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Development of inequity aversion in argentine children in different SES populations

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ABSTRACT

Inequity aversion, which can be categorized into disadvantageous inequity aversion and advantageous inequity aversion, does not develop in the same way across different societies and cultures. In the current study, we evaluated inequity aversion using the "inequity game" among Argentine children from two different populations: a low socioeconomic status (SES) group (n = 168) and a middle socioeconomic status group (n = 129). Middle-SES children showed stronger signs of disadvantageous inequity aversion and showed signs from an earlier age than low-SES children, but neither group showed advantageous inequity aversion. On the other hand, girls tended to manifest greater levels of advantageous inequity aversion than boys, while boys manifested greater disadvantageous inequity aversion than girls. These results indicate that the phenomenon of inequity aversion not only varies between different cultures and countries but also manifests differently within the same society.

1. Introduction

A sense of justice appears to be a pervasive trait among humans. It can be observed on a daily basis in the form of actions aimed at rectifying inequities. Existing theories propose that this sense of justice was essential for the evolution of increasingly complex societies, which are founded on systems of trust and cooperation (Brosnan, 2011; Brosnan & de Waal, 2014; Fehr & Schmidt, 1999; Brosnan, 2011; Brosnan & de Waal, 2014; Fehr & Schmidt, 1999). The sense of fairness can be studied and measured through the inequity aversion construct, which refers to the resistance that people put up – even with some degree of sacrifice – in the face of inequitable outcomes (Fehr & Schmidt, 1999). Inequity aversion can be divided into two categories: disadvantageous inequity aversion, which occurs when an individual rejects an outcome that is less than what they would be entitled to; and advantageous inequity aversion, which occurs when an individual opposes an outcome that is more than what they would be entitled to (Blake & McAuliffe, 2011; Fehr & Schmidt, 1999).

Various studies have shown that both types of inequity aversion present marked differences in terms of their development during childhood (Blake & McAuliffe, 2011; Blake et al., 2015; Li et al., 2022) and in terms of the neural circuits involved (Yu et al., 2014; Fliessbach et al., 2012; Gao et al., 2018). Some authors have proposed that these differences may be attributed to the fact that receiving an unfair but advantageous benefit would create an internal conflict within the individual that is more challenging to resolve than a situation in which an unfair but disadvantageous outcome is experienced (Blake & McAuliffe, 2011; Peters et al., 2008; van den Bos

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et al., 1997; van den Bos et al., 2006; van den Bos et al., 1998). For example, take the case of a father who distributes money to his children but gives a larger amount to one of them. The son who received less will feel the injustice and the disadvantage, which will lead him to reject what he received to oppose the result; however, for the brother who received more, it will be more difficult to reject the result in pursuit of justice, because although he considers it unfair, he benefited and could lose it. Consequently, disadvantageous inequity aversion has been linked to a more primitive sense of justice, which is self-oriented and accompanied by negative emotions such as envy, spite, and frustration (Aina et al., 2020; McAuliffe et al., 2014; Shaw & Choshen-Hillel, 2017), whereas advantageous inequity aversion represents a more complex and altruistic sense of justice that is oriented toward others (Blake et al., 2015; Shaw & Choshen-Hillel, 2017; Yu et al., 2021; Blake et al., 2015; Shaw & Choshen-Hillel, 2017; Yu et al., 2021).

Importantly, while the two forms of inequity aversion represent short-term losses for the individual, they bring long-term gains. For example, standing up against disadvantageous offers sends a signal to cooperative peers that the individual does not tolerate being exploited, which in turn leads to greater respect being shown to them in the future. Similarly, rejecting an advantaged proposal sends the signal of being a good cooperator with whom it is positive to work. Consequently, in the future, others will be more open to collaborating with her (Fehr & Schmidt, 1999; Brosnan & de Waal, 2014). This system allows cooperative behaviors to be maintained over time, thus facilitating the growth of societies (Debove et al., 2017).

1.1. Development of inequity aversion, gender, and cultural differences

The results of developmental studies indicate that infants can distinguish between fair and unfair resource distributions as early as infancy (Schmidt & Sommerville, 2011; Schmidt & Sommerville, 2011). Furthermore, infants demonstrate a preference for those who behave fairly (Burns & Sommerville, 2014; Geraci & Surian, 2011). At approximately three years of age, children tend to distribute candy in a manner that maximizes their gains, even when they believe that an egalitarian distribution rule should be followed (Rochat et al., 2009; Smith et al., 2013; Rochat et al., 2009; Smith et al., 2013). Conversely, as a child matures, he or she will begin to make distributions based on equality gains (Rochat et al., 2009), merit (Baumard et al., 2011; Kanngiesser & Warneken, 2012; Leventhal et al., 1973), reputation (Yazdi et al., 2020; Yazdi et al., 2020), and the perceived needs of his or her peers (Huppert et al., 2018; Malti et al., 2016; Huppert et al., 2018; Malti et al., 2016). Furthermore, age-related changes occur at the level of reasoning, with the onset of these changes occurring around the age of eight. At this age, children begin to judge distributions based on equity (proportional to effort) more positively than distributions based on equality (equal distributions for all; Rizzo & Killen, 2016). Similarly, they will develop a more flexible understanding of fairness, enabling them to comprehend that in certain circumstances, certain nonegalitarian distributions may be perceived as fair (Schmidt et al., 2016). Blake and colleagues (2011) showed that as early as age 4, American children start rejecting disadvantageous offers but not advantageous offers. The study also revealed that children did not exhibit greater signs of advantageous inequity aversion until the age of 8. These results align with both classic and modern studies on distributive justice, which indicate that children initially exhibit individualistic and self-centered tendencies before developing more prosocial tendencies that also consider others (Damon, 1975; Hook & Cook, 1979; Kohlberg & Hersh, 1977; McAuliffe et al., 2017; Robbins et al., 2016; Damon, 1975; Hook & Cook, 1979; Kohlberg & Hersh, 1977; McAuliffe et al., 2017; Robbins et al., 2016).

