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University students, economics education, and self-interest. A systematic literature review

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ABSTRACT

There is an open debate in academia about whether economics students behave in a more self-interested manner than non-economics students. This debate is based on the assumption that economics students are exposed to the study of standard economic models. These models begin with a representative agent, the homo œconomicus, which is a rational optimizer that serves to satisfy their own self-interest. A systematic review was conducted to enhance this debate. Empirical studies that tested the existence of behavioral and/or attitudinal differences related to self-interest among university economics and non-economics students were included. The results provide evidence that economics students are more self-interested than non-economics students. This review has allowed us to highlight the limitations of the pre-existing scientific papers published to date. Primarily, the majority of studies have used cross-sectional data, and it is advisable to carry out more studies with longitudinal data.

1. Introduction

In standard economics, the elaboration of models for economic analysis begins with a representative agent, the homo œconomicus, who is a rational optimizer that serves to satisfy their own self-interest. In economics, rationality is understood as the ability to properly analyze and process the information available.[1] Additionally, this agent is capable of optimizing decisions, combined with the ability to order preferences in a completely consistent manner (Klimczak, 2018; Rosengart et al., 2020; Urbina and Ruiz-Villaverde, 2019). Therefore, many researchers and social scientists have wondered whether exposure to the study of these types of economic models, based on the rational pursuit of self-interest, promotes a similar type of related behavior in students (Elegido, 2009; Ifcher and Zarghamee, 2018; Kirchgässner 2005, Lanteri, 2008; Etzioni, 2015). In other words, students are often trained in economic reasoning, which cultivates and reinforces beliefs about the prevalence and power of rational self-interest (Gandal et al., 2005; Molinsky et al., 2012). Leavitt (1989, p. 39) went so far as to argue that business education, with its narrow focus on economics, creates "critters with

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[1] In intermediate microeconomics, (see for instance Chapter 3 Consumer Behavior of Pindyck and Rubinfeld, 2013; p.69), the assumption of operationalized is concretized through the utility function. This function expresses consumer preferences. Hence, a series of choice axioms are established: (1) preferences are complete; (2) preferences are transitive; (3) preferences are monotonous (no satiability); and (4) diminishing marginal rate of substitution (strict convexity).

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lopsided brains, icy hearts, and shrunken souls".

Attempts have been made to empirically test whether "Econ students"[2] deceive more, are less cooperative, more selfish, less honest, less altruistic, etc. Thus, "deviations from pure selfishness have been interpreted by suggesting that subjects are better people (i.e., more altruistic, or fair), but maybe they are just better economists" (Engelmann and Strobel, 2004; p. 868). Sawyer (1966) pioneered a study using surveys and found significant differences between business students and those from other degrees. Business students were more concerned about maximizing their well-being. In another study, Marwell and Ames (1981) were among the first to test the "free rider" hypothesis with public goods experiments under different conditions on economics students and participants from various subpopulations. They found that economics graduate students were much more likely to free-ride (i.e., contribute less) than any other group of subjects. Meier and Frey (2004) recorded the behavior of students in relation to the donations they made in real life to two social funds managed by the University of Zurich. They found no behavioral differences among economics students, but they did find that business students donated significantly less than other students.

However, research findings on this topic are mixed. The debate presents a puzzle as to whether subjects only behave completely self-interestedly under certain circumstances, such as in competitive experimental markets with standardized goods, or in the final rounds of public goods experiments (Fehr et al., 2006). There are also studies that have found no differences in behavior between Econ and non-Econ students (e.g., Aarstad et al., 2011; Ahmed, 2008; Bauman & Rose, 2011; Brosig et al., 2010; Carter & Irons, 1991; Claiborne, 2002), and there are even studies that, contrary to expectations, have obtained evidence that Econ students are more willing to cooperate than non-Econ students (e.g., Hu and Liu, 2003; Yezer et al. 1996). Finally, other studies have observed that non-Econ students are more or equally selfish than Econ students (e.g., James et al., 2001).

In this study, we aimed to present the results of a systematic review of the academic literature on this topic: Are Econ students more self-interested than non-Econ students? Additionally, this study allowed us to answer other research questions, such as how is "self-interest" understood by researchers? What were the main methodological aspects of the reviewed studies? What were the main findings? This study has helped us refine the theoretical framework, as well as highlight the limitations of the published studies to date in order to guide future research.

This paper examines the theoretical approaches, followed by the method used to carry out this systematic review, in accordance with the Preferred Reporting Items for Systematic Reviews (PRISMA) statement.[3] The results for the research questions are then presented. Finally, there is a discussion regarding the results obtained, and the study concludes by detailing recommendations for future research.

2. Theoretical approaches

In order to understand the power that self-interest currently exercises in human action or motivation, one must go back to the ideological transformation of Europe in the 17th and 18th centuries from which capitalism emerged. According to Hirschman (1977), it was at this time that it was decided that taking advantage of passions would be more constructive than simply repressing them. Passions could be disciplined and transformed into constructive factors for the service of the common good. The search for self-interest began to be appreciated for its propensity to unite people as part of a social fabric based on mutual needs and exchange. The result was to be a smoothly functioning society populated by human actors seeking the "calm desire of wealth."

In the 18th century, the doctrine of self-interest was well established. Despite this, in the field of economic ideas, Adam Smith articulated his vision in his magnum opus, The Wealth of Nations (Smith, 1994). The doctrine of self-interest was then called "the invisible hand" and justifiably became the most influential economic metaphor.[4] In this way, in the study of economics, it is assumed—most often without criticism—that the pursuit of self-interest by economic actors produces the best social result, maximum national wealth. This paradox is possible because of the market's competitive power (Urbina and Ruiz-Villaverde, 2019).

Later, modern economic science focused on studying how individuals maximize their utility. According to Simon (1993), two important limitations arise from this: on the one hand, utility in neoclassical economics is restricted to desire for economic gain, which is questionable because it is not the only motive that guides human action; on the other hand, with the appropriate utility function, a person whose utility derived from giving to other people could—selfishly—give away "millions of dollars."

