



The origins of reference groups

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Abstract

Do individuals choose their reference groups, i.e. their Joneses, or are they culturally transmitted across generations and through the social environment? We provide evidence that feeds the theoretical debate about the origins of reference groups. Our findings for Uruguay suggest that reference groups are largely transmitted across generations and are also shaped by the social environment where individuals live. Our results are robust to several checks and to endogeneity issues. Our analysis of mechanisms shows that transmission is strongest when parents are homogeneous and when the gender of the parent and the offspring is the same.

Keywords Intergenerational transmission · Reference group · Income comparisons

1 Introduction

Interpersonal comparisons or relative concerns are a key element to understand individual behavior. People compare with others to self-evaluate their wellbeing or their job satisfaction (Easterlin 1974, 1995; Clark and Oswald 1996), measure their opinions and abilities (Festinger 1954), form income prospects (Hirschman and Rothschild 1973), gain access to better information (Heffetz and Frank 2011), decide about consumption baskets (Frank 1985;

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Charles et al. 2009; Kaus 2013; Heffetz and Frank 2011), make effort or labor supply decisions (Boskin and Sheshinski 1978; Piketty 1998; Postlewaite 1998; Bowles and Park 2005; Austen-Smith and Fryer 2005; Cullen and Perez-Truglia 2022), and to form preferences (Heffetz and Frank 2011; Bowles 1998) or attitudes towards inequality or fairness (Fehr and Schmidt 1999, 2003; Clark and D'Ambrosio 2015; Cojocaru 2014). More generally, reference groups are a source of norms, attitudes, values, tastes, and preferences (Merton and Kitt 1950; Clark and D'Ambrosio 2015).

Despite its relevance, previous empirical work is scarce and has focused on describing which are the relevant reference groups, paying very limited attention to understanding how reference groups are formed. There are different hypotheses about how people form their reference groups. While some scholars argue that individuals actively choose their reference groups, other authors contend that the relevance and composition of reference groups are determined by the social context where people live and by cultural transmission from parents to children.

Providing empirical evidence about the origins of reference groups is crucial to understand preferences, aspirations, and behavior. Piketty (2000) and Bourguignon et al. (2007) emphasize this aspect to explain the persistence of inequality, by stressing the relevance of sociocultural inequalities and their effects through the transmission of preferences and beliefs. These mechanisms could generate mobility traps and also efficiency losses in aggregate well-being. Therefore, understanding how they work is ultimately relevant to gain a better understanding of the trade-off between inequality and efficiency.

We examine whether parents transmit their preferences for status to their offspring by estimating, for the first time, the intergenerational correlation of reference groups. We also investigate whether the social environment where individuals live affect the reference groups they compare with. That is, we explore whether reference groups are determined by external circumstances.

We study young individuals who are about 18 years old and their mothers.¹ Evidence about the formation of reference groups at this age is especially relevant because, as argued by the “hypothesis of impressionable years”, this is a crucial stage of life during which individuals form beliefs that are unlikely to vary significantly in later stages (Inglehart and Baker 2000).

We use data for Uruguay, from the Longitudinal Welfare Study in Uruguay (ELBU, by its Spanish acronym), a unique panel data set, which includes tailor-made questions designed to investigate what are the reference groups and how they are formed. Five reference groups are considered: Friends, family, neighbors, people with the same job profile, and union workers. In addition to the relevant questions about intensity (how much) and direction (with whom) of income comparisons, the ELBU includes a rich set of control variables of children, their mothers, and the family. Key to our study, mothers can be matched to their children to examine the intergenerational transmission of reference groups, and we know the neighborhood of residence and the school where children went to, which will allow us to explore the influence of the social environment.

We find a strong and robust association between the answers of mothers and their offspring, which provides supporting evidence in favor of the view that external factors are responsible for the importance and type of reference groups people compare with. In our analyses, the intensity and direction of mothers always emerges as an important determinant of their children's reports about intensity and direction of comparisons. These strong correlations are

¹ We only consider mothers in the main part of the paper because we have a very reduced number of fathers in the sample. This notwithstanding, we report estimates for fathers in the Appendix, which should be taken with caution given the small sample size and the possibility of self-selection.

unaffected when we control for the fact that parents and children live in the same local environment. In other words, the intensity and type of groups parents and their children compare with are not similar because they face similar institutional environments (i.e. what Manski (2000) called correlated effects) but instead because parents raise children that compare with similar intensity and similar groups. This is not to say that the social environment has no influence on the formation of reference groups. We find some evidence that other individuals in the local environment might be important in shaping children's intensity of comparisons. However, our results suggest that the social environment has lower influence than parents. We, thus, provide evidence of vertical and oblique socialization in the formation of reference groups (Cavalli-Sforza and Feldman 1981).

After documenting the intergenerational transmission of reference groups, we explore possible mechanisms that can help us understand the process of the transmission. Consistent with the assumptions of the model of cultural transmission by Bisin and Verdier (2000), our results indicate that transmission is strongest when parents are similar in important characteristics, such as education. We also show that gender matters. As it also happens with the transmission of some preferences and attitudes, the transmission of reference groups from mothers to daughters is larger than from mothers to sons.

Our baseline results come from individual fixed effects models that control for individual-invariant characteristics. Our findings on the intergenerational correlation of reference groups are robust to several robustness checks. Our results do not change significantly when we saturate our specifications with a large set of maternal and children control variables. Placebo regressions where mothers and children are matched randomly show that there is no intergenerational correlation, suggesting that our results are not spuriously driven by similarities in observable characteristics between mothers and children or by a life cycle effect. Similar placebo regressions, where mother-child pairs are randomized within their social environment (i.e. their school or neighborhood) show that the intergenerational correlation is not driven by the intensity of comparisons prevalent in the social environment. Additional robustness checks also show that the intergenerational correlation is not explained by issues of endogeneity due to measurement error in the variables that measure the intensity and direction of mothers' comparisons, reverse causality, or the omission of relevant variables. To address these concerns, we estimate the intergenerational association using the questions originally used by Clark and Senik (2010), for mothers, and we use the Obviously Related Instrumental Variables model by Gillen et al. (2019).

We contribute to several strands of the literature. First, our findings about the importance of the family and the social environment in the formation of reference groups inform the literature, mostly theoretical, that inquires whether reference groups are the result of individual choices or external circumstances (Falk and Knell 2004; Bisin and Verdier 1998). Second, the strong intergenerational correlation of reference groups we find in our sample contributes to the empirical literature on the intergenerational transmission of norms, preferences, and values, which increases our understanding of the persistence of inequalities and poverty (Dohmen et al. 2012; Fernández et al. 2004; Giavazzi et al. 2019; Arrondel 2013; Lekfuangfu and Odermatt 2022; Wilhelm et al. 2008). Third, our paper also contributes to the literature on interpersonal comparisons in at least two directions. First, we provide new evidence about individuals' heterogeneity on the direction and intensity of comparisons. Our results suggest that people compare with several groups with different intensities. Second, we show for the first time that both intensity and direction of income comparisons are context-specific. Individuals compare with different people and with different intensity when their income falls for exogenous reasons, a crisis, than when they decide about the wage they would like to receive in a new job offer. Previous studies (e.g. Clark and Senik 2010) ask

individuals about their reference groups in a general manner, as if context did not matter. We show it does.

The rest of the paper is organized as follows. Section 2 outlines the arguments that explain whether reference groups are determined by cultural transmission or by individual choices. Section 3 describes the data and our variables of interest. We provide extensive descriptive statistics to show with whom and with what intensity mothers and children compare. Section 4 explains our empirical strategy. Section 5 presents our main results and explores possible mechanisms underlying the transmission process. Section 6 presents robustness checks and sensitivity analysis, and, finally, Section 7 includes some final remarks.

2 How are reference groups formed?

Evolutionary theories posit that we humans have ‘hardwired’ in ourselves certain preferences that promote survival. Social status, understood as the relative position of an individual in a group, is likely to be one such preference, as top-ranked members tend to fare better than others —this also applies to animals similar to humans, such as apes and chimpanzees. It would thus be natural for humans to be genetically programmed to care about their relative position in groups they belong to Postlewaite (1998). Our ancestors lived in communities with simple social structures and the community was likely to be the sole relevant social group. Modern societies are much more socially complex and social status is related to the relative position of individuals in more than one social group. Moreover, we know that social groups are not the same across individuals. The question then is how social groups are formed or determined? Previous theoretical work has convincingly argued that reference groups are, at least partly, chosen by the individual, and has also provided compelling reasons to believe that individuals do not entirely control and choose with whom they compare. In this section we outline the main arguments that explain why reference groups may be culturally transmitted or depend on the individual.

Individuals actively choose their reference groups

Several economic models assume that the choice of reference groups responds to individuals’ optimization decisions, which can be interpreted as rational choices within the traditional human capital investment framework (Becker and Tomes 1986; Falk and Knell 2004; Austen-Smith and Fryer 2005). In these models, the choice of reference groups responds to individual preferences, aspects of social psychology, or the presence of strategic behaviors (Falk and Knell 2004; Heffetz and Frank 2011; Clark 2012; Clark and D’Ambrosio 2015).

For instance, drawing on findings from social psychology, Falk and Knell (2004) introduce a social comparison model where people actively choose their reference standards to serve motives of self-enhancement and self-improvement. In the model, individuals maximize their utility by finding a good balance between comparing with others that are inferior to feel better (self-enhancement purposes) and comparing with high or demanding reference standards, which helps them do better (self-improvement purposes).

While these models stress the active choice of individuals in the formation of reference groups, they also acknowledge that individual choice is restricted by contextual factors, exogenous to the individual, such as the social environment —that results from the type of political and social institutions or the prevalent social norms and values— or the availability of information (Diener and Fujita 1997).

Cultural transmission of reference groups

An exogenous determinant of offspring's reference groups is the intergenerational transmission of the reference groups of parents. Bisin and Verdier (1998) assume that part of the preferences and values of children are not deliberately chosen by them but are rather instilled by their parents. They argue that in the transmission of preferences, social norms, and ideological attitudes down to their offspring, parents are biased towards their own preferences. This helps explain the persistence of cultural traits. We contend that reference groups belong to the set of cultural traits parents care about and want to preserve. Because of this we expect the reference groups parents compare with to be correlated with the reference groups their children compare with. That is, we expect to find intergenerational persistence of reference groups in our empirical analysis.