Numerous factors, including gender and culture, have been identified as influencing the development of inequity aversion. With respect to gender, Li et al. (2022) found that girls showed greater aversion to advantageous inequity than boys did, and McAuliffe (2013) observed that girls were more likely to reject advantageous inequity offers regardless of whether this behavior was public or not, whereas boys tended to change their levels of inequity aversion when observed by others. Although a study by Blake and McAuliffe (2011) did not report gender differences in the levels of inequity aversion between boys and girls, differences in social preference inclinations have been widely observed in adult males and females (Andreoni & Vesterlund, 2001; Caleo, 2018; Cobo–Reyes et al., 2020; Rand et al., 2016; Soutschek et al., 2017). For example, when altruism is costly, women are kinder; when it is not costly, men tend to be more altruistic (Andreoni & Vesterlund, 2001). Furthermore, as they age, women become more egalitarian than men (Cobo–Reyes et al., 2020), even women seem to have a more responsive neural reward system to prosocial rewards than men (Soutschek et al., 2017). On the other hand, men tend to be surplus maximizers (Kamas & Preston, 2012; Kamas & Preston, 2015) and tend to reject more disadvantageous offers (Hasan & Ejaz, 2018).

With respect to culture, Bates et al. (2015) studied the development of inequity aversion in 7 countries: Canada, India, Mexico, Peru, Senegal, Uganda and the United States. They observed that disadvantageous inequity aversion manifested in all countries and became stronger with age, but the ages at which it emerged varied. In the United States and Canada, disadvantageous aversion appeared between the ages of 4 and 6, while in India, Peru, Senegal and Uganda, disadvantageous aversion appeared between the ages of 6 and 8. Finally, in Mexico, disadvantageous aversion did not emerge until the age of 10. On the other hand, advantageous inequity aversion only emerged in the USA, Canada, and Uganda. In another study using the same paradigm conducted on a sample of Chinese children, disadvantageous inequity aversion appeared at age 5, while advantageous inequity aversion appeared at age 7 (Kajanus et al., 2019; Li et al., 2022). These developmental results where disadvantageous inequity aversion appears first before advantageous inequity aversion support theories that suggest that resolving a disadvantageous situation would be simpler than resolving an advantageous situation.

Given that the timing of the development of inequity aversion varies according to society, and that in most studies in developmental psychology the samples studied tend to be almost 90 % from so-called WEIRD (acronym that stands for Western, Educated, Industrialized, Rich and Democratic) societies, which represent less than 5 % of the world's population (Gutchess & Rajaram, 2023; Henrich, Heine, et al., 2010; Nielsen et al., 2017), it is urgent to continue replicating these studies in other parts of the world. Therefore, the primary objective of the current study was to analyze how inequity aversion develops in Argentine children and how it may develop differently between boys and girls. It is anticipated that similar patterns of development will be observed as in other countries, where

disadvantageous inequity aversion emerges before advantageous inequity aversion. Additionally, it is anticipated that girls will exhibit greater levels of advantageous inequity aversion than boys, while boys will exhibit greater levels of disadvantageous inequity aversion. Furthermore, Argentine society is distinguished by its unique characteristics and considerable internal variation, particularly in terms of socioeconomic differences; in this case, it is not only necessary to study the differences between societies but also to take into account the differences that occur within a single society.

1.2. Argentina and SES

The Argentine Republic is a democratic state located in South America. The country gained independence in 1816; subsequently, the 19th century was characterized by a period of consolidation and internal conflict, including civil wars and power struggles. Between 1870 and 1930, a significant number of immigrants, predominantly from Italy and Spain, arrived in Argentina, which made it the most Europeanized country in Latin America (Facio & Resett, 2006). In the 20th century, Argentina experienced both periods of economic prosperity and crisis. During the period of economic and social progress known as the 'golden age', significant economic and social progress was made. However, the subsequent decades were marked by military coups, political conflicts and recurrent economic crises that challenged the country's stability.

Argentina is typified as a collectivist society, wherein there is robust family cohesion that encompasses parents, siblings, and extended family members, including cousins, aunts, and uncles (Facio & Resett, 2006). Nevertheless, Argentina exhibits the highest levels of individualism compared to other countries in Latin America. These relatively more individualistic traits can be observed mainly in large urban conglomerates (https://www.hofstede-insights.com/fi/product/compare-countries/). Additionally, the country exhibits high rates of social inequality, with 43.8 % of the population classified as poor and 9 % classified as indigent. Notably, indigence is more prevalent among children and adolescents (Bonfiglio & Vera, 2022; Bonfiglio & Vera, 2022). This poverty is not merely a matter of limited financial resources; rather, it is characterized by the persistence of high levels of deprivation in numerous key areas, including access to food, healthcare, education, and social security rights. These deprivations occur in the context of marked and growing structural inequalities (Bonfiglio et al., 2020). This context is useful for studying the development of inequity aversion in different socioeconomic contexts within the same country.

A substantial body of research has demonstrated the impact of poverty on decision-making processes. For instance, individuals from low socioeconomic backgrounds tend to engage in conspicuous consumption (Wang et al., 2022), make riskier decisions, adopt unhealthy diets, and engage in minimal physical activity (Hanson & Chen, 2007). These decisions are often made with a focus on the present, to the detriment of future considerations. While it was previously assumed that such behaviors were suboptimal, recent studies are beginning to demonstrate that these ways of behaving may, in fact, represent optimal forms of adaptation to environments of instability and scarcity. This allows individuals to focus on immediate barriers and threats rather than the uncertain benefits of the future (Sheehy-Skeffington, 2020). Given that inequity aversion is the act of foregoing benefits in the present to pursue justice, which may yield cooperative benefits in the future, it is important to examine how SES may influence inequity aversion.

