METHODOLOGICAL EXPLORATIONS BASED ON AN EXPERIMENTAL STUDY CONDUCTED ON ADOLESCENTS IN DELHI

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Abstract

We conducted an artefactual field experiment and post-experiment surveys with 15-19-year old adolescents in private and government schools in Delhi. In this paper, we study a few methodological questions of interest using our fairly representative sample of 1,040 adolescents dispersed across the ability distribution, choice of stream in higher-secondary education, and household economic status. We investigate the characteristics of the potential participants that predict their willingness to participate in the experimental economics study; the characteristics of the participants that predict their understanding of the instructions given in the experimental economics study; and the characteristics of the participants that predict the time spent by them in completing the post-experiment surveys. Using regression analyses, we find that female adolescents as well as those with higher academic ability were able to understand the experimental instructions better. Female adolescents, and those with higher academic ability were also significantly faster in completing both the post-experiment surveys. Our study's result suggests that surveys aimed at female respondents may be less time-consuming than those aimed at male respondents. Moreover, surveyors may need to spend more time while surveying populations with low levels of academic ability. The high participation rate of 99.42 per cent in our study suggests that researchers conducting incentivised experimental studies can expect to secure high participation rates in subject pools similar to ours.

1. WILLINGNESS OF THE RESPONDENTS TO PARTICIPATE IN THE STUDY

This section examines the following research question to arrive at plausible answers: Which characteristics of the potential participants predict their willingness to participate in the experimental economics study?

1.1. Introduction

In survey literature, different demographic characteristics such as age (Herzog and Rodgers, 1988; Moore and Tarnai, 2002), income (Smith, 1983; Goyder, 1987; Curtin, *et al*., 2000), education

(Curtin, *et al*., 2000), gender (DeMaio, 1980; Moore and Tarnai, 2002), race (Curtin *et al*., 2000; Voigt *et al*., 2003), and health status (Pennell, 1991) are shown to be significant determinants of the respondents' willingness to participate in surveys. The experimental economics literature available on this subject is very limited. Slonim *et al*. (2013) show that the participants in their laboratory experiment had significantly less income, more leisure time, higher pro-sociality, and a greater interest in economic experiments as compared to the non-participants. They argue that the participation decision in their experiment can be understood as a rational response to the monetary recruitment incentives and duration of the study, given the existing income and time commitments of the potential participants.

1.2. Methodology

A total of 1040 adolescents studying in Class 11 or Class 12 in ten different schools in Delhi, including six government schools and four elite private schools,[1] were invited to participate in our research study. The study was conducted in altogether 45 experimental sessions, and the sessions in each school were held simultaneously to avoid spillover effects. The participants in our study enjoy anonymity as their identifying details like names, addresses and phone numbers were not collected by us. Each participant has been identified in our study by a unique five-digit study ID number that was randomly allocated to them at the beginning of the one-hour long study. The study was incentivised with a fixed reward for participation and more rewards given on the basis of the participants' performance and decisions in the experimental part of the study. Our potential participants marked their willingness to participate after they listened to the general instructions informing them about the duration of the study, rewards for participation, and how their anonymity would be maintained.

In order to examine the characteristics of the potential participants that predict their willingness to participate in the study, we collected data on the age, gender, percentage of marks scored in the Class 10 examination conducted by the Central Board of Secondary Education (CBSE) and a self-assessment of household's current economic conditions from all our potential participants. For this purpose, the adolescents who declined our invitation to participate in the study were requested to fill a short questionnaire asking details of their age, gender, percentage of marks scored in the Class 10 examination conducted by the CBSE, a self-assessment of their household's current

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[1] The elite private schools in our sample charge tuition fees of more than Rs. 4,000 per month.

economic conditions, and the reason as to why they were not interested in taking part in our study. The relevant data were collected from our participants through a post-experiment survey.

