

Electronic Supplementary Material of

The Evolution of Risk Attitudes: A Panel Study of the University Years

A Research Design

The overall project is a multi-wave panel of a sample of university students and graduates. Across the seven waves of data reported here we have multiple measures of risk. The studies were funded by the National Science Foundation (SES-1534403; SES2027548 for Rice and SES-1534411; SES2027513 for TAMU). The Rice Preferences Study began with a sample of 661 entering undergraduates matriculating in August of 2016. This was 66.7% of the entering class. Of that sample, 553 completed the study with an 83.7% response rate. Prior to arriving on campus in fall 2016 Rice students were given a battery of incentivized preference measures. Over the subsequent four years these subjects were involved in 2 to 4 tests per year. To provide a basis for comparison, each year a smaller sample (between 112 and 148) was drawn from incoming classes and tested with the same instruments. The remaining students from the Class of 2020, who had never been tested, were invited in March 2020 to participate in the initial study (259 of 376 completed the study). A total of 670 subjects participated in this study (67.1% of the graduating class). Following the onset of COVID-19 the study was expanded to cover post-graduation of the panel. Below we detail information for each of the waves included in this paper.

Wave 1 of the study (July 2016) constituted the initial sample which was drawn from a random sample of two-thirds of Rice University's entering freshman class (992 students). These subjects were contacted prior to arriving on campus in the late summer of 2016 (from July 14 – August 12, 2016). A total of 553 of the 661 students who were contacted completed this portion of the study. The study was carried out online. Subjects were told that the study would take about 25 minutes and that they will be compensated USD \$5 for completing a short survey and compensated for two out of six, randomly chosen, incentivized decision tasks. On average subjects earned \$26.79 for their participation. Excluding extreme outliers, it took subjects an average of 20 minutes to complete the study. Subjects participated in seven modules: the first module was a survey of basic preferences (including the SOEP item used in this study) and a personality inventory; a second module was a standard dictator

game; the third module was a third-party dictator game in which the third party made allocations between a member of their own residential college and someone from a different residential college (for a discussion of these dictator games see [Eckel et al. \(2022\)](#)); the fourth module was the lottery choice mechanism used in this study [Eckel and Grossman \(2008b\)](#); the fifth module was a loss aversion task; the sixth module involved a time discounting task; and the seventh module involved a competition task similar to that reported by [Niederle and Vesterlund \(2007\)](#). Modules two through seven were presented in fixed order and were incentivized.

Wave 2 of the study (October 2017) involved 488 respondents who participated in Wave 1. It took respondents an average of 32.9 minutes to complete the study and they earned an average of \$18.55. Subjects participated on-line and the study was open from October 27, 2017 through March 19, 2018. This study was focused on different risk measures across eight modules. The first module involved a survey of risky behaviors on the Rice campus. The eighth module was a survey that used a version of the [Weber et al. \(2002\)](#) instrument and included the SOEP risk measure used in the study. These two modules were in fixed order. The remaining modules included the lottery choice task used in this study [Eckel and Grossman \(2008b\)](#); the Holt-Laury risk task [Holt and Laury \(2002\)](#); the Gneezy/Potters risk task [Gneezy and Potters \(1997\)](#); a loss-aversion task; a version of the balloon task [Lejuez et al. \(2002\)](#); and a hypothetical pairwise risk task [Falk et al. \(2023\)](#). These modules were randomized for each subject. Two of the incentivized modules were randomly chosen and subjects were paid for those tasks.

Wave 3 of the study (March 2020) replicated Wave 1. The aim was to re-test subjects to observe whether preferences were consistent over time. An eighth module was added that measured the trust game. Otherwise the procedures were identical to what subjects did prior to matriculating. A total of 406 panelists participated in this study. Study subjects were told that the study would take approximately 25 minutes. Excluding outliers, subjects spent an average of 23 minutes with this on-line study. Subjects earned an average of \$32.65. The study took place between March 17 and April 11, 2020. Unfortunately when the study was launched subjects were barred from campus due to COVID-19. This was a major interruption for the seniors looking forward to graduating.

Wave 4 of the study (April-May 2020) took respondents an average of 22 minutes to complete. A total of 402 respondents from the original panel completed this study. For their participation, respondents earned an average of \$20.30. The study included 7 modules. In module one, respondents were asked a set of questions about behaviors they had engaged in to avoid contracting or spreading COVID-19. The second module focused on respondent's knowledge of COVID-19 and beliefs about the pandemic. The third module contained survey

measures of risk aversion, trust and trustworthiness, including the SOEP risk item used in this study. The fourth module turned to targets of trust, ranging from the US President to friends and family. The fifth module was incentivized and asked respondents to guess the injunctive norms held by other students from their university concerning COVID-19. The sixth module was also incentivized and asked respondents to guess the descriptive norms of other students concerning COVID-19. The seventh module contained a battery of demographic items and an opportunity to donate their earnings to a charitable organization.

In wave 5 of the study (July-August 2020) a total of 295 panelists participated and took an average of 27 minutes to complete it. In this study not everyone was paid. A sample of respondents were randomly selected and paid \$50 for completing the study. Another sample were randomly chosen and paid for an incentivized norms task. The study covered six modules. The first module repeated the same set of questions about precautionary behaviors as in wave 4. The second module focused on the respondents' knowledge of COVID, beliefs about the pandemic and attitudes toward vaccines. The third module turned to targets of trust, ranging from the US President to friends and family. This module also included the SOEP risk item used in this study. The fourth module was incentivized and asked respondents to guess the injunctive norms held by other students concerning COVID-19. The fifth module was also incentivized and asked respondents to guess the descriptive norms of other students concerning COVID-19. The sixth module contained a battery of demographic items.