Indeed, some studies have examined the relationship between SES and the rejection of disadvantageous unfair offers in the ultimatum game. The findings indicate that individuals with higher SES were more likely to reject such offers (Ding et al., 2017; Kim et al., 2022), suggesting that this behavior was mediated by a sense of entitlement among the rich (Ding et al., 2017) and a greater tolerance for injustice among people at lower socioeconomic statuses (Kim et al., 2022). A further study examined the reactions of children who received candy from a machine. The results indicated that children from lower socioeconomic backgrounds were less likely than those from higher socioeconomic backgrounds to perceive the machine as unfair when they received an unfair distribution (Peretz-Lange, 2022). These results may be related to what Jost (2012) proposes as system justification theory, which argues that the individuals who are most disadvantaged by the current state of affairs may have a greater psychological need to reduce ideological dissonance, leading them to support, defend, and justify existing social systems. A study of Argentine adolescents revealed that those in the lowest SES group perceived existing economic resources in Argentina to be more equitably distributed than those in the highest SES group. Additionally, they expressed a preference for a less equal ideal distribution of resources (Barreriro et al., 2019). This latter finding aligns with the one observed in a U.S. sample where adolescents from high SES families indicated that they preferred a more egalitarian society than adolescents from lower SES families (Flanagan & Kornbluh, 2019). In light of these previous findings, we predict that middle SES children will be more likely to reject unfair disadvantageous offers than low SES children.

To the best of our knowledge, no studies have directly examined the relationship between advantageous inequity aversion and SES. As previously mentioned, advantageous inequity aversion has been shown to be associated with altruistic behaviors in which the individual must forgo greater benefits in pursuit of justice. In his work, Inglehart (1981) posits that the pursuit of higher values such as the pursuit of justice can only emerge after basic needs are met. Furthermore, research conducted with the 'Dictator Game' has demonstrated that children from higher socioeconomic backgrounds exhibit greater levels of altruism than their counterparts from lower socioeconomic backgrounds (Benenson et al., 2007; Deckers et al., 2015). These findings suggest that people with higher SES exhibit greater levels of advantageous inequity aversion. However, other findings point to the opposite. A study utilizing the 'Dictator Game' with adults revealed that individuals who had grown up in lower socioeconomic environments made larger donations than those who had grown up in higher socioeconomic environments (Amir et al., 2018; Amir et al., 2018). Other studies have also demonstrated that individuals with lower socioeconomic status tend to be more generous, charitable, and helpful (Liu et al., 2023; Piff et al., 2010). In conclusion, we anticipate different levels of rejection of advantageous offers between the two groups but without clear directionality.

1.3. Present study

The present study aimed to investigate the emergence of inequity aversion behaviors in Argentine children between the ages of 5 and 12. To study inequity aversion in children, we decided to use a type of economic game called 'Inequity Game', developed to determine children's responses to unfair offers. In this game a player is faced with the decision whether to accept an offer of candies that may be equitable, unequal in disadvantage, or unequal in advantage. By rejecting unequitable offers, the participant demonstrates his/her dissatisfaction with the outcome and instead obtains an equitable result. The advantage of using economic games instead of observational studies or interviews is that they generate real involvement of the participants since their answers have real consequences for them and for others, which allows us to capture their true preferences (Murnighan & Wang, 2016; Pisor et al., 2020). While economic games may not capture the full complexity of human interpersonal interactions, they can offer a coherent and meaningful representation of many real-life encounters (Murnighan & Wang, 2016).

Additionally, we aimed to evaluate the effects of age, sex, and socioeconomic status on both types of inequity aversion. Given that SES has been identified as a moderating factor in children's and adults' intellectual development (Deckers et al., 2017; Mani et al., 2013; Peng et al., 2019) and, in turn, that IQ might influence moral reasoning (Beißert & Hasselhorn, 2016), we decided to use participants' IQ as a control variable.

2. Method

2.1. Ethical approval

The research protocol was approved by the Institutional Evaluation Committee of the School of Biomedical Sciences of Universidad Austral (Protocol N 18–032).

2.2. Participants

A total of 297 Argentine-aged children of both genders (47.8 % female) between 5 and 12 years of age (M = 8.3; SD = 1.76) were included. The participants were selected through nonprobabilistic purposive sampling from schools in the province of Buenos Aires. The sample was divided into two distinct socioeconomic sectors, namely, lower and middle (see Table 1).

2.3. Materials and instruments

Inequity aversion. To study inequity aversion, we used the 'Inequity Game', which was validated by Blake and colleagues (2011; 2011) The aim of the game is to assess whether children are more likely to reject inequitable offers than equitable offers. To do this, the participants sit facing each other with an apparatus in the middle that has two trays, a green lever, and a red lever. One of them plays an active role, and the other plays a passive role. The researcher makes candy offers to the children in the trays designated for each child. The participant in the active role can decide to accept the offer by pulling the green lever or reject it by pulling the red lever. Accepting the offer implies that each participant receives the candies offered by the researcher, and rejecting it implies that none of them receive what was offered. The offers made are given in two conditions. In disadvantageous inequitable conditions, participants receive two blocks of offers, 6 equal offers (each child receives one candy) and 6 inequitable disadvantaged offers (the active participant receives 1 candy and the passive participant receives 4); in advantageous inequitable conditions, participants receive two blocks of offers, 6 equal offers (each child receives one candy) and 6 inequitable advantaged offers (the active participant receives 4 candies and the passive participant receives 1). The block of equitable offers was used to control for any general tendency to reject offers or pull levers indiscriminately, and the difference in rejection levels between equitable and inequitable blocks is our indicator of sensitivity to unfairness. The order of the blocks was counterbalanced, and each pair of participants passed through only one condition.