1.3. Results

Out of the 1040 adolescents who were invited to participate in the study, only six potential participants declined the invitation to participate, leaving us with a sample of 1034 participants,[2] and a participation rate of 99.42 per cent. We believe that our subject pool which comprised adolescent school children, the anonymity granted to participants, and the conduction of the study during regular school hours contributed to the high participation rate. The opportunity cost of time was low for our subject pool as compared to the other subject pools, as adolescent school-children in India do not usually work and earn an income. Moreover, in our experiment, the subjects did not have to commit participation by making an appointment or face the uncertainty of having to wait for their turn to participate in the experiment, which are factors that can increase the participation rate, as discussed in Slonim *et al*. (2013). We believe that these features of our study resulted in the expected utility from participation for our participants to exceed the expected utility from not participating, thereby leading to the high participation rate.

Graphs 1, 2, and 3 show the distribution of the gender, academic ability as represented by the percentage of marks scored in the Class 10 CBSE examination, and economic status as represented by the respective monthly incomes of the fathers of the participants in our experimental economics study.

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[2] Four participants out of these 1034 participants did not complete the study due to various reasons.

Graph 1: Distribution of Gender of the Participants[3]
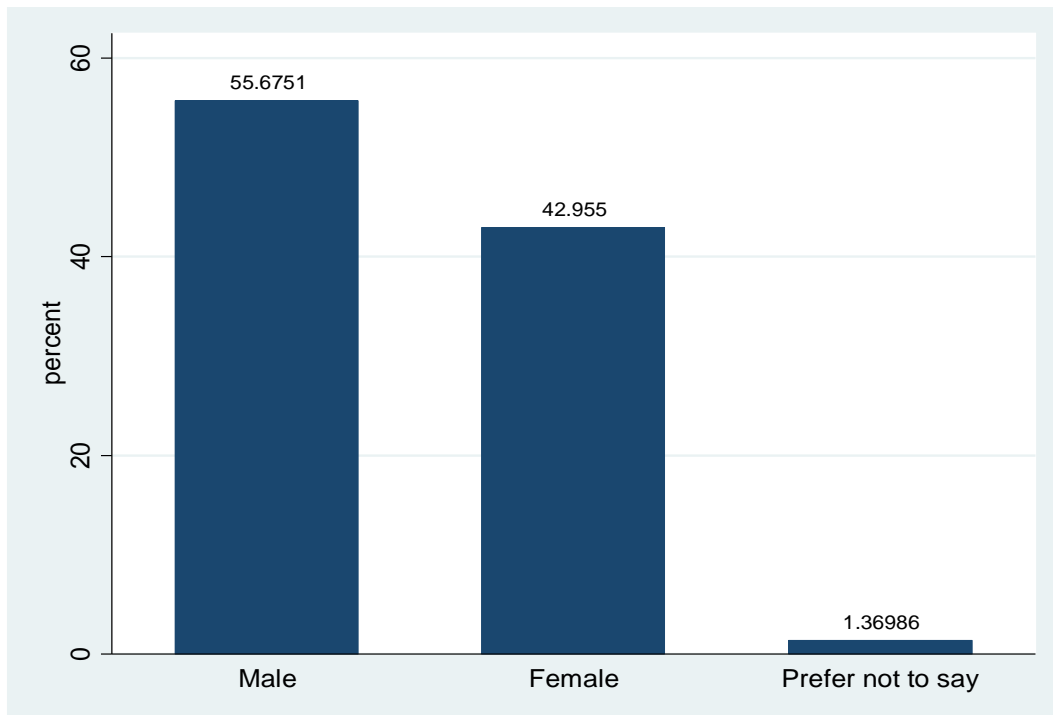
Source: Authors' contribution.

Graph 1, which depicts the distribution of gender, shows that the gender ratio was 772 girls per 1000 boys among our participants. The gender ratio among the adolescent population aged 10-19 years in Delhi is 821 girls per 1000 boys (Office of the Registrar General and Census Commissioner, India and United Nations Population Fund-India, 2014), which is not very different from the gender ratio of our sample.[4]

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[3] A total of 1022 out of 1034 participants answered the question on gender.

