Financial Risk-Tolerance During a Major Negative Life Experience: The Case of COVID-19 Pandemic

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Abstract

The paper examines the effect of an unprecedented, widespread, and life-threatening experience on risk-taking behavior focusing on the case of the COVID-19 pandemic. We conducted an online questionnaire of a diverse sample of subjects (total n = 1643) based on Holt and Laury's (2002) risk-tolerance measure in 7 different time points - before the pandemic, during each of its first four waves, and in additional two periods in which the restreictions were completely removed. The data demonstrates that a major life experience significantly reduces financial risk-taking. While the objective financial situation seems to deteriorate as the crisis became more severe, the observed decrease in risk-tolerance was the most apparent in the 1st wave, with no major differences between the three waves of the pandemic. In addition, with the removal of restrictions, the level of risk-tolerance did not return to its pre-pandemic state but began a slow and gradual return process. The variance in the risk-tolerance of individuals was highest before the pandemic and lowest in the 3rd wave. Moreover, we find no connection between the objective measure of financial risk and subjective tolerance towards risk during the pandemic. This finding suggests that changes to risk tolerance are highly affected by contextual and emotional considerations. Finally, we discuss our results in light of the risk seeking behavior of investors in commission-free online brokerage like Robinhood during COVID-19 and provide guidelines for policy implications.

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Introduction

Financial risk-taking refers to taking financial actions, such as investments or business ventures, with a chance that their actual result will differ from its expected return. Financial risk-tolerance is the maximum amount of financial risk an individual is willing to take when making a financial decision (Grable, 2000). In itself, financial risk is not inherently good or bad. Although the word "risk" has a negative connotation (and financial risk is no exception), taking financial risk at some level is important to achieve economic growth (Bucciol & Miniaci, 2018; Zhang et al., 2016). Especially when its expected value exceeds the safer alternatives. Thus, identifying the factors influencing people's risk tolerance is essential for effective financial markets management in both corporate and personal settings (Cassar et al., 2017; Kim & Lee, 2014).

Research suggests that about 25% of the variation in risk-tolerance across individuals can be explained by genetic traits (Cesarini et al., 2010). Several demographic and situational factors may explain the remaining variation. For example, males are more risk-tolerant than females (Charness & Gneezy, 2012; Sung & Hanna, 1996), and young people are usually more risk-tolerant than older people (Bakshi & Chen, 1994; Palsson, 1996). In a similar vein, people with higher incomes are more risk-tolerant than those with lower incomes (Schooley & Worden, 1996; Shaw, 1996), and education is positively correlated with risk-taking propensity (Cutler, 1995; Grable & Joo, 1997). In addition, people appear to be risk avoidant in the domain of gains but risk-seeking in the domain of losses. This classic framing effect has been demonstrated in numerous settings (e.g., Fishburn & Kochenberger, 1979; Igou & Bless, 2007; McElroy & Seta, 2003; Simon et al., 2004; Tversky & Kahneman 1981, 1988, 1992; Tykocinski et al., 2017).

In the last two decades, researchers also explored the effects of major life experiences on financial risk-tolerance (Bucciol & Zarri, 2015). This stream of research shows that major negative

life experiences like global crises (e.g., the great depression in 1923, the Korean War, the Financial crisis of 2008) profoundly affect individuals' behavior (Hoffmann et al., 2013; Guiso et al., 2013). Specifically, people's willingness to take financial risks significantly decreases due to experiencing negative events such as natural disasters, wars, and economic crises. For example, Cassar et al. (2011) show that individuals who experienced the 2004 tsunami in Thailand exhibit lower risk tolerance. Similarly, Kim and Lee (2014) found that early childhood exposure to the Korean War decreased risk tolerance. This traumatic event was so profound that it made individuals less tolerant to risk even five decades later.

