ISSN 22799362

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No. 730
December 2024

Carlo Alberto Notebooks

www.carloalberto.org/research/workingpapers

Are Anti-Vaxxers Anti-Social? How Convictions Shape Prosocial Behavior and Vaccination Decisions*

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December 12, 2024

Abstract

We identify a "truncated U-shape" relationship between pro-social behavior and Covid-19 vaccination status. Non-vaxxers display the highest pro-sociality, partially vaccinated individuals the lowest, and fully vaccinated individuals lie in between. This pattern is interpreted as a reflection of the effect of personal convictions on vaccination decisions and pro-social behavior. Our key insights are incorporated in a model where the likelihood of actions aligning with preferences depends on the strength of convictions, which is heterogeneous across individuals. Our findings illuminate the complex interplay between preferences and actions in socially relevant contexts.

Keywords: Altruism, Trust, Trustworthiness, Covid-19, Experiment, Convictions.
JEL Codes: D63, C91, I12

*We would like to thank Mariana Blanco, Alexander Cappelen, Nisvan Erkal, Urs Fischbacher, Ori Heffetz, Joshua Miller, Pietro Ortoleva, Siqi Pan, Marco Piovesan, Simone Quercia, Maria Recalde, Petros Sekeris, Agnieszka Tymula, and Tom Wilkening for helpful comments and discussions.
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1 Introduction

During the Covid-19 pandemic, vaccination was widely perceived as a pro-social act, with vaccinated individuals contributing to public health by slowing down the spread of the virus and thereby protecting others from infection. Therefore, it seems natural to expect individual measures of pro-sociality to increase with the number of vaccinations against Covid-19. In this paper we show that the relationship between pro-sociality and the number of vaccinations is, in fact, non-monotonic. We attribute this finding to individuals' convictions, i.e., to their ability to stand up for their preferences and inner beliefs.

In October 2022, we sent two separate online questionnaires to a large representative sample of the Israeli adult population. In the first questionnaire, we collected information regarding the number of vaccinations, number of infections with Covid-19 and reasons for vaccinating or for not doing so. In the second questionnaire, sent out roughly ten days after the first and in a completely unrelated manner, participants were asked to play the Dictator Game (DG) and the Trust Game (TG) in both roles.

A total of 1992 participants completed the first questionnaire, with 1562 following up and completing the second. Among them, some were non-vaccinated, most were fully vaccinated with at least three doses (the third being a booster), and the remainder received one or two doses and are therefore considered partially vaccinated. We observe a statistically significant pattern that we term a *truncated U-shape*: Non-vaxxers exhibit the highest levels of pro-social behavior, partially vaccinated show the lowest levels, and fully vaccinated fall between these two groups. This pattern remains consistent even when accounting for potential confounders.

To explain this pattern, we propose that an individual's vaccination status by the end of the pandemic reflects not only vaccine-related preferences but also information regarding the strength of the individual's convictions.[1] Convictions—the ability to overcome costs in order to follow one's preferences—is an individual trait that is likely to influence behavior across various contexts, but so far has been largely overlooked in the economics literature. This trait, we claim, influences not only the decision to vaccinate, but also the amounts transferred in the DG and the TG, and thus lends itself as a potential underlying mechanism that may elucidate our findings. Broadly speaking, convictions are expected to influence behavior in any situation where individuals must exert effort or incur costs to uphold their inner beliefs, ideals, and intentions—for example, in social activism, whistle-blowing on unethical practices, and engaging in voluntary activities. For many individuals, such circumstances generate a gap between their preferences and their actions, whereas others, with stronger convictions, are able to maintain consistency between the two.[2]

[1]We thank Alexander Cappelen for suggesting this potential mechanism.

[2]This type of consistency, referred to as *attitude-behavior consistency* in the psychology literature, describes the alignment of intentions and actions under the theory of planned behavior (Ajzen and Fishbein, 1977; Ajzen, 1991). It has also been shown to be economically relevant in environmental contexts (Gilg and Barr, 2006; Ghani et al., 2013; Wolters, 2014) and tax compliance (Guerra and Harrington, 2018).

The channel through which convictions shape individuals' vaccination status is as follows. The decision to vaccinate against Covid-19 by the end of the pandemic comprises two elements: preferences ("pro-vaccine" or "anti-vaccine") and convictions. Those who hold a preference favoring vaccination (pro-vaccine) are bound to follow their preference and vaccinate. This is not only due to their preference for the vaccine, but also because the costs of not vaccinating—such as governmental restrictions and social stigma—outweigh the costs of getting vaccinated. Thus, given that external societal pressures align with their preferences, the vaccination decision of pro-vaccine individuals does not reveal information regarding their strength of convictions. Consequently, we expect their average level of convictions to be roughly equal to the average in the population. Anti-vaccine individuals, on the other hand, incurred higher costs in following their preferences. The stigma attached to non-vaxxers is one example of a potential cost. The risk of losing one's job or being denied access to public spaces is another. In other words, external societal pressures conflict with their preferences. Under these circumstances, anti-vaccine individuals with weak convictions may have opted to vaccinate despite their preference to do the contrary. Some of these individuals were likely to vaccinate partially, if only to avoid societal pressure and a negative stigma. Others, specifically those with stronger convictions, were less likely to move away from their preferred course of action and consequently remained non-vaccinated until the end of the pandemic despite the associated costs. In other words, the vaccination decision of anti-vaccine individuals provides us with information regarding the strength of their convictions.

While the relationship between convictions and the vaccination status at the end of the pandemic seems quite straightforward, the link between convictions and pro-social behavior in our experimental games is perhaps slightly more subtle. Similarly to the decision to vaccinate, we claim that the decision regarding how much to transfer in the DG and TG also comprises the same two elements: preferences, which reflect the level of "pure pro-sociality" (how much one thinks should be transferred) and convictions (one's willingness to incur the material cost in order to actually transfer that amount). Throughout the years, many studies (from Forsythe et al., 1994 to Kurschilgen, 2023 and Bašić and Verrina, 2024; see Section 4.4) have documented a gap between the amount that individuals believe should be given (or give in a hypothetical scenario) in the DG and similar games, and what many of them actually give when real stakes are involved. This gap highlights the difficulty some individuals face in following their intentions and is indicative of the role of convictions in shaping behavior in these games. Furthermore, an equal split in the DG is widely regarded as the most appropriate action (Bicchieri, 2006; Capraro and Rand, 2018; Bašić and Verrina, 2024). The strong preference for an equal split, along with the documented heterogeneity in actual giving and the gap observed in the literature, suggests that convictions may substantially influence transfers in our experimental games.

Thus, we propose that convictions is the underlying individual trait that explains the non-monotonic relationship between pro-sociality and the number of vaccinations. The non-vaxxers are anti-vaccine individuals with strong convictions. Their strong convictions, which are above the average in society, are also reflected in higher than average transfers in the DG and TG. Partially vaccinated individuals are likely anti-vaxxers, as otherwise they would have opted for full vaccination. Their decision to partially vaccinate, despite their preference against the vaccine, reflects their inability to align their actions with their preferences, i.e., it suggests that they have weak convictions. These weak convictions are mirrored in their low transfers in the experimental games. Finally, the fully vaccinated group comprise mostly pro-vaccine individuals, with an average level of convictions that is equal to the population mean. Thus, their average strength of convictions falls between that of the non-vaxxers and partially vaccinated, and so do their transfer levels in the experimental games.

We provide further support for the underlying channel of convictions by leveraging the richness of our data. We start by focusing on the group of partially- and fully-vaccinated individuals who reported vaccinating due to external pressure. Their admission of vaccinating due to pressure reveals anti-vaccine preferences, so we categorize them—alongside those who reported not vaccinating for reasons that are not purely health related—as "admittedly anti-vaccine." Following the convictions-based mechanism, we predict a monotonically decreasing pattern of average transfers for these individuals along the vaccination status: Due to their anti-vaccine stance, those who received more vaccination doses are predicted to have weaker convictions, which should be reflected in lower transfers in the experimental games. This prediction is indeed confirmed by the data. Next, we focus on the partially vaccinated group, who are likely anti-vaccine based on their "interim" vaccination status. We divide them into two subgroups based on whether they reported vaccinating due to pressure. Since both groups are likely anti-vaccine, those who yielded to external pressure might not have done so if they hadn't encountered it. Hence, it is anticipated that, on average, they would hold stronger convictions compared to those who attained the same vaccination status without encountering such external pressures. We find that, indeed, those who partially vaccinated due to external pressure have, on average, higher transfers than those who reached the same vaccination status without referring to such pressure. Finally, we shift our attention to the non-vaxxers and order their explanations for not vaccinating according to their level of anti-vaccine sentiment. We predict (and, once again, confirm) that those who indicated more ideologically-motivated reasons for not vaccinating have higher average transfers than those who mentioned health-related concerns.

Our results may seem to challenge findings from previous studies that have shown a positive association between adherence to Covid-19 guidelines (including early vaccine adoption) and pro-social tendencies. We describe these studies and their relationship to ours in the next section. Despite the seemingly contradicting results, we believe that our findings actually complement the earlier ones when one considers the timing of the studies: Earlier studies were conducted in the initial stages of the pandemic while ours was held in late 2022 when the pandemic was already in its final phases. The link between convictions and vaccination status is only meaningful after the stigma surrounding non-vaccination and the pressure related to the decision not to vaccinate have consolidated and influenced the decisions of those who oppose the vaccine. Consequently, convictions were likely to play a role when we collected our data, but not during the period when the studies on adherence to Covid-19 guidelines and early adoption of the vaccine were conducted.

The paper proceeds as follows. Section 2 reviews the related literature. In section 3 we describe the experimental design and section 4 reports the results. In section 5 we lay out a formal model, tying together preferences, convictions and vaccination decisions. Section 6 concludes.

2 Related Literature

There are several studies that examine the relationship between pro-social and civic behavior on the one hand, and compliance with preventive measures against Covid-19 on the other hand. Most of these studies were conducted at the country/regional level and were held before the vaccine was available for distribution.

Bartscher et al. (2021) explored the correlation between civic capital, measured by voter turnout, and health outcomes during the Covid-19 pandemic. Their findings revealed that higher levels of this form of civic capital are associated with a lower number of Covid-19 cases per capita and a decrease in excess deaths caused by the disease. Barrios et al. (2021) and Goldstein and Wiedemann (2022) examined a similar type of civic capital and discovered a positive correlation with reduced physical mobility and increased levels of social distancing during the pandemic, i.e., with higher compliance with national authorities' recommendations. Barrios et al. (2021) also utilized a self-reported measure of trust in others, obtained through a non-incentivized survey question, as an alternative proxy of civic capital. Their findings revealed a positive correlation between this trust measure and social distancing.

Still prior to vaccine distribution but somewhat closer to our work, is the research conducted by Campos-Mercade et al. (2021), Fang et al. (2022) and Sternberg et al. (2024), which examine correlations at the individual level between pro-sociality and adherence with Covid-19 preventive behaviors. Campos-Mercade et al. (2021) use an incentivized experimental game that builds on the dictator game and find that one's willingness to risk the endowment of another person for their own financial benefit is negatively correlated with wearing a mask, washing hands and avoiding social contact. Fang et al. (2022) use experimentally validated survey questions based on Falk et al. (2023) and find that individuals who express higher pro-sociality in the survey have higher compliance rates with public health recommendations during the pandemic. Sternberg et al. (2024) follow a similar methodology, but their measure of pro-sociality is a weighted average of an incentivized donation decision and experimentally validated survey questions. They also find a positive correlation between pro-sociality and compliance with preventive measures, but the correlation loses its statistical significance after adding socio-demographic controls.

We are aware of three experimental studies relating social preferences at the individual level to the decision to vaccinate against Covid-19. The first two are Reddinger et al. (2022) and Basili et al. (2022), who examine the behavior of vaxxers and non-vaxxers in the public goods game (PGG) in the USA and Italy, respectively. Both of these studies collected data in 2021, shortly after the vaccine was introduced and distributed in those countries. The general finding in both studies is that those who got vaccinated in the very early stages of vaccine dissemination tend to contribute more than others in the PGG. The third paper, Sasaki and Kurokawa (2022), employs the DG, the same game that we use as our first measure. While they focus on in-group bias, they also report no statistically significant gap in DG giving between vaccinated and non-vaccinated individuals when the recipient in the game is anonymous. Their data was gathered in Japan in February 2022, placing it chronologically between the earlier data collection of Reddinger et al. (2022) and Basili et al. (2022), and our own later data collection.

We believe the time dimension is key to understanding the seemingly inconsistent results across studies. The first two studies focused on the decision to adopt the vaccine early. Individuals who were non-vaccinated in those studies may have planned to vaccinate but felt no urgency and, importantly, had not yet encountered substantial external pressures to do so. These pressures intensified over the course of the pandemic and were stronger during the period in which the study was run in Japan by Sasaki and Kurokawa (2022). By the time our study was conducted, these pressures have peaked. Therefore, individuals who were non-vaccinated in earlier studies may have become partially or fully vaccinated when the later studies were conducted. In other words, non-vaxxers in our study had had ample time to deliberate their decision. They steadfastly clung to their decision to decline the vaccine despite facing various external influences, such as social stigma and pressure from their workplace and the government throughout the years 2021 and 2022. This "clinging" exhibited by the persistent non-vaxxers plays a crucial role in our interpretation of the results through the channel of convictions. Furthermore, at the time of data collection for the earlier studies, distinguishing between partial and full vaccination was nearly impossible. By contrast, the timing of our study allows us to make this distinction by looking at the exact number of vaccine doses that participants received, enabling us to dig deeper into the convictions-based mechanism.[3]

Another notable distinction between our study and those held in the USA and Italy lies in the setup used for testing social preferences. While those studies use the PGG to simulate the decision-making process akin to individuals' choices regarding vaccination during the

[3]The data presented in Sasaki and Kurokawa (2022) also provides support for the conviction-based mechanism. See Section 5 for details.

pandemic, our approach differs.[4] Rather than attempting to mirror the vaccination decision experimentally, we measure individuals' transfers in the DG and TG, which are arguably the simplest games that measure pro-sociality (see e.g. Belot et al., 2010) and have been regarded by Chapman et al. (2023) as measuring "generosity in behaviors that directly reflect the well being of others." We explore the correlation between the three main facets of this generosity trait—altruism, trust and trustworthiness—and the decision to receive the Covid-19 vaccination.[5]

3 Experiment

The experiment consisted of two questionnaires, distributed to the same participant pool in October 2022, with an interval of approximately ten days between them. The questionnaires were distributed to a representative sample of the Israeli adult population through Panel4All, a large Israeli panel company. Both questionnaires appear in appendix E.

In the first questionnaire, participants were asked different questions related to Covid-19: Did you receive vaccination against Covid-19 and, if so, how many times? Were you ever infected with Covid-19 and, if so, how many times? In addition, those who reported not getting vaccinated were asked for the reason for refraining from doing so. They were given four possible options that included: "not being convinced of the vaccine's effectiveness," "not being bothered by the risk of contracting the disease," "being concerned about side effects," and "health reasons". They could also choose "other" in which case they were provided with space to elaborate on their reason. Those who indicated having received at least one shot of the vaccine were asked if they received one of the first two shots due to pressure from work and/or pressure due to the green-pass restrictions.[6]

The second questionnaire was sent to all participants who completed the first, approximately ten days later. Importantly, participants were provided no information that could link the second questionnaire with the first. Introducing spacing between the questionnaires and ensuring they cannot be linked in any noticeable way was intended to mitigate potential experimenter-demand effects. This time around participants were presented with two games in random order: The DG and the TG. In the DG, player A, the "dictator," was endowed with 40 ILS ($\sim$\$12) and had to decide how much of the total amount to pass over to player B (the options were to transfer 0,10,20,30, or 40 ILS). The decision of player A determined the final outcome of the game. The first stage of the TG was identical to the DG, i.e.,

[4]The fact that the PGG simulates the vaccine scenario is stressed by Reddinger et al. (2022) who write: "To the extent that one gets vaccinated out of concern for the health of others, contribution in this game is analogous to an individual's decision to obtain vaccination".