Intergenerational transmission is not the only exogenous source of reference group formation. The social environment where individuals grow up has also been argued to condition individuals' norms, values, preferences and behavior. The impact that neighborhoods have on individuals results from social interactions, or peer imitation (Katz et al. 2001). These mechanisms also shape, in an exogenous way, the reference groups of individuals.

Much the same way as we noticed above that cultural factors are known to influence the decisions of individuals when choosing their reference groups, some individuals are able to break away from socially pre-established reference groups. 'Acting white' is a good example. Minority communities or groups that are discriminated against often impose costs on their members who adopt behaviors that are identified with the discriminating group, regardless of the beneficial consequences that such behavior may have on the own individual. For instance, black peers exert strong pressure on their community members who decide to invest in education because this is a behavior socially identified with the white community. Despite this, an increasing share of black individuals have aspirations that are typically identified with the white community and pursue post-compulsory education at the expense of feeling rejected by their community (Austen-Smith and Fryer 2005).

Putting the above arguments together, it becomes clear that the origin of reference groups is likely to be partly decided by individuals and partly transmitted culturally. The main aim of this paper is to examine empirically whether and to what extent parents transmit their own reference groups down to their offspring.

3 Data and main variables

3.1 The longitudinal welfare study in Uruguay

This paper uses data from the third and fourth waves of the Longitudinal Welfare Study in Uruguay (ELBU, by its Spanish acronym), collected in 2011/12 and 2015/16, respectively. The ELBU interviews face-to-face a sample of mothers whose children attended the first year of public school in Uruguay (85% of the cohort) in 2004, when the first wave went to the field. This is of course not a representative sample of the entire population of Uruguay, as most sampled mothers belong to certain age-cohorts and 15% of children attend private schools. To check whether the sample of mothers in wave 1 of the ELBU is similar to the sample of mothers whose children attended the first year of public school in Uruguay, Appendix Table C1 compares personal and household characteristics from the ELBU and from a representative survey of the national population, the National Household Survey

(Encuesta Continúa de Hogares, ECH). As compared to the ECH, the p -values in the last column of this Table suggest that the sample of mothers in the ELBU are a bit more likely to be employed, and live in smaller and poorer households.²

To study the intergenerational transmission of reference groups we exploit the information reported by the offspring, aged about 18 years, who were interviewed in the fourth wave for the first time since the ELBU started.³ Survey interviews to parents and their children were conducted face-to-face, and separately to avoid coordination between children's and parents' answers and the possible influence of parents on children's answers. Most (90%) of the children live at the same address as the mother while the remaining 10% have left home and live at a different address. The dataset includes socioeconomic characteristics, personality traits and information of the offspring best friends as reported by the offspring. This broad set of controls will help us identify the intergenerational transmission of reference groups. Summary statistics of these variables are included in Appendix Table C3.

In our main analysis, we work with a sample of 648 mother/offspring pairs for which we have information on their intensity and direction of comparisons, and the set of covariates included in Appendix Table C3. This is a subset of the original 2011/12 sample of mothers of wave 1.⁴ The attrition from wave 1 to wave 4, however, does not seem to change the composition of our working sample. Appendix Table C4 shows that only mothers' years of education correlates (positively) with the probability of being in wave 4 conditional on having been interviewed in the first wave. This suggests that our sample is not selected as a result of attrition issues.

3.2 Intensity and direction of interpersonal comparisons

The fourth wave of the ELBU includes two questions that capture the intensity and direction of income comparisons. Inspired by Duesenberry (1949), to investigate whether comparisons are context-specific, the questions are framed in two different economic situations: Respondents answer the comparison questions when presented with an attractive Job Offer (that we will refer to as 'Job Offer' hereafter) and of an own income decrease ('Economic Crisis'). In the Job Offer scenario, the survey question reads: "Imagine that you get an offer of a permanent full-time job that you like. Your potential employer asks you to indicate the wage you are willing to receive. For each of the following items, please indicate in a scale from 1 to 10 (where 1 is very little and 10 is a lot) how true it is that you would consider, in your proposal, the wage of [reference group]", where the possible reference groups are: friends, family, neighbors, people with the same job profile, and union workers.⁵ In the Economic

² The large poverty rates of these households displayed in the Appendix Table C1 are the result of the severe crisis Uruguay suffered in 2002, and are in line with the child poverty rates from other studies, see Amarante et al. (2010).

³ 56% of offspring are 18 years old, 16% are 17 years old, 25% are 19 years old, 2% are 20 years old, and 1% are 21 years old.

⁴ Wave 1 includes 2,803 mothers. However, only 1,300 of these mothers are interviewed 11 years later, in wave 4, and only 1,223 of their offspring were interviewed. We additionally lose 575 due to non-response of either the mother or the offspring.

⁵ There is only one central trade union in Uruguay, that negotiates the working conditions of workers through collective bargaining. Collective agreements are set at industry level, and one of the important issues that such agreements establish is the minimum wage employers should pay. The union of each industry negotiates the minimum wages and pay increases for each industry and occupation, establishing a benchmark for each firm. Thus, respondents may take the wage level set by these collective agreements as reference points when they respond the question.

Crisis scenario, respondents are asked: “Imagine that there is an economic crisis and your household income is reduced. Indicate on a scale from 1 to 10 (where 1 is very little and 10 is a lot), how true it is that your economic satisfaction would be affected if your income falls below the income of [reference group]”, where possible reference groups are the same as in the Job Offer scenario. It is important to note that respondents are allowed to choose more than one reference group in their answers, i.e. social groups are not mutually exclusive. This is an important feature of the questions we use, which distinguishes them from previously used questions (e.g. Clark and Senik 2010). Obviously, respondents also have the possibility to choose different reference groups across the two economic scenarios. Both the type of comparison groups included in the questionnaire and the possibility to compare with more than one group is consistent with the type of individuals Norwegians reported to have searched for when Norwegian tax records became easily accessible online, allowing everyone in the country to observe the incomes of everyone else quickly and easily (Perez-Truglia 2020).⁶ Appendix Table C5 shows the wording of every possible response to the two questions and Appendix Table C2 reports average intensity for all reference groups for both children and mothers.

The comparison questions are presented one after the other, starting with the Job Offer scenario. The ordering of comparison groups is the same for all respondents and fixed for the two scenarios.⁷ The non-random way in which comparison groups are presented may raise concerns about interdependencies between the answers to contiguous groups or between the answers of the same group across the two scenarios. We do not know whether the answers would have been different if reference groups had been randomized. Notwithstanding this, Figs. 1 and 2 provide evidence that suggests that previous answers do not condition the subsequent answer in a systematic and obvious manner. The diagonal in the four (half) matrices displayed in Fig. 1 shows the correlation of answers of correlative reference groups, as they appear in the questionnaire. If respondents reported the same intensity score to the second reference group than the first one, the correlations on the diagonal would all be 1 while correlations would be 0 if the two correlative answers were unrelated. In contrast to these two situations, the correlations are between 0.27 and 0.59. The diagonal cells in the two matrices displayed in Fig. 2 show the correlations of the same reference groups across the two scenarios, and once again show that correlations are typically the largest in the matrices, but they are also far from 1, suggesting that answers for one reference group in the Job Offer scenario do not completely predict answers for the same reference group in the Economic Crisis scenario.

Besides the raw individual intensity reports for each one of the reference groups, we also measure the intensity of comparisons in two additional ways, which have been used in previous studies. We present descriptive statistics and baseline regression results in Appendix A.

Table 1 shows the percentage of mothers and children that compares with each group. Here, we consider that individuals compare with a group when reported intensity is larger than 7.⁸ Since answers are not mutually exclusive, individuals will have more than one comparison group whenever they report a score larger than 7 for more than one group. That is, columns in Table 1 add up to more than 100. In each case, the Table distinguishes children according to their gender, and mothers according to whether they are unemployed or not.

⁶ Norwegians searched for the income of individuals from more than one group, namely and in order of prevalence, relatives, friends, work colleagues, and neighbors.

⁷ Comparison groups are presented in the following order: Friends, Same profile, Neighbors, Families, Union.

⁸ The shares reported in Table 1 do not change in a significant manner if we use thresholds in the neighborhood of 7.

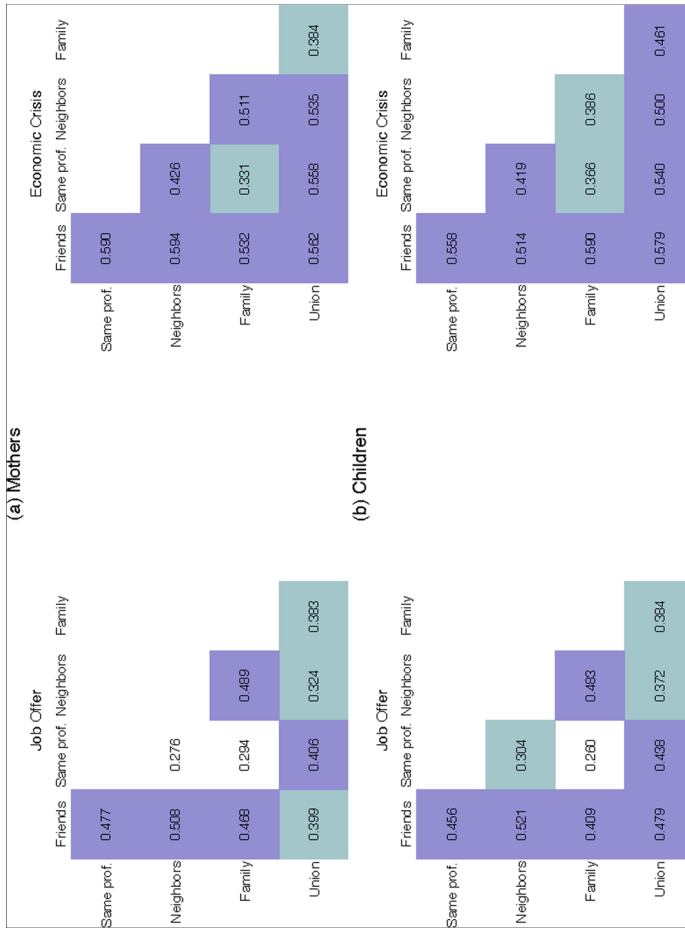


Fig. 1 Within-scenario correlation matrices for mothers and children. Note: Colors indicate the size of the correlation: white if [0.1 to 0.3]; grey-green if (0.3 to 0.4]; lilac if > 0.4. All coefficients are significant at 1 %