A possible psychological mechanism underlying the effect of negative life experiences on risk-tolerance was proposed by Loewenstein and colleagues (Loewenstein et al., 2001; Lerner et al., 2004). Specifically, negative life experiences invoke negative emotions such as fear and anxiety, thus increasing a sense of uncertainty and lack of control. To reduce the stress, individuals become less tolerant toward (financial) risk (Lerner & Keltner, 2001; Callen et al., 2014). In line with this notion, Levav and Argo (2010) found that financial risk-taking is associated with feelings of security. In their research, participants were instructed to engage in an investment task. The verbal instructions of the experimenter were either unaccompanied or accompanied by physical contact (either touch on the shoulder or a handshake). For instance, the authors found that a friendly pat on the shoulder increased risk-taking in the task, and a feeling of security moderated this behavioral tendency. Moreover, Grable and Roszkowski (2008) found that merely being in a good mood is positively correlated with a higher level of financial risk tolerance.

In the current research, we examine how the COVID-19 crisis affects risk tolerance. On March 11, 2020, the World Health Organization declared the outburst of the COVID-19 pandemic, with more than 4.5M deaths by November 2022 and major health, social and economic impact

(Couto et al., 2020). Thus, the COVID-19 pandemic presents a unique opportunity to investigate the effect of unprecedented, widespread, and life-threatening experience on risk-taking behavior.

Several studies have examined risk tolerance during the pandemic (e.g., Bordalo et al., 2020; Cori et al., 2020; Barrios & Hochberg, 2020; Bundorf et al., 2021; Fan et al., 2020; Plohl & Musil, 2021; Wise et al. 2020). However, most of them focused on health risk perceptions and beliefs unique to the current corona crisis. One exeption is the research of Galil et al. (2022), who found that during March-April of 2020, low socieoeconomic status individulas investors withdrew money from their risky funds and switched toless risky investment tracks. Our study contributes to this rapidly growing literature by examining how this prolonged negative life experience impacts financial risk tolerance among Israeli citizens. Fortunately, we collected data on risk tolerance a few months before the COVID-19 outbreak. Thus, we were able to test if people in the same population change their risk tolerance in direct response to the crisis, and between different waves of this pandemic.

Prior to the coronavirus pandemic outbreak, Israel's economy was at its peak, with an unemployment rate of 3.4% and a consistent increase in real wages of 3%. The COVID-19 crisis started in Israel towards the end of February 2020. A complete lockdown was announced two weeks later, marking the beginning of the 1st wave that lasted until the end of May. While the lockdown dramatically reduced the infection rate, its negative financial consequences soon followed, with 1.3 million new unemployed and an increase of 1.3% in unemployed persons in the labor force. Four months after the 1st wave, the infection rate in Israel sored to became one of the highest in developed countries. This 2nd wave led to the second lockdown on September 18, which deepened the economic crisis and further increased the unemployment percentage by 0.3%. After two peaceful months, Israel entered its 3rd wave, including a third lockdown which started on

December 27 and ended on February 7, 2021. During this 3rd wave, the percentage of unemployed persons in the labor force remained steady at around 4.8%.[1] Since the economic situation in Israel deteriorated as the crisis advance, we were able to test if changes to risk-tolerance are rational and correspond to the objective financial situation. Next, another (4th) major wave started in November 26, 2021, when 4 cases of the Omicron variant were discovered in Israel. This wave lasted until the end of January 2021, but due to changes in the Israeli government, this wave included very minimal restrictions. During this time, the percentage of unemployed persons in the labor force decreased a bit to 4.2 in Decmber and 3.6% in January 2022.[2] During 2022, there were some cases in which there was an increase in infaction rate, but the no-restriction policy remaind.

Method

To assess risk-tolerance during the COVID-19 pandemic, we conducted an online questionnaire using a diverse sample of subjects. The questionnaire asked an array of questions related to risk-tolerance as well as sociodemographic characteristics.