Wave 6 of the study (October-November 2020) took respondents an average of just under 20 minutes. A total of 226 of the original panelists participated. As with wave 5, not all subjects were paid. A sample were paid a \$50 bonus for completing the study and another group were randomly chosen to be paid for the incentivized norms task. The study covered seven modules: preventative behaviors; beliefs and attitudes about coronavirus and vaccines; incentivized injunctive norms; incentivized descriptive norms; and demographic items. The sixth module was focused on the 2020 US Presidential election and trust and included the SOEP risk item used in this study. There was considerable overlap in items from both Wave 4 and Wave 5.

Wave 7 of the study (July-August 2021) included 221 of the original panelists who spent just over 27 minutes in the study. Respondents were paid a fixed fee of \$10 for answering survey questions and were paid for one of the incentivized modules. That module was randomly chosen for each respondent at the conclusion of the study. On average respondents earned \$23.16 for participation. The study covered thirteen modules: preventative behaviors; beliefs and attitudes about coronavirus and vaccines; trust in various institutions; survey based risk items (including the SOEP risk item used in this study); incentivized injunctive

and descriptive norms relating to COVID; an incentivized task measuring confidence; a dictator game played with an entering Freshman at Rice; an incentivized investment task [Gneezy and Potters \(1997\)](#); the lottery choice task used in this study [Eckel and Grossman \(2008b\)](#); an incentivized dictator game with a member of their entering class (this task and the one with a Freshman were presented in random order to the respondent); an incentivized trust game in which the respondent played both roles; a charitable giving game for Covid relief in India; and survey items dealing with resilience, effects of Covid on friends and family and demographic items.

Five additional papers use elements of the data: [Eckel et al. \(2022\)](#), [Eckel et al. \(2023a\)](#), [Eckel et al. \(2023b\)](#), [Eckel et al. \(2024\)](#), [Krupka et al. \(2023\)](#).

B Task Descriptions

This study focuses on two different measures of risk preferences. The first item is a survey measure that asks respondents to indicate their risk orientation, as shown by the task screenshot in Figure B1. The second item is an incentivized lottery derived from [Eckel and Grossman \(2008b\)](#). Figure B2 is a screenshot of the task.

During the COVID-19 pandemic (Wave 4 through 7), we collected subjects' frequency of experiencing 11 negative emotion items. Figure B3 is a screenshot of the 11 items of negative emotions. We also surveyed subjects on whether they did any of the 12 precautionary behaviors, with a screenshot in Figure B4. In addition, we surveyed subjects on their propensity to engage in some risky behaviors, including some regular risky behaviors and some pandemic-related behaviors. Figure B5 is the screenshot of the survey items in Wave 4 (April 2020). Figure B6 is the screenshot in Wave 7 (June 2021). It's important to note that certain items in these two waves of studies are not congruent. In our manuscript, we solely incorporated items that were present in both studies for analysis purposes.

The screenshot shows a web-based survey interface. At the top, there are logos for RICE and the Baker Institute for Public Policy. Below the logos, a blue bar contains the text 'Rice Study'. The main content area is light blue and displays 'Question 28 of 28.' in bold. The question text is: 'How do you see yourself?' followed by 'Are you generally a person who enjoys taking risks or do you try to avoid taking risks?'. Below this, a note says: 'Please use the scale from 0 to 10 where 0 means "I avoid taking risks" and 10 means "I enjoy taking risks". You may click any number between 0 and 10.' The scale itself is a horizontal line with numbers 0 through 10. Below each number is a small circle with a dot inside, representing a radio button. The number 6 is highlighted with a blue background. To the left of the scale, it says 'I avoid taking risks' and to the right, 'I enjoy taking risks'. Below the scale is a 'Submit Response' button. At the bottom of the page, there is a footer with contact information: 'Phone: 713-548-3191, BRL Email: bri@rice.edu Address: 522 Fondren Library, Rice University Home, Houston, TX 77005'.

Figure B1: Screenshot: Survey Measure from German Socio-Economic Panel (SOEP)

Task 7

In this task you will select, from six different options, the one that you most prefer. The one you choose will determine your payoff for this task.

The six different options are illustrated below: (This is just an illustration, you will make your actual decision later.)

Each option has two possible outcomes, Low or High. For every option, each outcome is equally likely, or has a 50% chance of happening. At the end of the study, the computer will randomly choose a number between 1 and 10. If the number is 1-5, then you will earn the Low payoff; if it is 6-10 you will earn the High payoff.

For example, if you choose option 1, you will receive \$10.00 for sure; if you select option 4 you will earn \$4.00 if the computer draws a number between 1 and 5 and \$22.00 if the computer draws a number between 6 and 10.

Option	Low Payoff	High Payoff
1	\$10.00	\$10.00
2	\$8.00	\$14.00
3	\$6.00	\$18.00
4	\$4.00	\$22.00
5	\$2.00	\$26.00
6	\$0.00	\$28.00

Continue

Figure B2: Instructions for Eckel-Grossman risk instrument

The following questions deal with feelings and emotions that you might have. Please think back to March 1st before the pandemic was a problem for your university.

From March 1st until now, how often have you experienced the following:

	Frequently	Sometimes	Never
Feeling overwhelmed	☐	☒	☐
Feeling lonely	☐	☐	☐
Had difficulty making decisions	☐	☒	☐
Feeling hopeless about the future	☐	☐	☐
Feeling angry	☐	☒	☐
Feeling nervous	☐	☐	☐
Feeling like shouting at people	☐	☐	☐
Feeling fearful	☐	☐	☐
Feeling annoyed by others	☐	☐	☐
Feeling panicked	☐	☐	☐
Feeling sad	☐	☐	☐

← →

Figure B3: Screenshot: Negative Emotions

Please check all of the actions that you are currently doing to try to avoid getting COVID-19 or to avoid giving it to others that you don't normally do:

☐ Stockpiling supplies	☐ Wearing a face mask in public
☐ Reducing in person contact with friends	☐ Ordering items to my home instead of going out to get them
☐ Bringing hand sanitizer when I leave my home	☐ Encouraging others to avoid crowded places or to engage in social distancing
☐ Staying quarantined in my house and leaving only when necessary	☐ Reducing how much I touch my face
☐ Trying to keep a distance of six (6) feet or more from strangers	☐ Avoiding crowded places
☐ Washing my hands more frequently or thoroughly than normal	☐ Covering my mouth whenever I cough using a tissue or my elbow instead of my hand

← →

Figure B4: Screenshot: Precautionary Behaviors

For each of the following statements, please indicate the likelihood that you would engage in the described activity or behavior if you were to find yourself in that situation.