[5]There are other indications of important differences between the games we used (DG and TG) and the PGG, ranging from differences in motivations and reasoning (Bicchieri, 2006), through the role of pro-sociality in these games (Burton-Chellew and West, 2013), and over to low correlations between behavior in the PGG and in the other games (Belot et al., 2010; Chan et al., 2023).

[6]During the pandemic, the Israeli government introduced the green pass, which was granted to those who fully vaccinated and allowed them to enter public spaces such as restaurants, sports centers, theaters and other social gatherings.

player A was endowed with 40 ILS and had to decide how much to transfer to player B. At this stage, the amount transferred by player A was multiplied by 3 and player B had to decide how much of the tripled amount to transfer back to player A (in increments of 10 ILS). Player B was asked how much s/he would like to transfer back to player A for every possible amount transferred to her/him by player A, i.e., using the strategy method. Choices made in the games were incentivized: Ten percent of those who completed both questionnaires were randomly matched and received payoffs according to their decision in one of the two games played in one of the two roles (both randomly determined), in addition to the participation fee. Following the games, participants were asked a few more questions that served the purpose of ruling out other potential explanations for the relationship between vaccination and pro-sociality. These channels, alongside others, are explained in detail and explored in Appendix D.

A total of 1,992 participants completed the first questionnaire; 1,562 of them completed the second questionnaire as well, forming the basis for our analysis.[7] The study was pre-registered on the OSF registry. The registration DOI is:
https://doi.org/10.17605/OSF.IO/TWGPK.

4 Results

4.1 General

Table 1 shows the distribution of the number of vaccinations in our sample and in the general population as of October 2022.[8] 201 participants didn't receive a single dose of vaccination, with nine of them citing health reasons as their sole justification for choosing not to get vaccinated.[9] Among those who received at least one vaccination, 653 reported doing so

Table 1: Distribution over Number of Vaccinations (absolute numbers in parenthesis)

# Vaccinations	Sample	Population
0	12.9% (201)	10.7%
1	5.8% (91)	6.3%
2	18.4% (287)	18.2%
3+	62.9% (983)	64.8%
Total	100% (1,562)	100%

[7]There were no statistically significant differences in terms of the answers to the first questionnaire (and, in particular, in the distribution of the number of vaccinations) between those who completed both questionnaires and those who dropped out after the first one.

[8]The population data was taken from the website of the ministry of health at the time. Judging by the first row of the table, there is no indication that non-vaccinated individuals misreported their vaccination status in our questionnaire.

[9]According to our pre-registration, we also checked whether there were any participants who only marked "other reason" for not vaccinating and provided an explanation that could exempt them from being required to vaccinate. However, we did not identify any such participants.

due to pressure from their workplace or due to green-pass pressure. As pre-registered, we conduct our analyses separately with and without these 662 (653+9) individuals.[10] In the current section we run our analyses excluding these individuals (leaving us with 900 participants), in Section 5.1 we show and discuss how the results differ for the 653 individuals who reported vaccinating due to pressure, and in Appendix B we report the analyses performed using the entire sample, as well as all the pre-registered tests, which corroborate the results presented in the main text.

4.2 Socio-Demographic Determinants of Vaccination

We first conduct a "sanity check" and examine the effect of various socio-demographic characteristics—some of which are well-established determinants of vaccination—on a binary vaccination status (where vaccinating at least once is coded as one, and not vaccinating is coded as zero). The results appear in Table 2.[11] As expected, we find that older individuals and those with higher incomes are more likely to vaccinate, while the religiously orthodox, the non-Jewish minority, and those who belong to the political right wing are less likely to vaccinate, all else equal. These findings are very much in line with previous research about socio-demographic determinants of Covid-19 vaccine hesitancy (Malik et al., 2020; Robinson et al., 2021; Razai et al., 2021; Khubchandani et al., 2021; Hussain et al., 2022).

Table 2: Vaccination by Socio-Demographic Characteristics

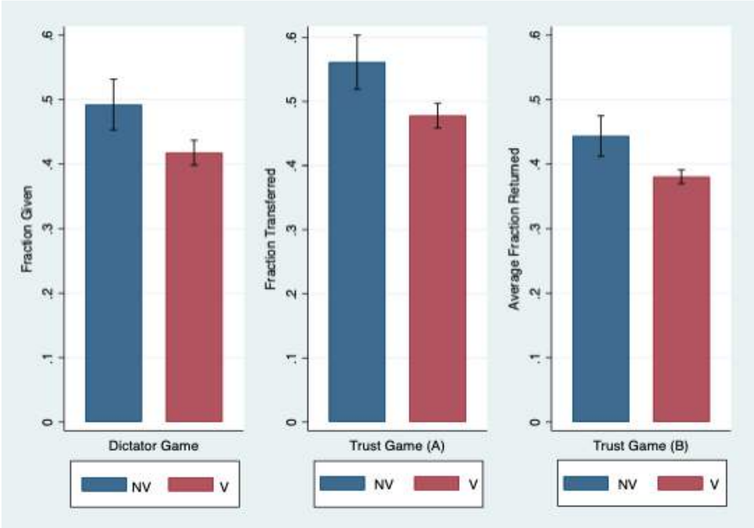
	Vaccinated (Yes=1/No=0)
Age	0.01***
	(0.00)
Female	-0.04
	(0.03)
High Education	0.04
	(0.03)
High Income	0.12***
	(0.02)
Minority (Non-Jewish)	-0.14**
	(0.06)
Religiously Orthodox	-0.17***
	(0.06)
Right Wing	-0.07**
	(0.03)
R^2	0.13
Observations	900

Notes: $*p < 0.1$,$**p < 0.05$, $***p < 0.01$.
Standard errors in parenthesis.

[10] This is inspired by Reddinger et al. (2022), who argue that voluntary and mandated vaccination may differ when it comes to revealing pro-social motivations.

[11] Here we present the results of the linear regression analysis; the results remain qualitatively similar when employing a Logit model.

Figure 1: Pro-sociality Measures for Vaxxers and non-Vaxxers



4.3 Overview of Pro-Sociality and Vaccination

Before we delve into the non-monotonic patterns that emerge in our data, we compare the different pro-sociality measures for vaxxers, i.e., those who received at least one vaccination dose, and non-vaxxers. Figure 1 shows the average pro-sociality measures for the two groups. As is apparent from the figure, we find that non-vaxxers have on average higher pro-sociality measures than vaxxers. The T-tests comparing the averages of the pro-sociality measures reveal a highly statistically significant difference between the two-groups' averages, as shown in Table 3.[12]

Next, we regress each measure of pro-sociality on the binary vaccination variable. Each regression includes four specifications. The first specification only controls for the order of the games. In the next specifications we sequentially incorporate the number of Covid-19 infections, socio-demographic characteristics, and trust in the ministry of health, which is

Table 3: Averages of Vaxxers and non-Vaxxers in the DG and TG

	Vaxxers (n=708)	non-Vaxxers (n=192)	t-statistic	p-value
Average Giving in DG	0.418	0.492	3.493	< 0.001
Average Sent in TG (Player A)	0.478	0.561	3.792	< 0.001
Average Returned in TG (Player B)	0.381	0.446	3.904	< 0.001

[12] Wilcoxon-Mann-Whitney tests provide a qualitatively similar separation between the two groups with $p < 0.001$ for all measures. According to our pre-registration, we also compared the difference in the level of trust in the ministry of health across groups. As expected, vaxxers have a statistically significantly higher average level of trust (3.538) than non-vaxxers (2.216), with $p < 0.001$. Since this comparison is not our main interest, it is not reported in the table.

Table 4: Giving in DG by Vaccination

	Fraction Given			
	(1)	(2)	(3)	(4)
Vaxxer	-0.075***	-0.072***	-0.064***	-0.066**
	(0.022)	(0.022)	(0.024)	(0.026)
Order	Yes	Yes	Yes	Yes
# of Infections	No	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes
Trust Moh	No	No	No	Yes
R^2	0.014	0.015	0.026	0.026
Observations	900	900	900	900

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

Table 5: Transfers in TG (Player A) by Vaccination

	Fraction Transferred			
	(1)	(2)	(3)	(4)
Vaxxer	-0.084***	-0.085***	-0.071***	-0.074***
	(0.024)	(0.024)	(0.025)	(0.028)
Order	Yes	Yes	Yes	Yes
# of Infections	No	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes
Trust Moh	No	No	No	Yes
R^2	0.016	0.016	0.038	0.038
Observations	900	900	900	900

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

Table 6: Average Returns in TG (Player B) Transfers by Vaccination

	Average Fraction Returned			
	(1)	(2)	(3)	(4)
Vaxxer	-0.066***	-0.066***	-0.068***	-0.065***
	(0.018)	(0.018)	(0.019)	(0.021)
Order	Yes	Yes	Yes	Yes
# of Infections	No	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes
Trust Moh	No	No	No	Yes
R^2	0.020	0.020	0.023	0.023
Observations	900	900	900	900

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

one of the questions that followed the experimental games. Tables 4, 5, and 6 summarize the findings.[13] For all measures and across all specifications we find that vaccinating is correlated with lower transfers. To interpret the magnitude of the result, consider for example specification (1) in Table 4: Compared to a non-vaxxer, a vaccinated person gives an amount that is, on average, smaller by 7.5% of the endowment (that is, roughly 3.4 ILS less out of the endowment of 40 ILS). Controlling for the number of infections has almost no bearing on the magnitude of the vaccination coefficient. The inclusion of the socio-demographic factors takes away some of the explanatory power of the vaccination variable in Tables 4 and 5, but the association between vaccination and all pro-sociality measures remains substantial and statistically significant across all specifications for the three measures.[14]

4.4 Main Results

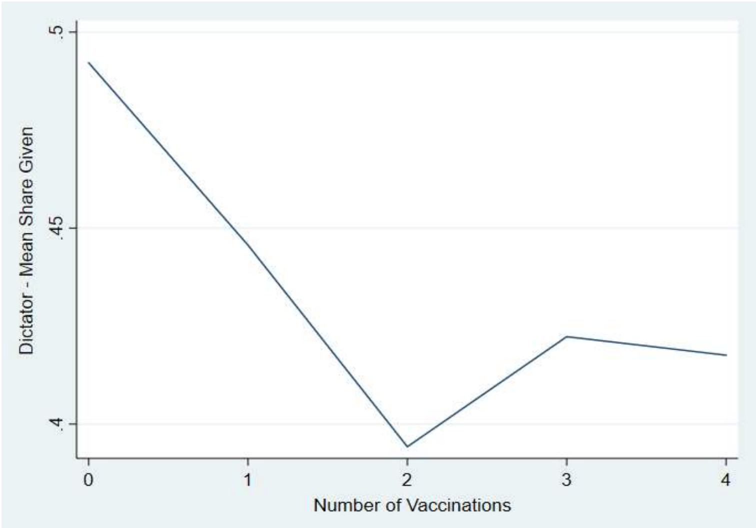
Our initial findings show that non-vaccinated individuals transfer more in our experimental games compared to those who received at least one vaccine dose. Notably, there are important distinctions between individuals who completed the full vaccination series as required by the government and those who complied only partially. In this subsection, we examine the entire pattern of average pro-sociality measures as a function of the number of vaccinations. The panels in Figure 2 display the average fractions transferred by number of vaccinations in the three roles played in our games. The truncated U-shape discussed

[13]Table B22 in Appendix B reports the p-values after adjusting them for multiple hypotheses testing using the Romano-Wolf correction. The adjusted values do not change any of the qualitative results. The adjustment of the p-values for the T-tests in Table 3 are not reported as it is evident that they remain significant even after a Bonferroni correction, let alone a Romano-Wolf correction.

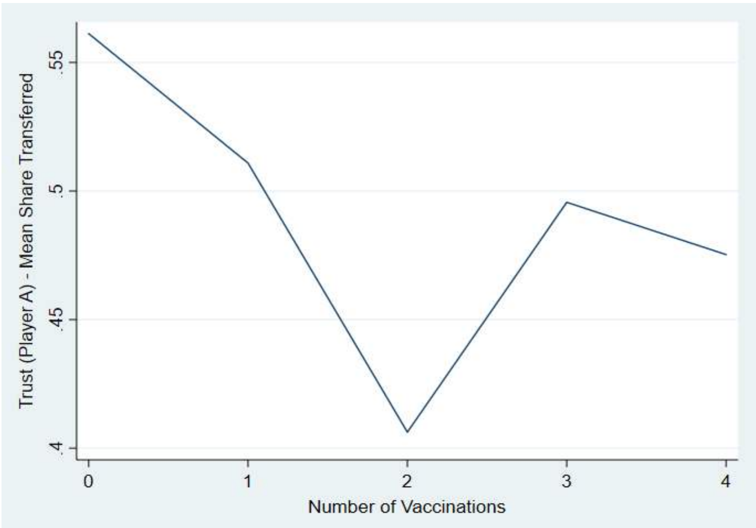
[14]The R^2 values are relatively low in all specifications, which is expected given that neither the decision to vaccinate, nor our set of controls, is expected to have substantial explanatory power for predicting variation in transfers in the DG and TG. However, our focus is on the correlation between the decision to vaccinate and the transferred amounts, which remains substantial and statistically significant across all specifications.

Figure 2: Average Fraction Transferred by Number of Vaccinations

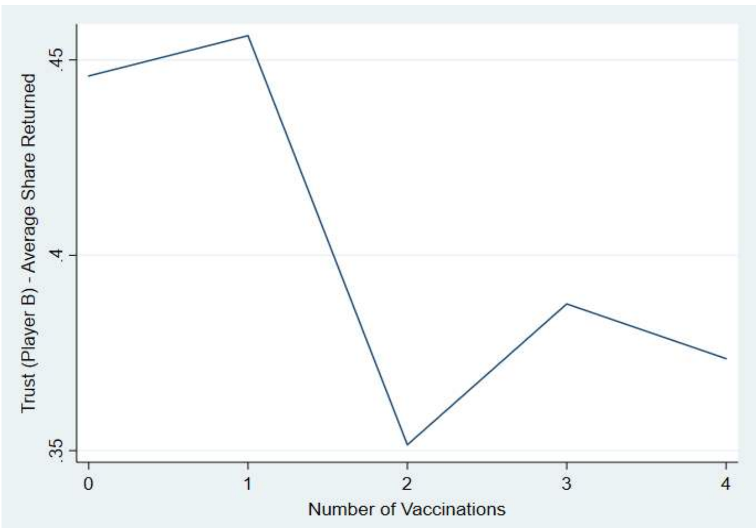
Panel (*a*): Dictator Game



Panel (*b*): Trust Game (Player A)



Panel (*c*): Trust Game (Player B)



in the Introduction clearly arises in all measures. Bear in mind that individuals who received three vaccinations were considered fully vaccinated and there is therefore no reason to expect their pro-sociality measures to be different from those who vaccinated four times (which could also explain the relatively flat lines connecting these two groups in the graphs).[15] Hence, for the rest of the analysis, we will group together all those who vaccinated at least three times. Similarly, we can group together those who were partially vaccinated, i.e., received either one or two vaccinations. Note that this group is not as cleanly defined as non-vaxxers and fully-vaccinated individuals. The reason is that some individuals who received only a single shot likely did so because they contracted the virus beforehand, and were subsequently required to receive only one additional dose by the ministry of health. Consequently, the partially-vaccinated group includes individuals who might have fully vaccinated if they hadn't contracted Covid-19. Thus, the statistically significant differences between groups reported below strengthen the conclusion that the "real partially vaccinated" individuals, i.e., those who vaccinated but did not fully comply with the recommendation of the ministry of health, are different than the fully vaccinated group and the non-vaxxer group in their behavior in the DG and TG.