Participnats. The sample includes 1,643 observations in total over 7 sampling rounds. 63 before the covid-19 pandemic, 256 in the 1st wave, and 146, 193, 364, 323 and 298 in the 2nd, 3rd 4th , 5th and 6th experimental rounds, in accordance. The sample size was not determined a-priori. Rather, we have collected as many people as possible during the two weeks after the start of each wave. Of the sample, 748 (46%) were men, , 948 (60%) married, 453 (29%) single, 202(13%) had no kids, 187 (12%) had one kid, 298 (19%) had 2 kids, 352(23%) had three kids, and 525(33%) had

[1] Data retrieved from the Central Bureau of Statistics at https://www.cbs.gov.il/he/mediarelease/doclib/2021/036/20_21_036t12.pdf
[2] Data retrived from the Central Bureau of Statistics at https://www.cbs.gov.il/he/mediarelease/doclib/2022/361/20_22_361t2.pdf

more than 3 kids. The average age was 40 years (SD=15.0). The largest education class was BA, with 542 respondents (35%), followed by 526 (34%) who have are high school graduates and 298 (19%) with an MA degree. For full details about the sample's demographic, see https://osf.io/ytzm8/. Participnats were recruited on Facebook and Whatsapp. Participation was voluntary and dependant on informed consent. The Institutional Review Board of the School of Psychology at Reichman University approved the study.

Design. Participants were asked to fill a web-based questionnaire (Qualtrics) based on Holt and Laury's (2002)[3] risk tolerance scale. Participnats were required to make 10 choices between paired lotteries that differ in risk level and expected value. One lottery (option B) was risky (the potential payoff between the two lotteries differ widely), while the other (option A) was safe (the potential payoffs differ slightly). For instance:

Alternative A:

0.1 chance of getting 20$

0.9 chance of getting 16$

Alternative B:

0.1 chance of getting 38.5$

0.9 chance of getting 1$

As seen from the example, the probability of the high payoff for both options is 1/10. The expected payoff incentive to choose option A is 16.4$, while the expected payoff to choose option B is 4.75[4]. Thus, only an extreme risk seeker would choose option B. While the payoffs of each

[3] Holt and Laury's (2002) risk tolerance scale is widely used to examine risk tolerance in variety of contexts. For example, see: Hoffman, Elizabeth, David Schwarz, Matthew Spizer and Eric Talley, Patently Risky: Innovation and Entrepreneurial Preferences, Harvard Journal of Law & Technology, Vol 34 (1), 2020.

[4] Expected payoffs were not provided in the instructions to participants.

gamble are fixed, the probability of the high payoff in each gamble increase by 10%. When the probability of the high payoff increases enough, a rational person should cross over to option B. the complete payoff scheme of the 10 choice options can be found at https://osf.io/dbcrh/.

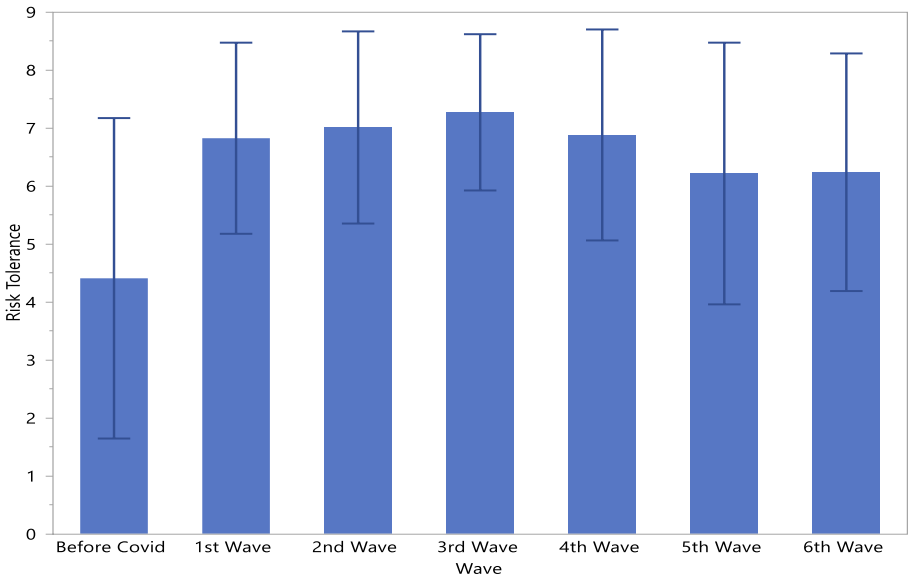
Risk-tolerance is measured as the number of times in which the participants prefer the low-risk lottery. A score of 0-3 reflects high risk tolerance, 4 indicates risk neutrality, and 5 and above reflects low risk tolerance. The 10 paired choices were randomly presented to participants. After making these 10 choices, participants were asked demographic questions including age, gender, income, profession, marital status, etc. Participants who did not respond to the entire set of questions were screened out of the sample.