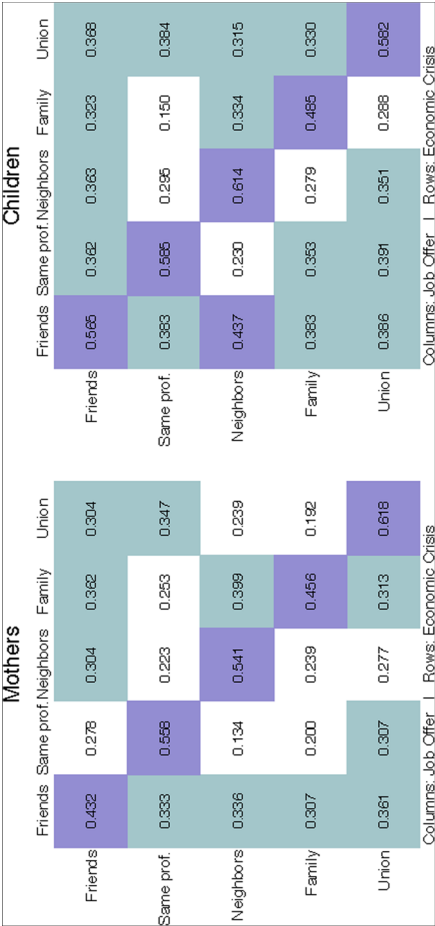


Fig. 2 Cross-scenario correlation matrices for mothers and children. Note: Colors indicate the size of the correlation: white if [0.1 to 0.3]; grey-green if (0.3 to 0.4]; lilac if > 0.4. All coefficients are significant at 1 %

Table 1 Percentage of children and mothers who identify with the different comparison groups. Job Offer and Economic Crisis scenarios

	Job Offer			Mothers			Economic Crisis			Mothers		
	Children						Children					
	All	Fem.	Male	All	Empl.	Unemp.	All	Fem.	Male	All	Empl.	Unemp.
Social groups												
Friends	10.2	9.6	10.7	9.1	9.1	9.0	15.4	14.2	16.7	12.6	12.3	13.5
Neighbors	2.6	2.7	2.5	3.2	3.2	3.4	3.5	3.0	4.1	5.7	5.7	5.6
Families	12.5	13.6	11.3	8.6	7.2	12.4	26.8	31.9	21.4	23.5	24.2	21.9
Labor-related groups												
Same profile	34.5	34.9	34.0	33.1	32.8	33.7	23.4	22.9	23.9	27.7	27.1	29.2
Union	14.6	13.3	16.0	14.0	15.5	10.1	11.4	9.6	13.2	15.1	15.5	14.0
Does compare	47.4	48.2	46.5	44.2	45.3	41.0	46.5	47.3	43.4	46.3	47.0	44.4
Does not compare	52.6	51.8	53.5	55.8	54.7	59.0	53.5	52.7	56.6	53.7	53.0	55.6

Individuals are considered to compare with a given group if they report a score greater than 7. This means that individuals can compare with more than one group

Labor related groups dominate when the scenario is about a Job Offer and the relevant outcome is labor income.⁹ The reference group composed of people with the same profile (education and experience) predominates while the second most preferred reference group is that of union workers. This result is confirmed for all children (regardless of their gender).¹⁰ In the case of mothers, labor related groups dominate among those who work. Among unemployed women, the family gains greater relevance to the detriment of the union. Finding that labor related groups are very relevant when individuals are prompted to think about the wage they would like to have is consistent with previous evidence showing that arbitrary differences in pay of perceived similar workers explain job quits (Dube et al. 2019) and that having pay information of similar co-workers affects job satisfaction (Card et al. 2012; Mas 2017).

Results differ when the scenario is of Economic Crisis and the relevant outcome is household income. Now what we call social groups (family, friends, neighbors) are more relevant than labor-related groups (same profile and union workers). Family is the most relevant comparison group for children.¹¹ However, the group “people with the same profile” is the most relevant comparison group for mothers. The proportion of individuals that compares with any of the groups is usually somewhat larger for children than for mothers. Overall, a bit less than half the mothers and the children report comparing with high intensity with at least one group. Finally, unlike the Job Offer scenario, when the scenario is of Economic Crisis, the comparison group of mothers is insensitive to their employment status.

Do reported intensity scores of different comparison groups follow any pattern? In its upper-left (Job Offer scenario) and its bottom-right (Economic Crisis scenario) quarters, Fig. 1 shows that correlations between intensity scores are neither very large—typically lower than 0.6—nor very small—usually larger than 0.3. There are three patterns worth noting. First, correlations between comparison groups are larger for the Economic Crisis scenario than for the Job Offer scenario. Second, ‘friends’ is the most complementary comparison

⁹ In describing the most salient features of Table 1, all the null hypotheses implied by our statements cannot be rejected with p -values close to 1, unless otherwise stated.

¹⁰ The only exception is that for daughters, Union does not dominate Family (p -value= 0.657).

¹¹ For sons, the hypothesis that Same Profile is larger than the Family cannot be rejected (p -value= 0.233).

group (followed by ‘family’), as it systematically shows larger correlations with the other comparison groups than any other group. This complementarity may indicate that family and friends literally overlap with other groups more (i.e., people draw friends from, say, coworkers) or that individuals who compare with friends are more likely to compare to coworkers. Finally, correlations between different comparison groups are very similar for mothers and children.

3.3 Is intensity and direction of comparisons context-specific?

Previous empirical studies that seek to elicit the groups individuals compare with and the intensity of such comparisons share two features: they study comparisons in one outcome variable only, and use questions that are framed in a general context and not in a particular context. For instance, Clark and Senik (2010) study only income comparisons while Friehe et al. (2018) look only at gross labor income comparisons. None of the two papers provide any detail about the context of the comparisons.

Our study looks at both household income and individual labor income comparisons for the same individuals, and does so in two different situations: in a context of a decrease in household income and of a (possible) increase in individual labor income. This allows us to study whether individual comparisons differ for different outcomes and whether they are context-dependent.¹² However, given the structure of the questions, we cannot separately identify the effects of studying a different outcome from that of using a different setting.

Figure 2 shows correlations between intensity scores across the two scenarios, for mothers (panel (a)) and children (panel (b)). The diagonal of this matrix shows that individuals do not report the same intensity for the same comparison groups in both scenarios (perfect consistence implies that all diagonal cells are equal to 1). Notwithstanding this, the correlations shown in the diagonal are positive and sizable, which shows a certain consistency in the answers and suggests that we are capturing the same object.¹³ We also observe that the correlation of reported intensity scores between different comparison groups is larger when the comparison corresponds to the same scenario than when they apply to different scenarios (compare Figs. 1 and 2).

In sum, even though individuals do not compare exactly with the same groups and intensity in both contexts, there are enough common patterns. We will present our main results for both scenarios. However, we will only present the results on mechanisms and robustness for the Economic Crisis scenario and will present results for the Job Offer scenario in the Appendix.

On the validity of the intensity of comparisons questions

Only a handful of studies use direct survey questions to individuals inquiring about their intensity of comparisons with different reference groups. Because of this, there may be concerns about the use of hypothetical scenarios and more generally about the validity of these questions. To appease these concerns, we show in Appendix Table B1 that reported intensity correlates with individuals’ aspirations, with a measure of the visibility of goods, and with life satisfaction in ways that are consistent with previous findings.¹⁴ All these results

¹² These are the only two scenarios included in the questionnaire. The two scenarios are presented to all participants in the same order.

¹³ Precisely because of this, in Section 6.3, we use the answer in one of the scenarios as instrument for the answer of the same comparison group in the other scenario to address measurement error issues.

¹⁴ See Appendix B for a more detailed description of the results of this subsection

suggests that the intensity variables we use capture in a meaningful and predictable manner the construct we want to measure.

Mothers and children probably have very different levels of personal experience with the hypothetical scenarios that the survey questions we use to elicit the intensity of comparisons involve. Because of this, one could think that offspring may respond by drawing on how they think their nearest adults (likely parents) would respond. We cannot check whether the correlation between offspring and parents comparison intensity would change if both offspring and parents reported comparison intensity at the same age, when presumably mothers and offspring have similar levels of personal experience with the hypothetical scenarios, as we only observe offspring when young. To investigate whether offspring seem to answer the sample questions as they think their mothers would, Appendix Tables B2 and B3 present the results of two exercises. First, we check whether the intergenerational correlation of children who left home, and who are arguably more detached from their parents than those who are still co-residing with them, is larger than that of co-residing children. Second, we check whether the intergenerational correlation of employed children, who may arguably have more experience with the labor market environment than non-employed children, is smaller than that of non-employed children, especially in the Job Offer scenario for the labor-related reference groups (i.e. same profile and union).

We find that the intergenerational association of comparison intensity is not smaller for children who left home and it is not larger for non-employed children.¹⁵ Furthermore, the intergenerational association of intensity for the two labor-related reference groups in the Job Offer scenario is not larger for non-employed children.¹⁶ Therefore, our findings suggest that the estimated intergenerational association of comparison intensity does not result from children answering the survey questions as they believe their parents would.

4 Empirical strategy

Intensity Our empirical strategy exploits the availability of multiple responses from each child/mother pair to control for individual-specific heterogeneity. To this end, we use the fixed effects model described in Eq. 1 to obtain an estimate of the intergenerational correlation of intensity of comparisons across all reference groups and the effects of the social environment.

$$Int_{ch}^c = \alpha \cdot c + \beta \cdot Int_m^c + \delta \cdot Int_m^c \cdot c + \varphi \cdot Int_{ch}^N + \gamma \cdot Int_{ch}^S + F_{ch} + \epsilon_{ch} \quad (1)$$

Int_{ch}^c is the standardized intensity report of child ch for group c while Int_m^c is the standardized intensity report for the same group c of the mother m .¹⁷ Thus, β measures the intergenerational correlation of comparison group intensity. A β of zero means that the intensity of comparison of children is independent of the intensity of comparison of their mothers while a β of one implies that, on average, children compare with the same intensity as their mothers.