Graph 2: Distribution of the Monthly Incomes of the Participants' Fathers[5]
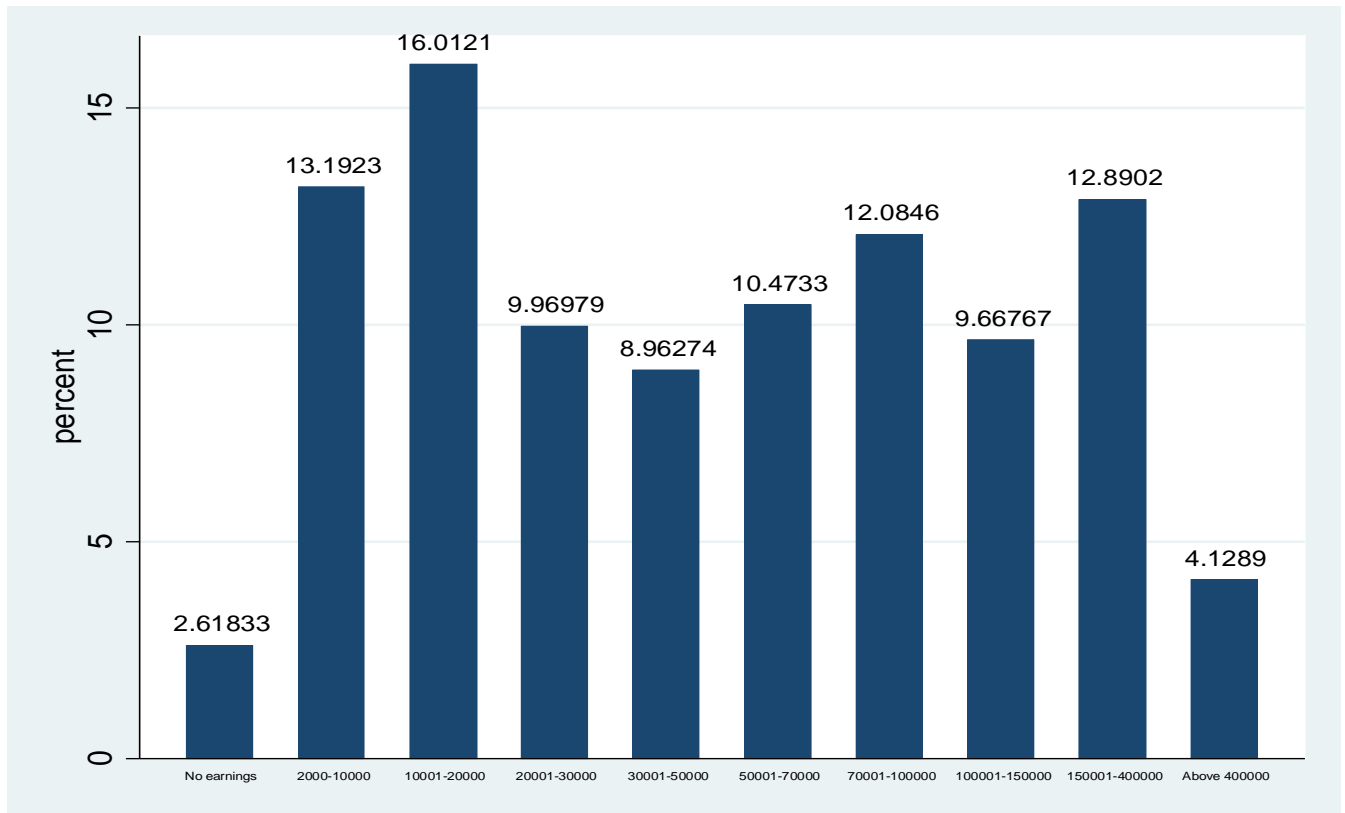
Source: Authors' contribution.

Graph 2 shows the distribution of the respective monthly incomes of the fathers of the participants in our study. It may be observed that 2.6 per cent of the sample respondents reported 'no earnings' for their fathers, 13.2 per cent reported the father's monthly income to be between Rs. 2000 and Rs. 10,000; 16 per cent reported it as Rs. 10,001–20,000; 10 per cent reported it as Rs. 20,001–30,000; 9 per cent reported it as Rs. 30,001–50,000; 10.5 per cent reported it as Rs. 50,001–70,000; 12.1 per cent reported it as Rs. 70,001–1,00,000; 9.7 per cent reported it as Rs. 1,00,001–1,50,000; 12.9 reported it as Rs. 1,50,001–4,00,000; and 4.1 per cent reported it to be above Rs. 4,00,000. The median monthly income of the fathers in our sample was between Rs. 30,001 and Rs. 50,000.