This invokes an open discussion of the definitions of self-interest and altruism. An individual is self-interested when they think, decide, and act according to their own satisfaction; however, they may care about the well-being of others to the extent that it affects

[2] In general terms, we use the term "Econ students" to refer to university students who, during their studies, take courses such as Economics, Microeconomics, Macroeconomics, etc. They do not necessarily have to be students of Economics; they can be students of Business Administration, Accounting, Finance, Marketing, etc.

[3] The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) statement, published by Moher et al. (2009), was designed to help systematic reviewers transparently report why the review was done, what the authors did, and what they found.

[4] The "invisible hand" is a concept that was first introduced by Adam Smith in The Theory of Moral Sentiments (1759). It is well known that, paradoxically, Adam Smith only uses the metaphor once in Book IV, Chapter II, paragraph IX of The Wealth of Nations. Following Tribe (2008), it is important to mention that "Das Adam Smith Problem" as the name given to an argument that arose among German scholars during the second half of the nineteenth century concerning the compatibility of the conceptions of human nature advanced in, respectively, Adam Smith's Theory of Moral Sentiments (1759) and his Wealth of Nations (1776). Very succinctly, the invisible hand explains the rejection of a centralized direction of the economy, hence the preference for a market economy. The principle of sympathy (the ability to share the feelings of others) constitutes, in the Smithian structure, an essential prerequisite to ensure the pursuit of self-interest among a multitude of competing economic agents.

their own well-being (Urbina and Ruiz-Villaverde, 2019). More recently, from the perspective of behavioral economics, the study of social or other-regarding preferences has addressed the discussion of self-interested versus altruistic motivations. Rabin (1998) pointed out the existence of important literature in the fields of psychology, labor relations, and economics on the importance of equity, fairness, status seeking, and other deviations of self-interest in workers' behavior. For this reason, behavioral economists have dedicated a great deal of effort, in the field of experimental research (through behavioral games), to interpreting the decisions of individuals (players in a laboratory) in relation to motivations based on altruism, reciprocal altruism, justice, etc. To a large extent the experiments have been devoted to testing the behavioral models developed by Fehr and Schmidt (1999), Bolton and Ockenfels (2000) and Charness and Rabin (2002). Within this framework of study, evidence shows that preferences that value others' decisions depend on the intentions, behavior, and motivation of said others. Individuals cooperate with those who cooperate and punish those who do not cooperate, even if this implies costs in terms of material well-being.

The study of self-interested behavior has also been approached from an axiological perspective by social psychologists. Shalom Schwartz's theory of the universal content and structure of human values has become a reference for this type of study (Schwartz, 1992). In his value model, Shalom Schwartz defines values as goals and motivations which serve as guiding principles in people's lives. First, he divides values into two categories according to whether they serve individual interests (e.g., power, achievement, hedonism) or collective interests (e.g., benevolence). Second, the goals and interests served by values can be either compatible or conflicting. Thus, two dimensions are proposed. The first dimension is called self-enhancement, in which individuals are motivated to follow their own intellectual and emotional interests (self-direction, stimulation, and hedonism values). The second dimension, self-transcendence, is defined as a preference for the status quo and the certainty provided by close relationships with other people, institutions, and traditions (tradition, conformity, and security values). Self-transcendence refers to the degree to which people are motivated to transcend selfish concerns and promote the well-being of others (including values of benevolence and universalism). Self-enhancement comprises values that motivate people to enhance their own personal interests, even at the expense of others (Schwartz, 1992).

Other branches of psychology, consider self-interest to be one of the most important traits for understanding the behavior of individuals. However, to understand this construct, the variable is approached in a broader sense, and the behavior of individuals is related to selfishness and individualism. In a recent study, Gerbasi and Prentice (2013) defined self-interest as "the pursuit of gains in socially valued domains, including material goods, social status, recognition, academic or occupational achievement, and happiness". The main explanation for people behaving in a self-interested manner starts with the assumption that other people will also act according to their own interest, and they can therefore justify their behavior for this reason (Holmes et al., 2002; Ratner and Miller, 2001; Miller and Ratner, 1998; Miller, 1999). Other reasons, such as altruism, conformity, or reciprocity, are taken seriously as long as they explain further variation in behavior beyond self-interest (Gerbasi and Prentice, 2013). When individuals are confronted by behaviors that appear to violate the unique central motive of self-interest, researchers are more likely to broaden the scope of this motive by considering other reasons, such as those mentioned above, than to question its influence on behavior and thus the non-centrality and uniqueness of self-interest (e.g., Cialdini, 1991; Omoto and Snyder, 1995).

3. Methods

A systematic literature review has been carried out according to the recommendations of the PRISMA statement (Moher et al., 2009). Empirical studies which have tested behavioral and/or attitudinal differences related to self-interest among Econ and non-Econ students were included.

3.1. Search strategy

The search was concluded in October 2022. Databases used in this review were *Web Of Science*, *ProQuest* and *Scopus* without restriction on search operators. Firstly, the search string was: ((‘Economic*’ OR ‘Business’ OR ‘Accounting’ OR ‘Finance’ OR ‘Marketing’) AND (‘student*’ OR ‘economic education’) AND (‘self-interest’ OR ‘selfish’ OR ‘selfishness’ OR ‘selfishly’)).

According to previous studies found in this search (Aarstad et al., 2011; Beekun et al., 2017; Gerlach, 2017; Jamil et al., 2019; Meier and Frey, 2004; Stanley and Tran, 1998; Wang et al., 2011), a possible relationship exists between the constructs of self-interest and selfishness. Therefore, a second search was conducted including papers which measured the construct of selfishness and its derivatives. The previous search equation was repeated by adding the terms: ‘egoism,’ ‘egoistic behavi*’ and ‘egotism.’ All papers had to meet the same inclusion criteria.

3.2. Eligibility criteria

This systematic review included empirical studies which met the following criteria: (a) must measure some behavioral and/or attitudinal variable based, motivated, or related to self-interest; (b) had a sample of Econ students; (c) included a comparison between Econ and non-Econ students; and (d) were published in Spanish or English.

Conversely, studies were excluded for the following reasons: (a) did not measure any behavioral and/or attitudinal variable based, motivated, or related to self-interest; (b) did not include Econ students; (c) did not include a comparison with non-Econ students; and (d) did not analyze empirical data.

