensions:

- **Economic preferences:** Time discounting, involving choices between immediate and delayed rewards (patience)^{19,32}; risk preferences, assessed through decisions involving probabilistic outcomes (prudence)^{19,20}; social preferences, measured via resource allocation tasks (egalitarianism, altruism, spitefulness)^{33–35}; and honesty, evaluated through opportunities to misreport outcomes³⁶.
- **Cognitive abilities:** Cognitive reflection, overriding intuitive responses^{19,37}; financial abilities, solving simple financial calculations¹⁹; probability knowledge and accuracy, measured via decisions in probabilistic scenarios³⁸ and creativity, generating multiple original ideas using a single object³⁹.
- **Strategic thinking:** Subjects choices and expectations in strategic environments (games)²².

We also collected information regarding the participant’s family background and outcomes in school:

- **Socio-demographics:** Age, gender, self-reported income, migrant status and family composition (number of siblings and her ranking).

Dimension	Variable sets	Task	n
Economic preferences	Time discount	The Truck task	5684
	Risk preferences	The Gumball Machine task	5592
	Social preferences	Dictator game (3 decisions)	4479
		Dictator game (6 decisions)	857
	Honesty	Pictures game	2700
		Numbers game	852
Cognitive abilities	Cognitive Reflection Test	CRT	5655
	Finance abilities	Financial tasks	5560
	Probabilistic knowledge	Test of probability knowledge	5426
	Creativity	The Brick task	4600
		The Rope task	508
Strategic thinking	Strategic games	Dominant strategies: Uno Cards	2697
		Cournot-Nash games: Piggy bank	860
		Coordination games	1793
General information of the subject	Socio-demographic	Age, gender, family variables	5890
	GPA	Self-reported As and Bs	5890
	Physical appearance	Self-reported height, weight and appearance by Stunkard figure scale	2627
	Mood	Short version of Kidscreen	5383
Additional instruments	Expectations	Career Ambitions and Global Exploration	1017
	Self-assessed math abilities	How good are you/How much you like	2857
	Time preferences	Compound staircase version	2450
	Perception of time	Sentence-completion task	1484

Table 2. Experiment summary by dimensions and observations. Note: In this study, multiple tasks were used in some dimensions to assess the same concepts. Due to adjustments made throughout the experimental process, it is possible to find different versions of tasks. In particular, for the assessment of social preferences, both a 3-question and a 6-question dictator game version have been used. Similarly, for the measurement of honesty, the picture difference task was predominantly used, occasionally substituted by the numerical difference task. For the evaluation of creativity, the brick task has been the main measure, although the rope task has been used alternatively in some sessions. In addition, for strategic thinking, the Uno game was used initially, followed by the piggy bank game and finishing with coordination games. Detailed information can be found in the Repository.

- **GPA:** The self-reported number of A's and B's scored in Mathematics, English and Spanish Literature during the previous year.
- **Physical appearance:** Self-reported height, weight and appearance by Stunkard figure scale^{40,41}.
- **Mood:** Three items from the Kidscreen questionnaire about their interactions at school, assessing whether they have fun with their friends or feel lonely^{42,43}.

Finally, for certain sub-samples (see available observations in Table 2), we gathered additional auxiliary information:

- **Expectations:** Information regarding subjects' expectations about their future outcomes, such as their university degree, traveling around the world, living abroad and desired future job.
- **Self-assessed math abilities:** Two types of questions: "How good are you at maths?" and "How much do you like maths?"⁴⁴.
- **Time discounting II:** Time preferences (patience) measured by the compound staircase version⁴⁵.
- **Time perception:** Questions about future actions at three levels⁴⁶.

Data Records

The dataset can be found in Zenodo⁴⁷ (<https://zenodo.org/records/13720112>) and is available in different formats (xls, cvs, dta). The screenshots of the complete experimental instructions are also available in the repository. We also provide STATA 18⁴⁸ scripts for some basic summaries of the available variables.

Sample variables. The experiments were conducted over multiple sessions from 2021 to 2023. A total of 5,890 students started the experiment, but 609 did not finish the entire questionnaire.