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[5] A total of 993 out of 1034 participants answered the question on the father's monthly income.

Graph 3: Distribution of the Percentage of Marks Scored by the Participants in the Class 10 CBSE Examination[6]
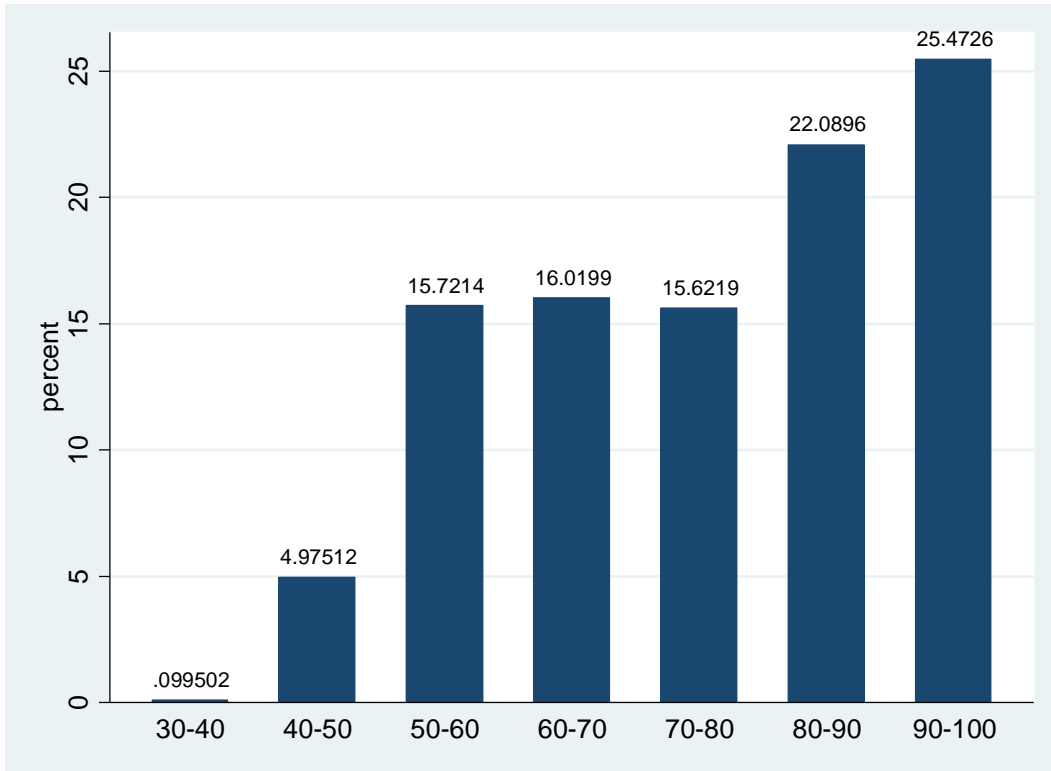
Source: Authors' contribution.

Graph 3 shows the distribution of the percentage of marks scored by the participants in their Class 10 CBSE examination. In our sample, the lowest score was 33 per cent, which is also the percentage required to pass the Class 10 examination and get promoted to Class 11. From the graph, it may be observed that 0.1 per cent of the participants scored 30–40 per cent marks; 4.98 per cent scored 40–50 per cent; 15.72 per cent scored 50–60 per cent; 16.02 per cent scored 60–70 per cent; 15.62 per cent scored 70–80 per cent; 22.09 per cent scored 80–90 per cent; and 25.47 per cent scored 90–100 per cent. The median of the Class 10 marks in our sample was between 70 and 80 per cent.

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[6] A total of 1005 out of 1034 participants answered the question on the percentage of marks scored in their Class 10 CBSE examination.

The distribution of the various participant characteristics, such as gender, academic ability as represented by the percentage of marks scored in the Class 10 CBSE examination, and economic status as represented by the incomes of the participants' fathers, as shown in Graphs 1, 2, and 3, respectively, indicated that our sample of 1040 is fairly representative of adolescent school-children aged 15-19 years in Delhi.