	Very unlikely	Unlikely	Not Sure	Likely	Very likely	No Answer
Drinking heavily at a social function	☐	☐	☐	☐	☐	☐
Engaging in unprotected sex	☐	☐	☐	☐	☐	☐
Driving a car without wearing a seat belt	☐	☐	☐	☐	☐	☐
Riding a motorcycle without a helmet	☐	☐	☐	☐	☐	☐
Sunbathing without sunscreen	☐	☐	☐	☐	☐	☐
Walking home late at night in an unsafe area of town	☐	☐	☐	☐	☐	☐
Hanging out with friends during the next few weeks	☐	☐	☐	☐	☐	☐
Taking public transportation during the next few weeks	☐	☐	☐	☐	☐	☐
Attending a service (such as a church, wedding, or funeral) during the next few weeks	☐	☐	☐	☐	☐	☐
Volunteering at a food bank during the next few weeks	☐	☐	☐	☐	☐	☐
Going to the convenience store to buy something to drink during the next few weeks	☐	☐	☐	☐	☐	☐

← →

Figure B5: Screenshot: Engagement in Risky Behaviors (Wave 4)

For each of the following statements, **please indicate the likelihood** that you would engage in the described activity or behavior if you were to find yourself in that situation.

	Very unlikely	Unlikely	Not Sure	Likely	Very likely
Drinking heavily at a social function	☐	☐	☐	☐	☐
Engaging in unprotected sex	☐	☐	☐	☐	☐
Driving a car without wearing a seat belt	☐	☐	☐	☐	☐
Riding a motorcycle without a helmet	☐	☐	☐	☐	☐
Sunbathing without sunscreen	☐	☐	☐	☐	☐
Walking home late at night in an unsafe area of town	☐	☐	☐	☐	☐
Hanging out with friends during the next few weeks	☐	☐	☐	☐	☐

(a) First Half of Survey Items

For each of the following statements, **please indicate the likelihood** that you would engage in the described activity or behavior if you were to find yourself in that situation.

	Very unlikely	Unlikely	Not Sure	Likely	Very likely
Taking public transportation during the next few weeks	☐	☐	☐	☐	☐
Attending a service (such as a church, wedding, or funeral) during the next few weeks	☐	☐	☐	☐	☐
Going grocery shopping	☐	☐	☐	☐	☐
Visiting with relatives at their home	☐	☐	☐	☐	☐
Visiting with friends at their home	☐	☐	☐	☐	☐
Attending a gathering with 5 or more people	☐	☐	☐	☐	☐
Attending a gathering with 100 or more people	☐	☐	☐	☐	☐

(b) Second Half of Survey Items

Figure B6: Screenshot: Engagement in Risky Behaviors (Wave 7)

C Additional Analysis

We begin by comparing respondents who remained in all parts of the study and those who dropped out by Wave 7 in their first encounter with the measure. For example, in the first rows of Table C1 we compare the normalized value of the lottery choice and the survey choice for those who remained in the panel and those who did not. The same is true for each of the other classes. Aside from respondents in the Class of 2021 for the survey measure, we find no significant differences.

Table C1: Incoming Freshmen: Those in Panel vs. Those Who Attrited

		Panel Mean (SD)	Attrition Mean (SD)	<i>p</i> -value
Class of 2020				
	Lottery	-0.234 (0.080)	-0.125 (0.051)	0.265
	Survey	0.137 (0.076)	0.218 (0.045)	0.357
	N	150	403	
Class of 2021				
	Lottery	-0.067 (.172)	0.212 (0.101)	0.172
	Survey	-0.201 (0.161)	0.407 (0.102)	0.003
	N	29	90	
Class of 2022				
	Lottery	-0.069 (0.167)	-0.137 (0.088)	0.704
	Survey	0.260 (0.165)	0.136 (0.083)	0.462
	N	41	111	
Class of 2023				
	Lottery	0.087 (0.145)	-0.066 (0.097)	0.401
	Survey	0.329 (0.156)	0.446 (0.095)	0.524
	N	39	104	
Untouched Seniors				
	Lottery	0.098 (0.132)	-0.063 (0.077)	0.307
	Survey	0.250 (0.135)	0.121 (0.076)	0.408
	N	61	196	

“Panel” indicates those subjects who participated in all waves of studies, i.e., those that are in the balanced panel; “Attrition” indicates those subjects who dropped out at some point among those studies;

“Untouched Seniors” are a group of students from the Class of 2020 who were excluded from the studies until Wave 3 when they already became senior graduates;

Both the lottery-choice measures and SOEP survey measures are standardized into mean 0 and standard deviation 1 using the data from the whole sample;

p-values are from two-tailed *t*-tests between the “Panel” group and the “Attrition” group.

Table C2 compares samples of the differing entering classes. This is to understand trends that might be due to changes over time. For the incentivized lottery, the Class of 2021 differed from both the Class of 2020 and the Class of 2021. In both instances the Class of 2021 exhibits greater risk seeking.