In contrast to adults, it is well-known that children and adolescents often find it more difficult to maintain concentration over extended periods and to complete all tasks¹³. Some of them simply leave the survey at a certain point. We check the responses after each session and reassess the tasks which were not successful. As a result of various adjustments made during the experimental sessions, the survey tasks underwent some changes.

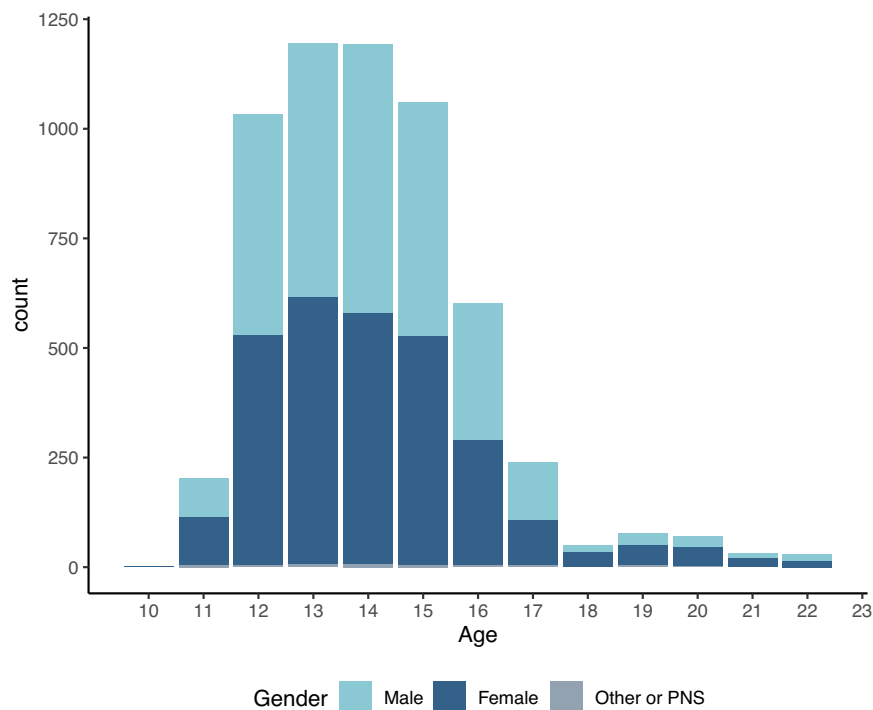


Fig. 1 Distribution of the sample in terms of age and gender. Note: The histogram contains three gender categories: Male, female and other/I prefer not to say (PNS).

Educational stage	Obs.	RR (%)	Mean Age	Std. Dev.	Min.	Max.
Primary school	508	73.82%	11.62	0.53	10	13
Secondary school	5003	91.84%	14.02	1.37	11	18
Sixth form	112	66.07%	17.09	0.34	17	19
Vocational training	236	88.76%	19.89	1.37	17	23

Table 3. Descriptive statistics by educational stage. Note: RR (%) refers to the response rate in each stage. Primary school refers to *Educación Primaria Obligatoria* (EPO), secondary school refers to *Educación Secundaria Obligatoria* (ESO) and sixth form refers to *Bachillerato*. In Spain, compulsory education is until secondary school, after that, they can start vocational training instead of sixth form.

Consequently, the number of observations for different variables in our dataset varies. Table 2 provides an overview of the available observations for each task.

The initial questionnaire screen (Table 1) provided essential information about the study, including an introduction to our team and funding sources.

Figure 1 displays the distribution of the final sample by age and gender. The sample is well-balanced in terms of gender; 49.68% are female students and 49.68% male. The remaining subjects (0.64%) are classified as unknown, either because they did not answer or they selected another category.

As for educational stages, 8.62% of the sample belongs to primary education, 84.94% belongs to secondary education, 1.90% to sixth form and 4.53% to vocational training. Table 3 presents the distribution of the observations by educational stage. Additionally, it displays the response rate and summary statistics for the ages at each stage.