The panels in Figure 3 display the averages of the three measures for the grouped categories: Non-vaxxers (Non), partially vaccinated (Partial) and fully vaccinated (Full). As one would expect given Figure 2, the truncated U-shape emerges for this classification of vaccination status.

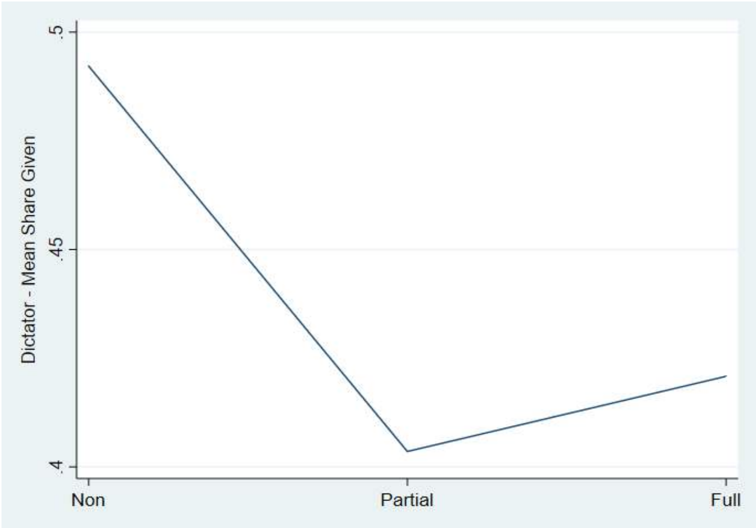
Next, we formally examine this truncated U-shape using a regression model. Since the patterns in Figure 3 are almost identical across measures, the dependent variable in our regression is the weighted average of the three transfers that participants had to decide upon in our experiment, i.e., a transfer index. Note that this index serves not only as a technical simplification but also, according to Chapman et al. (2023), the three measures composing the index are strongly related (they reflect various aspects of generous behavior).[16] The main explanatory variables are dummies for the different vaccination-status categories. Since the average transfers of the fully vaccinated are in-between the averages of the other two groups, they are naturally chosen to be the omitted group. The results are reported in Table 7 and they provide statistically significant support for the pattern in Figure 3. In other words, across various specifications, the fully-vaccinated group exhibits a transfer index that is statistically significantly lower than that of the non-vaxxers but statistically significantly higher than that of the partially-vaccinated group.

[15] At the time of our experiment the fourth vaccination, i.e., the second booster, was being administered to the elderly, populations at risk and others who explicitly requested the shot (e.g. for the purpose of travelling abroad).

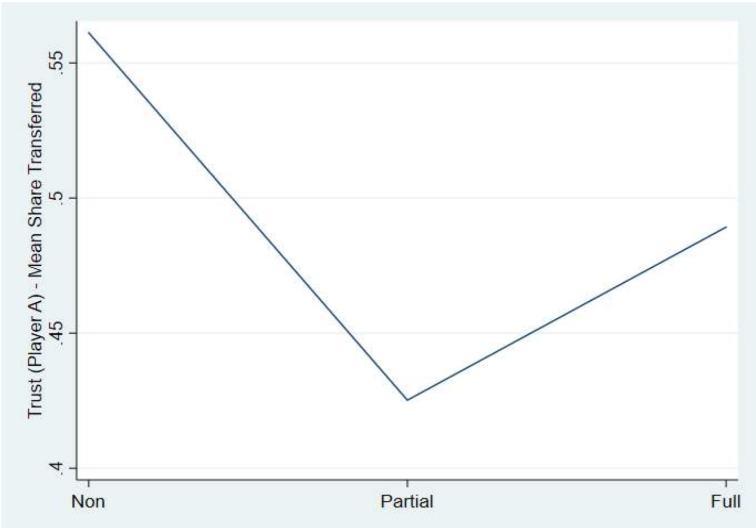
[16] Indeed, we find quite a strong positive correlation between each pair of measures ($\rho = 0.49 - 0.55,\ p < 0.001$).

Figure 3: Average Fraction Transferred by Vaccination Status

Panel (a): Dictator Game



Panel (b): Trust Game (Player A)



Panel (c): Trust Game (Player B)

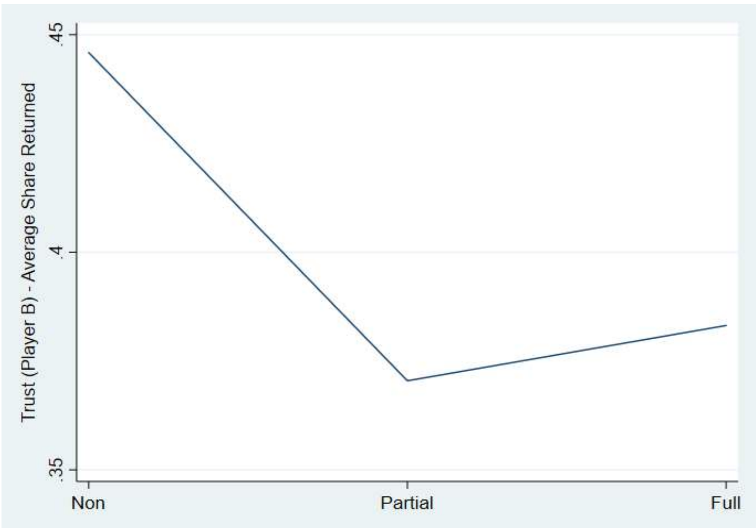


Table 7: Transfer Index by Vaccination Status

	Transfer Index			
	(1)	(2)	(3)	(4)
Partially Vaccinated	-0.031	-0.034*	-0.039**	-0.039*
	(0.019)	(0.020)	(0.020)	(0.020)
Not Vaccinated	0.069***	0.068***	0.057***	0.057***
	(0.018)	(0.018)	(0.019)	(0.021)
Order	Yes	Yes	Yes	Yes
# of Infections	No	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes
Trust Moh	No	No	No	Yes
R^2	0.027	0.027	0.037	0.037
Observations	900	900	900	900

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

4.5 Explaining the Results with a Convictions-Based Mechanism

Our suggested explanation for the above findings involves breaking down the vaccination decision into two stages. In the first stage, individuals form opinions (preferences) regarding the need to vaccinate, making them either "pro-vaccine" or "anti-vaccine". The second stage involves the actual decision to proceed with vaccination or not. The pro-vaccine are likely to act upon their preference and vaccinate. This is because, in addition to their inherent preference, the drawbacks of abstaining from vaccination (such as green-pass restrictions and social stigma) likely outweigh the costs of vaccinating. However, the decision made by the anti-vaccine is less straightforward. In the absence of external forces, these individuals are expected to choose to remain non-vaccinated. However, considerations such as the threat of a social stigma might have compelled them to act against their preference and decide to get vaccinated. Thus, the second stage of the vaccination decision involves their willingness to stand up for their preferences, which we will also refer to as their strength of convictions (or simply "convictions").

The fact that our data was collected in the final phases of the Covid-19 pandemic underscores the significance of convictions in determining the vaccination status of our participants. Individuals in our sample had had ample time to deliberate on their decision regarding vaccination. In other words, by remaining not vaccinated until October 2022, anti-vaccine individuals proved that they were willing to pay a cost, such as damage to their social image and restrictions on their freedom of movement, in order to stand up to their belief that they should not vaccinate.

We propose that convictions play a similar role in our experimental games. Similar to vaccination decisions, behavior in the DG and TG reflects not only individuals' pro-social inclinations but also their readiness to uphold these values, even at a personal cost. Put differently, we propose that transfers in the DG and TG also encompass two components: preferences, i.e. "pure pro-sociality" (representing what the individual considers to be the right course of action in these games), and convictions, indicating whether the individual is prepared to incur the material cost and give up some of their endowment to transfer the amount they deem appropriate.[17]

This assertion is backed by previous research that has examined both pro-social tendencies in the DG and actual behavior in this game. The literature reveals a gap between how people think this game ought to be played and how they actually play it. Some studies have documented that a vast majority of people hold a personal normative belief that giving half of their endowment is the most appropriate action in the DG (Bicchieri, 2006; Capraro and Rand, 2018; Bašić and Verrina, 2024). Capraro and Rand (2018), in their Study 4, report that 88.8% of their subjects indicate that giving half of their endowment is the morally right thing to do. Similarly, in a recent experiment by Bašić and Verrina (2024), 'giving half of the endowment' received the highest personal-norm rating in the responses of over 5 out of every 6 participants.[18] Bicchieri (2006) asks a somewhat different question, aiming to reveal which actions are considered "fair." She reports that 68% of the people consider the equal division as being fair.

Yet, actual behavior is far less generous. A meta-analysis by Engel (2011) spanning thirty years of studies of the DG in a wide range of countries and cultures, has gathered that dictators actually allocate half (or more) of their endowment only 29.8% of the time, and the average giving amounts to 28.3% of the endowment. In fact, this gap has already been documented in the very first experimental study of the DG by Forsythe et al. (1994). They find that the percentage of individuals who give half of their endowment drops substantially when the game is played for real stakes rather than hypothetically. Two recent studies echo these results. First, in the experiment of Bašić and Verrina (2024), 62% of the participants gave strictly less than their stated personal norm.[19] Second, Kurschilgen (2023) uses a slightly modified DG, and finds more evidence for this gap. He reports that "Faced with the incentivized choice, dictators become significantly more selfish...".[20] We hypothesize that this gap between stated preferences and actual behavior—sometimes referred to as the attitude-behavior gap or attitude-behavior consistency (see e.g. Juvan and Dolnicar, 2014; Guerra and Harrington, 2018; Bechler et al., 2021; Zhuo et al., 2022; Yuan et al., 2023)—can be attributed to the strength of convictions: Individuals with

[17]Cappelen et al. (2007) present a utility function with a similar structure, where agents assign weights to their material payoff and fairness ideal. We view a higher weight on the latter as analogous to stronger convictions.

[18]This information does not directly appear in Bašić and Verrina (2024); it has been privately communicated to us by one of the authors.

[19]This information, too, is not reported in Bašić and Verrina (2024) and has been privately communicated to us by one of the authors.

[20]Playing a game with no incentives is slightly different than answering a question about "the right thing to do" in that game. It is likely that the former would result in slightly more selfish responses than the latter and more closely align with actual transfers. Both types of evidence support the existence of a gap between intentions (or preferences) and actual behavior in the DG.

strong convictions contribute an amount they deem appropriate, while those with weaker convictions, despite sharing similar views on the appropriate action, are unwilling to pay that price. In other words, while most individuals agree about what the right thing to do is, fewer act accordingly when their own endowment is at stake. The role of convictions and its relation to the disparity between personal norms and actual actions are expected to be further emphasized given the anonymity of our online setting, since they are likely to make the act of giving harder than in social settings (Charness et al., 2007; Fiedler and Haruvy, 2009; Catola et al., 2021).

Hence, we propose that the notion of convictions serves as a link, tying together our observations about vaccination status in the later phases of the pandemic with behavior in the DG and TG: Non-vaxxers have demonstrated the strength of their convictions by refraining from vaccination, despite increasing pressures to do so, until the end of the pandemic. In our experimental games, it can be anticipated that their strong convictions will be manifested in their ability to align their transfers with what they perceive to be the right course of action. This results in transfers that tend to surpass, on average, those made by the general population. The same line of reasoning implies that partially-vaccinated individuals posses weak convictions, as it is likely that they were anti-vaccine but still partially vaccinated to get rid of the “anti-vaxxer” stigma (had they been pro-vaccine, they would have presumably chosen to fully vaccinate). Following our suggested link between convictions and behavior in our experimental games, their weak convictions are indeed expressed by their below-average transfers. Finally, the convictions of the fully-vaccinated individuals were not tested as they simply followed their preferences and vaccinated. Hence, their average level of convictions is likely to be close to the population mean. Consequently, according to our suggested mechanism, their average level of transfers is expected to lie between the averages of the two other groups, an expectation that is indeed met by the data.[21] Overall, this leads to the observed truncated U-shape of pro-sociality as a function of the vaccination status.[22]

Interestingly, a recent, not yet published, paper (Sasaki and Kurokawa, 2022) corroborates this convictions-based mechanism. They elicit the amount that a dictator gives to an anonymous counterpart in both a hypothetical and an incentivized setting. The gap between hypothetical and incentivized giving is smaller for non-vaccinated individuals (11.84 Japanese Yen) compared to vaccinated individuals (17.49 Yen), with a statistically significant difference between the two groups ($\Delta = 5.65$, $p < 0.01$).[23] In other words,

[21]The fully-vaccinated group also likely consists of a small minority of individuals who are anti-vaccine but still fully vaccinated to overcome the stigma. We come back to this point in the next section.

[22]Clearly, “pure pro-sociality” also impacts behavior in the DG and TG, potentially making the influence of convictions more challenging to discern in the data. Nevertheless, we argue that convictions play a substantial role in actual behavior in these games. Appendix C offers additional evidence of a positive correlation between transfers in our experimental games and a non-incentivized proxy of convictions elicited in a follow-up questionnaire.

[23]This statistical comparison of the gaps does not appear in their paper as it was not part of their research question. We made this calculation ourselves based on the data that appears in Table 2 of their WP.

non-vaccinated individuals give amounts that are more aligned with what they believe should be given than vaccinated individuals do. In the next section, using the richness of our data, we provide further support for the conviction-based mechanism.

5 Further Support for the Convictions-Based Mechanism

5.1 Pressure to Vaccinate

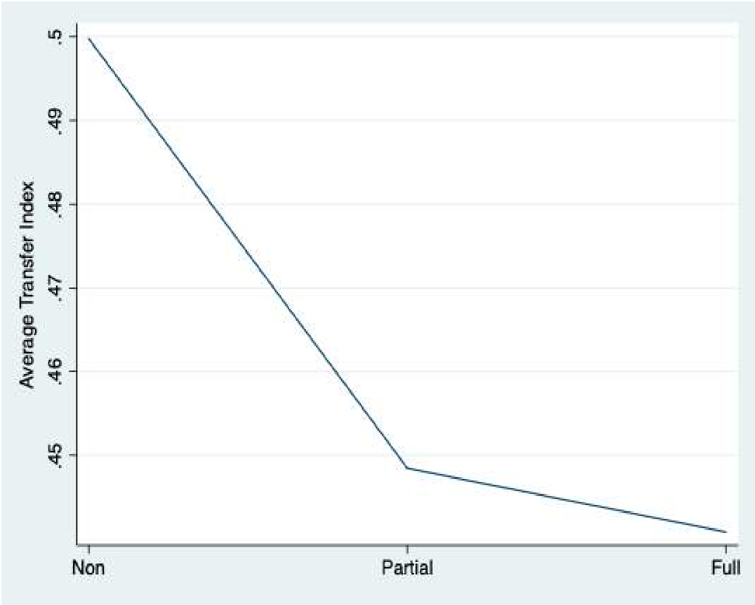
Up until this point, we excluded individuals who vaccinated due to workplace or green-pass pressure. In this subsection we turn our attention over to these individuals, which allows us to gain an additional insight into the convictions-based mechanism. It is worth noting that the pressure indicated by our participants is likely substantial. For instance, it includes individuals who vaccinated in response to a workplace threat mandating vaccination for continued employment. In other words, by indicating that they vaccinated *due* to workplace or green-pass pressure (or both), they reveal their anti-vaccine stance (if they were in favor of vaccination, they would not have indicated doing so due to external pressure). To this group we also add the non-vaxxers, excluding those who reported health reasons as their sole justification for not vaccinating. The combination of these groups—non-vaxxers and those who vaccinated due to pressure—may be thought of as "admittedly anti-vaccine" individuals: They either got vaccinated and acknowledged doing so due to external pressure, or remained non-vaccinated citing reasons that reflect anti-vaccine views.