Socioeconomic status. Participants were classified into two socio-economic groups according to the following three criteria: (1) the characteristics of the school's location, (2) the characteristics of the school itself, and (3) the educational level of the children's parents.

Intelligence. Intelligence was measured using the Spanish version of the 'K-ABIT' test validated by Cordero and Calonge (2000) with the intention of controlling this variable in the decision to refuse candy offers. The test evaluates verbal and nonverbal cognitive functions, yields a compound IQ, can be applied to people between 4 and 90 years of age, and has a reliability coefficient of.98.

The K-ABIT test includes two subtests. The "vocabulary" subtest, which has a reliability coefficient of.98, evaluates language knowledge, verbal concept formation and information flow. This subtest includes 87 items that are distributed in blocks of 4 and 5 items. Some of the items require the respondent to name an object represented graphically; for example, he or she is shown a drawing of a microscope and is asked to name what he or she is seeing. Other items require the person to guess a word from two clues presented to him or her, for example, a descriptive expression "a dark color" and a word with missing letters, e.g., "BL_ _K". Each correct answer is

Table 1
Distribution of participants by SES, and group age.

Age	5–6	7–8	9–10	11–12
Low SES	27	59	60	21
Middle SES	28	48	46	8

scored as 1, and each incorrect answer is scored as 0. Failure of all items in the same block results in termination of the subtest evaluation since the items are arranged in order of increasing difficulty. The direct score is calculated by taking the last item reached and subtracting the number of errors made.

The "matrices" subtest, which has a reliability coefficient of.97, assesses nonverbal reasoning and flexibility in the application of problem-solving strategies. This subtest has 48 items distributed in blocks of 4 and 5 items and is scored in the same way as the "vocabulary" subtest. As an example of one of the items, a stimulus is shown in image format (e.g., a dog); then a series of images is shown, and the subject is asked to identify which of the subsequent images is related to the first one (e.g., a bone).

2.4. Procedures and design

To access the sample of participants, the researchers contacted the authorities of the educational institutions and presented the research project. Once the project was accepted by the institution, the parents of the students were contacted by sending a note explaining the study and inviting their children to participate. The parents who agreed to participate signed an informed consent form.

Once informed consent was obtained from the children's parents, the researchers attended the institutions to carry out the evaluations. During the school day, the children were invited to participate in the experiment in a room designated by the institution for the study. To form the pair of children who were to participate in the study, children of the same age, sex and SES but belonging to different divisions were randomly selected and asked for verbal assent. Before the session commenced, one of the children was assigned the active role, and the second was assigned the passive role. Only the child occupying the active role was an actual participant in the study, data were only collected from these children. Then, the instructions of the game were explained, followed by a demonstration of the operation of the device and the levers. To allow the participants to test the game, 3 practice trials were conducted. The first trial consisted of an equitable offer, the second consisted of an inequitable disadvantageous offer, and the third consisted of an inequitable advantageous offer. If the participant did not pull one of the levers during the three trials, they were asked to do so that they could observe its operation. Finally, they were asked if there were any questions about the game. As the focus of this part of the study was on the children's understanding of the game, the explanations were modified according to the needs of each situation; therefore, the children's decisions at the moment they pulled the levers were not registered.

Following the completion of the test trials, the experimental phase commenced with a repeated-measures design. In this phase, the children underwent disadvantageous or advantageous inequitable conditions, which consisted of blocks of six equitable trials and six inequitable trials. The inclusion of children in one or the other condition and the order of the blocks were randomized. The children's decisions were videotaped, and the researchers subsequently coded the responses. Each response was coded as a rejected or accepted offer. Two participants received 11 instead of 12 trials due to errors in the evaluation process. All trials utilized candies for the offers, specifically 'Rocklets' (a local version of M&Ms), which are similar to the Skittles used in previous studies (Blake & McAuliffe, 2011).

Once the inequity game was concluded, the child who had assumed the passive role was requested to return to their classroom, while the participant who had assumed the active role was asked to remain to assess their cognitive development using the K-ABIT test. The institution provided the researchers with the participants' demographic data, including their age, gender, and parental educational level and occupation.

3. Statistical analysis

Statistical analyses were conducted using the R program (version 4.2.1). Children's rejection probabilities (accept = 0, reject = 1) for offers made by the researcher were analyzed using generalized linear mixed models (GLMMs) from the '*lme4*' package (Bates et al., 2015). We first created a *null model* without participant ID as a random effect and then a second model, '*model.b',* with participant ID as a random effect to control for repeated measures. The models were compared using the log-likelihood criterion, where the *null model* had a log-likelihood of 4585.9 and *model.b* had a log-likelihood of 4308.3, the latter improving the fit over the baseline. We then created a third model with *distribution* (equal, unequal), *condition* (disadvantageous, advantageous) and interaction term *distribution x condition*. This model markedly improved the fit (likelihood radio test [LRT], $x^2 = 71.8$, $p < .001$) and produced a main effect on the *distribution x condition* ($B = 0.81$, $SE = 0.15$, $p < .001$). Given that the interaction term was a significant predictor of children's decisions and in accordance with previous work delineated in Blake et al. (2015) Subsequent analyses were conducted with different datasets for each condition.

For the disadvantageous condition, we created a model to analyze the differences in refusals between equitable and inequitable disadvantageous offers and included the participant's ID as a random effect to control for repeated measures. We included the following predictors: *offer* (equity and disadvantageous inequity, with *equity* as the reference variable), *age* (continuous variable in months), *SES* (*middle* and *low*, with *middle* as the reference variable), sex (*male* and *female*, with *female* as the reference variable), *order*

Table 2
Distribution of participants by SES, sex, and condition.