¹⁵ Lack of significance of the difference may be due to small sample sizes, especially of the children who left home. Point estimates provide mixed results.

¹⁶ The intergenerational correlation for the reference group 'union' is larger for employed children while for the reference group 'same profile', point estimates for the sample of employed and for the sample of non-employed children are almost the same and statistically insignificant –see Appendix Table B3.

¹⁷ We standardize children and mothers' intensity variables in Eq. 1 by subtracting the mean intensity (across all groups) and dividing by its standard deviation. We standardize intensity to facilitate comparison of our results with those from previous studies. Mean neighborhood and school intensity variables average standardized children's and mothers' intensity excluding the intensity of the own child and her mother.

Int_{ch}^N and Int_{ch}^S are the average standardized intensity in the neighborhood of the child and her mother and the average standardized intensity of children and mothers who attended the same school as the child. Thus, φ and γ capture the effect of the social environment where individuals grew up. Since the social environment is common to mothers and their children, including these two variables ensures that the intergenerational correlation of intensity is not driven by factors that are common to both mothers and their children.

F_{ch} is a child fixed effect, which captures the effect of all variables that are common to all comparison groups for each child, i.e. all variables that are specific to the children –such as sex, education, labor market status, aspirations, or personality traits– and also of shared family characteristics and shared external shocks. These fixed effects, thus, reduce issues of omitted variable bias.¹⁸

The α parameter allows different intercepts per reference group¹⁹ while δ allows intergenerational correlations to vary for different reference groups. We discuss regression estimates in Section 5.1.

Direction To examine the determinants of intensity for each reference group, we estimate Eq. 2 separately for each comparison group c . Now, the dependent variable is the child's standardized intensity report for group c . We thus run 5 regressions, one per reference group.

$$Int_{ch,c} = \alpha' + \beta' \cdot Int_{m,c} + \varphi' \cdot Int_{ch,c}^N + \gamma' \cdot Int_{ch,c}^S + \sigma \cdot X_{ch} + \kappa \cdot X_h + \epsilon'_{ch,c} \quad (2)$$

Since now the intergenerational correlation is estimated for each comparison group, it is not possible to include individual fixed effects, as we did in Eq. 1. However, an alternative way to net out the effect of the individual-specific unobservable variables is to work with deviations from the individual mean. This is what we do to estimate Eq. 2, where we transform the direction variables by subtracting the average individual score across all groups from the individual score of each group. As we did with the intensity variables in Eq. 1, we then standardize the deviation-from-the-individual-mean variable.²⁰ $Int_{m,c}$ is the standardized intensity of the mother for group c , while $Int_{ch,c}^N$ and $Int_{ch,c}^S$ are the mean intensity within the neighbourhood and school where the child grew up.²¹ Since individual fixed effects can not be included, we control for a set of children's variables, X_{ch} –that includes educational level, ethnic ancestry, personality traits, place where children report having met their main friends (neighborhood, educational institution, or other places), whether children left home, and sex–, and household variables, X_h –that includes the log of per capita household income and region of residence.²² The baseline regression estimates we present in Section 5.2, control for all the variables mentioned above. Since reference groups affect behaviour, to avoid possible issues of bad controls, we check that our baseline estimates of interest are robust to

¹⁸ Note that the individual fixed effects in Eq. 1 do not permit identify the impact of individual-specific covariates, as these are constant within individuals. They are thus not included in the regression.

¹⁹ Since there is a mechanical relationship between the intercept and the relevant slope, β , allowing the intercept to vary across reference groups helps identify the average intergenerational correlation.

²⁰ We standardize the intensity variables of children and mothers in Eq. 2 by subtracting the mean deviation-from-the-individual-mean intensity variable of group c and dividing by its standard deviation.

²¹ Mean neighbourhood and school intensity variables average standardized intensity of children and mothers for group c , excluding the intensity of the own child and her mother.

²² Personality traits are transmitted from parents to children and the place where children meet their friends can capture social norms. We include both variables in the regressions to avoid confounding effects. Additional controls for maternal characteristics, including educational level, marital status, and age, are not statistically significant and do not change our estimates of interest. They are thus not included in the regressions we report. Results with these additional controls are available upon request.

not controlling for variables that can be affected by behaviour, i.e. only include gender and ethnic ancestry. We also estimate unconditional intergenerational correlations.²³ We find that intergenerational correlation estimates are not sensitive to the inclusion of covariates.

4.1 Estimation procedure

We estimate Eq. 1 with fixed effects and cluster standard errors at individual level, while Eq. 2 is estimated with OLS and robust standard errors. Results are presented in Section 5.

Our estimation sample includes mothers and children with non-missing information for all the variables that enter the regressions. The estimation sample includes 648 observations (3,240 in the individual fixed effects estimation, corresponding to the five intensity reports). We do not claim causality as our FE and OLS estimates of the intergenerational correlation and of the effects of the social environment in Eqs. 1 and 2 may face endogeneity problems due to issues of measurement error in parents' responses about their comparisons and reverse causality. Having said this, we present strategies to mitigate these potential concerns in Section 6.

5 Results

We present our results in three subsections. First, we discuss average intergenerational correlation estimates of intensity (Section 5.1) and direction (Section 5.2) of comparisons, and then we explore the mechanisms that may underlie the association of reference groups between parents and children (Section 5.3).

5.1 Intergenerational and social effects: intensity of comparisons

This section explores the intergenerational correlation and the social environment effects of the intensity of interpersonal comparisons using Eq. 1. The estimates of the intergenerational coefficients are based on the contemporaneous responses of the mother.²⁴ The estimated coefficients are presented in Table 2.

Results suggest that intergenerational effects are substantially larger than social environment effects in the Economic Crisis Scenario. The intergenerational correlation is sizeable and statistically significant. Our preferred specification in column (5) suggests that a standard deviation (SD) change in the intensity of comparison of the mother changes in the same direction, on average, 0.22 SD the intensity of comparison of her child. The interaction terms

²³ Regression results are available upon request.

²⁴ Our estimation sample includes only mothers as we have a very reduced number of fathers in the sample, only 70 of them. Table C6 in the Appendix shows that in the Crisis scenario the association of intensity of comparisons is larger for fathers than for mothers. However, this result should be taken with caution as our sample of fathers is very likely to be self-selected, possibly with fathers that devote more raring time to their children, and this may be correlated with the transmission effect we are estimating. Since we do not have information to correct for this sample selection of fathers, we have dropped them from our estimation sample. Such self-selection is unlikely to occur among mothers, as our sample contains a large proportion (85%) of the universe of mothers whose children attended the first year of public school in Uruguay in 2004. From the effects of the social environment only the school average intensity is sizeable and statistically significant. In the Job Offer scenario, the intergenerational association estimate is smaller for fathers than for mothers, and the effects of the environment are very small.

Table 2 Intensity of income comparisons

	Crisis scenario			Job Offer scenario						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Mother's Intensity	0.270*** (0.025)	0.251*** (0.025)	0.255*** (0.026)	0.247*** (0.026)	0.219*** (0.036)	0.172*** (0.024)	0.163*** (0.024)	0.159*** (0.024)	0.156*** (0.024)	0.141*** (0.036)
Neighborhood Average Intensity			0.112*** (0.028)	0.066** (0.029)	0.068** (0.028)			0.172*** (0.036)	0.133*** (0.038)	0.132*** (0.038)
School Average Intensity		0.529*** (0.112)		0.411*** (0.121)	0.386*** (0.121)		0.568*** (0.114)	0.347*** (0.124)	0.335*** (0.123)	
Dummy by reference group (ref: Friends)										
Same profile	0.000 (0.036)	-0.005 (0.036)	-0.012 (0.036)	-0.011 (0.036)	-0.011 (0.036)	0.000 (0.040)	-0.004 (0.040)	-0.019 (0.040)	-0.017 (0.040)	-0.017 (0.040)
Neighbors	0.000 (0.038)	0.005 (0.038)	-0.005 (0.038)	0.001 (0.038)	0.001 (0.038)	-0.000 (0.038)	0.005 (0.038)	-0.005 (0.038)	-0.001 (0.038)	-0.001 (0.038)
Family	-0.000 (0.035)	-0.002 (0.034)	-0.001 (0.034)	-0.002 (0.034)	-0.002 (0.034)	0.000 (0.043)	-0.001 (0.043)	0.004 (0.043)	0.002 (0.043)	0.002 (0.043)
Union	-0.000 (0.035)	-0.005 (0.035)	0.003 (0.035)	-0.002 (0.035)	-0.002 (0.035)	-0.000 (0.040)	-0.003 (0.040)	0.002 (0.040)	-0.000 (0.040)	-0.000 (0.040)
Intensity × Same prof.					-0.018 (0.040)					0.095*** (0.045)

Table 2 continued

	Crisis scenario				Job Offer scenario					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Intensity × Neighbors					-0.037 (0.043)					0.024 (0.050)
Intensity × Family					0.156*** (0.041)					-0.080 (0.049)
Intensity × Union					0.019 (0.042)					0.030 (0.047)
Constant	0.000 (0.021)	0.006 (0.021)	0.011 (0.021)	0.011 (0.021)	0.011 (0.022)	0.000 (0.024)	0.005 (0.024)	0.006 (0.024)	0.008 (0.024)	0.008 (0.024)
Observations	3240	3240	3240	3240	3240	3240	3240	3240	3240	3240
R ²	0.071	0.082	0.079	0.085	0.095	0.030	0.040	0.044	0.047	0.053

Children and mothers intensity variables are the z-score of the intensity reported in each group (friends, neighbors, family, people with the same professional profile, and union workers). The school (neighbourhood) average intensity is the average of the z-scores of the mothers and their children who attended the same class in their first year of school (reside in the same neighbourhood). We exclude the intensity of own mother and child when calculating the school or neighborhood average. *Significant at 10%, **significant at 5%, ***significant at 1%. Standard errors in parentheses. Robust standard errors are clustered at individual level

show that the intergenerational correlation is 0.16 SD larger when mothers and their children compare with the family.