Table C2: Comparison of Entering Classes using Lottery Choices

	Mean (SD)	N	<i>t</i> -statistic
Class of 2020 and 2021			
Lottery 2020	-0.154 (0.043)	553	
Lottery 2021	0.140 (0.087)	120	-2.906***
Class of 2020 and 2022			
Lottery 2020	-0.154 (0.043)	553	
Lottery 2022	-0.121 (0.078)	154	-0.367
Class of 2020 and 2023			
Lottery 2020	-0.154 (0.043)	553	
Lottery 2023	-0.025 (0.081)	143	-1.371
Class of 2021 and 2022			
Lottery 2021	0.140 (0.087)	120	
Lottery 2022	-0.121 (0.078)	154	2.237***
Class of 2021 and 2023			
Lottery 2021	0.140 (0.087)	120	
Lottery 2023	-0.025 (0.081)	143	1.388
Class of 2022 and 2023			
Lottery 2022	-0.121 (0.078)	154	
Lottery 2023	-0.025 (0.081)	143	-0.857

This table reports *t*-statistics from *t*-tests between different classes of students prior to matriculation;

* $p < .1$, ** $p < .05$, *** $p < .01$.

Table C3 provides similar analysis for the survey measure. Here too we find some differences between the Class of 2023 and the Classes of 2020 and 2022. In both instances the Class of 2023 exhibits a greater willingness to engage in risky behavior.

Table C3: Comparison of Entering Classes using Survey Choices

	Mean (SD)	N	<i>t</i> -statistic
Class of 2020 and 2021			
Survey 2020	0.196 (0.039)	553	
Survey 2021	0.259 (0.089)	119	-0.671
Class of 2020 and 2022			
Survey 2020	0.196 (0.039)	553	
Survey 2022	0.169 (0.081)	152	0.316
Class of 2020 and 2023			
Survey 2020	0.196 (0.039)	553	
Survey 2023	0.414 (0.081)	143	-2.499***
Class of 2021 and 2022			
Survey 2021	0.259 (0.089)	119	
Survey 2022	0.169 (0.081)	152	0.775
Class of 2021 and 2023			
Survey 2021	0.259 (0.089)	119	
Survey 2023	-0.025 (0.081)	143	1.388
Class of 2022 and 2023			
Survey 2022	-0.121 (0.078)	154	
Survey 2023	0.414 (0.081)	143	-1.285

This table reports *t*-statistics from *t*-tests between different classes of students prior to matriculation;

* $p < .1$, ** $p < .05$, *** $p < .01$.

Table C4 compares a sample of subjects who were juniors and seniors in 2016 with our incoming freshmen from the Class of 2020 panel, also sampled in 2016. We find no significant differences between the two samples across either measure.

Table C4: t-test of 2020 Panel in 2020 Spring vs. Class of 2017 in 2016 Fall

	Lottery Choices		SOEP Risk Measure	
	Mean	<i>p</i> -value	Mean	<i>p</i> -value
2020 Panel	-0.221	.068	0.051	0.484
Class of 2017	0.005		0.138	

“2020 Panel” indicates those subjects from the Class of 2020 who participated in all waves of studies, i.e., those that are in the balanced panel.

Table C5 replicates Table 4 in the text. It includes everyone from the Class of 2020 Panel who participated in at least one wave of the study. Here we check to see if panel attrition has an obvious effect on our estimates. It does not. The coefficients here are similar to those in Table 4, with stronger statistical significance reflecting the larger sample size.

Table C5: Panel Regression: Stability of Risk Preferences (Unbalanced Class of 2020)

	DV: Lottery Choice		DV: SOEP Survey Measure	
	(1)	(2)	(3)	(4)
Months From Matriculation	0.005*** (0.001)	0.005*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)
Female	-0.345*** (0.076)	-0.350*** (0.076)	-0.193** (0.075)	-0.184** (0.075)
Female $\times$ Months From Matriculation	-0.005*** (0.002)	-0.005*** (0.002)	-0.002 (0.002)	-0.002 (0.002)
Constant	0.094* (0.056)	0.032 (0.117)	0.220*** (0.055)	0.182 (0.145)
Observations	2067	2067	2573	2573
Individuals	553	553	553	553
Characteristics Controls	No	Yes	No	Yes

This table includes all participants from the Class of 2020 Panel, which is an unbalanced panel; Standard errors clustered at individual level are in parenthesis. * $p < .1$, ** $p < .05$, *** $p < .01$. The dependent variables of Model (1) and (2) are the risk attitude measured by the lottery choice in [Eckel and Grossman \(2008a\)](#), and the dependent variables of Model (3) and (4) are the risk attitude measured by the SOEP survey question. All variables are standardized to mean 0 and standard deviation 1 using the whole sample in all waves.

Individual characteristics controls include race dummies.

Table C6 addresses the question of whether differing time intervals between waves have an unmodeled effect on our estimates. Models 1 and 3 are the original estimates noted in Table 4 of the study. Models 2 and 4 in Table C6 further include a variable, “Months Since Last Survey”. This variable is the time interval between the current and previous waves of studies, accounting for the imbalance in the timing of studies. We find that by adding this variable we see no change across the main coefficients. A different specification of the time trend has no effect on our interpretation.

Table C6: Panel Regression: Stability of Risk Preferences (with Wave Interval Controls)

	DV: Lottery Choice		DV: SOEP Survey Measure	
	(1)	(2)	(3)	(4)
Months From Matriculation	0.004* (0.002)	0.004* (0.002)	-0.004** (0.002)	-0.004** (0.002)
Female	-0.435*** (0.138)	-0.435*** (0.138)	-0.258* (0.145)	-0.258* (0.145)
Female $\times$ Months From Matriculation	-0.004 (0.003)	-0.004 (0.003)	-0.003 (0.002)	-0.003 (0.002)
Months Since Previous Study		-0.002 (0.002)		0.007*** (0.002)
Constant	-0.028 (0.173)	-0.015 (0.176)	0.685* (0.363)	0.638* (0.365)
Observations	749	749	1050	1050
Individuals	150	150	150	150
Characteristics Controls	Yes	Yes	Yes	Yes

This table includes the balanced panel of Class of 2020;

Standard errors clustered at individual level are in parenthesis. * $p < .1$, ** $p < .05$, *** $p < .01$.