All the six non-participants in our study answered a short questionnaire requesting information on their age, gender, percentage of marks scored in the Class 10 CBSE examination, a self-assessment of their household's current economic conditions, and the reason as to why they were not interested in participating in our study. As regards the demographic characteristics of the non-participants, including five males and one female, five of them were aged 16 years, and one was 17 years old. The distribution of marks obtained by them in their Class 10 CBSE examination was 94 per cent, 93 per cent, 92 per cent, 88 per cent, 89 per cent, and 65 per cent, respectively. Three of the non-participants marked their household's current economic conditions to be 'very wealthy', the highest level in a seven-point scale, wherein we asked the non-participants to mark their respective household's current economic condition. One of them marked the sixth box, whereas the remaining two marked the fourth box as their answer to this question. Four non-participants answered that they did not want to participate as they had some other important work. One of them answered that he did not want to follow instructions and concentrate on the research study, while another answered that she was not interested in the rewards to be won by participating in the study.

1.4. Conclusion

Due to the very low number of the non-participants, we are unable to obtain any reliable estimate of the characteristics of the subjects that determine their willingness to participate in the economics experiments using regression analysis.[7] However, as our sample is fairly representative of adolescent school-children aged 15-19 years in Delhi, the high participation rate of 99.42 per cent in our study suggests that researchers conducting incentivised experimental studies can expect to secure high participation rates in subject pools similar to ours.

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[7] However, as just 0.54 per cent of the targeted sample declined the invitation to participate, we have minimal self-selection bias in our study.

2. UNDERSTANDING OF THE INSTRUCTIONS PROVIDED IN THE EXPERIMENT AMONG THE PARTICIPANTS

This section analyses the following research question: Which characteristics of the participants predict their understanding of the instructions given in the experimental economics study?

2.1. Introduction

The lack of understanding of instructions among the participants threatens the internal validity of experimental studies. This is because if participants in an experimental study lack a complete understanding of the experimental instructions, their behaviour cannot be understood as their response to the treatment variable of interest. A participant who does not have a complete understanding of the experimental instructions may be responding to some other stimuli and not the treatment. This necessitates the use of some tool by the investigator conducting the experiment to understand if the participants have a proper understanding of the instructions provided in the experiment or not. In order to fulfil this requirement, we employed a pre-task quiz to test the participants' understanding of the instructions given by us in our experimental task.

2.2. Methodology

The instructions concerning the experimental task were explained to the participants by those conducting the experiment in the classrooms. The participants were then asked to complete the pre-task quiz by correctly answering eight questions which were designed to test their understanding of the rules of the experimental game. The participants were encouraged to read the instructions again to help them answer the pre-task quiz, and were advised to ask for help by raising their hands for assistance. After the participants finished answering the pre-task quiz, the experimenters explained the relevant instructions again and presented answers to the quiz.

2.3. Results

Table 1: Number of Mistakes Made in the Pre-Task Quiz

Quiz_mistakes count	Frequency	Percentage	Cum.
0	964	93.59	93.59
1	40	3.88	97.48
2	9	0.87	98.35
3	6	0.58	98.93
4	2	0.19	99.13
5	3	0.29	99.42
6	4	0.39	99.81
8	2	0.19	100
Total	1030	100	

Source: Authors' contribution.

Table 1 delineates the number of mistakes made by the participants in answering the pre-task quiz, which had eight questions that tested their understanding of the experimental game. It may be observed that 93.59 per cent of the participants gave correct answers to all the eight quiz questions, displaying a complete understanding of the experimental game in which they were about to participate. 60.53 per cent of the 66 participants who had made one or more mistakes, were found to have made just one mistake in the quiz comprising eight questions. As can be seen from Table 1, six participants made two mistakes, two participants made four mistakes, three participants made five mistakes, four participants made six mistakes, and only two participants displayed a complete ignorance of the experimental game by wrongly answering all the eight quiz questions. Table 2 displays the distribution of percentages scored in the Class 10 CBSE examination and participants who made mistake(s) in the pre-task quiz.

Table 2: Distribution of Percentages Scored in Class 10 CBSE Examination and Participants Who Made Mistake(s) in the Pre-Task Quiz

Percentage of Marks Scored in Class 10 CBSE Examination	Number of Participants Who Made Mistake(s) in the Pre-task Quiz	Percentage of Participants Who Made Mistake(s) in the Pre-task Quiz
30-40	1	100
40-50	4	8
50-60	24	15.19
60-70	9	5.59
70-80	13	8.28
80-90	10	4.50
90-100	3	1.17

Source: Authors' contribution.