Predicting average transfers for the "admittedly anti-vaccine" as a function of the vaccination status is straightforward, within our convictions-based mechanism. Given their clear anti-vaccine stance, we would expect those who fully vaccinated to have weaker convictions, and hence lower transfers, than those who partially vaccinated, since the latter remained more aligned with their anti-vaccine preference. By the same token, we would expect the non-vaxxers in this group to demonstrate the highest transfers, as they did not give-in to pressure at all. Thus, looking at this group of admittedly anti-vaccine individuals, we expect monotonically decreasing average transfers as we move along the vaccination status, from non-vaxxers through partially vaccinated and over to the fully vaccinated. Figure 4 shows the average transfer index for the different vaccination statuses for this admittedly-anti-vaccine group. It shows a monotonically decreasing trend in the index as we move along the vaccination statuses, in line with the prediction for this group.

5.2 Zooming-in on the Partially Vaccinated

Following the convictions-based mechanism, one might naively expect individuals who revealed obtaining the vaccine due to work or government pressure to exhibit lower transfers than those who did not indicate pressure and reached the same vaccination status. However, this conclusion is premature. Imagine two anti-vaccine individuals, person A and person B, who work at the same workplace and ended up receiving the same number of vaccinations

Figure 4: Average Transfer Index by Vaccination Status: Admittedly Anti-Vaccine



by the end of the pandemic. Person A decided to get vaccinated as soon as the social stigma against non-vaxxers emerged. Person B, despite facing the same stigma, remained non-vaccinated. Later, their workplace issued an ultimatum requiring vaccination for continued employment, leading Person B to reluctantly get vaccinated. It is clear that Person B has stronger convictions than Person A. Therefore, the extent of the experienced pressure must be taken into account before making any statements about the average level of convictions.

With this in mind, let's zoom in on the partially-vaccinated group. All individuals in this group reached the same vaccination status by the end of the pandemic. Furthermore, recall that this group likely consists only of anti-vaccine individuals.[24] Hence, according to our convictions-based mechanism, those within the partially vaccinated group who experienced pressure should, on average, have higher transfers than those who did not. This is indeed confirmed by the data as the average index of the former group is 0.45 and the average index of the latter is 0.40. The difference between the two indices is statistically different from zero ($t = 2.2879,\ p = 0.0227$).

5.3 Zooming-in on the Non Vaccinated

While we do not observe the pressure experienced by the non-vaxxers, we do observe the explanations they provided for their decision to forego vaccination. The non-vaxxers were asked to choose at least one of five possible options to explain their decision:

[24] Note that the proportion of partially-vaccinated individuals among those who reported that they vaccinated due to pressure is considerably larger than among those who vaccinated but did not report acting due to pressure (38% compared to 18%, respectively). This underscores our interpretation of partial vaccination as an indication of having an anti-vaccine preference.

- I was not convinced of the vaccine's effectiveness
- I was not bothered by the risk to contract the virus
- I was concerned about side effects
- Health reasons prevent me from taking the vaccine
- Other (please specify)

The explanations are ordered here by the strength of the anti-vaccine sentiment: The first two explanations clearly express a more anti-vaccine stance ("pure anti-vaccine reasons") compared to the next two, which reflect health-related concerns.[25] Consequently, we can expect the level of convictions (and hence average transfers) to be higher among those who indicated any of the pure anti-vaccine reasons: These individuals clearly made an active choice against the vaccine based on their preferences and despite the social stigma associated with their decision.[26] Table 8 shows the average levels of transfers of those who cited pure anti-vaccine reasons (the first and second reasons) and those who only cited health-related concerns (the third and fourth reasons). Average transfers are higher for the former group, in-line with the convictions-based explanation.[27]

To sum up Section 5, we have outlined three pieces of evidence supporting our conviction-based mechanism (beyond the truncated U-shape). First, transfers decrease in vaccination status among the admittedly anti-vaxxers. Second, among the partially vaccinated, those who reported vaccinating due to work and green-pass pressure give higher transfers than those who vaccinated without referring to such pressures. Third, among non-vaxxers, those with an ideological anti-vaccine stance tend to make higher transfers than those with non-ideological reasons.

Table 8: Average Transfers of Non-Vaxxers by Stated Reasons

	Giving in DG	Player A in TG	Player B in TG	Transfer index
Pure anti-vaccine reasons ($n = 157$)	0.49	0.56	0.45	0.5
Health-related concerns ($n = 34$)	0.43	0.54	0.37	0.45

Notes: The table reports the fractions transferred in the three games and the transfer index for non-vaxxers. The first row reports these fractions for those who indicated at least one of the two explanations that reflect an anti-vaccine sentiment. The second row reports the averages for those who indicated only health-related concerns.

[25] The third explanation (being concerned about side effects) may be thought of as a subjective variant of the fourth one.

[26] In this analysis, we exclude 10 participants who only chose 'Other' since classifying them relies on subjective interpretations of their explanations.

[27] Since the size of the group that chose only the third or fourth reason is small (34 participants), we do not report the results of the statistical tests comparing the averages. The difference in the average return of player B in the TG is significant at the 5% level but the other differences are not.

6 Model

In this section we lay out a model that incorporates preferences towards vaccinations, extrinsic and intrinsic costs of vaccination decisions, and convictions. The model is able to produce all patterns found in our data. Initially, the only extrinsic cost for not vaccinating is social stigma, corresponding to the analysis of our main pool of participants (Section 4.4) that excludes those who vaccinated due to workplace and green-pass pressure. These pressures (as in Section 5.1) are introduced later. Proofs are relegated to Appendix A.

Suppose there are two types of individuals: Those who prefer getting the vaccine (pro-vaccine), making up a fraction $\alpha \in (0, 1)$ of the society, and those who prefer not to receive it (anti-vaccine). The action space consists of two corresponding actions—full vaccination and no vaccination—and a third "compromise" option of getting only partially vaccinated. There are costs associated with choosing each action. First, there is an extrinsic cost e for not getting vaccinated at all, which is multiplied by a factor $\mu \in [0, 1)$ when choosing the compromise option of partial vaccination. This cost reflects the stigma associated with not vaccinating, which can be relieved, to some extent, by getting partial vaccination.[28] Second, there is an intrinsic cost c incurred when an individual's chosen action directly contradicts their personal preferences. For example, this occurs when someone opts for full vaccination despite being anti-vaccine or chooses not to vaccinate despite being pro-vaccine. This intrinsic cost is heterogeneous in the population, and is drawn from a continuous distribution with density $f(c)$ and full support on R^+ (whose average is denoted by $\hat{c}$).[29] Larger values of c correspond to higher intrinsic costs of making a choice that is not aligned with one's preferences. This cost is interpreted as one's convictions and it is multiplied by a factor $\lambda \in (0, 1)$ when choosing the compromise solution of partial vaccination. We assume that the distribution of c is the same for both types of vaccine preferences. In other words, there is no correlation between individuals' convictions and their preference with respect to vaccination.

Given this cost structure, it is immediate that for all the pro-vaccine individuals it is a dominant strategy to follow their preference and fully vaccinate, incurring no cost in the process. Moving on to the anti-vaccine group, below is the loss L associated with each of the choices available to them.

$$L = \begin{cases} e & \text{if receives no vaccination} \\ \mu e + \lambda c & \text{if receives partial vaccination} \\ c & \text{if receives full vaccination} \end{cases} \tag{1}$$

For partial vaccination to be chosen by some anti-vaccine individuals in their attempt to

[28]It is straightforward to add a small cost for vaccinating (as long as the cost of not vaccinating remains higher), or to make the stigma heterogeneous in the population. However, it is not necessary to do so in order to capture the essence of the mechanism at work.

[29]The full support requirement is not essential, it simply enables us to state some of our results as strict inequalities rather than weak ones.

minimize L, there needs to be a non-empty range of values of c for which $\mu e + \lambda c < \min\{e, c\}$. Since c is continuously distributed over R^+, this boils down to requiring that $\frac{\mu}{1-\lambda} e < \frac{1-\mu}{\lambda} e$, so that individuals with $c \in [\frac{\mu}{1-\lambda} e, \frac{1-\mu}{\lambda} e] \equiv [\underline{c}, \bar{c}]$ choose to partially vaccinate. This interval is non empty if and only if

$$\mu + \lambda < 1. \tag{2}$$

A sensible interpretation of condition (2) is that the reduction in the costs associated with partial vaccination—a reduction that is more significant the smaller μ and λ are—is substantial enough to make it worthwhile for some individuals to choose this compromise alternative. To account for the patterns in our data, from now on we assume that inequality (2) holds.

Lemma 1. *The action chosen by an anti-vaccine individual depends on their intrinsic cost c as follows.*

$$a = \begin{cases} \textit{fully vaccinate} & \textit{if } c < \underline{c} \\ \textit{partially vaccinate} & \textit{if } c \in [\underline{c}, \bar{c}] \\ \textit{not vaccinate} & \textit{if } c > \bar{c} \end{cases} \tag{3}$$

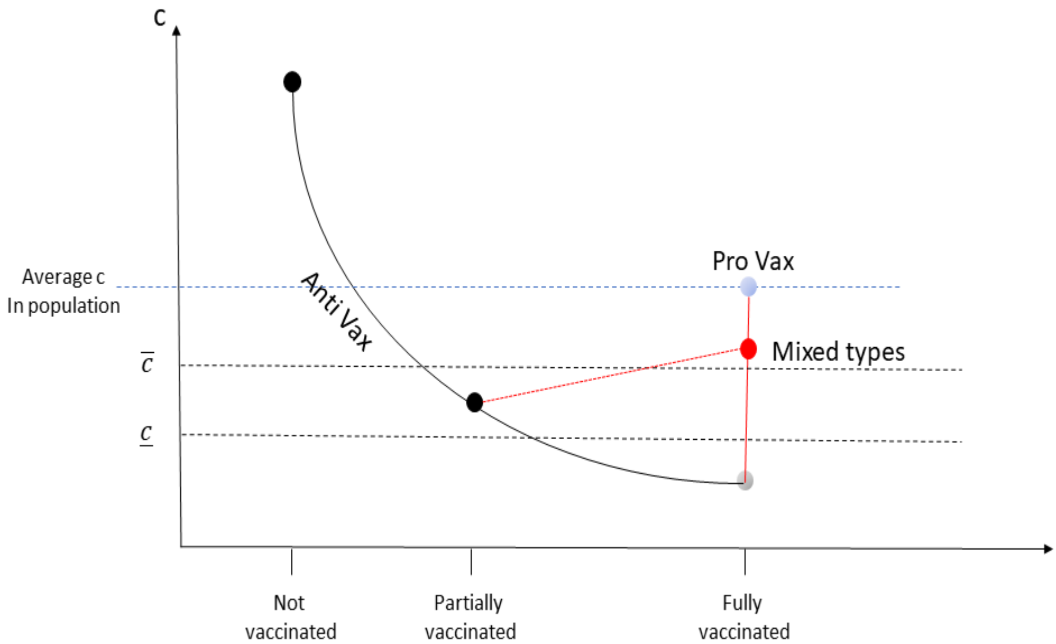
We are now ready to state the main result of the model.

Proposition 1. ***Truncated U-shape***

1. *The average intrinsic cost among the non-vaccinated is larger than among the fully vaccinated and the partially vaccinated.*
2. *If $\frac{\int_{\underline{c}}^{\bar{c}} c f(c) dc}{\int_{\underline{c}}^{\bar{c}} f(c) dc} < \frac{\alpha \hat{c} + (1-\alpha) \int_0^{\underline{c}} c f(c) dc}{\alpha + (1-\alpha) \int_0^{\underline{c}} f(c) dc}$, then the average intrinsic cost among the fully vaccinated is larger than among the partially vaccinated.*

Part 1 of the proposition establishes the decreasing part of the truncated U-shape and part 2 establishes its increasing part. The intuition for the proposition is as follows. Among the pro-vaccine individuals everyone fully vaccinates, hence the average intrinsic cost of this group is simply $\hat{c}$. Among the anti-vaccine group, those with high c follow their preference and do not vaccinate, those with low c fully vaccinate, and those with an intermediate c partially vaccinate (this downward sloping pattern of intrinsic cost is illustrated in Figure 5 and corresponds to the empirical pattern presented in Figure 4). Thus, if we compare the average c for each *action*, it will always be highest for the non vaccinated (part 1 of Proposition 1). The comparison of the partially and fully vaccinated relies on the parameter values, but an insightful and easy case to consider is when $\mu = 0$ (while $\lambda \neq 0$), which captures the case where one can entirely eliminate the stigma by partially vaccinating. This value of μ implies that $\underline{c} = 0$, so that those who are anti-vaccine never fully vaccinate – they either partially vaccinate, if their c is low (smaller than $\bar{c}$), or do not vaccinate, if their c is high. In this case, it is clear that the average c of the

Figure 5: Average Intrinsic Cost by Vaccination Status - Basic Model



The figure illustrates the average intrinsic cost as a function of vaccination status. The condition in part 2 of Proposition 1 ensures that the black dot that corresponds to the average intrinsic cost of the partially-vaccinated group is lower than the red dot on the right that represents the average intrinsic cost of the mixed types who fully vaccinated. The figure illustrates that this happens if the fraction of pro-vaccine individuals in society (α) is sufficiently large.

partially vaccinated will be smaller than that of the fully vaccinated (whose average c will simply equal the average c in society as they consist only of those with a preference to vaccinate). This is a special case where the inequality in part 2 of the proposition holds, which, together with part 1, implies the "truncated U-shape" reported in the empirical part. The inequality holds also for larger values of μ, but it also depends on the values of α, λ and the distribution of c in society.[30] Larger values of α make it more likely that the inequality holds, because they imply that, among the fully vaccinated, there is a smaller share of anti-vaccine individuals (whose c is smaller). While α is not observable in the data, it is likely to indeed be quite substantial in most countries (at least among western societies), where a large part of the population wholeheartedly adopted the official recommendation to get vaccinated. The effect of λ is non deterministic: As λ increases from 0 to $1-\mu$, the range $[\underline{c}, \bar{c}]$ shrinks towards the value $c = e$. Depending on the exact shape of $f(c)$, this might make the LHS of the inequality in part 2 of the proposition larger or smaller. Increasing λ has an ambiguous effect on the RHS of the inequality too, and depends on the value of α.[31]

To sum up the model so far, we assume that the choice whether to vaccinate, and to what extent, is subject to a trade off between being true to one's preferences regarding vaccination and attempting to avoid being stigmatized. Some anti-vaccine individuals do not withstand the pressure: The weaker their convictions, the higher is the number of vaccine shots they will eventually take. Consequently, the non vaccinated are bound to have the strongest convictions. Furthermore, under plausible conditions, those who partially vaccinate will have, on average, the weakest convictions, generating a "truncated U-shape" in convictions as a function of the extent of vaccination: There is a steep decline when moving from no vaccination to partial vaccination, and then a moderate increase when moving from partial vaccination to full vaccination—see the illustration in Figure 5. This analysis assumes that the costs of remaining non-vaccinated are summarized by the social stigma and are the same for everyone. However, we know that some people faced additional pressures and factored them into their vaccination decisions. Therefore, we next extend the model to incorporate two levels of costs, which allows us to capture additional patterns in our data that the basic framework cannot address.