3.3. Selection process

Papers were selected in four phases: (1) the title and abstract were read to identify records related to the research. Duplicate or full text records that were not available were excluded; (2) all complete texts were read with the exclusion criteria in mind; (3) a critical reading of the studies was carried out; and (4) a descending search of the papers references selected in previous phases was performed.

Two team members independently performed the search, selection, critical reading, and extraction of information. The reliability of the information extraction was evaluated using the Kappa index. For each registered variable (see below), the degree of agreement between members was 100 %.

3.4. Data collection process

A coding manual (available upon request) was used to record all variables and group them into four categories according to our research questions (see the Introduction), namely: (1) Conceptual aspects: conceptualization of the construct to study. (2) Construct and operational aspects: outcomes of the construct to study and measurement instrument. (3) Methodological aspects: data collection (transversal vs. longitudinal); sample size; variables of the characteristics of the sample such as types of degree; age and sex. Finally, (4) Conclusive aspects: statistical results of the degree to which the outcomes were studied (descriptive data, statistical tests, regression analysis, etc.); narrative conclusions and presence of theoretical framework: indoctrination vs. selection.

4. Results

A total of 697 studies were retrieved from the databases: 202 studies from Web of Science; 261 studies from Scopus; and 234 studies from ProQuest. After a strict application of the search criteria, a final sample of $k = 29$ was obtained. Fig. 1 shows the complete flow of empirical studies (Page et al., 2021).

The results are presented by group in the aforementioned categories according to our research questions.

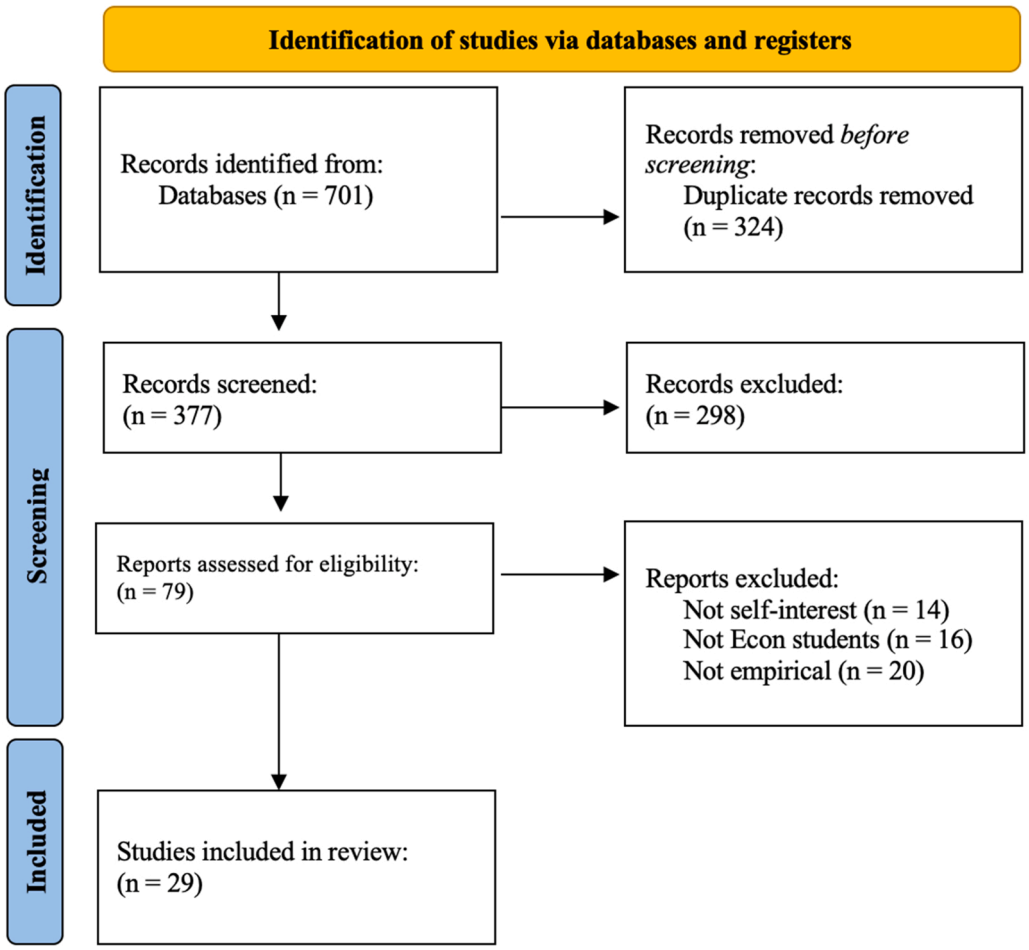

Fig. 1. Flowchart of identified, excluded, and included studies.

4.1. Conceptual aspects. How did researchers understand "Self-interest"?

When it comes to identifying the construct, it is worth mentioning that some papers did not define any of the terms in their research. However, the majority used the term "self-interest." Some of these papers additionally also used other terms related to self-interest, such as "selfish," "selfishness," "selfishly"; and only a minority (3 papers) use other words related lexically to the above without mentioning "self-interest" (Dzionek-Kozłowska and Rehman, 2017; James et al. 2001; Sawyer, 1966). In addition, some papers used the concept of "self-interest" (and its derivatives) and the concept of "egoism" (and its derivatives) indistinctly. For this reason, the way in which the authors defined the object of study construct, self-interest, was reviewed to verify a possible relationship between these two concepts: self-interest and egoism.

Aarstad et al. (2011) closely related self-interest to relativism and egoism because they believed that both motivated students to pursue goals focused on personal gain. According to Beekun et al. (2017) egoism would be a morally correct act if it promoted an individual's long-term interest. Gerlach (2017, p.2) distinguished three theoretical mechanisms to explain egoism: (i) economics students were less concerned with fairness when making allocation decisions; (ii) they were equally concerned with fairness but had a different notion of what is fair when it came to allocations; and (iii) they expected others to behave more selfishly and, therefore, felt less obliged to behave fairly themselves. Jamil et al. (2019, p.98) believed that egoism was viewed as an individual action motivated by self-interest; and, therefore, egoistic individuals tended to act in a more self-interested manner and maximized their personal gains.