The social environment effects are way smaller than the intergenerational ones. A 1 SD increase in the neighbourhood average intensity increases the intensity of comparison of children by 0.04 SD while the effect is 0.07 when the school average intensity increases by 1 SD.

The comparison of the intergenerational correlation estimates of columns (1) and (4) shows that the effect of parental intensity persists after controlling for the impact of the social environment. This suggests that even though the social environment is common to mothers and their children, the intergenerational correlation we estimate is not driven by the impact of the social environment on the intensity and type of reference groups both mothers and children compare with. In other words, our intergenerational correlation is not spurious, as it does not simply capture a mechanical effect, which Manski (2000) termed correlated effects.

The intergenerational correlation is smaller in the Job Offer (0.14) than in the Economic Crisis (0.22) scenario, while the social environment effects together are larger in the Job Offer scenario, due to the larger effect of the school average intensity –see estimates in column (10).²⁵ Thus, in the Job Offer scenario, intergenerational and social environment effects are similar. It is worth noting that, unlike in the Economic Crisis scenario, in the Job Offer one, the labour-related group “people with the same professional profile” is the only reference group for which mothers’ comparisons have a larger effect on children’s comparisons.

The size of our estimated coefficients on the intergenerational association of comparison intensity is similar to the estimated transmission of other preferences. In particular, our estimates of intergenerational association of intensity of 0.22 for the Economic Crisis scenario and of 0.14 for the Job Offer scenario are in the same range as the estimated intergenerational association of risk (0.14) and trust (0.22) attitudes, reported in Dohmen et al. (2012). In line with Dohmen et al. (2012), we also find that the intensity of comparisons prevalent in the social environment has an independent effect on children’s intensity, and that the effect of the social environment does not displace the intergenerational correlation.²⁶

To check whether the effect of the social environment could reflect sorting of children into neighborhoods with similar intensity of comparison to their own, we estimate the same regressions using only the sample of children who currently live with their parents and thus presumably did not choose their neighborhood of residence. Parents might sort into neighborhoods based on the reference groups they compare with, but we control for parental intensity of comparisons in the regression. We again find a positive and significant impact of neighborhood average intensity on the child, which suggests that the prevailing intensity of comparisons in the social environment do influence child intensity of comparisons.²⁷

The correlation between mothers’ and children’s answers we estimate in Table 2 could be spurious, as they could be driven by similarity in observable characteristics or by a life cycle effect (i.e. a correlation across generations rather than an effect between mothers and their children). To address this issue, we estimate 500 intergenerational correlations (β in Eq. 1) after randomizing mothers’ responses and family information. Dohmen et al. (2012) use a

²⁵ The SD of the average intensity in the school and in the neighbourhood are 0.17 and 0.54, respectively. As a result, the effects of the school and neighbourhood average intensity are 0.06 and 0.07, respectively.

²⁶ See Table 6 in Dohmen et al. (2012). We cannot compare social environment effects because Dohmen et al. (2012) capture social effects using the average intensity in the region of residence, a much broader definition of the relevant social environment, and do not report the mean or standard deviation of the average intensity in the region, so we cannot compute the size of the effect.

²⁷ Results of these regressions are available upon request

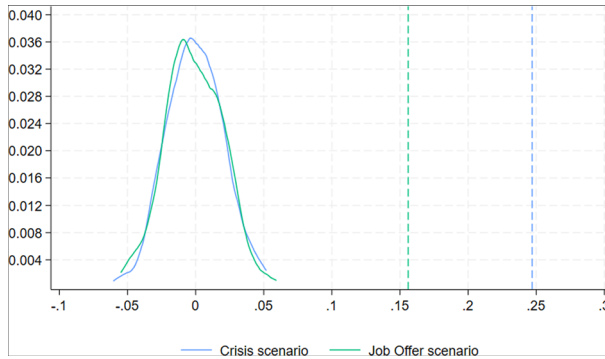


Fig. 3 Intergenerational correlation between randomly matched mothers and children. The density functions show relative frequencies of 500 correlation estimates of intensity of comparisons between randomly matched mothers and children. Vertical bars show the intergenerational correlation estimates from the sample of real mother-child pairs, reported in cols. (4) and (9) of Table 2

similar strategy to address whether the intergenerational correlation is driven by similarity in regional characteristics.

Figure 3 shows the distribution of the 500 estimates from these placebo regressions, for the two scenarios. All estimates are significantly different from the intergenerational correlations reported in Table 2 (illustrated by the vertical lines), are close to zero, and are virtually zero on average. This suggests that our baseline estimates are not driven by the similarity in observable characteristics or by life cycle effects, but likely capture the transmission of reference groups from mothers to children.

To corroborate that the intergenerational correlation is not driven by the intensity of comparisons prevalent in the social environment, we estimate the intergenerational correlation for samples of children and mothers randomly matched within their social environment (i.e. their school or neighborhood), and check whether the intergenerational correlation obtained from the sample of the randomly matched mothers and children is similar to the correlation we estimate with real mother-child pairs. If they were similar, this would suggest that the estimated correlation between mothers and children was the result of mothers and children sharing the same social environment. Figure 4 shows the density of the 500 estimated intergenerational correlations from randomly matched mother-child pairs within the same school or the same neighborhood. The figure shows that the correlation estimated from randomly matched mother-child pairs is not similar to the intergenerational correlation estimated from real mother-child pairs (illustrated by the vertical lines), suggesting, once again, that shared social environment does not drive the correlation of intensity between mothers and children. This result holds for both the Economic Crisis and the Job Offer scenarios.

It is worth noting that the correlations with school or neighborhood average intensity obtained with randomly assigned mothers rather than true mothers are always positive, consistent with our results above showing an independent role for the social environment in influencing child attitudes.

When we use the two alternative measures of intensity, i.e. the highest-intensity and the number-of-high-intensity-groups, intergenerational correlations are also positive and sizable while social environment effects disappear. These results are presented in Tables A1 and A2 and further discussed in Appendix A.

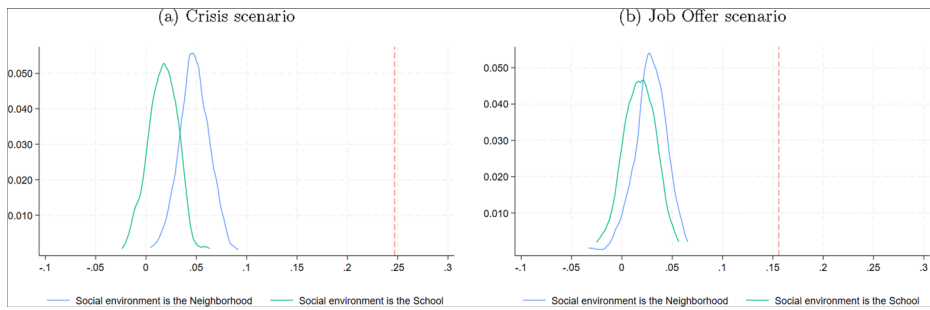


Fig. 4 Intergenerational correlation between randomly matched mothers and children within the social environment. The density functions show relative frequencies of 500 correlation estimates of intensity of comparisons between randomly matched mothers and children from the same neighborhood or same school. Vertical bars show the intergenerational correlation estimates from the sample of real mother-child pairs, reported in columns (4) and (9) of Table 2

5.2 Intergenerational and social effects: direction of comparisons

We now focus on the transmission of the direction of comparisons from mothers to children. To this end, we estimate Eq. 2 for each one of the five reference groups. Table 3 shows the results, in panel (a) for the Economic Crisis scenario and panel (b) for the Job Offer scenario. Appendix Tables C7 and C8, report the full set of estimates for each comparison group in both scenarios. Recall that the dependent variable is now the standardized individual score for the relevant reference group (i.e. the z-score of the absolute deviations from the individual average score across all five groups).

The positive and significant estimates imply an intergenerational association of reference groups. In other words, the groups mothers compare with are related to the groups their children compare with. The association of reference groups is not the same for all groups. The intergenerational correlation is largest for the two groups that mother and child share. In line with the interaction effects reported in Table 2 column (5), in the Economic Crisis scenario, the intergenerational correlation is largest for Family (0.387). The correlation for Neighbours is also large (0.281). Now, these correlations do not capture contextual effects, as they are also included in the regression, and do not seem to be relevant as they are typically not statistically significant. The intergenerational correlation estimates are lower for all groups in the Job Offer scenario except for the Same profile (0.247 vs. 0.179). This last group is the most relevant in the Job Offer scenario, followed by Neighbors (0.204) and Union (0.188). Our estimates, thus, provide evidence that supports the idea that the selection of reference groups is partly exogenous, as mothers' preferences correlate with their children's choices.²⁸

Panel (a) of Appendix Figs. C1 and C2 show that the average estimated correlation between mothers' and children's answers of randomizing mothers' and children's intensity answers within each reference group and running 500 regressions is very different from the estimated intergenerational correlations shown in Table 3 and virtually zero for all reference groups and scenarios. On a second exercise, we show that estimated intergenerational correlations with

²⁸ Recall that our estimation sample includes mothers only, as a reduced sample of fathers available in the ELBU is likely to be self-selected. This notwithstanding, we show results for the sample of fathers in Table C9 in the Appendix. Results indicate that the transmission from fathers to their children is only present for three of the five groups (Neighbors, Family, and Same Profile), but in these three cases, correlations are larger than in the sample of mothers. Probably due to the small sample size, contextual effects are unstable in the sample of fathers.