Technical Validation

The study is a laboratory-in-the-field experiment. Data were collected in the school classrooms under the supervision of team members and research assistants.

The data recorded in the software were downloaded for cleaning using Stata⁴⁸. Variables were coded and incomplete entries were not deleted. Only the age variable was imputed through the year of birth reported by the students and according to the course to which they belonged.

Our experiment includes standard tasks from the literature as well as tasks adapted by our research team from previous literature¹⁹. We have extensive prior experience in designing experiments for teenagers and collecting data in primary and secondary schools using lab-in-the-field techniques. Previous evidence suggests that there are no significant differences in outcomes when using hypothetical payoff tasks, such as eliciting risk preferences^{27–31}. Prior to each task, students were provided with a brief description and they were informed of the economic implications of their decisions in hypothetical terms. This ensured that participants fully understood

The Truck task			The Gumball Machine task		
Decision num.	A	B	Decision num.	A	B
#1	83.63%	16.37%	#1	89.43%	10.57%
#2	57.80%	42.20%	#2	80.88%	19.12%
#3	46.93%	53.07%	#3	45.41%	54.59%
#4	39.34%	60.66%	#4	18.19%	81.81%
#5	36.66%	63.34%	#5	10.03%	89.97%
#6	29.19%	70.81%	#6	5.24%	94.76%

Table 4. Percentage of responses for each decision. Note: Subjects in both tasks can exhibit inconsistent responses within the task, for instance, if they switch back from option B to option A. The same tendency can be observed in both tasks: The majority of subjects begin with option A and change to option B gradually and finally, the majority of subjects end up choosing option B in the last decision.

the nature of the tasks, while maintaining the validity of the experimental design and the scalability of the study. Some pilots of the tasks were carried out independently to configure the final design. The changes in the survey are detailed in the variables descriptor available in the repository.

One of the main problems in collecting data from non-standard samples is that some tasks are not understood and participants show inconsistent behavior across them. To address this, our design took into account the results of pilots that adapted the tasks to the adolescent context through the use of visual aids. As a result, the consistency rates are remarkably higher than those reported in the literature^{7,19,20}.

Consistency is assessed by examining how the choices of participants align with their stated preferences in different situations, based on their personal decision-making patterns. Among the data reported for the economic preferences dimension, we find a high percentage of consistent responses in the tasks that require certain within-task consistency. We observe that 82.75% of the individuals who complete the time preference task exhibit consistent behavior. Similarly, 79.20% of individuals report consistent answers in the risk preferences task²⁰. Table 4 includes a distribution of responses for both tasks across their 6 decisions, where a trend can be identified that may represent this high level of consistency. Such enhanced consistency indicates that the data collected from adolescents are reliable and coherent, providing a robust foundation for examining adolescent decision-making processes and developmental trends.

Usage Notes

The Zenodo repository gives access to the available data together with a descriptive note on the variables and their coding. The variable descriptor includes a definition of the task, some general characteristics, and the specific name under which it is found in the database. We provide further information on the changes that the survey has made over time. In addition, the repository visualizes the experimental screens in the original Spanish language.

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Code availability

STATA 18⁴⁸ software was used. The code for the variables can be found in the aforementioned repository.

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Author contributions

A.AL, A.C., J.A.C., A.E., M.P.E., D.J., J.K., D.M., A.S., M.J.V. and P.B. conceived the experiment. M.V., A.AL, A.Ar, T.G., A.I., D.J., P.L., A.C.M., M.P.R., P.R. and M.J.V. conducted the experiment. A.C., J.A.C., J.K., D.M. and P.B. provided data or analysis tools. M.V., A.AL, A.Ar, T.G., D.J., P.L., A.C.M., M.P.R., P.R. and A.S. performed the analysis. M.V., T.G. and J.K. wrote the paper. A.AL, A.C., J.A.C., A.E., M.P.E., D.J., P.L., D.M., A.S. and P.B. reviewed the paper.

Competing interests

The authors declare no competing interests.

Additional information

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