Thus, the authors related self-interest to egoism when personal gains or benefits were central to Econ students' decision-making.

4.2. Construct and operational aspects. How had authors related self-interest to other outcomes?

All papers selected in the review tested behavioral differences related to self-interest between Econ and non-Econ students. However, some authors have used different outcomes when conceptualizing and operationalizing self-interest (Table 1). The explanation given by different authors on the choice of these outcomes was as follows.

4.3. Corruptibility and greed

Frank and Schulze (2000) did not study self-interest in isolation but studied the degree to which self-interest dominated interest in others. The authors considered the outcome corruptibility met these requirements because it conflicted with generally accepted moral norms. Stanley and Tran (1998) described the theoretical-conceptual framework around the term self-interest. When presenting the results of their study, they introduced the term greed in order to make a comparison with a similar study. Thus, the constructs—corruptibility and greed—were outcomes used to test the self-interested behavior of university students.

Table 1
Summary of construct and operationalization aspects.

Study	Construct	Operationalization variable
Aarstad et al. (2011)	Ethical values	Fairness, relativism, and egoism
Ahmed (2008)	Pro-social	Cooperation
Bauman and Rose (2011)	Pro-social	Giving behavior
Beekun et al. (2017)	Egoism	Egoism, utilitarianism, relativism, justice, and ethical decision
Blossiers and Soto (2008)	Egoism	Egoism
Cappelen et al. (2015)	Pro-social	Pro-social
Carter and Irons (1991)	Self-interest	Amount acceptable and amount kept
Cox (1998)	Cooperation	Voting behavior, tipping behavior and investment behavior
Dzionek-Kozłowska and Rehman (2017)	Cooperation	Cooperation
Espín et al. (2022)	Self-interest	Envy, compassion, and unemployment
Frank et al. (1993)	Cooperation	Cooperation and honesty
Frank and Schulze (2000)	Corruptibility	Amount acceptable and amount kept
Frey and Meier (2003, 2005)	Pro-social	Giving behavior
Gandal et al. (2005)	Self-interest	Power and achievement
Gerlach (2017)	Self-interest	Fairness
Hole (2013)	Self-interest	Fairness
Hu and Liu (2003)	Altruism	Cooperation
Ifcher and Zarghamee (2018)	Self-interest	Self-interest
James et al. (2001)	Cooperation	Cooperation
Jamil et al. (2019)	Egoism	Egoism
Lanteri and Rizzello (2014)	Cooperation	Cooperation
Meier and Frey (2004)	Pro-social	Giving behavior
Mertins and Warning (2014)	Reciprocity	Fairness
Petersen and Ford (2019)	Ethical values	Personal values
Sawyer (1966)	Altruism	Altruism
Selten and Ockenfels (1998)	Altruism	Giving behavior
Stanley and Tran (1998)	Greed	Fairness
Wang et al. (2011)	Greed	Greed

4.4. Cooperation, pro-social preferences, altruism, self-enhancement, and reciprocity

Most authors used the outcomes cooperation or pro-social preferences to contrast them with self-interested behavior and/or attitude when actions or attitudes promoted for personal gain come into play. Thus, "students who major in business and economics might act less cooperatively when that behavior leads to personal profit" (Cox, 1998, p.69) or emphasis on the self-interest model tends to inhibit cooperation (Dzionek-Kozłowska and Rehman, 2017). Some authors even considered pro-social preferences as a general outcome which included cooperative behavior or attitude (Ahmed, 2008; James et al., 2001; Meier and Frey, 2004). For instance, Ahmed (2008, p. 301) posited that "Economics students differ in their pro-social preferences and can be divided into selfish and cooperative types". Thus, the common conceptual element which led self-interest to the opposing behaviors or preferences was due to the weight which people perceived the benefit of others to have in relation to their own.

This classification for defining self-interest was expanded when we focused on the operationalization of these measurements. That is, the authors used operationalized variables different from those previously defined and new variables appeared, such as, fairness or power.

4.5. Methodological aspects. What were the main methodological aspects of the studies reviewed?

When relating the outcomes which were identified with self-interest and the instruments used to assess them, a series of nuances must be noted. Authors measured the same outcomes with different instruments. For example, the variable self-interest was measured by way of three different questionnaires; likewise, it was measured by five different behavioral sets: dictator game, ultimatum game, public goods game, third-party punishment game, and prisoner's dilemma game. The same instruments were also used to measure other outcomes. Authors used the ultimatum game to measure self-interest, greed, and pro-social behavior.

Fig. 2 below shows the different outcomes employed by authors and their respective instruments. The instruments were classified as follows: questionnaires, economic experiments, and university records.

In order to verify the main methodological aspects of the studies reviewed, it was necessary to check the following aspects listed in Table 2. Note. * PVQ: Schwartz Portrait Values Questionnaire (Schwartz et al., 2001); **SVS: Schwartz Value Survey (Schwartz, 1992).

The sample size of the empirical studies presented in the papers was different depending on whether the design was cross-sectional or longitudinal. In the case of cross-sectional studies, the sample size was not homogeneous, with samples ranging from 16 participants (Stanley and Tran, 1998) to 600 (Espín et al., 2022), the average being 216 participants. In the case of the longitudinal studies, the samples were much larger because they used census samples. Sample sizes were 8743 (Bauman and Rose, 2011), 37,588 participants