In order to study the |characteristics of the participants that predict their understanding of the instructions in the experiment, we ran a Poisson regression with Quiz_mistakes count, that is, taking the number of mistakes made in the pre-task quiz as the dependent variable, and gender, academic ability, economic status, and session-level dummies as the independent variables. Gender is a categorical variable that takes the value 1 if the participant is male, 2 if the participant is female, and 3 if the participant answers 'Prefer not to say' when asked to self-report their gender. We measured academic ability by the percentage of marks scored by the participants in their Class 10 examination conducted by CBSE. All the participants in our study had taken this exam, therefore providing us with a comparable measure of academic ability across participants.[8] We used data on the ownership of consumer durables, and housing characteristics of the participants' households, which was collected as part of the post-experiment survey, to ascertain the economic status of the participants. As the consumer durables and housing characteristics are acquired over many years, we expected our index to reflect the medium-or long-term economic status of the participants' households. We used the statistical method of principal components analysis for the construction of the Economic Status Index of the participants in our study. We included session-

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[8] Most schools in Delhi are affiliated to the CBSE.

level dummies in our regression analysis to control for session-level heterogeneity among the 45 experimental sessions that we conducted in ten schools.

Table 3: Determinants of the Number of Mistakes Made in the Pre-Task Quiz

VARIABLES Dependent Variable: Quiz_mistakes count	(1) Poisson Model	(2) Average Marginal Effects
Gender (Reference category: Male=1)		
(2) Female	.5372316***	-.077055***
	(.1218591)	(.0268695)
(3) Prefer Not to Say	.3091737	-.1150286***
	(.2334234)	(.0428746)
Academic ability	.9224995***	-.0104618***
	(.0091356)	(.0015826)
	. 1.034943	.0044543
Economic status index	(.0478323)	(.0060068)
Sessions Dummy	Yes[9]	Yes
	21.82467**	-
Constant	(27.19805)	
Observations	987[10]	987
Pseudo R-Squared	0.3105	-

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' contribution.

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[9] Coefficients, standard errors, and p values of our 45 session-level dummies have been omitted from this table as these are not relevant to our analysis.

[10] A total of 43 participants have been excluded in the regression analysis. This is because of case-wise deletion of data on participants who did not provide data on one or more of the explanatory variables used in the regression. In the regression analyses results reported in this paper, the number of observations reported in the regression table differs from the number of participants in our study due to this reason.

The results of the regression have been presented in Table 3. From the column reporting the average marginal effects in the table, we can see that after controlling for other variables, on an average, females made 0.08 fewer mistakes in the pre-task quiz as compared to males. This result is statistically significant at the significance level of 1 per cent. We can also see that as the percentage of marks scored by the participants in their Class 10 CBSE examination increased by 1 unit, they made 0.01 fewer mistakes in the pre-task quiz, after controlling for other variables. This result is statistically significant at the significance level of 1 per cent. The regression table also shows that economic status of the participants is not a statistically significant determinant of the number of mistakes made by them in the pre-task quiz.

Table 4: Determinants of Having a Complete Understanding of Instructions about the Experimental Task

VARIABLES Dependent Variable	(1) Quiz_all correct
Gender (Reference category: Male=1)	
(2) Female	.5081904
	(.3578033)
(3) Prefer Not to Say	.6722496
	(.8316705)
Academic ability	.083773***
	(.017669)
Economic status index	.0180832
	(.0776961)
Sessions Dummy	Yes
Constant	-3.748071**
	(1.576402)
Observations	987

Robust standard errors in parentheses.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Source: Authors' contribution.

We ran another regression to get a second measure of the characteristics that predict participant understanding in our experiment. We ran a Firthlogit regression with 'Quiz_all correct', which is a dummy variable that takes the value 1 if a participant answered all the eight questions in the pre-task quiz correctly, indicating that he/she had a complete understanding of the experimental task, and the value 0 if the participant made at least one mistake, that is, he/she did not have a complete understanding of the experimental task. We assigned gender, academic ability, economic status, and session-level dummies as the independent variables.