The dependent variable of Model (1) is the risk attitude measured by the lottery choice in [Eckel and Grossman \(2008a\)](#), and the dependent variable of Model (2) is the risk attitude measured by the SOEP survey question. All variables are standardized to mean 0 and standard deviation 1 using the whole sample in all waves.

“Months Since Previous Study” is the month intervals between the current wave of study and the previous wave of study;

Individual characteristics controls include race dummies.

Table C7 looks at those participants in the study prior to the onset of Covid-19. It includes all members of the Class of 2020 who participated in both Waves 1 and 2 of the study. Again we find similar patterns in our parameter estimates.

Table C7: Panel Regression: Stability of Risk Preferences Before COVID-19 Pandemic

	DV: Lottery Choice	DV: Survey Measure
	(1)	(2)
Months From Matriculation	0.016*** (0.005)	-0.009** (0.004)
Female	-0.389*** (0.087)	-0.147* (0.081)
Female $\times$ Months From Matriculation	0.001 (0.007)	-0.018*** (0.005)
Constant	-0.147 (0.132)	0.124 (0.180)
Observations	978	978
Individuals	489	489
Characteristics Controls	Yes	Yes

This table includes subjects from the Class of 2020 who participated in both Wave 1 and Wave 2 studies;

Standard errors clustered at individual level are in parenthesis. * $p < .1$, ** $p < .05$, *** $p < .01$.

The dependent variable of Model (1) is the risk attitude measured by the lottery choice and the dependent variable of Model (2) is measured by the survey question. All variables are standardized to mean 0 and standard deviation 1 using the whole sample in all waves.

“Months Since Previous Study” is the month intervals between the previous wave of study and the current wave of study;

Individual characteristics controls include race dummies.

Table C8 replicates Table 6 in the text. It is used as a robustness check for our panel. It looks at the variation in Covid-19 rates across the United States and asks how it affects our two risk measures. In this table we have boosted our sample size by using everyone who participated in the study at any point.

Table C8: Panel Regressions: Impact of COVID-19 Positive Cases on Risk Attitudes (Unbalanced Class of 2020)

	DV: Lottery Choice			DV: Survey Measure		
	(1)	(2)	(3)	(4)	(5)	(6)
Months From Matriculation	0.005*** (0.002)	0.005*** (0.002)	0.005*** (0.002)	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)
Female	-0.346*** (0.076)	-0.345*** (0.076)	-0.349*** (0.076)	-0.191** (0.075)	-0.192** (0.075)	-0.181** (0.075)
Female $\times$ Months From Matriculation	-0.005*** (0.002)	-0.006*** (0.002)	-0.006*** (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)
7-D pp INC in Positivity Rate	0.109 (0.648)	-0.069 (0.738)	-0.109 (0.718)	-0.449*** (0.141)	-0.435** (0.191)	-0.438** (0.190)
Female $\times$ 7-D pp INC in Positivity Rate		0.743 (1.337)	0.739 (1.321)		-0.029 (0.282)	-0.023 (0.281)
Constant	0.095* (0.056)	0.095* (0.056)	0.030 (0.117)	0.217*** (0.055)	0.217*** (0.055)	0.183 (0.143)
Observations	2044	2044	2044	2526	2526	2526
Individuals	553	553	553	553	553	553
Characteristics Controls	No	No	Yes	No	No	Yes

This table includes all participants from the Class of 2020, which is an unbalanced panel;

Standard errors clustered at individual level are in parenthesis. * $p < .1$, ** $p < .05$, *** $p < .01$;

The dependent variables of Model (1) and (2) are the risk attitude measured by the lottery choice and the dependent variables of Model (3) and (4) are measured by the survey question. All variables are standardized to mean 0 and standard deviation 1;

Individual characteristics controls include race dummies.

Table C9 takes a slightly different tack. Here we use the sample of subjects who are in our panel. Instead of using the weekly average of reported Covid-19 cases, we look at monthly averages. If we assume that respondents are attuned to changes that happen over a longer than shorter period of time, then it might affect our estimates. It does not – our estimates are consistent with those we find in Table 6 in the text.

Table C9: Panel Regressions: Impact of COVID-19 Positive Cases on Risk Attitudes

	DV: Lottery Choice			DV: Survey Measure		
	(1)	(2)	(3)	(4)	(5)	(6)
Months From Matriculation	0.004 (0.002)	0.004 (0.003)	0.004 (0.003)	-0.003 (0.002)	-0.003 (0.002)	-0.003 (0.002)
Female	-0.441*** (0.139)	-0.437*** (0.139)	-0.436*** (0.138)	-0.237 (0.145)	-0.236 (0.145)	-0.249* (0.145)
Female $\times$ Months From Matriculation	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.003 (0.002)	-0.003 (0.002)	-0.003 (0.002)
30-D pp INC in Positivity Rate	0.112 (0.302)	0.035 (0.348)	0.025 (0.350)	-0.154*** (0.050)	-0.177** (0.076)	-0.177** (0.076)
Female $\times$ 30-D pp INC in Positivity Rate		0.294 (0.564)	0.293 (0.570)		0.044 (0.101)	0.043 (0.101)
Constant	0.063 (0.107)	0.062 (0.107)	0.020 (0.182)	0.175 (0.115)	0.174 (0.116)	0.677* (0.370)
Observations	719	719	719	1009	1009	1009
Individuals	150	150	150	150	150	150
Characteristics Controls	No	No	Yes	No	No	Yes

Standard errors clustered at individual level are in parenthesis. * $p < .1$, ** $p < .05$, *** $p < .01$.

