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Framing policies to mobilize citizens' behavior during a crisis: Examining the effects of positive and negative vaccination incentivizing policies

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Abstract

The COVID-19 pandemic has highlighted the issue of mobilization policies, that is, government practices directed at making the mass public voluntarily perform various behaviors for the collective benefit during a crisis. As COVID-19 vaccinations became accessible, governments faced the challenge of mass vaccination mobilization in order to achieve herd immunization. Aiming to effectively realize this goal, policy designers and regulators worldwide considered various mobilizing tools for vaccination compliance, including rewards and penalties, as they targeted vaccine opposers and hesitators, while trying to avoid the crowding-out effect among individuals who were intrinsically motivated to get vaccinated. However, the unique circumstances of the Coronavirus pandemic may have eliminated the crowding-out effect. Thus, our study explored the effect of regulation in the form of positive and negative incentivizing tools (i.e., rewards and penalties) during the coronavirus pandemic on vaccination intentions of 1184 Israeli citizens, prior to the national vaccination campaign. Results indicate that (1) both negative and positive incentives have a similar positive effect on individuals who declare they will not get vaccinated and those who hesitate to get the shot; (2) both positive and negative incentives induce the crowding-out effect; and (3) negative incentives generate a larger crowding-out effect in individuals who report preliminary intentions to get vaccinated, compared to positive ones. This emphasizes the need to avoid the crowding-out effect during the current and similar crises, and suggests considering applying a gradual and adaptive policy design in order to maximize regulatory efficacy and compliance.

Keywords: COVID-19, crowding-out, incentives' architecture, mobilizing policies, policy tools, vaccine compliance.

1. BACKGROUND

While eagerly waiting for a safe and effective vaccine for the COVID-19 virus, governments and health authorities adopted various policy measures and regulations aimed at containing the spread of the virus and its collateral damage on society and the economy. However, once the vaccines arrived, governments were faced with another challenge: reaching a sufficient level of immunization that will indeed enable the suppression of the pandemic. The speed in which the vaccine was developed and approved, enhanced public concerns regarding its safety, reliability, and effectiveness, affecting vaccine compliance to some extent (Dror et al., 2020; Wilf-Miron et al., 2021). Aiming to tackle this issue, many governments and health authorities applied informative campaigns, stressing the vaccine's safety and effectiveness (Berger, 2020). Nonetheless, hesitancy and non-compliance still remained substantial hurdles in the way of herd immunity and the pandemic's containment (Dror et al., 2020). Consequently, the question of mobilization policies and tactics through stricter regulatory instruments, that is, designing and applying incentivizing policies, namely rewards and penalties, rose among policy makers, regulators, and researchers alike (Higgins et al., 2021; Kahana & Yassur Beit-Or, 2021).

The concept of compliance is at the heart of both the regulatory and policy literatures (Prakash & Potoski, 2016; Schneider & Ingram, 1990). Governments strive to achieve public compliance with their policies in order to fulfill their policy goals through rules and regulations (Gritsenko & Wood, 2022; Prakash & Potoski, 2016). In other words, rules and regulations are one of the empirical referents of policy, and the "vehicles" for enabling collective actions aimed at enhancing compliance (Schneider & Ingram, 1990). By doing

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so, regulations enable accomplishing policy goals and governance (Gritsenko & Wood, 2022; Prakash & Potoski, 2016). In our context, mass vaccination is the goal of the policy, and regulation, in its broad context, is the policy tool that can be manifested as different types of incentivizing strategies. Although some regulatory approaches (i.e., positive vs. negative incentivization) are viewed as more effective than others in achieving public compliance with governments' policies (Ayres & Braithwaite, 1992; Barak-Corren & Kariv-Teitelbaum, 2021; John et al., 2022), the main strands of compliance-enhancement regulation literature focus on the corporate and/or taxation context (Ayres & Braithwaite, 1992; Barak-Corren & Kariv-Teitelbaum, 2021), and may not be effective in other contexts, such as the health-behavior context (Prakash & Potoski, 2016).