[30] Small values of μ, for which the inequality is most likely to hold, capture "liberal societies" (see Michaeli and Spiro (2015)), where small deviations from the social norm are only lightly sanctioned.

[31] It is easy to verify that for $\lambda = 0$ the inequality in part 2 of the proposition does not hold. This is because in this case the option of no vaccination is dominated by partial vaccination, and so the partially vaccinated become the group with the highest convictions among the anti-vaccine, with average convictions above the average in society. However, this case clearly does not correspond to the empirical evidence, because if it was true we would have zero non vaxxers. The fact that λ is not close to zero means that people are, at least to some extent, perfectionist (sensitive to small deviations from their bliss point), in line with previous findings in the literature (Kendall et al., 2015; Chen et al., 2023).

6.1 An Extension: Two Levels of Extrinsic Cost

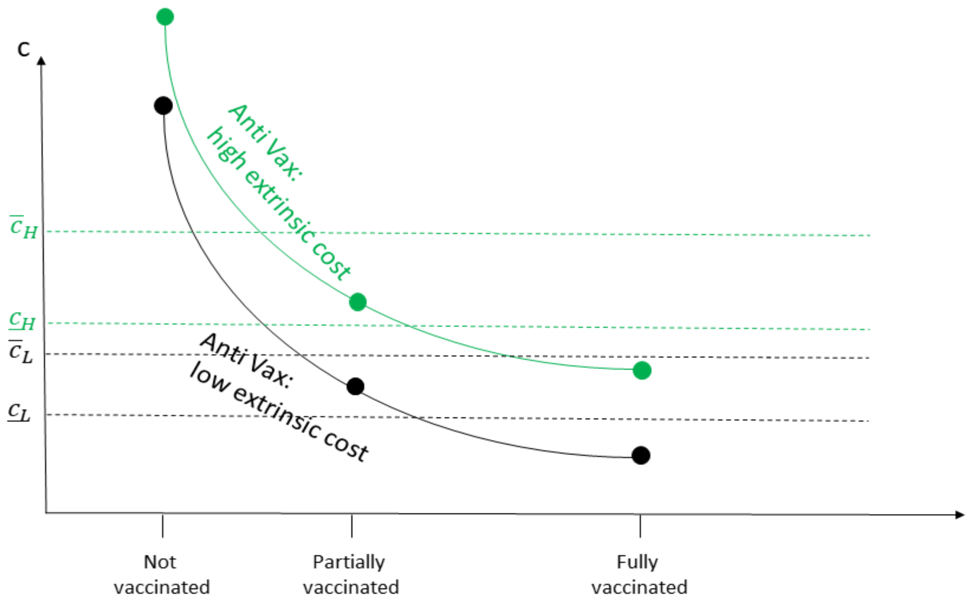
Suppose now that there are two possible levels of extrinsic cost for remaining non-vaccinated: e_L (Low) and e_H (High), s.t. $e_L < e_H$. We interpret e_L as the cost of the stigma associated with not vaccinating, while e_H includes an additional cost on top of the stigma. This additional cost reflects workplace and/or green-pass restrictions that certain individuals face if they opt not to vaccinate. The level of extrinsic cost faced by an individual is assumed to be orthogonal to the individual's vaccination preference and to their intrinsic cost c, with a fraction $\beta \in (0,1)$ of the individuals facing the low cost. Denote $\underline{c}_L \equiv \frac{\mu}{1-\lambda}e_L$, $\underline{c}_H \equiv \frac{\mu}{1-\lambda}e_H$, $\bar{c}_L \equiv \frac{1-\mu}{\lambda}e_L$ and $\bar{c}_H \equiv \frac{1-\mu}{\lambda}e_H$. Then Lemma 1 holds for anti-vaccine individuals facing e_L with $\underline{c} = \underline{c}_L$ and $\bar{c} = \bar{c}_L$, and for anti-vaccine individuals facing e_H with $\underline{c} = \underline{c}_H$ and $\bar{c} = \bar{c}_H$.

This straightforward extension of the model enables us to derive two additional predictions from the convictions-based mechanism, both of which we can test using our data. First, the downward-sloping pattern of intrinsic costs as a function of vaccination status for anti-vaccine individuals, as implied by Lemma 1, should hold within each level of extrinsic cost, i.e., for each of the pairs $(\underline{c}_L, \bar{c}_L)$, $(\underline{c}_H, \bar{c}_H)$, as illustrated in Figure 6. Indeed, this pattern is shown to hold in our data for individuals facing the high extrinsic cost, as visualized in Figure 4 in Section 5.2.[32]

With the extended model we can also make predictions comparing the intrinsic costs of individuals with the same vaccination status who faced different extrinsic costs. Holding the vaccination status fixed, the model predicts higher average intrinsic cost for those who faced the high extrinsic cost compared to those who faced the low extrinsic cost, as one would naturally expect. However, we cannot test this prediction for every vaccination status. The reasons that we cannot do so are (i) we do not have information regarding pressure of the non-vaccinated, and (ii) among the fully vaccinated, we cannot distinguish pro-vaccine individuals from anti-vaccine individuals who vaccinated without referring to workplace and/or green-pass restrictions. Thus, we can only test this prediction for the partially vaccinated who, based on their revealed choice, are likely to be anti-vaccine. For this group, the prediction is straightforward: $\frac{\int_{\underline{c}_L}^{\bar{c}_L} cf(c)dc}{\int_{\underline{c}_L}^{\bar{c}_L} f(c)dc} < \frac{\int_{\underline{c}_H}^{\bar{c}_H} cf(c)dc}{\int_{\underline{c}_H}^{\bar{c}_H} f(c)dc}$. This condition implies that within this vaccination status, those who faced the higher extrinsic cost should have, on average, a higher intrinsic cost, namely stronger convictions. This prediction is illustrated in Figure 6 and indeed holds in our data, as shown in Subsection 5.1.

[32] As previously discussed, anti-vaccine individuals with low extrinsic costs who chose to fully vaccinate cannot be distinguished from pro-vaccine individuals, meaning that the corresponding downward-sloping pattern for this group cannot be observed in the data.

Figure 6: Average Intrinsic Cost by Vaccination Status for Anti-vaccine Individuals under Two Levels of Extrinsic Cost



7 Summary and Conclusion

Utilizing a large representative sample of the Israeli adult population, approached in the latter stages of the Covid-19 pandemic, we find a truncated U-shape pattern of pro-sociality as a function of vaccination status: Non-vaxxers exhibit the highest levels, partially vaccinated individuals show the lowest, while the fully vaccinated fall in-between. Our explanation for this non-monotonic pattern hinges on the idea that in both the vaccination domain, as well as in the experimental games, choices reflect not only preferences, but also one's willingness to incur costs in order to follow those preferences. We refer to this willingness as the individual's convictions.

According to this convictions-based mechanism, stronger convictions are associated with larger transfers in our experiment as well as with individuals' willingness to incur costs to follow their preferences regarding the Covid-19 vaccination. Those who chose not to vaccinate until the pandemic's later phases demonstrated their ability to staunchly hold on to their anti-vaccination beliefs. Partially vaccinated individuals likely held the same anti-vaccine preferences as the non-vaxxers, but acted against their preference to avoid social stigma, and in some cases workplace and green-pass pressures. Thus, they demonstrated low convictions. The fully vaccinated group includes mostly pro-vaccine individuals with varying levels of convictions, and some anti-vaccine individuals with weaker convictions, resulting in an average convictions level that is close to the population mean. Our mechanism suggests that the transfers in our experimental games are a reflection of these varying levels of convictions across groups. We present a simple model to formally capture the interplay between preferences and convictions in the decision to vaccinate against Covid-19.

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A Proofs

A.1 Proof of Lemma 1

The optimal choice of an individual given their c follows immediately from equation (1), which states the disutility associated with each vaccination choice, while assuming that the inequality in equation (2) holds.[33]

A.2 Proof of Proposition 1

Part 1

First note that all pro-vaccine individuals fully vaccinate, while anti-vaccine individuals choose according to the rule specified in Lemma 1. Therefore, the average intrinsic cost among the non-vaccinated group is the average of $\{c|c > \bar{c}\}$. This value is of course larger than the average of $\{c|\underline{c} < c < \bar{c}\}$, which is the average intrinsic cost among the partially vaccinated. Furthermore, the former is larger than $\hat{c}$, the average c in the entire society (owing to averaging only over values above $\bar{c}$), which itself is larger than the average c among the fully vaccinated. This is so because the group of fully vaccinated is composed of all pro-vaccine individuals (whose average c is $\hat{c}$) and of anti-vaccine individuals with $c < \underline{c}$, who pull the average c of this group downwards.

Part 2

The LHS of the inequality in this part of the proposition is the average intrinsic cost among the partially vaccinated, while the RHS is the average intrinsic cost among the fully vaccinated. To see why the RHS is the average c among the fully vaccinated, note that the group of fully vaccinated consists of pro-vaccine individuals, whose fraction in society is α and average c is $\hat{c}$, and anti-vaccine individuals with an intrinsic cost c that is lower than $\underline{c}$, whose fraction in society is $(1-\alpha)\int_0^{\underline{c}} f(c)dc$ (due to the independence between c and the attitude towards vaccination) and conditional mean of c is $\int_0^{\underline{c}} cf(c)dc/\int_0^{\underline{c}} f(c)dc$.

B Additional Analyses

This section provides the results and tables that appear in Sections 4.2-4.4 using:

- The full sample with the same classification into vaxxers and non-vaxxers used in the main text. That is, we include those who cited health reasons as their only reason for not vaccinating and those who reported vaccinating due to work or green-pass pressure.
- MoH Classification: A slightly different categorization that classifies individuals into "vaxxers," "non-vaxxers" and "indeterminate" by criteria established by the

[33] If equation (2) does not hold, the individual either fully vaccinates (if $c < e$) or refrains from vaccinating (if $e < c$).

ministry of health. These criteria take into consideration the required number of vaccine doses relative to the number of infections. According to this categorization fully vaccinated individuals (Vaxxers) consist of those who received three doses or more together with those who vaccinated twice and were infected by Covid-19 at least twice. The indeterminate group consists of individuals who received only one dose and individuals who received two doses but were infected at most once. These individuals may have been considered not fully vaccinated for some period of time by the MoH. This categorization was specified in our pre-registration. As preregistered, some analyses exclude the indeterminate group.

B.1 Overview of Pro-Sociality and Vaccination: Entire Sample and MoH Classification

Table B1 reports the t-statistics and corresponding p-values for each measure using for the full sample. Results are very similar to those in the main text. Results of the Wilcoxon-Mann-Whitney tests are also very similar to those reported in the main text with $p < 0.0055$ for all measures. Table B2 reports the t-tests and corresponding p-values for the vaxxer and non-vaxxer group according to the MoH classification with the full sample. The Wilcoxon-Mann-Whitney tests give similar results to the t-tests with $p < 0.0089$ for all measures. Table B3 reports the t-tests and corresponding p-values for the vaxxer and non-vaxxer group according to the MoH classification using the restricted sample (i.e., without non-vaxxers who reported health reasons as their sole justification for not vaccinating and without those who reported vaccinating due to pressure). Once again, the Wilcoxon-Mann-Whitney tests give similar results to the t-tests with $p < 0.0041$ for all measures.[34] and according to both the t-tests and the Wilcoxon-Mann-Whitney tests ($p < 0.001$ for both tests and according to both the MoH classification and the classification used in the main text). Since it is not part of our main interest, it is not reported in the tables. In the pre-registration we also specified another classification that is based on the MoH classification but finer: (*i*) non vaxxers, (*ii*) vaxxers (according to the MoH classification) who reported pressure (either green-pass or workplace), and (*iii*) vaxxers (according to the MoH classification) who did not report pressure.[35] For this categorization we ran an Analysis of Variance for each measure (and for the level of trust in the ministry of health) and found that we can reject the null hypothesis according to which our measures

[34] The level of trust in the ministry of health is statistically significantly higher for the vaxxers than for the non-vaxxers according to all classifications, both for the restricted and the non-restricted sample,

[35] We specified a potential fourth category of non-vaxxers who reported a health reason as their sole justification for not getting vaccinated. However, this category comprises less than 5% of the sample (only 9 participants), and so according to the pre-registration, we grouped them together with the other non-vaxxers.

are independent of the category ($p < 0.0037$ for all measures).[36]

Table B1: Averages of Vaxxers and non-Vaxxers in the DG and TG: Full Sample

	Vaxxers (n=1361)	non-Vaxxers (n=201)	t-statistic	p-value
Average Giving in DG	0.432	0.49	3.025	$= 0.0025$
Average Transfers in TG (Player A)	0.49	0.558	3.403	< 0.001
Average Returned in TG (Player B)	0.381	0.443	4.074	< 0.001

Table B2: Averages of Vaxxers and non-Vaxxers in the DG and TG: MoH Classification (Full Sample)

	Vaxxers (n=1,031)	non-Vaxxers (n=201)	t-statistic	p-value
Average Giving in DG	0.431	0.49	3.004	0.0027
Average Transfers in TG (Player A)	0.493	0.558	3.183	0.0015
Average Returned in TG (Player B)	0.381	0.443	4.001	< 0.001

Table B3: Averages of Vaxxers and non-Vaxxers in the DG and TG: MoH Classification (Restricted Sample)

	Vaxxers (n=596)	non-Vaxxers (n=192)	t-statistic	p-value
Average Giving in DG	0.419	0.492	3.348	< 0.001
Average Transfers in TG (Player A)	0.486	0.561	3.359	< 0.001
Average Returned in TG (Player B)	0.383	0.446	3.705	< 0.001

B.2 Regressions: Entire Sample and MoH Classification

In this subsection we report the same regressions that appeared in the main text (Tables 4, 5, and 6) but we do so for the entire sample, i.e., without excluding anyone based on reasons for vaccinating/not vaccinating (Tables B4, B5, and B6). We also run the same

[36] Post-hoc analyses largely show that the differences are between non-vaxxers and both categories of vaccinated individuals, rather than between the two subsets of vaccinated individuals themselves. This resonates the more detailed analyses presented in the main text, where we attribute the latter result to the composition of the group of vaxxers who did not report vaccinating due to pressure (which comprises both pro-vaccine individuals, with varying levels of convictions, and anti-vaccine individuals, with weak convictions). Consequently, and in order to conserve space, we do not include the tables with the post-hoc analyses, but they are available upon request.

regressions using the MoH classification while excluding the indeterminate group (Tables B7, B8, and B9).