The dependent variables of Model (1) and (2) are the risk attitude measured by the lottery choice and the dependent variables of Model (3) and (4) are measured by the survey question. All variables are standardized to mean 0 and standard deviation 1.

Individual characteristics controls include race dummies.

Table C10 checks the robustness of Table 7 in the text. Here we add respondents who participated but were not part of the panel. The negative impact of Sadness and Fear on the risk attitude measured by the survey question is more robust in our sample, while the positive impact of Anger and Hostility found in the 2020 Panel loses significance.

Table C10: Panel Regressions: Impact of Negative Emotion on Risk Tolerance (Unbalanced Class of 2020)

	DV: Lottery Choice		DV: SOEP Survey Measure	
	(1)	(2)	(3)	(4)
Female	-0.547*** (0.087)	-0.555*** (0.086)	-0.242*** (0.086)	-0.241*** (0.087)
Sadness and Fear	-0.062 (0.061)	-0.074 (0.060)	-0.133** (0.057)	-0.132** (0.057)
Female $\times$ Sadness and Fear	0.043 (0.079)	0.057 (0.078)	0.110 (0.070)	0.107 (0.070)
Anger and Hostility	-0.048 (0.074)	-0.051 (0.073)	0.072 (0.061)	0.073 (0.062)
Female $\times$ Anger and Hostility	0.091 (0.103)	0.090 (0.103)	-0.082 (0.071)	-0.086 (0.072)
Constant	0.328*** (0.070)	0.456*** (0.154)	-0.057 (0.066)	0.131 (0.204)
Observations	621	621	1124	1124
Individuals	410	410	427	427
Characteristics Controls	No	Yes	No	Yes

This table includes all participants from the Class of 2020, which is an unbalanced panel; Standard errors clustered at individual level are in parenthesis. * $p < .1$, ** $p < .05$, *** $p < .01$; The dependent variables of Model (1) and (2) are the risk attitude measured by the lottery choice in [Eckel and Grossman \(2008a\)](#), and the dependent variables of Model (3) and (4) are the risk attitude measured by the SOEP survey question. All variables are standardized to mean 0 and standard deviation 1;

The variables “Sadness and Fear” and “Anger and Hostility” are the two factor scores from the factor analysis over subjects’ responses to the questions on frequencies of 10 different negative emotions;

Model (1) and (2) includes data from Waves 4 and 7, because we did not include the lottery choice task in Waves 5 or 6. Model (3) and (4) includes data from Waves 4, 5, 6, and 7, as we collected the survey risk measure for all these waves;

Individual characteristics controls include race dummies.

Table C11 also checks the robustness of Table 7, but with respect to the coding of the emotion variables. To address concerns about the use of ordinal categorical variables as continuous explanatory variables, we first recode the 11 emotion survey items to create binary indicators that take a value of 1 if participants responded “Frequently” or “Sometimes” and 0 if “Never.” We then perform confirmatory factor analysis with varimax rotation, as with the original items. Consistent with the factor analysis results in the main text, we obtain two factors which load on the same questions: Sadness and Fear, and Anger and Hostility.

Next, we re-run the regressions from Table 7 using these two factor scores, with results reported in Table C11. Consistent with the main findings, neither negative emotion factor predicts risk tolerance as measured by the lottery-choice task. However, for risk tolerance as measured by the non-incentivized survey question, higher levels of Sadness and Fear are associated with lower risk tolerance. The coefficient for Anger and Hostility is positive but not statistically significant, aligning with Table C10 and suggesting that its relationship with risk tolerance is not robust.

As an additional robustness check, we also retest this result, coding the negative emotion items by assigning a value of 1 if participants responded “Frequently” and 0 otherwise. Replicating Table C11 with this alternative coding yields consistent results.

Table C11: Panel Regressions: Impact of Negative Emotions on Risk Tolerance (Factor Scores from Binary-Scored Negative Emotion Items)

	DV: Lottery Choice		DV: Survey Measure	
	(1)	(2)	(3)	(4)
Female	-0.547*** (0.131)	-0.534*** (0.132)	-0.295** (0.136)	-0.317** (0.136)
Sadness and Fear	-0.072 (0.090)	-0.086 (0.091)	-0.206*** (0.071)	-0.199*** (0.072)
Female $\times$ Sadness and Fear	-0.040 (0.124)	-0.015 (0.125)	0.177** (0.085)	0.166* (0.086)
Anger and Hostility	-0.000 (0.113)	-0.004 (0.126)	0.052 (0.055)	0.051 (0.056)
Female $\times$ Anger and Hostility	-0.032 (0.152)	-0.017 (0.162)	-0.099 (0.069)	-0.100 (0.070)
Constant	0.235** (0.113)	0.177 (0.207)	-0.110 (0.114)	0.393 (0.364)
Observations	300	300	600	600
Individuals	150	150	150	150
Characteristics Controls	No	Yes	No	Yes

This table includes the 2020 Panelists who participated in all waves of studies; “Sadness and Fear” and “Anger and Hostility” in this table are factors generated through the following way: we generate 11 negative emotion indicators from the 11 negative emotion items, receiving value 1 if participants responded “Sometimes” or “Frequently” and value 0 if “Never”; then we use confirmatory factor analysis with a varimax rotation to create two factors aggregating those items, referred as “Sadness and Fear” and “Anger and Hostility” respectively;

Standard errors clustered at individual level are in parenthesis. * $p < .1$, ** $p < .05$, *** $p < .01$;

The dependent variables of Model (1) and (2) are the risk attitude measured by the lottery choice in [Eckel and Grossman \(2008a\)](#), and the dependent variables of Model (3) and (4) are the risk attitude measured by the SOEP survey question. All variables are standardized to mean 0 and standard deviation 1;

Model (1) and (2) includes data from Waves 4 and 7, because we did not include the lottery choice task in Waves 5 or 6. Model (3) and (4) includes data from Waves 4, 5, 6, and 7, as we collected the survey risk measure for all these waves;

Individual characteristics controls include race dummies.