Results

Overall, the average risk tolerance across all respondents was 6.59 (SD=1.99) in the range between 0-10. As higher levels of the risk tolerance measure suggest higher aversion towards risk, this average indicates that our sample generally exhibits low risk tolerance levels. One-way ANOVA revealed that the effect of the COVID19 pandemic on risk tolerance is significant ($F_{(6, 1636)}$=24.63, p<0.0001). Post-hoc analyses with Tukey multiple comparisons correction confirmed that before Covid, the average risk tolerance measure (M=4.41, SD=2.76) was significantly lower than for the 1st (M=6.83, SD=1.65), 2nd (M=7.01, SD=1.66), 3rd (M=7.27, SD=1.35), 4th (M=6.88, SD=1.82), 5th (M=6.22, SD=2.26) and 6th (M=6.24, SD=2.05) waves Overall p value of 5%. No significant difference was detected between the 1st , 2nd , 3rd and 4th waves in addition, no significant differences were detected between the 5th and 6th wave. These results are summarized in Table 1 and Figure 1. As seen from the figure, we found a significant increase in the risk-tolerance measure during the waves of the COVID-19 pandemic, relatively to the pre-pandemic

test group. This pattern of results suggests that people decreased their tolerance towards risk as the pandemic evolved, and preferred safer gambles.

Figure 1: Risk Tolerance by Wave*



*Each error bar is constructed using 1 standard deviation from the mean.

Table 1: ANOVA for the difference in Risk Tolerance between the sample groups

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
Before Covid	63	4.41^{C}	0.24	3.94	4.89
1st Wave	256	6.83^{A}	0.12	6.59	7.06
2nd Wave	146	7.01^{A}	0.16	6.70	7.32
3rd Wave	193	7.27^{A}	0.14	7.00	7.54
4th Wave	364	6.88^{A}	0.10	6.69	7.08
5th Wave	323	6.22^{B}	0.11	6.01	6.43
6th Wave	298	6.24^{B}	0.11	6.02	6.46

Inspecting the density of the risk tolerance measure across the different timepoints, we notice that before COVID-19, respondents exhibited the most uniform distribution, with a mild peak at 4.4 and a density of about 0.15. During the COVID-19 crisis, the distribution tends to

produce a clear peak that moves towards higher values. The 1st wave is centered around 6.83 with a density of 0.23. For the 2nd wave, the peak moves further upwards to 7.01 with a similar density. For the 3rd wave, the distribution exhibit the narrowest spread around the peak at 7.27 with a density of 0.35. For the 4th wave the peak of the distribution is at 6.88 with the density of 0.175, fwith the removal of the restrictions, we can see a beginning of a slow and gradual return process to the pre pandemic results and the peak of the distributions is around 6.22-6.24. These results are presented in Figures 2-3.

