TeensLab dataset: Economic preferences and cognitive abilities among teenagers

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ABSTRACT

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 policies[1].

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 situations[2–6]. Understanding and predicting the future behavior of adults, it is crucial to comprehend the development of their attitudes toward risk, their social and time preferences, their cognitive abilities, creativity, etc., particularly during younger ages[7–18].

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 behaviour 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. 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 instruments.

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 schools[19], *ii*) a study of the impact of visual aids in experimental lottery tasks to reduce inconsistency among adolescents[20], *iii*) the development of time and risk preferences throughout the adolescence[21], *iv*) the dynamics of social preferences among girls and boys[22] and *v*) the use of coordination devices among adolescents[23]. These studies as well as information about the *TeensLab* can be found on our website (https://loyolabehlab.org/teenslab/).

Methods

Data Acquisition

Conducting research with minors requires adherence to strict protections and laws. Our experiment was approved by the Ethical Committee of Universidad Loyola Andalucía. Furthermore, for 10-year-olds, it was also approved by the Bioethics Commission of the University of Barcelona. In addition, all responses were guaranteed to be anonymized and researchers are not able to identify subjects.

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 participation[19]. 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[24–30].

Behavioral Measurements

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 (patience)[19,31], risk preferences (prudence)[19,20], social preferences (egalitarianism, altruism, spitefulness)[32–34] and honesty[35].
- **Cognitive abilities:** Cognitive reflection[19,36], financial abilities[19], probability knowledge and accuracy[37] and creativity[38].
- **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).
- **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[39,40].
- **Mood:** Three items from the Kidscreen questionnaire about their interactions at school, assessing whether they have fun with their friends or feel lonely[41,42].

Finally, we collected - for certain sub-samples - some additional instruments to be used as auxiliary information:

- **Expectations:** Questions about achieving a university degree, traveling around the world, living abroad and desired future job.
- **Self-assessed math abilities (SAMA):** Two types of questions: "How good are you at maths?" and "How much do you like maths?"[43].
- **Time discounting II:** Time preferences (patience) measured by the compound staircase version[44].
- **Time perception:** Questions about future actions at three levels[45].

Data Records

The dataset can be found in an online GitHub repository (https://github.com/teenslab/datateenslab) 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 18[46] scripts for some basic summaries.

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 maintaining concentration for longer periods and completing all tasks can be more challenging for children and adolescents[13]. Therefore, different variables in our dataset have varying numbers of observations.

The initial questionnaire screen provided essential information about the study, including an introduction to our team and funding sources. Additionally, participants were informed of the confidentiality of their responses and the legal framework covering their data. Participants had to provide informed consent to data protection measures to proceed with the questionnaire.

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. Figure 2 reports a box plot with the age of the students distributed according to their educational stage. Additionally, Table 2 provides an overview of the educational stages in Spain classified by the age of the students.

Technical Validation

Our experiment includes standard tasks from the literature as well as tasks adapted by our research team from previous literature[19]. We have extensive prior experience in designing experiments for teenagers and collecting data in primary and secondary schools using lab-in-the-field techniques.

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 task[20]. Table 3 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. Given that they are teenagers, i.e. a non-standard population, the consistency rates are remarkably higher than those reported in the literature[7,19,20].

Usage Notes

The repository contains a descriptive note on the variables and their coding. In addition, it can be found a visualization of the screens of the experiment in Spanish (the language in which it was presented).

Code availability

STATA 18[46] software was used. The code for the variables can be found in the aforementioned repository.

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Author contributions statement

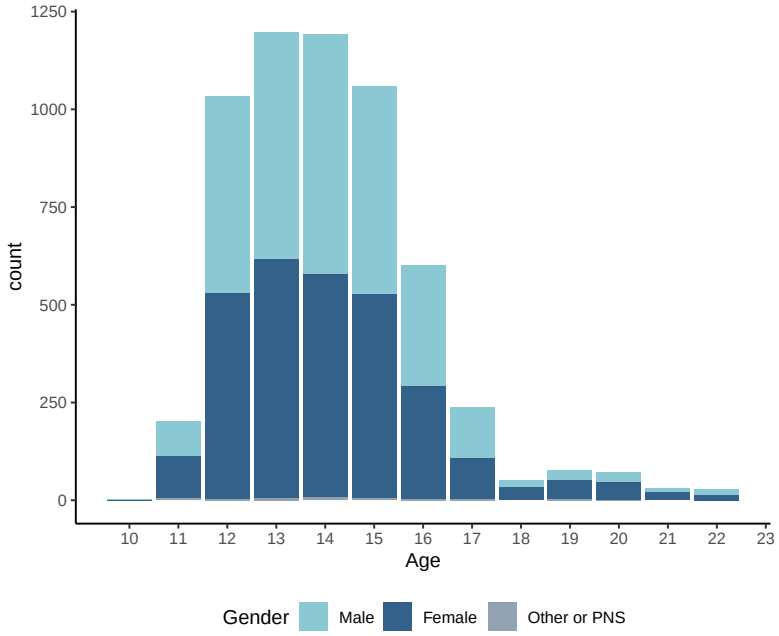
A.Al., A.C., J.A.C., A.E., M.P.E., D.J., J.K., D.M., A.S., M.J.V. and P.B. conceived the experiment. M.V., A.Al., A.Ar., T.G., A.I., D.J., P.L., A.C.M., M.P.R., P.R. and M.J.V. conducted the experiment. A.C., J.A.C., J.K., D.M. and P.B. provided data or analysis tools. M.V., A.Al., A.Ar., T.G., D.J.,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

Figures & Tables

Figure 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).

Figure 2. Age box plot by educational stage

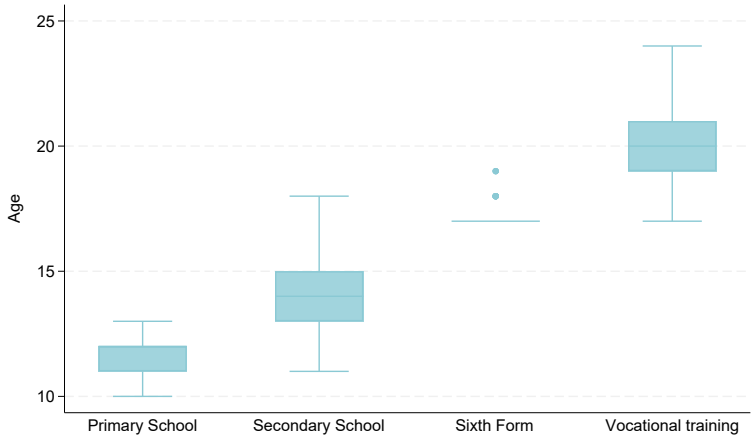


Table 1. Experiment summary by dimensions and observations.

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 related to the individual	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

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.

Table 2. Relationship between age and educational stages in Spain

Age	Educational stage
10-11	*Educación Primaria Obligatoria*
11-12	(Primary school)
12-13	
13-14	*Eduación Secundaria Obligatoria*
14-15	(Secondary school)
15-16	
16-17	*Bachillerato*
17-18	(Sixth form)

Note: *Educación Primaria Obligatoria* (EPO) refers to primary school, *Eduación Secundaria Obligatoria* (ESO) refers to secondary school and *Bachillerato* refers to sixth form. In Spain, compulsory education is until secondary school, after that, they can start vocational training instead of sixth form.

Table 3. Percentage of responses for each decision

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%

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.