Table C12 is a robustness check of Table 9 by including respondents who participated but were not part of the panel. The negative association between the SOEP survey measure and the Precautionary Behavior Index in Wave 7 is consistent with the finding in Table 9. We also find positive correlation between the survey measure and the Regular Hazardous Behavior Index for both waves, with effect sizes comparable to those in Table 9. The only noticeable difference between this table and the main result table is in Panel C, column (3), where higher risk tolerance measured by the survey question is associated with an increase in the Pandemic-Related Hazardous Behavior Index – a result not found in the main table. However, this positive association disappears after applying the ORIV approach in column (4), indicating that the correlation is not robust.

Table C12: Predictive Power of Risk Measures on Precautionary and Hazardous Behaviors (Unbalanced Class of 2020)

	Wave 4 (April 2020)				Wave 7 (June 2021)			
	(1) OLS	(2) ORIV	(3) OLS	(4) ORIV	(5) OLS	(6) ORIV	(7) OLS	(8) ORIV
Panel A: DV: Precautionary Behavior Index								
Lottery Choice	0.001 (0.009)	-0.001 (0.020)			-0.044** (0.018)	-0.023 (0.043)		
Survey Measure			0.003 (0.009)	0.023* (0.014)			-0.046*** (0.015)	-0.053* (0.028)
Female	0.043** (0.018)	0.043** (0.021)	0.044** (0.017)	0.050*** (0.018)	0.067* (0.034)	0.081* (0.042)	0.082** (0.033)	0.080** (0.034)
Constant	0.654*** (0.054)	0.654*** (0.054)	0.653*** (0.054)	0.650*** (0.053)	0.503*** (0.099)	0.492*** (0.112)	0.491*** (0.103)	0.505*** (0.116)
Panel B: DV: Regular Hazardous Behavior Index								
Lottery Choice	0.073** (0.035)	0.176** (0.081)			0.064 (0.051)	-0.014 (0.099)		
SOEP Survey Measure			0.252*** (0.033)	0.296*** (0.054)			0.138*** (0.049)	0.161** (0.067)
Female	-0.057 (0.068)	0.006 (0.079)	-0.038 (0.064)	-0.023 (0.063)	0.001 (0.092)	-0.058 (0.099)	-0.002 (0.084)	-0.004 (0.085)
Constant	2.102*** (0.167)	2.055*** (0.163)	2.104*** (0.159)	2.096*** (0.156)	1.914*** (0.115)	1.947*** (0.129)	1.917*** (0.137)	1.865*** (0.150)
Panel C: DV: Pandemic-Related Hazardous Behavior Index								
Lottery Choice	0.027 (0.037)	0.106 (0.078)			-0.031 (0.067)	-0.073 (0.162)		
SOEP Survey Measure			0.128*** (0.033)	0.088* (0.050)			-0.022 (0.062)	-0.086 (0.097)
Female	-0.148** (0.061)	-0.101 (0.070)	-0.134** (0.061)	-0.144** (0.061)	0.032 (0.121)	-0.035 (0.149)	0.045 (0.120)	-0.013 (0.121)
Constant	2.020*** (0.220)	1.984*** (0.211)	2.017*** (0.208)	2.022*** (0.211)	3.019*** (0.355)	3.173*** (0.382)	3.008*** (0.356)	3.175*** (0.383)
Individuals	400	399	402	401	221	211	221	211
Characteristics Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors clustered are in parenthesis. * $p < .1$, ** $p < .05$, *** $p < .01$.

The variable Survey Measure is the risk tolerance measured by the survey question; the variable Lottery Choice is the risk tolerance measured by the lottery choice. Both measures are standardized to mean 0 and standard deviation 1.

Individual characteristics controls include race dummies.

Table C13 reports the descriptive statistics for the two binary-coded hazardous behavior indices. The regular hazardous and the pandemic-related hazardous behaviors both are based on a five-point Likert scale. We recode these items into binary variables equal to 1 if respondents choose “Likely” or “Very likely” and 0 if otherwise, indicating engagement in risky behaviors. We then compute two indices by averaging the binarized items: one for regular hazardous behaviors and another for pandemic-related behaviors. The table shows that both indices differ significantly between Wave 4 and Wave 7. Regular hazardous behaviors increased over time, while pandemic-related hazardous behaviors declined, as subjects learned more about the risks of specific behaviors. These results reinforce those in Table 8 in the manuscript.

Table C13: Descriptive Statistics of Binarized Hazardous Behavior Indices (2020 Panelists)

	Wave 4 (April 2020)	Wave 7 (June 2021)	<i>p</i> -values from <i>t</i> -tests
Binarized Regular Hazardous Behavior Index	0.192 (0.197)	0.224 (0.304)	<0.01
Binarized Pandemic-Related Hazardous Behavior Index	0.188 (0.192)	0.051 (0.121)	<0.001
Individuals	150	150	

This table contains the descriptive statistics of two binarized hazardous behavior indices for the 2020 Panelists who participated in all 7 studies (n=150);

In this table, the two binarized indices are coded as follows: for each hazardous behavior item, we generate a binary indicator that takes value 1 if respondent chooses “Likely” or “Very likely” and 0 if otherwise; then we take averages to generate the two indices, one includes regular hazardous behaviors (see items in Figure B5) and another includes pandemic related hazardous behaviors (see items in Figure B6).

Within each cell with two values, the top value is the mean, and the bottom value in the parenthesis is the standard deviation;

The last column presents the *p*-values from paired *t*-tests that compare Wave 4 and Wave 7 for each index.