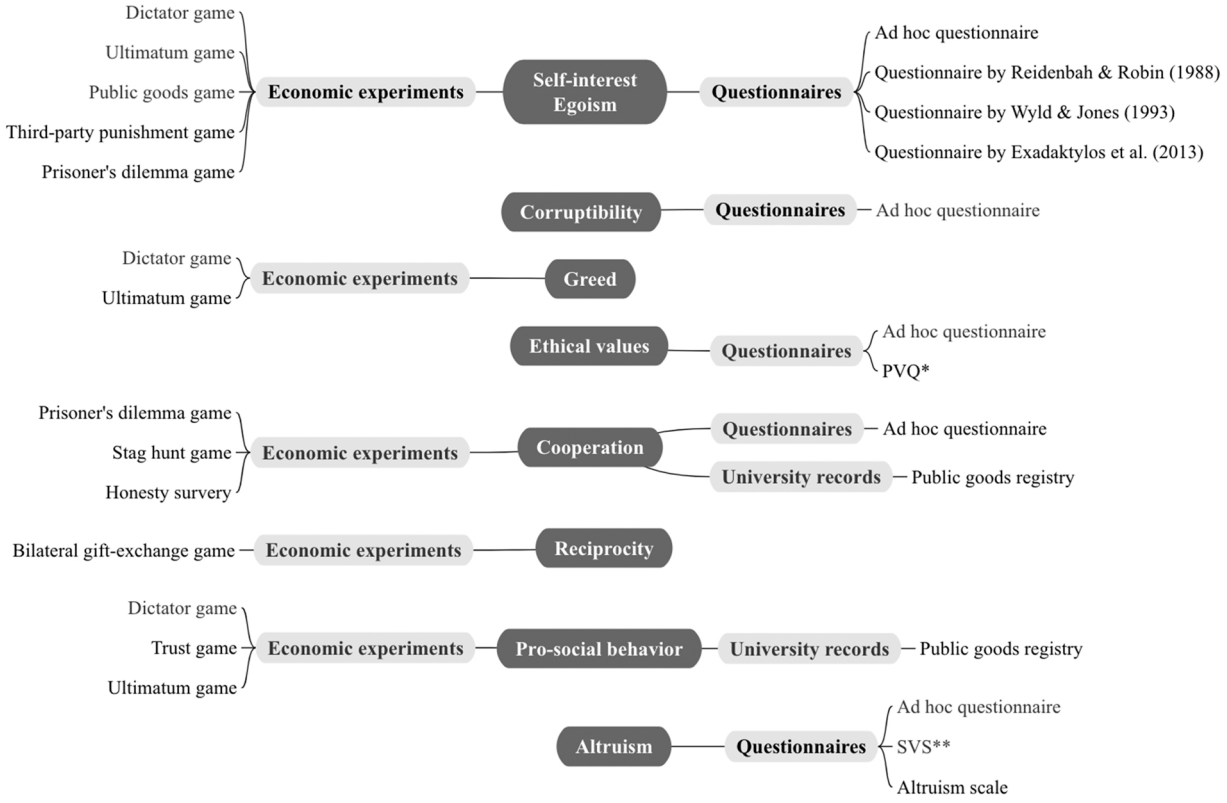

Fig. 2. Relationship between outcomes and instruments used to measure self-interest.

Table 2
Summary of methodological aspect.

Study	Data collection (Longitudinal vs. Transversal)	Sample Size (N)	Field of study (Econ students)	(Non-Econ students)
Aarstad et al. (2011)	Transversal	168	Business	Engineering
Ahmed (2008)	Transversal	90	Economics	Humanities and police cadets
Bauman and Rose (2011)	Longitudinal (Panel, Census)	8743	Economics	Arts and Sciences
Beekun et al. (2017)	Transversal	158	Business	Sciences
Blossiers and Soto (2008)	Transversal	336	Business and Economics	Medicine and Sociology
Cappelen et al. (2015)	Transversal	375	Business and Economics	Humanities, Natural Sciences and Social
Carter and Irons (1991)	Transversal	92	Economics	Unspecified
Cox (1998)	Transversal	301	Business and Economics	Nurse and Education
Dzionek-Kozłowska and Rehman (2017)	Transversal	341	Economics	Sociology
Espín et al. (2022)	Transversal	600	Business and Economics	Medicine, Civil Engineering, Law, Anthropology and Psychology
Frank et al. (1993)*	Transversal	207	Economics	Math, Computer Science, Engineering, Natural Sciences, Humanities, Architecture and Music
Frank et al. (1993)*	Longitudinal	—	Economics	Astronomy
Frank and Schulze (2000)	Transversal	161	Economics, Economic Pedagogy and Agricultural Economics	Unspecified
Frey and Meier (2003, 2005)	Longitudinal (Panel, Census)	96.783	Business and Economics	Unspecified
Gandal et al. (2005)	Transversal	262	Economics	Social Sciences
Gerlach (2017)	Transversal	165	Economics	Arts and Sciences
Hole (2013)	Transversal	376	Business	Engineering
Hu and Liu (2003)	Transversal	255	Economics	Unspecified
Ifcher and Zarghamee (2018)	Longitudinal	276	Unspecified	Unspecified
James et al. (2001)	Transversal	33	Economics, Business and Accounting	Psychology
Jamil et al. (2019)	Transversal	146	Business	Sciences, Social Sciences, Engineering and Computer Sciences
Lanteri and Rizzello (2014)	Transversal	190	Economics	Nursing and Law
Meier and Frey (2004)	Longitudinal (Panel, Census)	37,588	Business and Economics	Unspecified
Mertins and Warning (2014).	Transversal	359	Business	Law
Petersen and Ford (2019)	Transversal	203	Business	Engineering, Arts and Medicine
Sawyer (1966)	Transversal	122	Business	Social Sciences and Social Services
Selten and Ockenfels (1998)	Transversal	118	Economics	Unspecified
Stanley and Tran (1998)	Transversal	16	Economics	Arts
Wang et al. (2011)	Transversal	112	Economics	Education

Note. *Frank et al. (1993) present two different studies in the same article.

(Meier and Frey, 2004) and 96,783 (Frey and Meier, 2003, 2005). The article by Ifcher and Zarghamee (2018) had the smallest sample size, with a total of 276 participants in which the authors conducted a laboratory experiment where participants completed 6 experimental tasks before and after treatment. It is worth mentioning that the fourth longitudinal study (Frank et al., 1993) did not report sample size. Age and sex were recorded; however, nevertheless, they do not appear in Table 2 because more than 75.86 % of the papers did not report such information.