	Low SES		Middle SES	
Condition	Boys	Girls	Boys	Girls
Disadvantageous	43	38	36	26
Advantageous	43	44	34	33

(*equity first* and *equity second*, with *equity first* as the reference variable), *trial* (numeric variable), and *IQ* (numeric variable). The model included the analysis of the following interactions: *offer x age*, *offer x SES*, *offer x sex, offer x order,* and the triple interaction of *offer x SES x age*. Subsequently, for the advantageous condition, we replicated the model of the disadvantageous condition, including the same variables and interactions. The distribution of participants by SES, sex, and condition is shown in Table 2.

4. Results

4.1. Disadvantageous inequity aversion

The results shown in Table 3 indicate that there was a significant interaction between age and offer ($B = -0.23$, $SE = 0.11$, $p < .05$). This finding implies that although the level of rejection increases with age, this increase is less pronounced for disadvantageous offers than for equity offers. A positive interaction between SES and offers was also observed ($B = -4.57$, $SE = 1.27$, $p < 0.001$), indicating that middle-SES children rejected disadvantageous offers more strongly than did low-SES children (see Fig. 1). A positive interaction between sex and offers was also observed (B=0.67, SE= 0.23, $p < .01$), indicating that boys were more likely to reject disadvantageous offers than girls. Additionally, a significant triple interaction between offer, age, and socioeconomic status (B=0.40, SE= 0.14, $p < .01$) was observed, indicating that for low SES individuals who receive a disadvantageous offer, the effect of age on the likelihood of refusal is more pronounced. Specifically, as age increases among low SES individuals, the probability of refusal increases even more when individuals receive a disadvantageous offer. The interaction between offer and order was also significant ($B = -0.98$, $SE = 0.46$, $p < 0.05$). Tukey corrections were applied to adjust for multiple comparisons and to control for type I error in the post hoc tests. The results revealed a significant effect for order 1 (Tukey's post hoc test $= -1.496$, $SE = 0.263$, $z = -5.686$, $p < .001$), indicating that participants rejected significantly more disadvantageous offers compared to equitable offers when the fair offer was presented first. For order 2, significant effects were also found (Tukey's post hoc test $= -0.518$, $SE = 0.254$, $z = -2.035$, $p < 0.05$) indicating that participants rejected significantly more disadvantageous offers compared to equitable offers when the fair offer was presented second, although the effect was smaller compared to the order in which the fair offer was presented first (see Fig. 3).

The predictor trial also demonstrated a significant yet relatively modest effect on the probability of rejection ($B = -0.08$, $SE = 0.03$, $p < 0.05$). This indicates that participants became increasingly likely to accept the offer following multiple attempts or exposures. Finally, the predictor IQ, which was included as a control variable, demonstrated a significant, albeit modest, effect ($B = 0.01$, $SE = 0.00$, $p < .05$).

To ascertain the age at which children exhibit aversion to disadvantageous inequity, rejection rates were plotted with 95 % confidence intervals using the sjPlot package and the plot_model function (see Fig. 1). According to Blake et al. (2015), when the confidence intervals for inequitable offers cease to overlap with the confidence intervals for equitable offers, this indicates that at that age, children reject significantly more inequitable offers than equitable offers. These results indicate that inequity aversion is present as early as age five among middle-SES children in Argentina. It is also noteworthy that the incidence of refusals to equal offers increases with age, with the difference between refusals becoming more diffuse by the age of 11. In contrast, in low SES Argentine children, the

Table 3
Estimate and standard error (s.e.) of fixed effects in generalized linear mixed models predicting children's decision for the disadvantageous model.

	Disadvantageous Model
Intercept	−4.50*** (1.01)
Offer (reference variable = equity)	3.72*** (1.04)
Age	0.33** (0.10)
SES (reference variable = middle)	4.12*** (1.17)
Sex (reference variable = female)	−0.38+ (0.21)
Order (reference variable = equity first)	0.15 (0.29)
Trial	−0.08** (0.03)
IQ	0.01** (0.00)
Offer x Age	−0.23* (0.11)
Offer x SES	−4.56*** (1.27)
Offer x Sex	0.68** (0.23)
Offer x Order	−0.98* (0.45)
Offer x Age x SES	0.40** (0.14)
Number of observations	1715
Number of groups	143
AIC	1995.1
BIC	2076.8
Log Likelihood	−982.5
Deviation	1965.1

Note. The standard error is in parentheses.
*** $p < .001$
** $p < .01$
* $p < .05$
+ $p < .10$

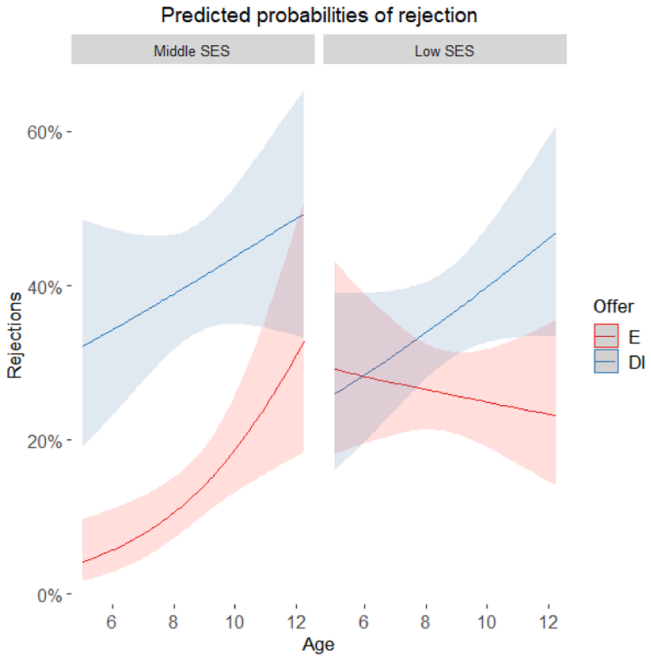

Fig. 1. *Rejection probabilities of Argentine children of middle and low SES to equitable (red line) and inequitable disadvantageous offers (blue line) as a function of age.* **Note.** E: Equitable offer. DI: Disadvantageous inequity offers.