The results of the regression analysis have been presented in Table 4. We can see from this table that gender is not a statistically significant determinant of participants' understanding of the experimental instructions. Economic status too is not a statistically significant determinant of participant understanding. Academic ability, as measured by the percentage of marks scored by the participants in their Class 10 CBSE examination, is a positive and statistically significant determinant of whether they have a complete understanding of the instructions given in the experiment, which, in turn, is reflected in their providing correct answers to all the pre-task quiz questions. This result that participants with higher academic ability displayed a better understanding of experimental instructions is statistically significant at the significance level of 1 per cent.

2.4. Conclusion

We conducted regression analyses to understand the characteristics that predict participant understanding of instructions given in our experiment. Regressing a dependent variable that measures the number of mistakes made by the participants in answering the pre-task quiz on gender, economic status, academic ability, and session-level dummies, we observed that females make significantly fewer mistakes as compared to males. Participants with a higher academic ability also make fewer mistakes. In the second regression, we regressed a dummy variable that took the value 1 if a participant answered all the eight questions in the pre-task quiz correctly, and the value 0 if the participant made at least one mistake, on the independent variables of gender, economic status, academic ability, and session-level dummies. This regression result indicates that academic ability is a positive and statistically significant determinant of whether the participants have a complete understanding of the experimental instructions. The results of both the regressions show that economic status is not a statistically significant determinant of participant understanding

in our experiment. These results from an adolescent participant pool in a developing country with diverse participant characteristics[11] contribute to the literature on the determinants of participant understanding of instructions in economics experiments.

3. TIME TAKEN BY PARTICIPANTS IN COMPLETING THE POST-EXPERIMENT SURVEYS

This section deals with the following research question: Which characteristics of the participants predict the time spent by them in completing the post-experiment surveys?

3.1. Introduction

The experimental part of our study was followed by post-experiment surveys, including a survey on the socio-demographic details of the participant, and another survey on the ownership of consumer durables and housing characteristics of the participant's household. We used these two surveys to explore the methodological question regarding response times among the participants.

3.2. Methodology

We collected the socio-demographic details of the participants through a post-experiment survey. The participants were instructed to self-report the time taken to complete this socio-demographic survey when they had finished answering all the questions. They wrote down the time taken in answering by looking at the stop clock placed in front of them, which kept time since they started answering. For confirming their self-reported time, the participants were also encouraged to take the help of the investigators conducting the experiment who were present in the class. Before they began answering, we instructed the participants that they would not be rewarded on the basis of the time taken by them for answering the survey questions.

We obtained the second measure of the response time by asking the participants to self-report the time they took to answer the questions pertaining to the ownership of consumer durables and the housing characteristics of the participant's household. The participants were asked to write 'No' or '0' in the blank space provided if their household did not own the particular item mentioned in the

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[11] The standard subject pools in economic experiments are college or university students, and such samples display a much lower variation in terms of economic status and academic ability as compared to our sample of adolescent school-children.

survey questionnaire. If their household owned a particular item, they were instructed to write 1, 2, 3, 4, and so on, to indicate the number of units of the goods owned by their household. The participants were instructed to self-report the time taken to complete this socio-demographic survey when they had finished answering all the questions. They wrote down the time taken in answering by looking at the stop clock placed in front of them, which kept time since they started answering. For confirming their self-reported time, the participants were also encouraged to take the help of the investigators conducting the experiment who were present in the class. Before they began answering, we instructed the participants that they would not be rewarded on the basis of the time taken by them for answering the questions.

3.3. Results

3.3.1. Results from the Socio–Demographic Survey

A total of 1011 out of 1034 participants self-reported the time taken for answering the socio-demographic survey. It was found that the participants spent an average of 460.35 seconds in answering the survey questions, with a standard deviation of 317.82 seconds.

We employed an OLS regression to understand the participant characteristics that determine the response time of the participants in the post-experiment socio–demographic survey. Our regression model has the time taken to complete the socio–demographic survey as the dependent variable, and gender, academic ability, economic status, and session-level dummies as the independent variables. Gender is a categorical variable that takes the value 1 if the participant is male, 2 if the participant is female, and 3 if the participant answers 'Prefer not to say', when asked to self-report their gender. We measured academic ability by the percentage of marks scored by the participants in the Class 10 examination conducted by the CBSE. We used data on the ownership of consumer durables, and the housing characteristics of the participants' households collected as part of the post-experiment survey to generate an Economic Status Index, which is a continuous variable representing the economic status of the participants. We included session-level dummies in our regression analysis to control for session-level heterogeneity among the 45 experimental sessions conducted in ten schools.