Table B4: Giving in DG by Vaccination: Full Sample

	Fraction Given			
	(1)	(2)	(3)	(4)
Vaxxer	-0.059***	-0.058***	-0.048**	-0.045**
	(0.021)	(0.021)	(0.021)	(0.022)
Order	Yes	Yes	Yes	Yes
# of Infections	No	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes
Trust Moh	No	No	No	Yes
R^2	0.006	0.007	0.014	0.015
Observations	1562	1562	1562	1562

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

Table B5: Transfers in TG (Player A) by Vaccination: Full Sample

	Fraction Transferred			
	(1)	(2)	(3)	(4)
Vaxxer	-0.068***	-0.068***	-0.060***	-0.054**
	(0.022)	(0.022)	(0.022)	(0.023)
Order	Yes	Yes	Yes	Yes
# of Infections	No	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes
Trust Moh	No	No	No	Yes
R^2	0.008	0.008	0.021	0.022
Observations	1562	1562	1562	1562

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

Table B6: Average Returns in TG (Player B) by Vaccination: Full Sample

	Average Fraction Returned			
	(1)	(2)	(3)	(4)
Vaxxer	-0.064***	-0.063***	-0.064***	-0.059***
	(0.017)	(0.017)	(0.017)	(0.018)
Order	Yes	Yes	Yes	Yes
# of Infections	No	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes
Trust Moh	No	No	No	Yes
R^2	0.015	0.015	0.020	0.020
Observations	1562	1562	1562	1562

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

Table B7: Giving in DG by Vaccination: MoH Classification (without indeterminate group)

	Fraction Given			
	(1)	(2)	(3)	(4)
Vaxxer (MoH Classifcation)	-0.060***	-0.058***	-0.045**	-0.044*
	(0.021)	(0.021)	(0.022)	(0.024)
Order	Yes	Yes	Yes	Yes
# of Infections	No	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes
Trust Moh	No	No	No	Yes
R^2	0.008	0.009	0.017	0.017
Observations	1232	1232	1232	1232

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

Table B8: Transfers in TG (Player A) by Vaccination: MoH Classification (without indeterminate group)

	Fraction Transferred			
	(1)	(2)	(3)	(4)
Vaxxer (MoH Classifcation)	-0.065***	-0.066***	-0.054**	-0.054**
	(0.022)	(0.023)	(0.023)	(0.025)
Order	Yes	Yes	Yes	Yes
# of Infections	No	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes
Trust Moh	No	No	No	Yes
R^2	0.008	0.008	0.024	0.024
Observations	1232	1232	1232	1232

Notes: $*p<0.1$, $**p<0.05$, $***p<0.01$.
Standard errors in parenthesis.

Table B9: Average Returns in TG (Player B) by Vaccination: MoH Classification (without indeterminate group)

	Average Fraction Returned			
	(1)	(2)	(3)	(4)
Vaxxer (MoH Classifcation)	-0.063***	-0.064***	-0.063***	-0.061***
	(0.017)	(0.017)	(0.018)	(0.019)
Order	Yes	Yes	Yes	Yes
# of Infections	No	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes
Trust Moh	No	No	No	Yes
R^2	0.016	0.016	0.022	0.022
Observations	1232	1232	1232	1232

Notes: $*p<0.1$, $**p<0.05$, $***p<0.01$.
Standard errors in parenthesis.

B.3 Additional Analyses Specified in the Pre-Registered Analysis Plan

We report the results of analyzing the data while flipping the axes, i.e., when the dependent variable is the number of vaccinations (where those who vaccinated 3 or more times are grouped together and considered as if they vaccinated 3 times) and the independent variables are the fractions transferred according to our three measures. This is the specification that appears in the pre-registered analysis plan and, as can be seen below, leads to similar conclusions as the analysis in the main text in terms of the overall correlations between transfers and vaccination decisions.[37] Tables B10, B11, and B12 report the results of these

[37] In the main text, we chose to present the correlation in the reverse order of dependent/independent variables, in order to highlight the convictions-based mechanism.

regressions excluding those who vaccinated due to (workplace and green-pass) pressure and those who did not vaccinate due to health reasons.[38]. Tables B13, B14, and B15 report the results of the same regressions for the entire sample. The controls are the same as those in the main text along with social media and the alternative-lifestyle variables (as specified in our pre-registered analysis plan).[39] As in the analysis in the main text, we can see that higher transfers are associated with a lower number of vaccinations. Notice that the correlations are slightly weaker than in the main text. The reason is that, as we already know, the relationship between the number of vaccinations and transfers in the experimental games is non-monotonic. Nonetheless, the overall correlation reported in Tables 4, 5, and 6 is strong enough to show up even when flipping the axes and considering the entire range of vaccinations.[40]

Table B10: Numbers of Vaccinations by Giving in DG

	Number of Vaccinations (0-3)			
	(1)	(2)	(3)	(4)
Fraction Given	-0.483***	-0.443***	-0.319**	-0.114
	(0.158)	(0.155)	(0.143)	(0.127)
Order	No	No	No	Yes
# of Infections	No	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes
Trust in MoH	No	No	No	Yes
Social Media	No	No	No	Yes
Alternative Lifestyle	No	No	No	Yes
R^2	0.011	0.043	0.199	0.392
Observations	900	900	900	900

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

[38]P-values adjusted for multiple comparisons using the Romano-Wolf correction appear in Table B23

[39]The order in which we add the controls is also according to the pre-registered analysis plan.

[40]We also ran these regressions with the level of trust in the MoH as the independent variable. All specifications show a strong and significant positive correlation between the level of Trust in MoH and and the number of vaccinations. Since this was not part of our main interest in the paper, these tables are omitted to conserve space.

Table B11: Numbers of Vaccinations by Transfers in TG (Player A)

	Number of Vaccinations (0-3)			
	(1)	(2)	(3)	(4)
Fraction Transferred	-0.438***	-0.432***	-0.272*	-0.119
	(0.157)	(0.156)	(0.143)	(0.123)
Order	No	No	No	Yes
# of Infections	No	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes
Trust in MoH	No	No	No	Yes
Social Media	No	No	No	Yes
Alternative Lifestyle	No	No	No	Yes
R^2	0.010	0.043	0.198	0.392
Observations	900	900	900	900

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

Table B12: Numbers of Vaccinations by Average Returns in TG (Player B)

	Number of Vaccinations (0-3)			
	(1)	(2)	(3)	(4)
Avg. Fraction Returned	-0.726***	-0.708***	-0.623***	-0.338*
	(0.203)	(0.202)	(0.186)	(0.173)
Order	No	No	No	Yes
# of Infections	No	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes
Trust in MoH	No	No	No	Yes
Social Media	No	No	No	Yes
Alternative Lifestyle	No	No	No	Yes
R^2	0.015	0.048	0.205	0.395
Observations	900	900	900	900

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

Table B13: Numbers of Vaccinations by Giving in DG: Full Sample

	Number of Vaccinations (0-3)			
	(1)	(2)	(3)	(4)
Fraction Given	-0.315***	-0.292***	-0.205**	-0.113
	(0.109)	(0.107)	(0.104)	(0.098)
Order	No	No	No	Yes
# of Infections	No	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes
Trust in MoH	No	No	No	Yes
Social Media	No	No	No	Yes
Alternative Lifestyle	No	No	No	Yes
R^2	0.006	0.039	0.132	0.244
Observations	1562	1562	1562	1562

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

Table B14: Numbers of Vaccinations by Transfers in TG (Player A): Full Sample

	Number of Vaccinations (0-3)			
	(1)	(2)	(3)	(4)
Fraction Transferred	-0.292***	-0.290***	-0.207**	-0.113
	(0.108)	(0.107)	(0.101)	(0.093)
Order	No	No	No	Yes
# of Infections	No	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes
Trust in MoH	No	No	No	Yes
Social Media	No	No	No	Yes
Alternative Lifestyle	No	No	No	Yes
R^2	0.005	0.040	0.132	0.244
Observations	1562	1562	1562	1562

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

Table B15: Numbers of Vaccinations by Average Returns in TG (Player B): Full Sample

	Number of Vaccinations (0-3)			
	(1)	(2)	(3)	(4)
Avg. Fraction Returned	-0.531***	-0.522***	-0.489***	-0.338***
	(0.137)	(0.136)	(0.130)	(0.123)
Order	No	No	No	Yes
# of Infections	No	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes
Trust in MoH	No	No	No	Yes
Social Media	No	No	No	Yes
Alternative Lifestyle	No	No	No	Yes
R^2	0.011	0.045	0.139	0.248
Observations	1562	1562	1562	1562

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

As a final robustness check (that appeared in our pre-registered analysis plan), we consider the categorization according to the criteria of the ministry of health without excluding the indeterminate group. In order to include them in the analysis, we specify a multi-nomial logit model where the dependent variable is the category (vaxxer, non-vaxxer, or indeterminate) and the independent variables are the transfers.[41] Tables B16, B17 and B18 report the regression results for the restricted sample (i.e., when excluding those who reported vaccinating due to pressure or a health reason for not vaccinating), while Tables B19, B20 and B21 report the results for the entire sample. In these regressions we do not include the number of infections as an explanatory variable since it is already taken into account in the classification of the vaccination status according to the criteria of the MoH. As can be seen from the tables, high transfers are associated with a higher likelihood of being a non-vaxxer (the omitted group, coded as zero).[42]

Finally, Tables B22 and B23 report adjusted $p-$values (alongside the original $p-$values) for the main explanatory variables in Tables 4-6, and Tables B10-B12, respectively. The adjusted values follow the Romano-Wolf correction specified in the pre-registered analysis plan.

[41] In the analysis plan we specified an ordered logit model. However, after observing the non-monotonic patterns between number of vaccinations and transfers, we think that a more general multi-nomial logit is more fitting in this case.

[42] Once again, we do not include here the regressions for the level of Trust in MoH. As expected, these regressions show that the likelihood to belong to the indeterminate group or the vaxxer group significantly increases as the level of Trust in MoH increases.

Table B16: Vaccination by Giving in DG: MoH Classification (Restricted Sample)

	Vaccination Category (MoH))		
	(1)	(2)	(3)
1 (Indeterminate)			
Fraction Given	-1.205***	-1.146**	-0.895*
	(0.465)	(0.471)	(0.534)
2 (Vaxxer)			
Fraction Given	-1.042***	-0.857**	-0.493
	(0.321)	(0.346)	(0.437)
Order	No	No	Yes
Socio-Demographics	No	Yes	Yes
Trust in MoH	No	No	Yes
Social Media	No	No	Yes
Alternative Lifestyle	No	No	Yes
Pseudo R^2	0.008	0.116	0.269
Observations	900	900	900

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

Table B17: Vaccination by Transfers in TG (Player A): MoH Classification (Restricted Sample)

	Vaccination Category (MoH)		
	(1)	(2)	(3)
1 (Indeterminate)			
Fraction Transferred	-1.728***	-1.569***	-1.193**
	(0.469)	(0.465)	(0.521)
2 (Vaxxer)			
Fraction Transferred	-1.003***	-0.660*	-0.207
	(0.313)	(0.341)	(0.414)
Order	No	No	Yes
Socio-Demographics	No	Yes	Yes
Trust in MoH	No	No	Yes
Social Media	No	No	Yes
Alternative Lifestyle	No	No	Yes
Pseudo R^2	0.011	0.118	0.272
Observations	900	900	900

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

Table B18: Vaccination by Average Returns in TG (Player B): MoH Classification (Restricted Sample)

	Vaccination Category (MoH)		
	(1)	(2)	(3)
1 (Indeterminate)			
Avg. Fraction Returned	-1.814***	-1.710***	-1.010
	(0.631)	(0.622)	(0.685)
2 (Vaxxer)			
Avg. Fraction Returned	-1.417***	-1.327***	-0.570
	(0.392)	(0.434)	(0.569)
Order	No	No	Yes
Socio-Demographics	No	Yes	Yes
Trust in MoH	No	No	Yes
Social Media	No	No	Yes
Alternative Lifestyle	No	No	Yes
Pseudo R^2	0.010	0.118	0.269
Observations	900	900	900

Notes: $^{*}p<0.1$, $^{**}p<0.05$, $^{***}p<0.01$.
Standard errors in parenthesis.

Table B19: Vaccination by Giving in DG): MoH Classification (Full Sample)

	Vaccination Category (MoH)		
	(1)	(2)	(3)
1 (Indeterminate)			
Fraction Given	-0.827**	-0.751**	-0.536
	(0.357)	(0.351)	(0.392)
2 (Vaxxer)			
Fraction Given	-0.892***	-0.682**	-0.418
	(0.312)	(0.320)	(0.370)
Order	No	No	Yes
Socio-Demographics	No	Yes	Yes
Trust in MoH	No	No	Yes
Social Media	No	No	Yes
Alternative Lifestyle	No	No	Yes
Pseudo R^2	0.003	0.068	0.144
Observations	1562	1562	1562

Notes: $^{*}p<0.1$, $^{**}p<0.05$, $^{***}p<0.01$.
Standard errors in parenthesis.

Table B20: Vaccination by Transfers in TG (Player A): MoH Classification (Full Sample)

	Vaccination Category (MoH)		
	(1)	(2)	(3)
1 (Indeterminate)			
Fraction Transferred	-1.072***	-1.059***	-0.767**
	(0.351)	(0.349)	(0.369)
2 (Vaxxer)			
Fraction Transferred	-0.906***	-0.716**	-0.364
	(0.305)	(0.313)	(0.342)
Order	No	No	Yes
Socio-Demographics	No	Yes	Yes
Trust in MoH	No	No	Yes
Social Media	No	No	Yes
Alternative Lifestyle	No	No	Yes
Pseudo R^2	0.004	0.070	0.145
Observations	1562	1562	1562

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

Table B21: Vaccination by Average Returns in TG (Player B): MoH Classification (Full Sample)

	Vaccination Category (MoH)		
	(1)	(2)	(3)
1 (Indeterminate)			
Avg. Fraction Returned	-1.407***	-1.389***	-0.904*
	(0.430)	(0.427)	(0.468)
2 (Vaxxer)			
Avg. Fraction Returned	-1.404***	-1.366***	-0.808*
	(0.359)	(0.373)	(0.430)
Order	No	No	Yes
Socio-Demographics	No	Yes	Yes
Trust in MoH	No	No	Yes
Social Media	No	No	Yes
Alternative Lifestyle	No	No	Yes
Pseudo R^2	0.006	0.071	0.145
Observations	1562	1562	1562

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

Table B22: Original and adjusted p-values of vaxxer variable in main regressions

Dep. Var.	p-values	(1)	(2)	(3)	(4)
DG	Original	< 0.001	< 0.001	0.005	0.01
	Adjusted	0.002	0.004	0.01	0.014
TG (A)	Original	< 0.001	< 0.001	0.003	0.005
	Adjusted	0.002	0.004	0.01	0.014
TG (B)	Original	< 0.001	< 0.001	< 0.001	0.001
	Adjusted	0.002	0.004	0.003	0.005

Notes: The table reports the original and adjusted p-values of the variable "vaxxer" for each of our measures and for all six specifications that appear in Tables 4, 5, and 6. The p-values of the original model in this table are obtained from a regression model with non-robust standard errors. In the main text, we run the regressions and determine the significance levels using robust standard errors.

Table B23: Original and adjusted p-values of pro-sociality measures in main regressions of the pre-registration analysis plan

Indep. Var.	p-values	(1)	(2)	(3)	(4)
DG	Original	0.002	0.004	0.023	0.363
	Adjusted	0.004	0.007	0.026	0.38
TG (A)	Original	0.003	0.003	0.046	0.331
	Adjusted	0.005	0.006	0.056	0.339
TG (B)	Original	< 0.001	< 0.001	0.001	0.036
	Adjusted	0.001	0.001	0.002	0.044

Notes: The table reports the original and adjusted p-values of the independent pro-sociality measures in the specifications reported in Tables B10, B11, and B12. The dependent variable is the number of vaccinations (with 3 and 4 vaccinations classified as 3). The p-values of the original model in this table are obtained from a regression model with non-robust standard errors. In the main text, we run the regressions and determine the significance levels using robust standard errors.