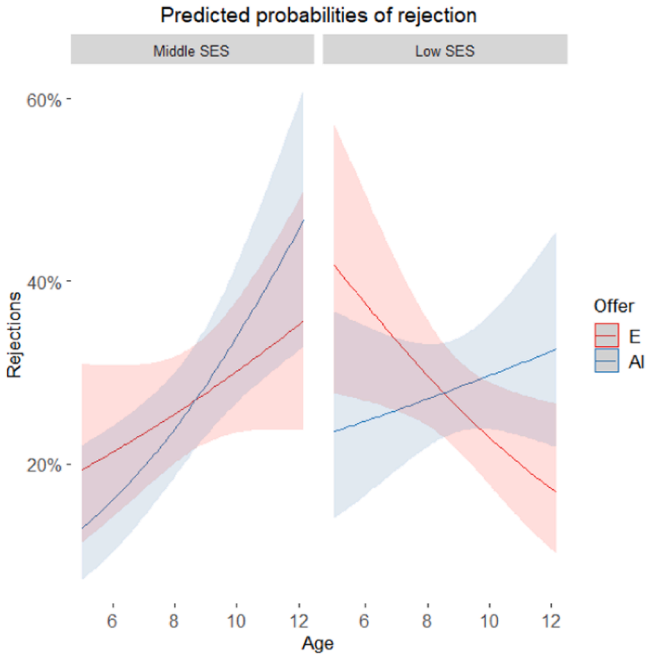

Fig. 2. *Rejection of equitable (red line) and inequitable advantageous offers (blue line) as a function of age among middle and low SES Argentine children.* **Note.** E: Equitable offers. AI: Advantageous inequity offers.

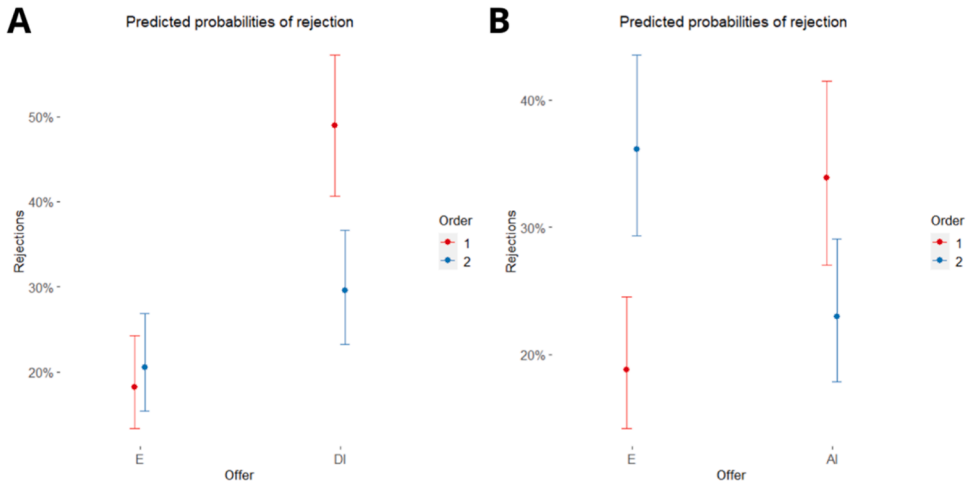

Fig. 3. *Predicted probabilities of rejection according to offer and order. (A) Disadvantageous model. (B) Advantageous model.* **Note.** 1: Received the equity offers first. 2: Received the equity offers second. E: Equitable offers. DI: Disadvantageous inequity offers. AI: Advantageous inequity offers.

first instances of this phenomenon are observed around the age of nine, although the intervals between occurrences are relatively short. However, as the individual approaches the age of 11, the intervals begin to converge once more.

4.2. Advantageous inequity aversion

For the advantageous condition, the same model used for the disadvantageous condition was tested, which included the fixed effect of the binary response of acceptance or rejection of the offer (acceptance = 0, rejection =1), the random effect of the participant's *ID* (identification number) and the following predictors: *offer* (equity and disadvantageous inequity, with *equity* as the reference variable), *age* (continuous variable in months), *SES* (*middle* and *low*, with *middle* as the reference variable), sex (*male* and *female*, with *female* as the reference variable), *order* (*equity first* and *equity second*, with *equity first* as the reference variable), *trial* (numeric variable), and *IQ* (numeric variable). Furthermore, the following interactions were included in the model: *offer x age*, *offer x SES*, *offer x sex, offer x order,* and *offer x SES x age* (see Table 3).

The model demonstrated a significant interaction between offer and order (B = −1.43, SE = 0.44, p < .01), indicating that the

Table 4
Estimate and standard error (s.e.) of fixed effects in generalized linear mixed models predicting children's decision for the advantageous model.