Table 5: Determinants of the Response Time in the Socio–Demographic Survey

VARIABLES Dependent Variable	(1) Response time_ Socio–Demographic Survey
Gender (Reference category: Male=1)	
(2) Female	-36.35835***
	(13.89284)
(3) Prefer Not to Say	-49.86415
	(81.14126)
Academic ability	-2.519935**
	(1.119683)
Economic status index	1.451006
	(3.236639)
Sessions Dummy	Yes[12]
Constant	442.5752***
	(92.12244)
Observations	974
R-Squared	0.4366

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' contribution.

The results of the regression have been presented in Table 5. We can see that female adolescents took 36.36 seconds lesser than their male counterparts to complete the socio–demographic survey. This result is statistically significant at the significance level of 1 per cent. We also found that

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[12] Coefficients, standard errors, and the p values of our 45 session-level dummies have been omitted from this table as these are not relevant to our analysis.

academic ability is a significant determinant of the survey response time. In our sample, as the percentage of marks scored by the adolescents in their Class 10 CBSE examination increased by 1 percentage point, they spent 2.52 seconds lesser to finish the socio–demographic survey. This result is statistically significant at the significance level of 5 per cent.

3.3.2. Results from the Household Assets Survey

A total of 1015 out of 1034 participants self-reported the time taken for answering the questions. It was found that the participants spent an average of 114.54 seconds on answering the questions, with a standard deviation of 70.93 seconds.

Table 6: Determinants of the Response Time in the Household Assets Survey

VARIABLES Dependent Variable	(1) Response time_ Household Assets Survey
Gender (Reference category: Male=1)	
(2) Female	4.801708
	(3.414985)
(3) Prefer Not to Say	-.3777472
	(30.79052)
Academic ability	-.5110579***
	(.1858589)
Economic status index	2.538238**
	(1.01636)
Sessions Dummy	Yes
Constant	92.76242***
	(15.07567)
Observations	977
R-Squared	0.5187

Robust standard errors in parentheses.

Source: Authors' contribution.

We employed an OLS regression to understand the subject characteristics that determine the response time of the participants in the post-experiment household assets survey. Our regression model has the time taken to complete the household assets survey as the dependent variable, and gender, academic ability, economic status, and session-level dummies as the independent variables.

The results of the regression analysis have been presented in Table 6. We found that richer adolescents took longer to complete the household assets survey. It was found that as the Economic Status Index of the participants computed on the basis of their household assets increased by one unit, the participants spent 2.54 seconds more to complete the household assets survey. This result is statistically significant at the significance level of 5 per cent. The reason for this result could be that the adolescents whose households own a greater number of units of household assets spend more time to recollect and calculate the number of units of the different household assets asked in the survey. We also found that academic ability is a significant determinant of the survey response time. In our sample, as the marks obtained by the adolescents in their Class 10 CBSE examination increased by 1 percentage, they were found to be spending 0.51 seconds lesser to finish the socio–demographic survey. This result is statistically significant at the significance level of 1 per cent.

3.4. Conclusion

In our study, participants belonging to a higher economic status took significantly more time to complete the household assets survey, presumably because they had to spend more time to recollect and write down the number of their household assets. Girls took significantly less time as compared to boys to finish the socio–demographic survey. This result suggests that surveys aimed at female respondents may be less time consuming than those aimed at male respondents. We also found that academic ability is a statistically significant determinant of the survey response time regardless of the type of survey. Those with a higher academic ability took lesser time to complete the post-experiment surveys. In their web-based survey, Yan and Tourangeau (2008) found that respondents who had completed high school finished the survey faster than those who had not studied up to high school, a result they deemed to be consistent with the capacity theory

of comprehension given by Just and Carpenter (1992). Our study's result suggests that surveyors may need to spend more time while surveying populations with low levels of academic ability.

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