Regarding the study population, two groups were considered: one group comprised Econ students and the other non-Econ students. The first group falls mainly in two degrees: Economics and Business. The majority (12 papers) used only Economics students and 7 papers only Business students. However, 7 papers used both degrees as a definition for the sample of Econ students. It is noteworthy that 2 papers also used Accounting and Operations Research students and students of Economic Pedagogy or Agricultural Economics as a sample of Econ students. Therefore, the sample as a whole was: 67.86 % of papers used Economics students; 50 % used Business students; 3.57 % used Accounting students; and 3.57 % Economic Pedagogy or Agricultural Economics students. In the case of Ifcher and Zarghamee (2018) students' degrees were not specified. However, in the laboratory experiment they were asked if they had ever studied game theory or economics in general during any college course. For the second group, non-Econ students, there was greater diversity of degrees. As shown in Table 2, with the exception of 1 paper which also samples Police cadets, all were university students.

The methodological aspects described above highlight the heterogeneity of studies on the subject. In addition, in order to study the quality of the evidence on this topic, the risk of bias of the selected papers in this review was analyzed (see Table 3).

Selection, performance, detection, and attrition biases were considered. The conditions for establishing the risk levels of each bias were based on Cochrane guidelines (Higgins et al., 2019) and the methods section of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE; Von Elm et al. 2014). According to the results, it could be posited that attrition bias is unlikely to affect the studies (high: 0 %, low: 55.17 % and undetermined: 44.83 %). However, most studies showed a high risk of selection bias (high: 72.41 %, low: 17.24 %, and undetermined: 10.34 %).

With regard to performance bias (high: 20.69 %, low: 27.59 %, and undetermined: 51.72 %), and detection bias (high: 0 %, low:

Table 3
Risk of bias of the selected papers.

Study	Bias			
	Selection	Performance	Detection	Attrition
Aarstad et al. (2011)	High	Low	Undet.	Low
Ahmed (2008)	High	High	Undet.	Low
Bauman and Rose (2011)	Low	Low	Low	Low
Beekun et al. (2017)	High	–	Low	Undet.
Blossiers and Soto (2008)	High	Undet.	Low	Undet.
Cappelen et al. (2015)	High	Low	Low	Undet.
Carter and Irons (1991)	Low	Undet.	Undet.	Low
Cox (1998)	Low	Undet.	Undet.	Undet.
Dzionek-Kozłowska and Rehman (2017)	High	Undet.	Undet.	Undet.
Espín et al. (2022)	High	Undet.	Low	Undet.
Frank et al. (1993)*	Undet.	High	Undet.	Low
Frank et al. (1993)*	Undet.	Undet.	Undet.	Undet.
Frank and Schulze (2000)	High	Undet.	Undet.	Low
Frey and Meier (2003, 2005)	Low	Low	Low	Low
Gandal et al. (2005)	High	Undet.	Undet.	Undet.
Gerlach (2017)	High	High	Low	Low
Hole (2013)	High	High	Undet.	Undet.
Hu and Liu (2003)	Low	High	Undet.	Undet.
Ifcher and Zarghamee (2018)	Low	Low	Low	Low
James et al. (2001)	High	High	Undet.	Undet.
Jamil et al. (2019)	High	Undet.	Low	Low
Lanteri and Rizzello (2014)	High	Undet.	Undet.	Undet.
Meier and Frey (2004)	Low	Low	Low	Low
Mertins and Warning (2014).	High	Undet.	Undet.	Low
Petersen and Ford (2019)	High	Undet.	Low	Low
Selten and Ockenfels (1998)	High	Low	Low	Undet.
Sawyer (1966)	High	Undet.	Undet.	Low
Stanley and Tran (1998)	High	Undet.	Undet.	Low
Wang et al. (2011)	High	Low	Low	Low
TOTAL	High: 72.41 %	High: 20.69 %	High: 0 %	High: 0 %
	Low: 17.24 %	Low: 27.59 %	Low: 44.83 %	Low: 55.17 %
	Undet.: 10.34 %	Undet.: 51.72 %	Undet.: 55.17 %	Undet.: 44.83 %

Note. High = High risk of bias; Low = Low risk of bias; Undet. = Undetermined risk of bias due to lack of information. *Frank et al. (1993) present two different studies in the same article.

44.83 %, and undetermined: 55.17 %), more than half of the papers did not report the information, therefore, it could not be concluded whether the risk was high or low.

4.6. *Conclusive aspects. What are the main findings?*

Finally, this question was addressed using the variables included in the conclusive aspects (see Table 4).

When considering self-interest, 62.07 % of the reviewed papers showed statistically significant differences between the two groups. Econ students presented more self-interested behavior than non-Econ students. However, 4 of these papers showed a number of nuances. Carter and Irons (1991), by way of the ultimatum game, determined that Econ students acted less pro-socially than non-Econ students. Only in the case of the group of students who proposed the distribution of a sum of money in the ultimatum game, were the results not maintained when selecting senior students. Cox (1998) found significant results for only two of the four outcomes studied. Likewise, Cappelen et al. (2015) found significant differences only in women. Finally, Espín et al. (2022) suggested that the differences were due to self-selection in preferences and indoctrination in students' beliefs about the behavior of others.

Only 2 papers have determined that Econ students are not considered less cooperative than non-Econ students (James et al., 2001, Hu and Liu, 2003). However, Hu and Liu (2003) argued that exposure to the self-interest model does not necessarily alter the extent to which people behave self-interestedly, despite the fact that Econ students were considered more cooperative when negotiating than non-Econ students. The remaining papers (17.86 %) did not show significant differences, but they did find that Econ students were more self-interested. Consequently, 86.21 % of the papers concluded that there were significant differences in the level of self-interested behavior according to the degree studied.

5. Discussion

Currently, there is an open debate in academia on whether teaching standard economics promotes self-interested behaviors and/or attitudes (e.g., Ahmed, 2008; Haucap and Müller, 2014; Meier and Frey, 2004; Mertins and Warning, 2014; Hu and Liu, 2003). This is due, in part, to the fact that students are exposed to study models for economic analysis which start from a specific representative agent, the *homo œconomicus*, which is characterized by the rational search of their own self-interest (Urbina and Ruiz-Villaverde,

Table 4
Summary of conclusive aspects.