Figure 2: Risk Tolerance Density by Wave

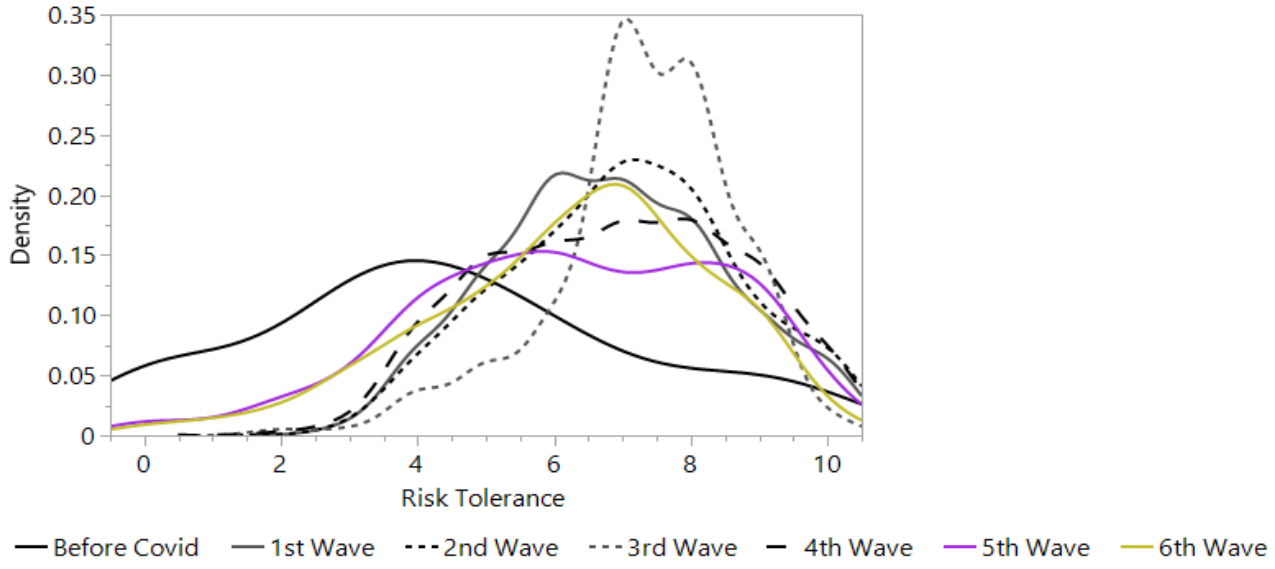
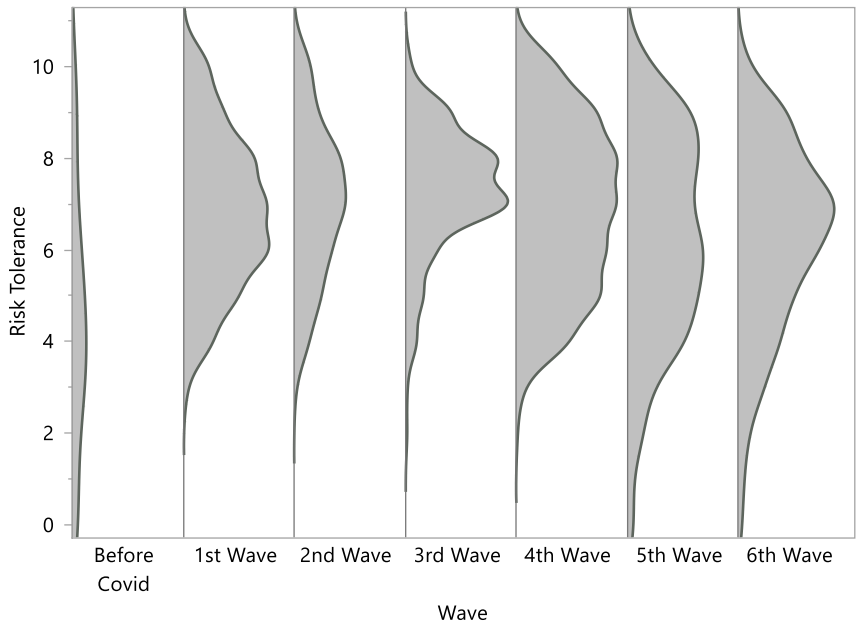
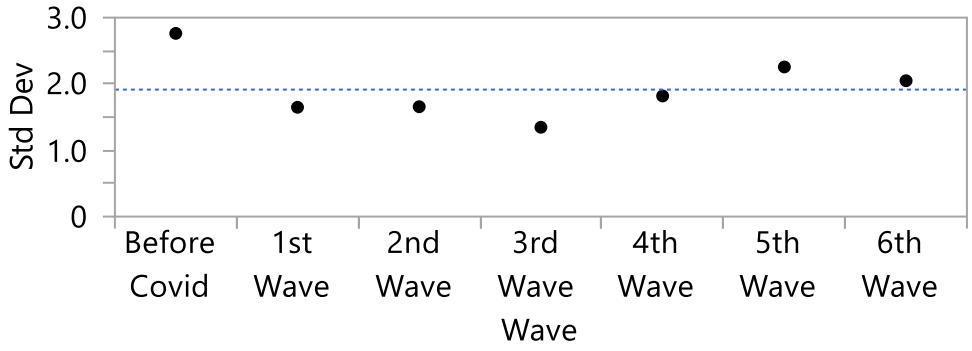