Table 3 Direction of income comparisons

	Social groups			Labor-related groups	
	Friends (1)	Neighbors (2)	Family (3)	Same profile (4)	Union (5)
(a) Crisis scenario					
Mother's Direction	0.128*** (0.047)	0.281*** (0.046)	0.387*** (0.044)	0.179*** (0.044)	0.222*** (0.047)
School Average Direction	0.430 (0.333)	0.393 (0.252)	0.420* (0.216)	0.295 (0.321)	0.222 (0.234)
Neighborhood Average Direction	0.685 (0.919)	0.947 (0.945)	-0.074 (0.677)	1.080 (0.856)	-0.422 (0.854)
Constant	0.031 (0.616)	0.895 (0.646)	-1.455*** (0.550)	0.686 (0.610)	0.016 (0.602)
Observations	648	648	648	648	648
R2	0.064	0.141	0.250	0.107	0.083
(b) Job Offer scenario					
Mother's Direction	0.105** (0.044)	0.204*** (0.048)	0.081** (0.041)	0.247*** (0.043)	0.188*** (0.047)
School Average Direction	-0.327 (0.373)	-0.386 (0.300)	0.348 (0.314)	-0.034 (0.265)	0.464 (0.284)
Neighborhood Average Direction	2.645** (1.249)	3.923*** (0.896)	1.401 (0.895)	2.444*** (0.770)	-0.353 (0.798)
Constant	1.017* (0.591)	1.128* (0.590)	-1.039 (0.635)	-0.380 (0.590)	-0.181 (0.631)
Observations	648	648	648	648	648
R2	0.056	0.117	0.094	0.147	0.071

Dependent variable: Standardized individual comparison intensity scores. All regressions include controls. The set of other control variables include log of per capita household income, highest educational level, gender, ethnicity, not living at parents' home, labor market status, Region of residence, Big Five Inventory, and where met 1st friend. Estimates of the controls are reported in Appendix Tables C7 and C8. *Significant at 10%, **significant at 5%, ***significant at 1%. Standard errors in parentheses

randomized family information (i.e. log of per capita income and region of residence), in addition to randomizing mother's answers, are also virtually zero for all reference groups and scenarios (see panel (b) of Figures). Again, these results suggest that our baseline estimates are not driven by the similarity in observable characteristics or by life cycle effects, but likely capture the transmission of reference groups from mothers to children.

Appendix Figs. C3 and C4 show, for each reference group, that the correlation estimated from randomly matched mother-child pairs is not similar to the intergenerational correlation estimated from real mother-child pairs (illustrated by the vertical lines), suggesting, once again, that shared social environment does not drive the correlation in intensity of comparisons between mothers and children. Again, this result holds for both the Economic Crisis and the Job Offer scenarios.

Do we find some evidence suggesting that individuals actively choose reference groups? As for the intensity of comparisons above, the large set of covariates in our regressions

are usually not statistically significant.²⁹ We thus find no indication of individuals actively choosing reference groups (Falk and Knell 2004; Clark and Senik 2010). As above, the statistical insignificance of control variables is not driven by a possible correlation between these controls and mothers' comparison reports, for when we exclude the comparison variable of the mother from our specifications, results remain largely unchanged.³⁰

Since two of the five reference groups individuals can choose from are related to the labor market (i.e. Same Profile and Union), the intergenerational correlation of reference groups may differ according to the labor status of the mother. To check this, Tables C10 and C11 in the Appendix presents estimates of Eqs. 1 and 2, the latter for each reference group, by mother's employment status. Table C10 shows that the intergenerational correlation of intensity is larger when mothers are employed only in the Crisis scenario, while Table C11 shows that intergenerational estimates of labor-related reference groups are larger when mothers are employed for nearly all groups and scenarios.

In sum, we find that mothers' choices and intensity of comparisons affect with whom and how much their children compare. The maternal comparison groups are the only variables in our regressions that systematically affect the direction and intensity of children's comparison groups. This suggests that the formation of reference groups is partly transmitted across generations. We also find that the social environment has an independent effect on children's intensity and direction of comparisons, suggesting that other role models are also relevant for attitude formation, as Bisin and Verdier (1998) indicate. However, the intergenerational effect is larger than the effect of the social environment, suggesting that mothers have a larger influence on reference group formation than other social groups, such as neighbours or families attending the same school. Finally, we also find little evidence of individuals actively choosing their reference groups, as the vast majority of the covariates we include in the regressions, which comprise children's characteristics, maternal characteristics, and family variables, are not statistically significant. Only some personality traits of children are relevant, and when they are, they are relevant for some reference groups only.

5.3 Exploring mechanisms underlying the intergenerational correlation

In the previous sections, we document a positive intergenerational association in the intensity of comparisons as well as in the type of groups children and mothers compare with, which suggest that there is a process of vertical socialization of comparison groups. This section explores the mechanisms that may underlie this transmission process of reference groups from parents to children.

We first examine whether transmission of reference groups is stronger when parents are more similar. In their model of cultural transmission, Bisin and Verdier (2000) explicitly assume that more similar parents have a more efficient technology to transmit their culture. Two arguments may support this assumption. First, a child who receives diverging signals from two very different parents may look elsewhere for a role model. Second, we also expect individuals who are willing to put in a lot of effort to transmit their reference groups down to their offspring to be also willing to seek a partner who shares her reference groups.

We run separate regressions for children with relatively homogeneous parents, which we define as those with the same education level, and for children with heterogeneous parents.

²⁹ See Tables C7 and C8 in the Appendix. Only two personality traits (agreeableness and conscientiousness) show significant effects on some of the groups. Some covariates are significant for specific groups, for example, gender in Family, region of residence in Union, and Left home in Neighbours and Family.

³⁰ These results are not reported but are available upon request.

The first two columns in Table 4 report the intergenerational association coefficients for these two groups of parents.³¹ Consistent with the assumption of Bisin and Verdier (2000), point estimates suggest that transmission of comparisons' intensity is stronger when parents are more homogeneous. Significance tests for equality of coefficients across equations, displayed in the bottom panel of Table 4, however, suggest that differences in coefficient estimates are not statistically significant, probably be due to small sample sizes. The point estimates of intergenerational correlation for each one of the reference groups reported in Table 5 show that the stronger intergenerational correlation when parents have the same education level holds for all reference groups but one. Again, sample sizes are small and standard errors, large.

Bisin and Verdier (2000) also assume that single-parent households are less effective in socializing the child than homogeneous parent couples. An argument to support this assumption could be that single parents have less time than parent couples to transmit their cultural attitudes to their children. However, as single parents are the sole role model for the child, the opposite could be true, as Dohmen et al. (2012) point out. The point estimates we show in the third column of Table 4 suggest that the correlation is stronger in relatively homogeneous parent-couple households than in single-parent households. The point estimates for each comparison group that we report in Table 5 suggest that the larger correlation for relatively homogeneous parent couples are driven by two reference groups, namely family and friends. Standard errors of our point estimates, however, are again large.

The arguments provided in the last two paragraphs suggest that the intergenerational correlation is stronger in single-parent households than in heterogeneous parent-couple households, as in the former, the single parent is the sole role model and may have a larger influence, while in the latter, the child may receive divergent signals, which may weaken transmission. Consistent with this prediction, Table 4 shows that the point estimate is larger for single-parent households than for heterogeneous parent couples. This result is corroborated when we examine the point estimates of the intergenerational correlation of intensity separately for each comparison group, as this is larger for all comparison groups but one. However, note that, as above, sample sizes are small and estimated differences are not statistically significant.

In sum, in line with the assumptions of the model of cultural transmission by Bisin and Verdier (2000), our results suggest that the most effective family structure to transmit reference groups to children is that of homogeneous parent couples. We also find that intergenerational correlations of reference groups is stronger in single-parent households than in heterogeneous parent couples. These conclusions are obtained from taking our point estimates at face value, as our sample sizes are small and the precision of our estimates is low. Our results are consistent with the findings (Dohmen et al. 2012) obtain in their study of intergenerational transmission of risk and trust attitudes in Germany.

The gender of both mother and child could also affect the transmission of reference groups. Previous work indicates that the gender of the parent and the offspring matters in the intergenerational transmission of certain preferences and tastes. This literature emphasizes the influence of nurture on the formation of gender identities and the importance of intergenerational transmission for gender attitudes and behaviors (Bütikofer 2013; Farré and Vella 2013; Morrill and Morrill 2013; Fernández and Fogli 2009; Fernández et al. 2004). Another strand of the literature documents differences in the intergenerational correlation between gender. For instance, Lundberg (2005) finds that parents tend to invest more in children of their

³¹ We show and discuss estimates for the Crisis scenario in the main text. Estimates for the Job Offer scenario are shown in Appendix Tables C12 and C13, and discussed in the main text when relevant.

Table 4 Exploring mechanisms. Intergenerational correlation of intensity of income comparisons. Crisis scenario

	Parental educ. and family structure			Gender		Income		Well-being	
	Co-resident mother and father		Only mother	Daughter	Son	High	Low	High	Low
	Education	Different							
Mother's Intensity	Same	(1a)	(1c)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
	0.285***	0.223***	0.235***	0.321***	0.164***	0.245***	0.243***	0.256***	0.221***
	(0.034)	(0.034)	(0.025)	(0.024)	(0.025)	(0.025)	(0.024)	(0.020)	(0.034)
School Average Intensity	0.492**	0.486**	0.350***	0.306**	0.562***	0.276**	0.495***	0.406***	0.406**
	(0.195)	(0.223)	(0.123)	(0.124)	(0.144)	(0.138)	(0.127)	(0.105)	(0.203)
	0.055	0.099*	0.059*	0.086***	0.028	0.137***	0.013	0.054**	0.104*
Neighborhood Average Intensity	(0.048)	(0.057)	(0.031)	(0.031)	(0.037)	(0.036)	(0.031)	(0.026)	(0.055)
	895	775	1570	1660	1580	1615	1625	2406	816
	0.106	0.088	0.073	0.126	0.055	0.093	0.084	0.087	0.082
Difference of means tests: Are the estimates different?									
p-values:	(1a) vs. (1b)	(1a) vs. (1c)	(1b) vs. (1c)	(2a) vs. (2b)	(3a) vs. (3b)	(4a) vs. (4b)			
Mother's Intensity:	0.384	0.387	0.882	0.001	0.920	0.628			
School Average Intensity:	0.732	0.870	0.792	0.091	0.244	0.639			
Neighborhood Average Intensity:	0.722	0.327	0.610	0.599	0.057	0.808			

Regressions include reference groups fixed effects and individual fixed effects. Dependent variable: Standardized intensity scores reported in each group (friends, neighbors, family, people with the same professional profile, and union workers). The *p*-values show the test of equal coefficient estimates between groups. *Significant at 10%, **significant at 5%, ***significant at 1%. Standard errors in parentheses. Robust standard errors are clustered at individual level

Table 5 Exploring mechanisms. Intergenerational correlation of direction of income comparisons. Crisis scenario