	Advantageous Model
Intercept	−1.64* (0.71)
Offer (reference variable = equity)	−0.17(0.80)
Age	0.12 (0.07)
SES (reference variable = middle)	2.55** (0.96)
Sex (reference variable = female)	0.03 (0.19)
Order (reference variable = equity first)	0.89*** (0.27)
Trial	−0.14*** (0.03)
IQ	0.00 (0.00)
Offer x Age	0.13 (0.09)
Offer x SES	−0.91 (1.11)
Offer x Sex	−0.41^{+} (0.22)
Offer x Order	−0.43** (0.43)
Offer x Age x SES	0.11 (0.12)
Number of observations	1847
Number of groups	154
AIC	2176.8
BIC	2259.6
Log Likelihood	−1073.4
Deviation	2146.8

Note. The standard error is in parentheses.
*** p < .001
** p < .01
* p < .05
$^{+}$ p < .1

order in which offers are submitted exerts a considerable influence on the probability of rejection. Tukey corrections were applied to adjust for multiple comparisons and to control for type I error in the post hoc tests. The results showed a significant effect for order 1 (Tukey's post hoc test = −0.790, SE = 0.249, z = -3.176, p = 0.002), indicating that participants rejected significantly more advantageous offers compared to equitable offers when the equitable offer was presented first (see Fig. 3). For order 2, significant effects were also found but in the opposite direction (Tukey's post hoc test = 0.643, SE = 0.240, z = 2.676, p = 0.007), indicating that participants rejected significantly more equitable offers compared to advantageous offers when the equitable offer was presented second (see Fig. 3). The predictor trial also exhibited a significant effect (B = −0.13, SE = 0.03, p < .001), indicating that participants were more likely to accept the offer after multiple attempts or exposures. The results indicated no significant effects for the interactions offer and age (B = 0.13, SE = 0.9, p = .13), suggesting that the rejection of advantageous offers does not significantly increase with age. Similarly, the offer and SES interaction (B = −0.91, SE = 1.11, p = .41) indicated no differences in the level between the two groups. Finally, the triple interaction of offer, age, and SES (B = 0.11, SE = 0.12, p = .38) was also nonsignificant. Furthermore, the control variable IQ was found to have no effect on the outcome variable (B = 0.00, SE = 0.00, p = .82). Table 4

Finally, to explore the age at which advantageous inequity aversion emerges, rejection rates were plotted with 95 % confidence intervals (see Fig. 2). The overlap of confidence intervals across ages indicated that there is no difference in rejection rates between equitable and inequitable advantageous offers, suggesting that advantageous inequity aversion did not manifest in the children in this sample, although a clear tendency toward improving probabilities of rejection was observed in both groups, and an even steeper slope was observed for middle-SES children.

5. Discussion

Although inequity aversion has been studied in children from different countries and cultures, few related studies have been conducted in Latin American countries, and none have been conducted in Argentina. Argentina is a country of marked contrasts: it has the particularity of being a Latin American country with a high level of European immigration in the conformation of its inhabitants, and a high proportion of the adult population has a university education, but it has high levels of social inequality. In fact, approximately 50 % of the population lives in poverty (Bonfiglio & Vera, 2022; Bonfiglio & Vera, 2022). Hence, studying how inequity aversion varies in Argentina allows us to understand how cultural and socialization factors can shape such aversive behaviors. On the other hand, studying the variations that occur within the same culture helps us to understand how other factors, such as age, gender, and socioeconomic status, can affect the development of this phenomenon.

Regarding our first objective, which is to examine the development of inequity aversion in Argentine children, we observed a pattern of development that is consistent with that observed in other societies; in particular, in non-WEIRD societies, disadvantageous inequity aversion manifests from an early age, while advantageous inequity aversion does not. On the one hand, this finding supports the theory that there are distinct psychological mechanisms and developmental patterns underlying each type of aversion (Blake & McAuliffe, 2011; Blake et al., 2015; Li et al., 2022; Blake & McAuliffe, 2011; Blake et al., 2015; Li et al., 2022); on the other hand, this finding supports the influence of culture on these behaviors (Blake et al., 2015). As suggested by Callaghan and Corbit (2018), socialization may not cause prosocial behaviors but may rather shape them. When these behaviors require low costs for the individual (disadvantageous inequity aversion), their development is stable across different cultures. However, as the difficulty of the behavior increases (advantageous inequity aversion), greater cultural and social differences emerge during development (Callaghan & Corbit, 2018).

Another point of consideration is that Argentina is a country that exhibits both collectivist and individualistic characteristics; however, in the context of fairness, group cohesion may exert a strong influence on individual decision making. In collectivist societies, the emphasis is on promoting the common good, which leads to more flexible norms of exchange and cooperation. In addition, exchange tends to occur more often between intimates, thus providing opportunities for beneficial inequity aversion to develop later in a child's development (Blake et al., 2015; Henrich, Heine, et al., 2010).

The study also revealed that 5- to 12-year-old middle-SES children exhibited disadvantageous inequity aversion from 5 years of age, while low-SES children showed aversion to disadvantageous inequity from 9 years of age. Notably, these differences were observed even after controlling for participant IQ levels. The results suggest that cultural and behavioral patterns can differ within the same society. In Argentina, a considerable portion of the populace falls below the poverty threshold. This may entail substantial idiosyncratic disparities among the distinct socioeconomic strata that may impact decisions concerning the unequal distribution of disadvantages. It is plausible that children from higher socioeconomic backgrounds exhibit more individualistic behavior patterns, such as competitiveness, a focus on merit, and a sentiment of entitlement, than children from lower socioeconomic backgrounds (Ding et al., 2017; Hofstede et al., 2010). The second possible explanation is linked to the contextual demands faced by each SES group, thus necessitating distinct coping strategies. Low-SES children may be less likely to reject disadvantageous offers from a younger age due to their greater vulnerability, while middle-SES children may have more flexibility in coping with losses and therefore may more forcefully reject them in pursuit of more favorable future outcomes. Sheehy-Skeffington (2020) argued that the decision-making processes of low SES groups are an adaptation to cues concerning resource scarcity, environmental instability, and low subjective social status. These groups adapt by prioritizing short-term needs to survive under such conditions. A third plausible explanation is that low SES groups view inequities as inevitable and believe that little can be done to alter them (Barreriro et al., 2019; Flanagan & Kornbluh, 2019); consequently, refusing unfair and disadvantageous offers might be viewed as a less viable means to bring about change in forthcoming resource transactions, leading to weaker rejection or a greater tolerance to injustice (Kim et al., 2022). Even in Argentina, adolescents with lower SES tend to perceive society as fairer than it truly is, as reported by Barreiro et al. (2019). These findings align with predictions from system justification theory (Jost, 2012), which posits that individuals in vulnerable situations are

paradoxically less likely to challenge the system responsible for their disadvantage.