C Willingness to Stand Up for One's Beliefs

In this section we describe our elicitation of a proxy of individuals' convictions. We leapfrogged on another project in which we approached the same participant pool who completed both questionnaires described in Section 3. We asked participants to rate the extent to which they agree with the following statements (on a scale of 1-5):[43]

- I am willing to fight for my beliefs even if it entails large personal costs.
- I invest time and/or money in promoting ideological issues (e.g. social, environmental, or political issues) that are important to me (e.g. join protests, attend group meetings, donate to NGOs/parties, actively volunteer in different activities that promote these

[43]The separate project, the questions reported in this section of the appendix and the questions regarding trust in institutions reported in the next section were pre-registered on the OSF website. Identifying number https://doi.org/10.17605/OSF.IO/WS6UA.

issues, try to convince other people to take my side, promote my opinion on social networks).

Both questions are non-incentivized and they attempt to elicit different perspectives of individuals' willingness to stand up for their beliefs, i.e., their convictions. The first question is more direct, yet abstract in its nature, while the second describes more concrete behaviors that a person may undertake to advance their personal beliefs. In what follows we use each of these proxies separately as well as a *convictions-proxy index*, which is the average of the answers to both questions.

Our suggested convictions-based mechanism is based on two premises. The first is that convictions are correlated with high transfers in our experimental games. As stated in our pre-registration to the other project mentioned above, we test this link by looking at the correlations between individuals' transfers and these proxies. Tables C1, C2, and C3 report the results of the regressions in which the transfer index (which we constructed and used in Subsection 4.4) is the dependent variable. The independent variables are the convictions-proxy index, the extent of agreement with the first statement ("fight for beliefs"), and the extent of agreement with the second question ("ideologically active"), respectively. In all tables, both specifications control for the order of the questions, while the second column also includes socio-demographic controls. In line with our suggested mechanism, we find that the correlations between our transfer index and these proxies are positive.

Table C1: Transfers and Convictions-Proxy Index

	Transfer Index	
	(1)	(2)
Convictions-Proxy Index	0.017*	0.025***
	(0.009)	(0.009)
Socio-Demographics	No	Yes
Adjusted-R^2	0.003	0.024
Observations	726	726

Notes: $*p < 0.1, **p < 0.05, ***p < 0.01$.
Standard errors in parenthesis.

Moving on to the second premise, we examine whether a quadratic relationship shows up between these proxies of convictions and the number of vaccinations. Table C4 reports the results of three regressions using this quadratic specification, one for each proxy of convictions. The first column uses the answers to the first question as the dependent variable, the second column uses the answers to the second question, and the third column uses the index that combines both questions. As can be seen in the table, we find some support for a quadratic relationship between the proxy for convictions and the number of vaccinations, especially when the first question is tested, either in isolation (column 1) or

Table C2: Transfers and Fighting for Beliefs

	Transfer Index	
	(1)	(2)
Fight for Beliefs	0.011	0.016*
	(0.008)	(0.008)
Socio-Demographics	No	Yes
Adjusted-R^2	0.000	0.019
Observations	726	726

Notes: $*p < 0.1, **p < 0.05, ***p < 0.01$.
Standard errors in parenthesis.

Table C3: Transfers and Ideological Activism

	Transfer Index	
	(1)	(2)
Ideo Active	0.012*	0.017**
	(0.007)	(0.007)
Socio-Demographics	No	Yes
Adjusted-R^2	0.002	0.023
Observations	726	726

Notes: $*p < 0.1, **p < 0.05, ***p < 0.01$.
Standard errors in parenthesis.

as part of the convictions-proxy index (column 3).

We acknowledge that our proxy of convictions suffers from some drawbacks. Most notably, it is non-incentivized, while convictions, by their very nature, express the willingness to engage in action when real stakes (and sometimes very high stakes) are involved. Another drawback is that we elicited these proxies during a period of political and civil unrest in which many people in Israel took to the streets to protest following the judicial reform set forth by the newly elected government. These events may have had an influence on the answer to these questions. Moreover, given the political nature of this civil unrest and the relationship between vaccinations and political orientation (see Table 2), the proximity to these events may have systematically biased our elicitation of proxies of convictions. Notwithstanding these drawbacks, we view the findings concerning these proxies as offering some validation for the convictions-based mechanism outlined in the main text.[44]

[44] In line with the pre-registration to the other project, we also ran the main regressions (Tables 4, 5, and 6) that appeared in the main text while including the convictions-proxy index as a control. The coefficient of the main variable of interest (vaccination status), as well as its significance levels remain qualitatively similar to those in the original regressions while the coefficient of the convictions-proxy index is positive and mostly significant (these regressions are available upon request). This means that while our proxy appears to correlate with transfers in our games, it does not seem to fully capture the channel of convictions, possibly due to its non-incentivized nature and the political contamination mentioned above.

Table C4: Convictions-Proxy and Number of Vaccinations

	Convictions-Proxy		
	(1)	(2)	(3)
# Vaccinations	-0.160	-0.069	-0.114
	(0.107)	(0.089)	(0.082)
(# Vaccinations)^2	0.061**	0.026	0.043**
	(0.027)	(0.022)	(0.021)
R^2	0.014	0.004	0.012
Observations	726	726	726

Notes: $*p < 0.1, **p < 0.05, ***p < 0.01$. Standard errors in parenthesis. Columns (1), (2), and (3) specify the dependent variable as the answers to the first question, second question, and the convictions-proxy index, respectively.

D Alternative Mechanisms

D.1 Mechanisms Tested Thus Far

Our explanation to the truncated U-shape of pro-sociality measures as a function of vaccination status is that the strength of convictions is a latent variable that affects both transfers in our experimental games and the tendency to vaccinate against Covid-19. While there may be other latent variables influencing these two observed behaviors, many of the potential candidates have been controlled for in our analysis and therefore cannot fully account for the results. Here we present the main alternative mechanisms and discuss the extent to which they are able to explain our results. None of these mechanisms can fully explain the patterns described in the body of the paper.

D.1.1 Religion

Religious people are, on average, more pro-social. This was shown both by comparing individuals with varied levels of religiosity (e.g., Everett et al., 2016 show it for Christians, Umer, 2020 for Muslims and Sosis and Ruffle, 2004 for Jews), and by priming religion before letting participants play the DG and similar games (e.g., Shariff and Norenzayan, 2007 and Ahmed and Salas, 2011). The reasons behind this relationship have been analyzed both in the social sciences (see e.g. Norenzayan and Shariff, 2008) and in the humanities (Xygalatas and Martin, 2016), and will not be reiterated here.

For our purposes, it's important to note that if indeed religiosity is positively correlated with prosociality, then it potentially could explain the negative correlation between transfers and vaccination. This could be the case if more religious individuals are less inclined to take the vaccine (because they rely less on science to guide their choices in life). However, while our data does show that being religiously orthodox is negatively correlated with taking the vaccine (see Table 2), this channel does not explain our results: The negative correlation between transfers and vaccination remains strong and statistically significant even after controlling for the level of religiosity (see column (3) in Tables 4-6, where religiosity is included as one of the various socio-demographic controls). Furthermore, it is not clear how the religiosity mechanism could account for the non-monotonic pattern we report.

D.1.2 State Intervention and Individual Freedom

This potential mechanism operates as follows: People with a right-wing political orientation, prioritize maintaining their individual freedoms and are more opposed to various types of state interventions (Libertarianism).[45] Hence, they are more likely to object to state-mandated vaccination, in line with recent findings (Siegrist and Bearth, 2021; Wollebæk et al., 2022; Peng, 2022). At the same time, they hold more individualistic views and support the idea that a person should take care (only) of oneself, which might make them less inclined to be generous in the experimental tasks. This could have potentially explained a positive correlation between transfers and the tendency to get vaccinated. However, even though participants with a right-wing political orientation do seem to vaccinate less (see Table 2), there is a (weak) positive correlation between holding these political views and our transfer index ($\rho = 0.0704,\ p = 0.0513$). Accordingly, we find that non-vaccinated individuals in our sample transfer on average more, not less, than vaccinated individuals, suggesting that this mechanism cannot explain our findings.

D.2 Mechanisms Tested in This Appendix

D.2.1 Social Media

Social media was a major platform through which anti-vaccine groups spread misinformation, conspiracies and other arguments against the vaccine (Puri et al., 2020). It has been documented that the spread of such content was associated with greater vaccine hesitancy (see for example Wilson and Wiysonge, 2020). At the same time, social media, by its very nature, may be positively associated with being a social type of person and hence, potentially, having stronger pro-social attitudes. Note that this explanation has the potential to explain the differences in transfers between vaxxers and non-vaxxers, as reported in Tables 4-6, but cannot shed light on the truncated U-shape pattern of transfers as a function of vaccination status.

To test whether social-media usage explains the higher transfers of non-vaxxers compared to vaxxers, we utilize participants' responses from the second questionnaire, where they rated their social-media usage on a 5-point Likert scale. This questionnaire was completed after the experimental games. In line with the previous findings in the literature, the correlation between social-media involvement and the number of vaccinations is negative and significant ($\rho = -0.09,\ p = 0.016$). However, the second part of this suggested

[45] Cappelen et al. (2024) highlight this tendency in the context of inequality and redistribution.

mechanism does not hold as there is no correlation between social-media involvement and the transfer index defined in Section 4.4 ($\rho = 0.0015,\ p = 0.963$).

D.2.2 Alternative Lifestyle

Following the experimental games in the second questionnaire, participants were asked a few questions that were meant to capture what we call “alternative lifestyle” variables. These include their perceived level of own spirituality, their use of conventional medicine and of alternative medicine (all reported on a 1-5 scale), and whether they are vegan/vegetarian. These questions were included in order to test (and potentially rule out) a mechanism that operates as follows: People with an “alternative lifestyle” are less likely to get vaccinated. At the same time, one might expect them to be more pro-social and more trusting than others. If this is true, then this could explain why non-vaxxers transfer, on average, more than vaxxers in our experimental games. As with social media discussed above, this explanation has the potential to shed light on the binary comparison between vaxxers and non-vaxxers but not on the more general non-monotonic pattern described in the text.

Indeed, Table D1 shows that the tendency to use alternative medicine has a negative impact on vaccination, and the opposite is true for the use of conventional medicine. Self-perceived spirituality is predictive of a lower tendency to vaccinate and so is being vegetarian or vegan (although the coefficient of the latter is not statistically significant). Thus far, these results are in line with the suggested mechanism. To explore this mechanism further, we construct an alternative-lifestyle index calculated as a weighted average of responses to the four questions we define as alternative-lifestyle variables (with conventional medicine usage contributing negatively to the index, i.e., higher use implies a lower index score). The correlation between this alternative-lifestyle index and the transfer index from Section 4.4 is positive and significant ($\rho = 0.143,\ p < 0.001$), suggesting this mechanism may indeed explain part of the negative correlation observed in Tables 4-6. We therefore turn next to investigate whether this mechanism substantially reduces the explanatory power of the vaccination variable in Tables 4-6. If it does, this would suggest that alternative-lifestyle factors are important omitted variables that may be driving the correlation between vaccination status and the transfers in our experimental games.

Table D2 presents this test. In the first four columns we regress the transfer index defined in Section 4.4 while gradually adding controls as in Tables 4-6, while in the fifth column we add the four alternative-lifestyle variables as explanatory variables. This column shows that the alternative-lifestyle variables indeed take away some explanatory power from the binary vaccination classification. Specifically, roughly one fourth of the effect size of the binary vaccination variable is “explained away” by alternative-lifestyle variables. However, the coefficient of the binary vaccination variable remains substantial in magnitude and significant. Therefore, the alternative-lifestyle mechanism cannot be the primary explanation for the observed gap in transfers between vaxxers and non-vaxxers.

Table D1: Vaccination by Alternative-Lifestyle Variables

	Vaccinated (Yes=1/No=0)	
	(1)	(2)
Veg	-0.04	-0.04
	(0.04)	(0.04)
Spiritual	-0.07***	-0.04***
	(0.01)	(0.01)
Alternative Med	-0.04***	-0.06***
	(0.01)	(0.01)
Conventional Med	0.10***	0.09***
	(0.01)	(0.01)
Socio-Demographics	No	Yes
Adjusted-R^2	0.17	0.27
Observations	900	900

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

Table D2: Transfer Index by Vaccination and Alt Lifestyle

	Transfer Index				
	(1)	(2)	(3)	(4)	(5)
Vaxxer	-0.075***	-0.074***	-0.067***	-0.068***	-0.047**
	(0.017)	(0.017)	(0.018)	(0.020)	(0.020)
Order	Yes	Yes	Yes	Yes	Yes
# of Infections	No	Yes	Yes	Yes	Yes
Socio-Demographics	No	No	Yes	Yes	Yes
Trust Moh	No	No	No	Yes	Yes
Alternative Lifestyle	No	No	No	No	Yes
R^2	0.024	0.024	0.033	0.033	0.056
Observations	900	900	900	900	900

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

D.2.3 Trust in Institutions

In this subsection we explore whether the level of trust in institutions can account for our findings, particularly those concerning the behavior of player A in the Trust Game.[46] The potential mechanism at play is the following: Individuals with low trust in institutions are less likely to vaccinate since the vaccine is offered by the country's institutions (Musa

[46]The mechanism suggested in this subsection deals specifically with the behavior of player A in the TG rather than with our three different measures as a whole. Nonetheless, given the high correlations across measures, it has the potential to shed light on the patterns of our transfer index in general. However, it may only be able to explain the difference in transfers between vaxxers and non-vaxxers rather than the non-monotonic pattern found in the data.

et al., 2022; Fobiwe et al., 2022). At the same time, they may have a relatively high level of trust in others, if their lack of trust in institutions is compensated for by higher trust in other individuals.[47]

As a first glimpse into this mechanism, we follow our pre-registration and test the correlation between our measure of trust in-others as player A in the TG and the level of trust in the MoH (the more general measure of trust in institutions was only constructed using the follow-up study). We ran two specifications (no controls and a full set of controls) of a regression in which the fraction transferred as player A in the TG is the dependent variable and the level of trust in the MoH is the independent variable. The correlations are indeed negative, albeit quite weak and not significant with the full set of controls, as can be seen in Table D3.[48]

Table D3: Trust in TG (player A) and Trust in MoH

	Frac. Transferred (Player A in TG)	
	(1)	(2)
Trust in MoH	-0.013**	-0.009
	(0.006)	(0.007)
Order	No	Yes
# of Infections	No	Yes
Socio-Demographics	No	Yes
Alternative Lifestyle	No	Yes
R^2	0.003	0.027
Observations	1562	1562

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

To further investigate this channel, we utilized the follow-up questionnaire that was distributed to the same pool of participants as part of a separate research project. In this follow-up questionnaire, we inquired about participants' level of trust (1-5) in nine institutions that were unrelated to healthcare and not too involved with the political reform advocated by the government when the survey was circulated (the full list appears in the third questionnaire in Appendix E). We created a trust-in-institutions index by averaging these ratings and used it to examine whether the level of trust in institutions may explain our findings.

As expected, Table D4 demonstrates a positive and significant coefficient of the trust-in-institutions variable when predicting vaccination.[49] However, as shown in Table D5,

[47]Previous findings demonstrated a negative relationship between trust in others and some proxies of trust in institutions, such as the level of law enforcement (Wintrobe et al., 1995) and the amount of regulation (Aghion et al., 2010; Carlin et al., 2009), though there are other indications that the two types of trust are in fact complements (see e.g. Tabellini, 2008a,b, 2010).

[48]Relatedly, Naef and Schupp (2009) report weak correlations between trust as player A in the TG and trust in different institutions (not including the ministry of health).