Figure 3: Risk Tolerance Disribution by Wave



Testing for differences in the variance of risk tolerance, we find a significant differences between the waves. Here we find that the largest variance (SD) was before covid and it was at its smallest level at the 3rd wave. Figure 4 denonstrates the standard deviations of risk tolerance by wave.

Figure 4: Standard Deviations of Risk Tolerance by Wave



The estimation of a separate model for risk tolerance at each time point separately with age and gender is presented in Table 2. Age was found to be significant only for the 1s wave (B=-

0.015, p<0.05). gender was found to be significant twice, once at the 1st wave (B=-0.43, p<0.05) and again at the 4th wave (B=-0.46, p<0.05).

Table 2: Risk Tolerance by age and gender at each time point – multiple regression

Term	Before Covid	1st Wave	2nd Wave	3rd Wave	4th Wave	5th wave	6th wave
Intercept	3.125	7.727***	7.154***	7.344***	7.108***	6.31***	6,115***
	(4.606)	(0.343)	(0.424)	(0.363)	(0.283)	(0.376)	(0.367)
Age	0.050	-0.015*	0.003	-0.001	0.002	-0.006	0.007
	(0.178)	(0.007)	(0.010)	(0.009)	(0.006)	(0.008)	(0.008)
Gender [W-M]	0.048	-0.428*	-0.318	-0.052	-0.462*	0.372	-0.434
	(0.763)	(0.215)	(0.297)	(0.196)	(0.188)	(0.251)	(0.237)
R^2	0.001	0.032	0.008	0.0004	0.017	0.009	0.013
N	63	253	143	191	354	319	298

Table provides four separate models for risk tolerance. Each model includes all the variables available at that time point. In the first wave, significant differences appeared between married and single (B=1.15, p<0.05) as well as between respondent with children vs. none (B=-1.59, p<0.01). In the second wave and third waves, none of the independent variables were found to be significant. For the 6th wave, a significant difference was found for the monthly income category of less than 5K (B=-1.22 , p<0.001).

Table 3: Risk Tolerance models - multiple regression

	1st Wave	2nd Wave	3rd Wave	4th Wave	5th Wave	6th Wave
Intercept	8.056***	5.958***	6.403***	6.002***	6.288***	6.433***
	(0.833)	(1.192)	(0.798)	(0.702)	(0.872)	(0.723)
Age	-0.016	-0.01	0.023	0.015	0.000	0.013
	(0.016)	(0.021)	(0.018)	(0.009)	(0.010)	(0.010)
Gender[Woman-Men]	-0.216	-0.362	0.117	-0.457*	0.357	-0.248
	(0.262)	(0.330)	(0.245)	(0.211)	(0.268)	(0.251)
Marital status[Married-Single]	1.152*	-0.058	0.37	-0.083	-0.355	0.009
	(0.482)	(0.475)	(0.443)	(0.387)	(0.410)	(0.500)
Number of children[1-0]	-1.598**	0.445	-0.014	0.092		-0.173
	(0.573)	(0.648)	(0.514)	(0.374)		(0.537)