With respect to advantageous inequity aversion, no significant differences were found between the groups in the levels of rejection. This indicates that both middle- and low-SES children reject both equitable and advantageous offers in a similar manner. Nevertheless, it is noteworthy that the graphs illustrate an increase in the levels of rejection with age in both groups, with a more pronounced increase observed in middle-SES children. This finding may align with Inglehart (1981) assertion that the pursuit of justice is a concern that emerges only after basic needs are met. However, stronger evidence is needed to support the hypothesis that middle-SES children exhibit higher levels of advantageous inequity aversion.

It is also worth noting that middle-SES children at older ages experienced increased rejection of fair offers in both advantageous and disadvantageous conditions. One possible explanation is that the offered candies are no longer valuable rewards for middle SES-older participants; therefore, rejecting an equitable but not very valuable offer becomes an appropriate decision and a signal to the experimenter to increase the offer. Interestingly, Li et al. (2022) found that in the inequity game, participants between the ages of 8 and 12 were more likely to reject disadvantageous offers when the rewards were tokens instead of food; for future studies, it will be important to control for this variable.

This study also indicated that the levels of rejection differed according to the sex of the children. While boys rejected more inequitable disadvantageous offers, girls tended to reject more inequitable advantageous offers, which was also observed in a recent study by Li et al. (2022). These results may be explained by the fact that women tend to be more altruistic (Doñaete-Buendía et al., 2022; Rand et al., 2016), more averse to inequity (Kamas & Preston, 2012; Martinsson et al., 2011) and more likely to share, which would allow them to reject those offers that favor them but disadvantage their partner. In contrast, men who tend to be more selfish, profit-maximizing (Dickinson & Tiefenthaler, 2002; Soutschek et al., 2017) and competitive (Kesebir et al., 2019) would have a harder time rejecting advantageous distributions but not disadvantageous distributions. In addition, Andreoni and Vesterlund (2001) observed that while men tend to perform low-effort altruistic behaviors, they are less likely to perform high-cost altruistic behaviors. The opposite trend is observed among women, as they are more likely to give when it is more costly to do so.

The order in which blocks of offers were received also influenced how participants made decisions. For the disadvantageous condition, as observed in other studies (Blake & McAuliffe, 2011), children more strongly rejected the inequitable offers when they came after the equitable offers; it is possible that receiving the equity offer first exerts an anchoring effect (Tversky & Kahneman, 1974), i.e., it creates an expectation of what the offers should be like. Therefore, the disadvantageous offers were perceived as more unfair and in turn elicited a greater reaction to it. Similarly, in the advantageous condition, advantageous offers were rejected significantly more than the equitable offers when they were received after the equitable offers, i.e., after creating the expectation that the offers should be equitable. Conversely, equitable offers were rejected significantly more than the advantageous offers when they were received after the advantageous offers; in these cases, the advantageous offers will have created an expectation of how the offers should be and consequently receiving an equitable offer could be perceived as a loss.

Another interesting result was that the number of trials also exerted an effect on rejection levels. It was observed that as the trials progressed, the levels of rejection decreased; in this vein, other research has shown that participants responded differently to the practice trials that they received first than to the experimental trials that came later (Kajanus et al., 2019). It is possible that as the offers pass, the emotional affect diminishes, and the participants begin to behave more rationally, trying to maximize the gains of both participants, which should be considered for future research.

6. Limitations and future studies

The results and interpretations presented here need to be considered with several limitations. Although the inclusion of children in the disadvantageous inequity or advantageous inequity condition was random, we started from a nonprobabilistic purposive sample due to the accessibility we had to the participants. This fact makes it difficult to generalize the results to children from the entire Argentine population. On the other hand, the study used a cross-sectional design, which does not allow us to accurately capture the evolutionary changes during childhood; therefore, studying the development of this phenomenon from a longitudinal paradigm would provide greater precision to the results.

Given the increase in rejection of fair offers with age in the middle-SES group, one limitation of this study was the lack of assessment of the perceived value of the candy used. It would also have been interesting to assess familiarity among the participants, given that although they were not classmates, they belonged to the same school. Finally, it would be interesting for future research to examine children's rationalizations when justifying their decisions through follow-up questions, which would allow us to gain a deeper understanding of the inequity aversion phenomenon.

7. Conclusions

The importance of the present study lies in the contribution that inequity aversion is shaped not only by cross-cultural factors but also by intrasocietal factors such as socioeconomic status. To our knowledge, no studies have explored the effect of SES using the "inequity game" paradigm. Although aversion to inequity and, more specifically, disadvantageous inequity aversion are universal characteristics of human beings, they do not manifest in the same way across different sectors of Argentine society. It is important to take this into account, given that higher levels of inequity aversion have been associated with greater cooperative tendencies and greater social benefits, and it would be interesting to study how it would be possible to encourage greater development in different socioeconomic sectors to promote greater growth in all communities.

CRediT authorship contribution statement

Belén Mesurado: Methodology, Supervision, Writing – review & editing. **Paulina Guerra:** Writing – review & editing, Writing – original draft, Methodology, Data curation, Conceptualization. **Guillermo Solovey:** Data curation, Formal analysis, Software, Visualization.

Data availability

Data will be made available on request.

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