	Parental educ. and family structure			Gender		Income		Well-being	
	Co-resident mother and father Education Same	Different	Only mother	Daughter	Son	High	Low	High	Low
	(1a)	(1b)	(1c)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
(a) Friends									
Mother's Direction	0.174** (0.072)	0.094 (0.088)	0.095 (0.059)	0.163*** (0.055)	0.086 (0.057)	0.171*** (0.050)	0.059 (0.062)	0.184*** (0.047)	-0.032 (0.080)
School Average Direction	1.044 (0.655)	-0.234 (0.838)	0.369 (0.437)	0.533 (0.446)	0.345 (0.502)	0.670* (0.399)	0.114 (0.560)	0.527 (0.377)	-0.110 (0.683)
Neighborhood Average Direction	-3.078* (1.848)	0.704 (2.595)	2.438* (1.340)	-0.427 (1.473)	2.148 (1.352)	-0.217 (1.124)	1.672 (1.771)	1.002 (1.144)	-1.082 (2.036)
Difference of means tests: Are the estimates different?									
p-values:	(1a) vs. (1b)	(1a) vs. (1c)	(1b) vs. (1c)	(2a) vs. (2b)		(3a) vs. (3b)		(4a) vs. (4b)	
Mother's Intensity:	0.405	0.141	0.494	0.259		0.158		0.155	
School Average Intensity:	0.088	0.870	0.255	0.944		0.630		0.218	
Neighborhood Average Intensity:	0.575	0.327	0.327	0.297		0.310		0.132	
(b) Neighbors									
Mother's Direction	0.276*** (0.082)	0.226** (0.087)	0.293*** (0.053)	0.368*** (0.050)	0.171*** (0.058)	0.279*** (0.059)	0.299*** (0.052)	0.277*** (0.044)	0.259*** (0.083)
School Average Direction	1.021* (0.527)	0.047 (0.589)	0.188 (0.334)	-0.230 (0.326)	1.122*** (0.373)	0.450 (0.344)	0.357 (0.358)	0.293 (0.271)	0.937 (0.578)
Neighborhood Average Direction	0.417 (1.927)	2.110 (1.748)	0.768 (1.216)	3.030*** (1.152)	-1.146 (1.241)	-0.353 (1.169)	2.635** (1.258)	1.458 (0.952)	-1.447 (1.923)

Table 5 continued

Difference of means tests: Are the estimates different?						
p-values:	(1a) vs. (1b)	(1a) vs. (1c)	(1b) vs. (1c)	(2a) vs. (2b)	(3a) vs. (3b)	(4a) vs. (4b)
Mother's Intensity:	0.809	0.067	0.136	0.015	0.799	0.757
School Average Intensity:	0.091	0.958	0.052	0.252	0.080	0.235
Neighborhood Average Intensity:	0.233	0.586	0.095	0.501	0.847	0.409
(c) Family						
Mother's Direction	0.491*** (0.070)	0.317*** (0.073)	0.381*** (0.059)	0.414*** (0.054)	0.350*** (0.051)	0.394*** (0.054)
School Average Direction	0.216 (0.393)	0.868* (0.470)	0.489 (0.315)	0.349 (0.314)	0.523* (0.286)	0.361 (0.294)
Neighborhood Average Direction	0.081 (1.408)	-0.024 (1.407)	-0.505 (1.022)	0.802 (1.078)	-0.465 (1.003)	-0.109 (0.774)
Difference of means tests: Are the estimates different?						
p-values:	(1a) vs. (1b)	(1a) vs. (1c)	(1b) vs. (1c)	(2a) vs. (2b)	(3a) vs. (3b)	(4a) vs. (4b)
Mother's Intensity:	0.353	0.947	0.316	0.126	0.591	0.063
School Average Intensity:	0.175	0.190	0.795	0.962	0.995	0.218
Neighborhood Average Intensity:	0.961	0.627	0.616	0.325	0.417	0.808
(d) Same profile						
Mother's Direction	0.165** (0.083)	0.212*** (0.081)	0.161*** (0.057)	0.252*** (0.055)	0.137** (0.057)	0.217*** (0.057)
School Average Direction	0.161 (0.578)	0.578 (0.734)	0.146 (0.421)	-0.177 (0.447)	0.685* (0.402)	0.045 (0.467)
Neighborhood Average Direction	0.158 (1.644)	1.237 (2.136)	1.626 (1.068)	1.702 (1.208)	0.135 (1.020)	1.778 (1.318)
						0.307*** (0.082)
						0.459 (0.321)
						3.301* (0.888)
						0.243*** (0.073)
						1.116** (0.483)
						-0.422 (1.491)

Table 5 continued

Difference of means tests: Are the estimates different?						
p-values:	(1a) vs. (1b)	(1a) vs. (1c)	(1b) vs. (1c)	(2a) vs. (2b)	(3a) vs. (3b)	(4a) vs. (4b)
Mother's Intensity:	0.900	0.925	0.959	0.216	0.107	0.158
School Average Intensity:	0.596	0.706	0.829	0.134	0.937	0.052
Neighborhood Average Intensity:	0.763	0.738	0.997	0.996	0.665	0.732
(c) Union						
Mother's Direction	0.207** (0.082)	0.168** (0.081)	0.260*** (0.059)	0.313*** (0.059)	0.135** (0.055)	0.196*** (0.047)
School Average Direction	0.655 (0.548)	0.232 (0.730)	0.171 (0.300)	0.374 (0.321)	-0.127 (0.372)	0.506* (0.280)
Neighborhood Average Direction	0.256 (1.840)	-2.285 (2.506)	-0.377 (1.044)	0.399 (1.192)	-1.037 (1.187)	-1.295 (0.972)
Difference of means tests: Are the estimates different?						
p-values:	(1a) vs. (1b)	(1a) vs. (1c)	(1b) vs. (1c)	(2a) vs. (2b)	(3a) vs. (3b)	(4a) vs. (4b)
Mother's Intensity:	0.716	0.982	0.679	0.145	0.438	0.296
School Average Intensity:	0.725	0.522	0.786	0.941	0.247	0.176
Neighborhood Average Intensity:	0.419	0.366	0.959	0.931	0.448	0.411
Observations	155	179	314	332	325	482
					323	164

Dependent variable: Standardized intensity scores for each reference group. All regressions include controls, which are the log of per capita household income, highest educational level, gender, ethnicity, not living at parents' home, labor market status, region of residence, big five inventory, and where met 1st friend. The *p*-values show the test of equal coefficient estimates between groups. *Significant at 10%. **Significant at 5%. ***Significant at 1%. Standard errors in parentheses

same gender, which would lead to a higher correlation in achievements in the labor market. However, the evidence on this point is ambiguous and suggests that the results of sons and daughters are correlated with the abilities of both the father and the mother (Gronqvist et al. 2017).

We next investigate whether the intergenerational correlation of reference groups is more pronounced between mothers and daughters or between mothers and sons.³² To this end, we estimate the intergenerational correlation of intensity (Eq. 1) and direction (Eq. 2) of comparisons for daughters and sons separately.

We find strong evidence that the intergenerational association of intensity of comparison is larger for daughters than for sons.³³ Point estimates reported in columns (2a) and (2b) of Table 4 indicate that the difference is economically relevant, as the correlation is twice as large for daughters than for sons, and despite the small sample sizes it is statistically significant. As Table 5 shows, the larger intergenerational transmission of intensity we find for daughters is the result of this transmission being larger for all reference groups. Our results on the influence of gender of the child for the intergenerational transmission of reference groups are at odds with the results that Dohmen et al. (2012) obtain for Germany, as they find that gender plays no role in the intergenerational transmission of risk and trust attitudes. This shows that socialization processes are not homogeneous across attitudes.

Models of cultural transmission assume that parents care for children's economic success and well-being. Thus, parents should be willing to transmit reference groups that have proved productive for them. Similarly, children of unsuccessful parents may be more reluctant to compare with the reference groups their parents do (Dohmen et al. 2012). To test this prediction, we run separate regressions by parental income level and parental subjective well-being.³⁴ We find mixed evidence in support of this mechanism. Results in Table 4 show that the intergenerational correlation of intensity does not seem to differ by parental income but do so for subjective well-being.

Finally, the number of siblings could also affect the transmission of reference groups. Since time is limited, the more children in the family, the less time mothers can devote to socializing each one of them. Thus, we expect the transmission of reference groups to be stronger in families with fewer children. However, we do not find evidence for this quantity versus quality trade-off effect in our data. Estimates of intergenerational correlation of intensity of comparisons (not shown) for families with different numbers of children do not differ.

6 Sensitivity analysis and robustness checks

Without additional assumptions about the behavior of the error term conditional on our controls in Eqs. 1 and 2, the estimated intergenerational correlation parameters cannot be interpreted as causal. The estimated coefficients represent the best linear prediction of the child's responses. Some endogeneity issues may threaten the correct identification of intergenerational persistence estimates obtained by OLS or FE reported thus far. The source

³² Recall that we also examine the intergenerational association between fathers (as opposed to mothers) and children in Appendix Table C6.

³³ We show and discuss estimates for the Crisis scenario in the main text. Estimates for the Job Offer scenario are shown in Appendix Tables C12 and C13, and discussed in the main text when relevant.

³⁴ We split the sample into two income groups, which include individuals below and above median income, and into two well-being groups, those reporting scores between 1 and 3, and those reporting scores 4 and 5.

of such bias may be related to measurement error, reverse causality, or omitted variables (especially for the OLS regressions and less so for the FE regressions).

In Section 5, we already show that the estimated intergenerational correlations are not driven by the impact of the social environment on the intensity and type of reference groups both mothers and children compare with, by similarity in observable characteristics of mothers and children, or by a life cycle effect. In Section 6.1, we discuss the implications of measurement error and present an exercise that specifically addresses this issue. In Section 6.2, we show that estimated intergenerational correlations are not sensitive to how intensity of comparison is elicited. In Section 6.3, we present an instrumental variable strategy, which addresses the three sources of biases and provides consistent estimates. Finally, in Section 6.4 we show that our intergenerational correlation estimates are not explained by shared scale use of the variables that measure intensity of comparisons for mothers and offspring.