Study	Statistical results	Conclusions	Hypotheses
Aarstad et al. (2011)	Ordinary least squares (OLS) b= 0.220; p < .05; R^2 = .09	Econ students behave less ethically sensitive, on issues related to relativism and egoism, than non-Econ students (controlling for gender)	Not tested
Ahmed (2008)	Chi-Squared test X^2 = 17.8; p < .001 (prisoner's dilemma) X^2 = 15.7; p < .001 (stag hunt game)	Econ students behave less cooperatively than non-Econ students	Indoctrination
Bauman and Rose (2011)	Linear regression B= 0.006; p < .001 (WashPIRG group) B= 0.006; p < .001 (ATN group)	Econ students behave less pro-social than non-Econ students (controlling for gender, subjects, age, black and nationality)	Indoctrination vs. Self-selection
Beekun et al. (2017)	t-test t = 4.05, p < .001	Econ students behave more selfish than non-Econ students	Not tested
Blossiers and Soto (2008)	Descriptives (percentages)	Econ students behave more selfish than non-Econ students	Economic training
Cappelen et al. (2015)	DNS p = .07 (men, dictator) p < .05 (women, dictator) p = .40 (men, trust) p < .001 (women, trust)	Econ students from the women's group behave less pro-social than non-Econ students	Not tested
Carter and Irons (1991)	Ordinary least squares (OLS) B= −0.74; p < .05; R^2 = .05 (total responder group) B= 0.71; p < .05; R^2 = .09 (total proposer group) B= 1.47; p < .05; R^2 = .10 (senior responder group) B= 0.18; p > .05; R^2 = .12 (senior proposer group)	Econ students behave less pro-social than non-Econ students. However, in the case of the proposer group, the results are not maintained when only senior students were selected (controlling by course).	Indoctrination vs. Self-selection
Cox (1998)	Ordinary least squares (OLS) B = 0.05, p > .05 B = 0.12, p > .05 B = −0.13, p < .05 B = 7.59, p < .05	Of the four questions (VDs), they found significant results in only two, in those the Econ students behave less cooperative than non-Econ students (controlling for gender, age and course)	Economic training
Dzionek-Kozłowska and Rehman (2017)	Descriptive statistics (means)	No statistically significant differences	Indoctrination
Espín et al. (2022)	Probit regression p > .40	No statistically significant differences	Indoctrination vs. Self-selection
Frank et al. (1993)*	Ordinary least squares (OLS) B= 0.17, p < .05, R^2 = .20	Econ students behave less cooperatively than non-Econ students (controlling for game, gender, and course)	Economic training
Frank et al. (1993)*	Descriptive statistics (percentages)	Econ students behave less cooperatively than non-Econ students	Economic training
Frank and Schulze (2000)	Probit regression B= 0.64, p < .05	Econ students behave more corrupt than non-Econ students (controlling for gender, fix payments and course)	Indoctrination vs. Self-selection
Frey and Meier (2003, 2005)	Probit regression B= −0.10, p < .05	Econ students behave less pro-social than non-Econ students	Indoctrination vs. Self-selection
Gandal et al. (2005)	MANOVA F= 16.02, p < .001 (achievement) F= 4.15, p < .05 (power)	Econ students attach more importance to achievement and power values than non-Econ students	Economic training
Gerlach (2017)	Tobit regression B= −2.25; p < .001	Econ students behave more selfish than non-Econ students (controlling for gender)	Not tested
Hole (2013)	Linear regression B= −0.05, p = .04	Econ students behave more selfish than non-Econ students	Self-selection
Hu and Liu (2003)	Chi-Squared test X^2 = 11.39; p < .001 (First round) X^2 = 14.31; p < .001 (Second round)	Econ students behave more cooperative than non-Econ students (controlling for gender)	Not tested
Ifcher and Zarghamee (2018)	t-test p = .005	Econ students behave more selfish than non-Econ students	Self-selection vs. Economic training
James et al. (2001)	t-test t = 1.98, p = .06 (Psychology)	Econ students do not behave less cooperative than non-Econ students	Not tested
Jamil et al. (2019)	t-test t = 0.34, p > .05 (egoism)	No statistically significant differences	Economic training
Meier and Frey (2004)	t-test t = 16.20, p < .001	Econ students behave less pro-social than non-Econ students	Indoctrination vs. Self-selection

(*continued on next page*)

Table 4 (*continued*)

Study	Statistical results	Conclusions	Hypotheses
Mertins and Warning (2014).	Probit regression B= 0.11, p < .05, R^2 = .11	Econ students behave less reciprocal than non-Econ students (controlling for gender, siblings, parent academics and willingness to take risks)	Self-selection
Petersen and Ford (2019)	Linear regression B= −0.15, p < .05, R^2 = .13 (self-transcendence)	Econ students prioritize less self-transcendence than non-Econ students (controlling for age and nationality)	Self-selection
Sawyer (1966)	t-test p < .05	Econ students behave less altruistic than non-Econ students	Not tested
Selten and Ockenfels (1998)	Mann-Whitney test p > .10	No statistically significant differences	Not tested
Stanley and Tran (1998)	t-test t = 2.01; p > .05	No statistically significant differences	Not tested
Wang et al. (2011)	t-test and Chi-Square test t = 3.66, p < .001 (unrestricted task) X2 = 6.55, p < .05 (restricted task)	Econ students behave greedier than non-Econ students	Not tested

Note. DNS = Data Not Shown: the statistical test used is not reported; OLS = Ordinary least square; b = standardized beta coefficient in a regression model; B = non-standardized beta coefficient in a regression model; R^2 = percentage of variance explained in a regression model; t = t-Student statistic; F = Fisher-Snedecor statistic; X^2 = Chi-square test statistic.

2019). This systematic literature review allowed us to delve into this field of study and obtain an overview of the papers published to date which provide empirical evidence on the issue.

Most of the papers reviewed showed the existence of behavioral and/or attitudinal differences between Econ (mainly in Economics and Business) and non-Econ students. However, this conclusion should be interpreted cautiously for the reasons discussed below.

First, self-interest is understood in a conceptually broad manner by researchers, and therefore, it is conceptualized by different terms and definitions. The conceptual relationship between the terms self-interest and egoism has been accepted in a large number of reviewed papers. The authors relate self-interest to egoism when personal gains or benefits are central to the decision-making behavior of Econ students.