Table C14 re-produces the results of Panels B and C in Table 9 using the recoded versions of the Regular and Pandemic-Related Hazardous Behavior Indexes as described in Table C13. Similar to the results in Panel B of Table 9, the increased risk tolerance measured by the survey measure predicts increased regular hazardous behavior in both Waves 4 and 7, while the lottery choice measure does not provide robust predictions for this index. For the pandemic-related hazardous behavior index, the survey measure is positively associated with the index in Wave 4 (Model 3), but this relationship loses statistical significance after applying the ORIV method (Model 4). As a result, neither risk measure predicts pandemic-related hazardous behavior, aligning with the findings in Table 9.

Table C14: Predictive Power of Risk aversion Measures on Hazardous Behavior Indices (Binary-Coded Items)

	Wave 4 (April 2020)				Wave 7 (June 2021)			
	(1) OLS	(2) ORIV	(3) OLS	(4) ORIV	(5) OLS	(6) ORIV	(7) OLS	(8) ORIV
Panel A: DV: Binarized Regular Hazardous Behavior Index								
Lottery Choice	0.024 (0.019)	0.122* (0.063)			0.016 (0.016)	-0.000 (0.037)		
SOEP Survey Measure			0.065*** (0.018)	0.091*** (0.022)			0.030* (0.016)	0.043* (0.023)
Female	0.022 (0.032)	0.072 (0.047)	0.033 (0.031)	0.042 (0.030)	-0.010 (0.032)	-0.019 (0.038)	-0.010 (0.031)	-0.006 (0.030)
Constant	0.123*** (0.044)	0.143*** (0.053)	0.088 (0.060)	0.077 (0.066)	0.129** (0.051)	0.140*** (0.054)	0.134** (0.056)	0.132** (0.058)
Panel B: DV: Binarized Pandemic-Related Hazardous Behavior Index								
Lottery Choice	0.002 (0.011)	-0.029 (0.030)			0.015 (0.024)	0.043 (0.064)		
SOEP Survey Measure			0.026** (0.013)	0.019 (0.016)			0.014 (0.023)	0.045 (0.038)
Female	-0.028 (0.021)	-0.043 (0.029)	-0.019 (0.021)	-0.022 (0.021)	0.028 (0.048)	0.045 (0.061)	0.024 (0.047)	0.033 (0.047)
Constant	0.188** (0.083)	0.182** (0.084)	0.176** (0.081)	0.180** (0.080)	0.393*** (0.083)	0.375*** (0.094)	0.400*** (0.083)	0.394*** (0.088)
Individuals	150	150	150	150	150	150	150	150
Characteristics Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

In this table, the two indices as dependent variables are constructed from binarized hazardous behaviors, as described in Table C13;

Analysis in this table includes data from the 2020 Panelists who participated in all 7 studies (n = 150);

Robust standard errors clustered are in parenthesis. * $p < .1$, ** $p < .05$, *** $p < .01$.

The variable Survey Measure is the risk tolerance measured by the survey question; the variable Lottery Choice is the risk tolerance measured by the lottery choice. Both measures are standardized to mean 0 and standard deviation 1.

Individual characteristics controls include race dummies.

References

- Eckel, C., Sinha, N., and Wilson, R. (2023a). The evolution of preferences and charitable giving: a panel study of the university years. *Oxford Economic Papers*, 75(4):1073–1092.
- Eckel, C., Wilson, R. K., and Youn, S. (2024). Eager beavers v. lazy slugs: selection effects in experiments with social preferences. *Journal of the Economic Science Association*, pages 1–9.
- Eckel, C. C. and Grossman, P. J. (2008a). Forecasting risk attitudes: An experimental study using actual and forecast gamble choices. *Journal of Economic Behavior & Organization*, 68(1):1–17.
- Eckel, C. C. and Grossman, P. J. (2008b). Men, women and risk aversion: Experimental evidence. *Handbook of Experimental Economics Results*, 1:1061–1073.
- Eckel, C. C., Hoover, H. G., Krupka, E. L., Sinha, N., and Wilson, R. K. (2023b). Using social norms to explain giving behavior. *Experimental Economics*, 26(5):1115–1141.
- Eckel, C. C., Wilson, R. K., and Youn, S. (2022). In-group favoritism in natural and minimal groups. *Economics Letters*, 219:110794.
- Falk, A., Becker, A., Dohmen, T., Huffman, D., and Sunde, U. (2023). The preference survey module: A validated instrument for measuring risk, time, and social preferences. *Management Science*, 69(4):1935–1950.
- Gneezy, U. and Potters, J. (1997). An experiment on risk taking and evaluation periods. *The Quarterly Journal of Economics*, 112(2):631–645.
- Holt, C. A. and Laury, S. K. (2002). Risk aversion and incentive effects. *American Economic Review*, 92(5):1644–1655.
- Krupka, E., Hoover, H., Eckel, C., Rosenblat, T., Ojumu, O., and Wilson, R. K. (2023). Multiple social identities cloud norm perception: Responses to covid-19 among university aged republicans and democrats. *Frontiers in Behavioral Economics*, 2:1205873.
- Lejuez, C. W., Read, J. P., Kahler, C. W., Richards, J. B., Ramsey, S. E., Stuart, G. L., Strong, D. R., and Brown, R. A. (2002). Evaluation of a behavioral measure of risk taking: the balloon analogue risk task (bart). *Journal of Experimental Psychology: Applied*, 8(2):75.

- Niederle, M. and Vesterlund, L. (2007). Do women shy away from competition? do men compete too much? *The Quarterly Journal of Economics*, 122(3):1067–1101.
- Weber, E. U., Blais, A.-R., and Betz, N. E. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of behavioral decision making*, 15(4):263–290.