6.1 Alternative measures to address issues of consistency of mother's responses: Clark and Senik's (2010) question

An objection that could be raised to our empirical strategy is that the variables we use to capture the intensity and direction of comparisons may suffer from measurement error issues. For instance, respondents may not fully understand our question or they may incorporate some type of bias in their responses (e.g. they do not pay attention or provide strategic responses, as in the context of happiness –see van Praag and Ferrer-i Carbonell (2007)). If so, our measures of intensity and direction of comparison would be measured with error. If we assume classical measurement error in the mother and children responses, our estimates of the intergenerational persistence of reference groups would be downward biased. Alternatively, if the measurement error terms of mothers and children are positively correlated, our estimates of intergenerational persistence of reference groups could be upward biased. However, this problem seems implausible because the surveys of children and parents were carried out in different times and at different places (they did not share physical space), so we do not expect the error terms to be correlated.

Yet, another possibility is that the framing of the questions causes the same type of error in the responses of both parents and children. To alleviate concerns about the measurement error this may entail, we estimate Eq. 1 substituting our measure of mother's comparisons intensity for the intensity measure by Clark and Senik (2010).³⁵ This strategy avoids the potential problem of correlation of the error terms of mothers and children due to the framing of the question.

Figure C5 in the Appendix compares the distribution of this question in the ELBU and in the European sample used in Clark and Senik (2010).³⁶ As Appendix Fig. C6 shows, the distribution of intensity of our measures differs from the distribution of intensity of Clark and

³⁵ Mothers report the reference groups they compare with using Clark and Senik's question twice in the ELBU, in the third (2011/12) and fourth waves (2015/16). The estimates reported in Table C14 use the average of both waves.

³⁶ Clark and Senik (2010) used two questions: a) How important is it for you to compare your income to others? Answers range on a scale from 0 (not important at all) to 6 (very important). In the ELBU, the response range is more limited, from 1 to 5. To compare the results, Clark and Senik (2010)' answers 1 and 2 are grouped into category 1, and answers 6 and 7 are grouped into category 5. To measure direction of comparisons, they used the following question: Which persons are you more likely to compare your income to? The following response options were offered: coworkers, family members, friends, someone else, I do not compare. The same categories are used in the ELBU. Both questions (intensity and direction) are found in waves 3 and 4 of the ELBU.

Senik's (2010) measure. The Job Offer and Economic Crisis scenarios show greater intensity at the extremes (values of 0, 5, and 6) in detriment of intermediate values.³⁷

Since it seems implausible to assume that the measurement error of both variables is correlated, finding a positive β parameter would suggest that the correlation between mothers' and children's intensity is explained by factors other than measurement error, possibly the intergenerational transmission of reference groups.

The results reported in columns (2) and (5) of Table C14 corroborate the strong, significant, and positive intergenerational persistence we find with our measures of intensity –see Section 5.1. This suggests that our β estimate does not suffer from serious error measurement problems. It also suggests that the intergenerational correlations are not explained simply by patterns of scale use being shared by parents and children. We return to the issue of scale use in Section 6.4.

Next, in addition to Clark and Senik's intensity measure, we also include our (ELBU) measure of intensity in the regression. We report the key estimates of this augmented specification in columns (3) and (6) of Table C14. Since both measures capture the same object and the dependent variable (i.e. child intensity) is our (ELBU) measure of intensity, we expect our (ELBU) measure of intensity to be significant in detriment of the significance of Clark and Senik's measures. Results show that this is indeed the case.

6.2 Sensitivity to how intensity of comparison is elicited

We use Clark and Senik's intensity measure for both mothers and children to show that the intergenerational correlation of the intensity of comparisons holds when the intensity is elicited differently. We regress the intensity of children on the intensity of mothers and the same set of covariates as Appendix Table A1, and obtain a positive and significant intergenerational correlation estimate of 0.125 (se 0.043).³⁸

This positive intergenerational correlation estimate also addresses concerns related to the fact that children around 18 years of age might not have much experience of the two specific situations in which comparisons are presented in the paper, i.e. being offered a permanent full-time job and economic satisfaction when faced with a reduction in household income during a crisis. Since Clark and Senik's question elicit intensity of comparisons without providing any detail about the context of the comparisons, finding a positive intergenerational correlation suggests that children's reported intensity is likely to contain something else than sheer noise.

6.3 Instrumental variable

As a complementary strategy, we use instrumental variables to examine measurement error issues. As it is well known, measurement error leads to attenuation bias.³⁹ The size of the bias depends on the amount of information of the true variable which is available in the observed

³⁷ To compare both measures, we group the answers from our questions into seven categories. Unfortunately, we cannot build a one-to-one relationships between our direction questions and Clark and Senik's (2010).

³⁸ This estimate is slightly smaller than the intergenerational correlation we estimate with the ELBU measure of intensity of comparisons and a similar specification. Regression results are available upon request.

³⁹ Note that here we address a different issue than in Section 6.1. There, the main concern is that the association found between mothers and children is driven by the presence of measurement errors associated with the framing of the question and that these are correlated for mothers and children. In this case, the concern is that the presence of measurement errors generates an attenuation bias in the estimated intergenerational correlation coefficients.

variable. We follow the Obviously Related Instrumental Variables (ORIV) model (Gillen et al. 2019),⁴⁰ which assumes that the variables are measured with independent i.i.d. error and that there are two alternative measures of the explanatory variable with i.i.d. error and constant variance. Under these assumptions, the authors demonstrate that the second measure of the explanatory variable can be used as an instrument to mitigate the attenuation bias. ORIV yields consistent coefficients and standard errors. We treat mothers' intensity comparison reports in the Economic Crisis scenario as endogenous variables and their intensity comparison answers in the Job Offer scenario as instruments, as we deem they are closely-related survey measures. As Figs. A2 and A3 show, both comparison variables (in the Job Offer and Economic Crisis scenarios) are sufficiently correlated and could be measured with error. Likewise, we treat average intensity measures in the Economic Crisis scenario as endogenous variables and their average intensity measures in the Job Offer scenario as instruments. The battery of tests reported in the bottom panel of Tables C15 and C16 also suggests that the instruments are not weak.⁴¹ As pointed out above, we assume that the measurement error of the comparison intensity variables in the Job Offer and Economic Crisis scenarios are independent of each other and that errors have the same variance. The idea is that the related noisy measure of the endogenous variable can be used to recover a consistent estimate of the true transmission coefficient.

Appendix Tables C15 and C16 present the results for children's intensity and direction of comparison. We find IV coefficients of the intergenerational correlation to be larger than the corresponding OLS, which suggests that the latter underestimate the intergenerational transmission of reference groups. This, in turn, is consistent with the presence of measurement error issues in our intensity and direction variables, which introduce attenuation bias. However, the IV estimates of the school and neighborhood average intensity are more unstable.

6.4 Scale use

The scale of the intensity variables we use is the same for mothers and children, and this may be driving the correlation in comparison intensity between mothers and children. In Section 6.1 we provide some evidence that should attenuate this concern, as we show that we continue finding the intergenerational correlation of intensity of comparisons even when we use an intensity variable for mothers that has a different scale than that of children. In this section we exploit the fact that both mothers and children report intensity of comparisons for several reference groups to provide further evidence that indicates that patterns of scale use being shared by mothers and children do not drive our results. The intensity of comparison reported by mothers differs across reference groups. If children's reported intensity differs across reference groups in the same way, this is difficult to explain by shared scale use, as all intensity variables are measured with the same scale. Appendix Table C17 reports the estimates from 5 regression of children's intensity of comparisons for each one of the five reference groups on the intensity reports of mothers for the five comparison groups simultaneously. We also control for children's intensity of comparison for the reference groups other than the dependent variable and for the other covariates that we include in our baseline specifications of Table 3. The estimates in the diagonal of both panels of Appendix Table C17 are positive and statistically significant, which indicates that children's intensity

⁴⁰ Gillen et al. (2019) suggest this approach to deal with measurement error in the context of experimental laboratory based measures. They use duplicate elicitations of the variables with measurement error as instruments.

⁴¹ First stage regressions are available upon request.

of comparison for a given reference group is correlated with the mothers' intensity for the same reference group, once we control for the intensity of both mothers and children for all other reference groups. Moreover, the off-diagonal estimated coefficients are typically smaller or not statistically significant. These results further suggest that our intergenerational correlation estimates are not explained by shared scale use in any of the two scenarios. They also show that the mother's intensity of comparison for a given reference group is the best predictor of child's intensity of comparison for the same reference group.

7 Final comments

We know that income comparisons are important to understand the values, attitudes, preferences and behavior of individuals. However, we have a very limited knowledge about how reference groups are formed. Do individuals deliberately choose with whom and how much they compare or are reference groups determined by the social context where people live and by cultural transmission?

We study empirically the origins of reference groups. Our results suggest that parents instill their reference groups into their children. We find that the intergenerational transmission of reference groups is an important determinant of offspring's comparison intensity, and we show that the correlation between parents and their children is not due to issues of measurement error, omitted variables, the correlation between the two generations, or the social environment, which is common to mothers and their children. We also show that the intergenerational transmission of reference groups is not the only exogenous source of reference groups formation. We find that the social environment that mothers and children share, captured by the prevailing intensity of comparisons in the child's school or neighborhood, has an independent effect on children's intensity and direction of comparisons. However, our estimates suggest that other individuals in the local environment are less important than parents in shaping children's intensity of comparisons.

Since reference groups and income comparisons are important determinants of individual behavior and well-being, parents condition the behavior and well-being of their offspring by instilling their reference groups into them. This may be an efficient way for parents to invest in their children. However, the transmission of reference groups may also serve another goal, namely the preservation of the cultural identity of the parents (Bisin and Verdier 1998). The structure of our data, however, does not allow us to examine why parents instill their preference to their children. This is a promising avenue for further research.

Previous work argues that the intergenerational transmission, the social environment where individuals live and the ensuing persistence of reference groups is likely to perpetuate social differences in aspirations, which in turn explain persistence in socio-economic disparities and mobility traps (Piketty 2000; Bourguignon et al. 2007; Piketty 1998). Poorer families may transmit reference groups with less preferences for economic success and fatalistic beliefs than upper-income families, which becomes an additional mechanism for the persistence of inequality across generations (Piketty 1998). Our findings suggest that reference groups are transmitted from parents to children and that the social environment is also relevant. Future work will have to look at the relationship between the persistence of reference groups and the lack of social mobility in our societies.

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Declarations

Competing interests The authors declare no competing interests.

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