Monthly income[Less than 5K]	-0.099	-0.685	0.496	-0.046	0.061	-1.222***
	(0.441)	(0.507)	(0.421)	(0.272)	(0.347)	(0.407)
R2	0.09	0.28	0.082	0.095	0.098	0.102
Obs	324	115	163	324	287	272

Discussion

The data we collected in 7 different time points demonstrates that a major life experience significantly reduces financial risk-taking. These results are consistent with previous research showing that facing negative life experiences on the micro (e.g., Bucciol & Zarri, 2015; Kim & Lee, 2014) and macro (e.g., Malmendier & Nagel, 2011) levels affect financial risk tolerance. Moreover, the results correspond with the extant literature on the effects of COVID-19 on risk behavior (Marotta et al., 2020). For example, Bernstein et al. (2020) show that during the COVID-19 downturn, applicants searched for safer jobs relative to the time before the pandemic. Similarly, Yue et al. (2020) found that during COVID-19, households in China decreased investments by 9.15% as people became more risk-averse.

Interestingly, the reduced risk-taking tendency found in previous and our research goes counter to the behavior of investors in commission-free online brokerage like Robinhood. For example, Robinhood investors have been found to have a high appetite for risk during COVID-19 (Welch, 2020). Still, it might be that these investors exhibit risk-seeking behavior during the pandemic not because of an increase in risk propensity. Rather, it might result from the negative changes in everyday life, including peoples' concerns about their financial situation (Håkansson et al., 2021). Similar to online gambling (Håkansson et al., 2020) and gaming (King et al., 2020), online investment services provide rapid outcomes and may alleviate, even if just for the short term, some of the psychological and financial consequences of COVID-19 (Marotta et al., 2020).

Moreover, as the fintech brokerage Robinhood was the first to offer zero-price trading on a simple mobile app, it might occupy the days of people who were bound to their homes in light of the pandemic (Pagano et al., in press).

While the objective financial situation seems to linearly deteriorate due to the ongoing crisis (Chetty et al., 2020; Martin et al., 2020), the decrease in risk tolerance was the most apparent in the 1st wave, with no major differences between the three waves of the pandemic. This pattern of results may provide important insights into why major life crises affect risk tolerance. The lack of connection between the objective measure of financial risk (e.g., the percentage of unemployed persons in the labor force) and subjective tolerance towards risk suggests that changes to risk tolerance are more affected by emotional considerations than rational ones. Specifically, each wave of the corona outburst led to a complete lockdown characterized by social distancing and isolation. The stress associated with the lack of human contact may decrease the sense of security (Nowicki et al., 2020), a psychological factor essential for financial risk-taking (Levav & Argo, 2010). Thus, our results support previous research that emphasizes risk-taking behavior's emotional component (Cohn et al., 2014; Loewenstein, 2000; Loewenstein et al., 2001; Weber et al., 2013), and highlight the importance of secure social contact in decision-making.

One limitation of our research is the small sample size in the group of participants before-COVID (which is natural because we did not plan for this project before the outbreak of COVID-19). Nevertheless, the observed risk tolerance level in the pre-pandemic group fits what is usually reported in the literature. For example, in Holt and Laury's (2002) original paper, risk propensity ranged between 4-6. Similarly, a recent meta-analysis of 11 datasets with almost 50,000 observations found an average risk tolerance score of 5.82 (Alm & Malézieux, 2021). In addition, while the choices in our experiment were not incentivized, it was recently shown in three countries

(Honduras, Nigeria, and Spain) that not paying or paying a fixed fee or based on ones' choices make no difference at all (Brañas-Garza et al., 2021).

As risk tolerance has profound implications for economic decision-making (Cardenas & Carpenter, 2008; Cassar et al., 2017), our findings have important policy implications. For example, incentivizing or subsidizing risky ventures during and after major negative life events and creating financial products that appeal to people with low risk tolerance. More generally, it is well recommended to creating opportunities for individuals to maintain social connections and give them personal support on financial decisions even under strict behavior restrictions.

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