Additionally, this review shows that several authors relate self-interest to other variables, namely corruptibility or greed (direct relationship) and cooperation, pro-social preferences, self-transcendence, or reciprocity (opposite relationship). Although different behaviors or attitudes have been studied, the common conceptual element leading to self-interest is the weight that people place both on personal benefits (direct relationship) and on the benefits of others in relation to their own (opposite relationship). In doing so, all studies have attempted to test the same hypothesis: if the students' exposure to the study of standard economic models, where the economic agent is rationally self-interested, promotes differences in these outcomes.

This review highlights the confusion that exists in the study of self-interested behaviors or attitudes. Not all authors conceptually define self-interest in their papers, nor the relationship (direct or inverse) between this variable and other outcomes used for its measurement. There is great heterogeneity and recurring inconsistency in conceptualizing and operationalizing self-interest in a field as specific as economics. For example, some authors compare self-interest with altruism separately (Hu and Liu, 2003, Sawyer, 1966; Selten and Ockenfels, 1998), but none of them include altruism within prosociality. This makes it difficult to draw conclusions about the debate presented here along with the other aforementioned issues.

Gerbasi and Prentice (2013) propose that self- and other-interest are different constructs, related to each other, but not necessarily in opposite directions. Therefore, they use a common theoretical framework. They define self-interest as "the pursuit of gains in socially valued domains, including material goods, social status, recognition, academic or occupational achievement, and happiness." However, these authors also consider other reasons, such as altruism, cooperation, conformity, and reciprocity, to be taken seriously as long as they explain an additional variation of behavior beyond self-interest (Gerbasi and Prentice, 2013). When individuals are confronted with behaviors that appear to violate the unique and central motive of self-interest, researchers are more likely to broaden the scope of this motive by considering other reasons, such as those mentioned above, than to question its influence on behavior and thus the non-centrality and uniqueness of self-interest (e.g., Cialdini, 1991; Omoto and Snyder, 1995).

Second, although most of the papers reviewed show the existence of behavioral or attitudinal differences related to self-interest between Econ and non-Econ students, it cannot be concluded that these differences are due to the indoctrination effect of standard economics or a selection effect, since most studies do not test these hypotheses. Moreover, only a few studies among those that test for the possibility of indoctrination or selection effects consider the possible differences derived from a student's exposure to different parts of standard economics (e.g., Bauman and Rose, 2011; Frank et al., 1993). It would be interesting to control whether the course taken, during the research process was macroeconomics or microeconomics, since the assumptions of the homo œconomicus are more visible in microeconomics. This would yield greater understanding and validity when testing the hypothesis of indoctrination. In this vein, Ifcher and Zarghamee (2018) attempted to identify the exact components of the indoctrination effect.

Finally, this review allowed us to highlight some methodological limitations of the initial studies. Most papers do not report the age, sex, or year of participants in their studies. On average, the sample size of cross-sectional studies (95 %) was small, which is important for representativeness. Furthermore, cross-sectional data presents difficulties in inferring causal chains. To assess the causal direction of what drives the more self-interested behavior of economics students, longitudinal data sets that include a control group are required.

From the sample of reviewed studies, only 3 papers followed this strategy (Bauman and Rose, 2011; Frank et al., 1993; Meier and Frey, 2004). Additionally, the studies presented a high risk of selection bias, and in most of the papers, there was little information available on the reliability and validity of the instruments measuring the outcomes. It should be noted that the organization of instruments used by most authors to measure self-interest and other related concepts is confusing. For example, it is surprising that, since the Ultimatum Game is considered the canonical instrument for measuring reciprocity, none of the authors have used it for this purpose.

In light of these results, we make the following recommendations for future research: (i) it is not enough to test whether Econ students generally behave in a more self-interested manner. For Econ students, a distinction should be made between degrees. This recommendation is based on the fact that most studies on self-interested behavior use undergraduate students in economics (Ahmed, 2008; Bauman and Rose, 2011; Carter and Irons, 1991; Dzionek-Kozłowska and Rehman, 2017; Frank et al., 1993; Gandal et al., 2005; Gerlach, 2017; Hu and Liu, 2003; Lanteri and Rizzello, 2014; Selten and Ockenfels, 1998; Stanley and Tran, 1998; Wang et al., 2011). However, little or nothing is known about the rest of the students with economic training, and this could be considered a gap when generalizing these behaviors. In contrast, the authors who studied behavioral differences that could be based on other variables, such as moral-ethical dilemmas, selected mainly business students (Collin and Schmidt, 2020; Krick et al., 2016; McCannon, 2014; Neubaum et al., 2009; Petersen et al., 2019; Rosengart et al., 2020; Segal et al., 2011). However, these differences should be considered in future studies. (ii) Similarly, once behavioral differences have been tested, it is essential to understand why. In this way, it is recommended that both—the indoctrination and self-selection hypotheses are contrasted; (iii) in relation to the above, it is highly recommended to isolate the variable that might cause this indoctrination effect as much as possible. It is important to describe the specific theory or economic model taken during the research process. For example, as mentioned in the discussion, the assumptions of the homo œconomicus are more visible in microeconomics. In addition, it is essential to explicitly report variables, such as participants' sex, age, and education level. Reporting the characteristics of the sample helps identify the type of subjects on which the phenomenon of interest is being studied. Likewise, it is convenient to report any selection of values for a variable (for example, exclusion of women) because failure to do so could bias the results and the internal validity of the study. For this reason, these control variables are important to understand the behaviors and attitudes of the subjects, independent of the variable under study. (iv) it is complicated, but also necessary, to test the self-selection hypothesis. Therefore, future research must take into account whether participants have taken economics or business courses in secondary education, where students are also exposed to the behavioral postulates of standard economics; (v) given that most studies propose cross-sectional measurement strategies, longitudinal studies that allow causal chains to be inferred are recommended; (vi) finally, it is desirable to use different measurement instruments: with reference to tests, include evidence of reliability and validity when standardized tests are used, and avoid the learning effect when considering behavioral games.

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