[49]In these specifications we do not include the variable for trust in the MoH.

there is no correlation between trust in others and trust in institutions. The table reports the results of a regression in which the dependent variable is the fraction transferred by player A, and the index of trust in institutions is the main explanatory variable. The coefficient on the trust-in-institutions index is not statistically significantly different from zero (if anything, the sign of the coefficient is positive). Thus, we can reject the conjecture that this mechanism might explain our findings regarding player A's behavior in the TG.

Table D4: Vaccination by Trust in Institutions

	Vaccination Status (1=Yes, 0=No)		
	(1)	(2)	(3)
Trust in Institutions	0.144***	0.141***	0.097***
	(0.022)	(0.021)	(0.022)
# of Infections	No	Yes	Yes
Socio-Demographics	No	No	Yes
R^2	0.065	0.073	0.169
Observations	726	726	726

Notes: *p <0.1, **p <0.05, ***p <0.01.
Standard errors in parenthesis.

Table D5: Trust in Others and Trust in Institutions

	Frac. Transferred (Player A in TG)	
	(1)	(2)
Trust in Institutions	0.006	0.016
	(0.013)	(0.013)
Order	Yes	Yes
Socio-Demographics	No	Yes
R^2	0.000	0.034
Observations	726	726

Notes: $*p < 0.1, **p < 0.05, ***p < 0.01$.
Standard errors in parenthesis.

D.3 Other Potential Mechanisms

D.3.1 Cognitive Ability and Selfishness

Another potential explanation to the negative correlation between the observed transfers and the tendency to get vaccinated involves the latent variable of intelligence (or, more generally, cognitive ability). The suggested mechanism operates as follows: People who are more intelligent are both more inclined to get vaccinated and more inclined to act selfishly in our experimental games.

This mechanism, as those that appeared earlier, is insufficient to explain our findings. First, as we have demonstrated, our results are robust to controlling for education, which is often used as a proxy for intelligence (see Deary and Johnson (2010) and the papers cited therein). Second, while one might argue that calculating the equilibrium-behavior as the first mover in the TG requires cognitive ability, it is much harder to make that claim when it comes to the second mover in the game, and even more so for the DG (which, despite its name, is not even a game but a non-interactive decision problem). In fact, Chen et al. (2013) show that measures of cognitive ability that are less sensitive to the intrinsic motivation of the participant (such as Math SAT scores) are positively related to generosity (including giving in the DG),[50] and Achtziger et al. (2015) find that cognitive resources are positively correlated with non-selfish behavior in the DG.

Nonetheless, to further explore the possibility that cognitive ability is behind the gap in behavior in our experimental games, we conduct a simple test using our data. It is anticipated that individuals with higher cognitive abilities will perform better in these games, particularly in the role of player A in the TG (which is the only task that requires strategic thinking). Consequently, if non-vaccinated individuals indeed possess the lowest cognitive abilities, we would expect them to underperform with respect to the other groups.

To check this prediction, we computed the average return by player B in the TG in our sample for every possible amount transferred by player A. This was subsequently used for calculating the expected earnings for every amount transferred by player A. Using the distribution of transferred amounts of player A for each vaccination status, we then estimated the expected earnings for each group. The results indicate that non-vaccinated individuals earn an average of 43.36 ILS, partially vaccinated individuals earn 42.72 ILS, and vaccinated individuals earn 42.95 ILS. Thus, contrary to the cognitive ability hypothesis, non-vaccinated individuals actually perform slightly better than the other groups.

Hence, we do not find the link between intelligence and transfers in our games to be a convincing explanation for our results. Furthermore, even if we ignore the above difficulties with this suggested mechanism and the straightforward exercise conducted using our data, and accept the underlying channel of intelligence, it is not able to account for the non-monotonic pattern in our data. In particular, given the relatively low earnings of the partially vaccinated in the role of player A in the TG, it seems unlikely that their partial vaccination status was driven by overly sophisticated behavior.

D.3.2 Optimism

Optimism may be a potential underlying channel between vaccination decisions and pro-social behavior. This channel follows two links. First, optimistic people may have higher pro-social tendencies than others. This link finds some indirect support in prior work

[50] As Chen et al. (2013) explain in their paper, the evidence in the literature is mixed when it comes to measures of cognitive ability that are sensitive to intrinsic motivation. See e.g. Ben-Ner et al. (2004), Han et al. (2012) and the literature cited there.

(Baumsteiger, 2017; Zheng et al., 2020): The first study reports a moderate positive correlation between pro-social intentions and optimism ($\rho = 0.16,\ p = 0.01$, see Study 3 in that paper), while the second study finds a positive correlation between pro-social behavior and optimistic views about the future of moral individuals. The second link required for this channel to hold, is that optimistic individuals are less inclined to vaccinate since they underestimate their chances to suffer from the disease. This perception might lead them to view vaccination as unnecessary, resulting in a reluctance to get vaccinated. Previous work suggested that this may indeed be the case (Bond and Nolan, 2011; Dubov and Phung, 2015). However, recent research, specifically related to Covid-19, has found no effect of optimism on vaccination intentions (Wolff, 2021).

Thus, the empirical evidence in support of this channel is rather weak. Moreover, even if this channel has the potential to shed light on the differences in transfers between vaxxers and non-vaxxers, it cannot account for the non-monotonic patterns in our data.

D.3.3 Vaccine Shortage

Many countries around the world experienced vaccine shortages during the Covid-19 pandemic. When a shortage exists or is anticipated, individuals may choose to vaccinate out of concern for vaccine availability. Specifically, altruistic individuals might delay their vaccination to prioritize others, whereas selfish individuals may get vaccinated promptly to avoid potential stock depletion. This behavior may be reflected in the higher transfers of non-vaccinated individuals in our experimental games.

However, this channel is unlikely to play a role in our study, as Israel was one of the first countries to receive both the Pfizer and Moderna vaccines and consistently maintained an ample supply. This ensured availability for anyone wishing to vaccinate throughout the pandemic. Furthermore, non vaxxers in our study had ample time to get vaccinated. Thus, even if, theoretically, they initially refrained from doing so out of concern for others' welfare, they could have easily vaccinated later on.

E Instructions

First Questionnaire

<u>General Instructions</u>

Hello and thank you for your participation in a short questionnaire regarding Covid-19. Before we begin, let us state a few general comments.

1. The questionnaire is formulated in masculine form but refers to women and men alike.

2. The questionnaire is expected to take a few minutes to complete.

3. The questionnaire is anonymous; you are not required to provide any identifying information.

Informed Consent

You do not have to participate in the questionnaire and non-participation will not affect you in any way. If you would like to, you can stop the completion of the questionnaire and you will not be affected by it in any way. The questionnaire is completely anonymous. Thank you in advance for your cooperation. In order to continue to the questionnaire please mark the box below:

- I certify that I have read the consent form. I agree to complete this questionnaire and that my answers will be used for research purposes only.

Questions

1. Have you ever been infected with Covid-19 (i.e., tested positive to a Covid-19 PCR/antigen test)? (yes/no)
   - (If the answer to question 1 is yes): How many times were you infected with Covid-19?
     - 1
     - 2
     - 3+
2. Did you receive the vaccine against Covid-19 (at least once)? (yes/no)
   - (If the answer to question 2 is yes): How many vaccine doses did you receive?
     - 1
     - 2
     - 3
     - 4
   - (If the answer to question 2 is yes):
     - Did you make the decision to receive one of the first two doses of the vaccine due to pressure from your employer?
     - Did you make the decision to receive one of the first two doses of the vaccine due to pressure that followed from the restrictions on those who were not eligible to receive a green pass (for example inability to go out or to go on vacation)?

- (If the answer to question 2 is no): Why didn't you receive the vaccine? (you can mark more than one answer)
  - I was not convinced of the vaccine's effectiveness
  - I was concerned about side effects
  - I was not bothered by the risk to contract the virus
  - Health reasons prevent me from taking the vaccine
  - Other (please specify):

Second Questionnaire

General Instructions

Greetings. Thank you for agreeing to participate in a short questionnaire in decision making. First, allow us to make a few general comments.

1. The questionnaire is formulated in masculine form but refers to women and men alike.

2. The questionnaire includes two parts. In Part A you will play two short "games" and in Part B you will be asked to answer a few short questions. The identity of players who play against you will not be disclosed and neither will your identity be disclosed to them. Matching participants for the purpose of playing the games is done anonymously by the computer.

3. The questionnaire is expected to take a few minutes to complete.

4. The questionnaire is anonymous; you are not required to provide any identifying information.

5. For completing this questionnaire, you may be able to earn significant amounts of money that will be paid in addition to the participation fee. As this study ends, in two weeks, 10% of those who finish the questionnaire will be randomly selected by the computer and they will earn money according to one of the two games played in Part A. There is a 50% chance that the payment will be determined by the first game and a 50% chance that it will be determined by the second game (the computer will randomly choose one of them). Keep in mind that this payment is in addition to the payment that you will receive for participation.

Informed Consent

You do not have to participate in the questionnaire and non-participation will not affect you in any way. If you would like to, you can stop the completion of the questionnaire and you will not be affected by it in any way. The questionnaire is completely anonymous.

Thank you in advance for your cooperation. In order to continue to the questionnaire please mark the box below:

- I certify that I have read the consent form. I agree to complete this questionnaire and that my answers will be used for research purposes only.

Game 1 (Remember that if you will be randomly drawn to receive additional payment, there is a 50% chance that this game will determine your payoffs)

In this game there are two players: player A and player B. In the beginning of the game player A receives 40 NIS. This game consists of one stage only. Player A decides on the amount that he would like to transfer to player B out of the total amount of 40 NIS (he can transfer 0,10,20,30, or 40 NIS). Player B has no active role in this game. He simply receives the amount of money that was transferred to him.

Payoffs in Game 1

Player A will receive the amount that he kept for himself and player B will receive the amount that player A transferred over to him. You will play this game in both roles, once as player A and once as player B (in the role of player B you will not be asked to do anything). In each of the roles, a new participant will be randomly chosen to play against you.

If you will be randomly chosen to receive payment (with 10% chance) and this game will be chosen for payment (with 50% chance) then you will be paid according to one of the two roles in which you will play with an equal chance (according to a random draw made by the computer).

You are now playing in the role of player A.
What is the amount that you would like to transfer to player B out of the total amount of 40 NIS that you currently have?

- 0
- 10
- 20
- 30
- 40

You are now playing in the role of player B (against a different player randomly chosen by the computer)

As stated earlier, player A can transfer to you 0,10,20,30 or 40 NIS.

As player B you are not required to do anything.
Please press continue in order to continue to the next game.

Game 2 (Remember that if you will be randomly drawn to receive additional payment, there is a 50% chance that this game will determine your payoffs)

In this game there are two players: player A and player B. In the beginning of the game player A receives 40 NIS. This game consists of two stages.

- Stage 1: Player A decides on the amount that he would like to transfer to player B out of the total amount of 40 NIS (he can transfer 0,10,20,30, or 40 NIS). The amount transferred to player B will be multiplied by 3 so that player B will receive three times the amount transferred to him by player A.
- Stage 2: Player B decides on the amount that he would like to return to player A out of the total of the multiplied amount that he received.

Payoffs in Game 2
Player A will receive the amount that he kept for himself in Stage 1 in addition to the amount that player B will return to him in Stage 2. Player B will receive the amount that he kept for himself in Stage 2. For example, if you, as player A decided to transfer to player B an amount of X NIS out of the total amount of 40 NIS then after Stage 1 you will have 40-X NIS and player B will have 3X NIS. In Stage 2 player B will decide how much of the amount of 3X to return to you. The amount that he will transfer back to you will be added to the amount of 40-X that you already had and that will become your final payoff. Player B will receive 3X minus that amount that he will return to you.

You will play this game in both roles, once as player A and once as player B. In each of the roles, a new participant will be randomly chosen to play against you.

If you will be randomly chosen to receive payment (with 10% chance) and this game will be chosen for payment (with 50% chance) then you will be paid according to one of the two roles in which you will play with an equal chance (according to a random draw made by the computer).

You are now playing in the role of player A. What is the amount that you would like to transfer to player B out of the total amount of 40 NIS that you currently have?

- 0
- 10
- 20
- 30
- 40

You are now playing in the role of player B (against a different player randomly chosen by the computer)

As stated earlier, player A can transfer to you 0,10,20,30 or 40 NIS. At this stage we do not know what will be the amount that he will transfer over to you. Therefore, we ask you to state how much you would return for any possible scenario. What is the amount that you would like to return to Player A if he transferred 10 NIS to you (that is, if you will have 30 NIS after Stage 1):

- 0
- 10
- 20
- 30

What is the amount that you would like to return to Player A if he transferred 20 NIS to you (that is, if you will have 60 NIS after Stage 1):

- 0
- 10
- 20
- 30
- 40
- 50
- 60

What is the amount that you would like to return to Player A if he transferred 30 NIS to you (that is, if you will have 90 NIS after Stage 1):

- 0
- 10
- 20
- 30
- 40
- 50

- 60
- 70
- 80
- 90

What is the amount that you would like to return to Player A if he transferred 40 NIS to you (that is, if you will have 120 NIS after Stage 1):

- 0
- 10
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90
- 100
- 110
- 120

You will now be presented with a few short questions. Please answer sincerely, thank you.

1. To what extent are you involved in social media networks? WhatsApp isn't considered a social network for the purpose of this question (1=not involved at all, 5=very involved)?
2. Are you vegan or vegetarian? (yes/no)
3. To what extent do you perceive yourself as a spiritual person (1=not spiritual at all, 5=very spiritual)?
4. To what extent do you rely on alternative medicine (1=not at all, 5=strongly trust)?

5. To what extent is the following sentence true for you: "when I am sick, I tend to take (conventional) medication" (1=not at all, 5=very much)

6. To what extent do you trust the ministry of health (1=complete distrust to 5= very strong trust)?

Third Questionnaire

This questionnaire had a first part that was conducted as part of a different study. Below we report part B of the questionnaire. Some questions in this part were also not relevant for this study but we report them here for the sake of completeness (they appear in italics).

Part B
We will now ask you to answer a few short questions. Please answer sincerely, thank you.

Question 1: Here is a list of ten public institutions.[51] Please mark your level of trust in each of them: 1=very low trust, 2=low trust, 3=medium trust, 4=high trust, 5=very high trust

- Israel Police
- Israel Defense Forces
- Your local municipality
- The education system
- Lower level courts ("Hashalom" courts) - civilian and criminal disputes of lower order
- Medium level courts ("Mehozi" courts) – civilian and criminal disputes of higher order
- *The Supreme Court*
- The tax authority
- The ministry of environmental protection
- Bank of Israel

Question 2. Please mark your level of agreement with the following statement:

- I am willing to fight for my beliefs even if it entails large personal costs (1=agree to a very small extent, 2=agree to a small extent, 3=agree to a medium extent, 4=agree to a large extent, 5=agree to a very large extent).

[51] In this study, we were only interested in nine of these institutions. The supreme court which appears below in italics, was not relevant for this study.

Question 3. Please mark your level of agreement with the following statement:

- I invest time and/or money in promoting ideological issues (e.g. social, environmental, or political issues) that are important to me (e.g. join protests, attend group meetings, donate to NGOs/parties, actively volunteer in different activities that promote these issues, try to convince other people to take my side, promote my opinion on social networks). (1=agree to a very small extent, 2=agree to a small extent, 3=agree to a medium extent, 4=agree to a large extent, 5=agree to a very large extent).

Question 4. Please rate your view regarding the judiciary reform put forward by the current government on a scale of 1=strongly oppose to 5=strongly support.[52]

[52] Not relevant for this study.