The need to further explore the relationship between regulation and compliance with regards to health policies is reflected in the recent call made by the editors of *Regulation and Governance* to harness the COVID-19 crisis to further develop regulation literature with new insights regarding the conditions and the effectiveness of the use of regulation in the context of compliance with health policy (Short et al., 2021). Hence, this study responds to this call and suggests some insights in this matter. Similar to previous work on public compliance with health instructions during a health crisis and incentivizing strategies for enhancing public compliance with government policies (Six et al., 2021; Underhill, 2016), this study too looks at the government as the regulator, at the individual members of the public as regulatees, and at incentives as a type of regulation.

The public health literature suggests that incentives can increase vaccine compliance (Attwell et al., 2018; Jarrett et al., 2015; Mantzari et al., 2015; Schumacher et al., 2020). Incentives, in this regard, are fiscal or other governmental interventions and regulations aimed to guide individuals' choice to get vaccinated, with either a negative and penalizing nature, or of a positive and rewarding approach (Nuffield Council on Bioethics, 2007). For example, fines against parents who refuse to vaccinate their children (e.g., in Germany and Italy) or excluding unvaccinated children from public daycare and schools (e.g., in Italy, France and many states in the United States; Attwell et al., 2018), demonstrate a negative penalizing approach. On the other hand, government provision of food (e.g., in India; Jarrett et al., 2015) and maternity immunization allowance (e.g., in Australia; Curchin, 2019) to those who agree to get vaccinated or vaccinate their children, demonstrate a positive rewarding approach.

Nonetheless, the policy design literature stresses that when providing such incentives, there is a need to consider the psychological phenomenon of crowding-out, that is the decrease in intrinsic motivation to act in a certain manner once external incentives are suggested (Frey & Jegen, 2001; Frey & Oberholzer-Gee, 1997). Crowding-out may cause disengagement and decreased compliance with the desired behavior, and scholars have long debated on strategies and tools to minimalize it (Beretti et al., 2019; Feldman & Lobel, 2010; Hollander-Blumoff, 2011; Underhill, 2016).

Research has yet to answer the question of whether the crowding-out effect is context specific, that is, whether unique conditions such as the Coronavirus pandemic enhance or inhibit the likelihood of its occurrence. Previous research on vaccine incentivizing strategies has mainly referred to routine childhood vaccinations for diseases that are usually rare or suppressed, or to health professionals attempts to encourage seasonal flu shots (Attwell et al., 2018; Schumacher et al., 2020), with no reference to what may be the case if the situation is an ongoing pandemic. This is especially important due to the unprecedented scale and the dramatic affect the COVID-19 pandemic has had on all aspects of human existence (Breakwell, 2020; Park et al., 2020), enhancing the likelihood that social, civic, financial and psychological factors and considerations, alter the effects and effectiveness of incentives. According to Frey and Jegen (2001), the crowding-out effect occurs when recipients perceive incentives as conveying a message of control and mistrust. Other strands of psychological literature, such as the compensatory or alternative control model (Kay et al., 2008; Landau et al., 2015), suggest that in contexts such as the current pandemic, that are characterized by severe uncertainty, social disruption and instabilities in sense of control (Dennis & Wheaton, 2021; Elemo et al., 2021; Rettie & Daniels, 2020), controlling government interventions and incentives may actually be more desirable and perceived as legitimate by the public (Kay et al., 2008; Landau et al., 2015). This theoretical ambiguity stresses the need to identify the most effective incentivizing policies (i.e., rewards vs. penalties, to whom and when) under these special conditions, that will allow both maintaining and increasing vaccine compliance.

Aiming to do so, this study explored the effect of two types of incentives, that is, positive and negative, on vaccination intentions, which according to the theory of planned behavior (Ajzen, 1985) can be strong predictors

of actual vaccination compliance. Inspired by previous work on vaccination intentions against COVID-19 (e.g., Head et al., 2020; Persad & Emanuel, 2020) as well as against other pandemics (e.g., Bults et al., 2011), we performed an online survey among 1184 Israeli participants. The survey was conducted at a time when the COVID-19 vaccine was still unavailable to the Israeli public and no incentivizing policies were publicly discussed by Israeli policy makers. Participants were asked to state their general intentions to get vaccinated against COVID-19 and their intentions to get vaccinated if the government applied different positive or negatives incentives.

Our findings demonstrate that both positive and negative incentives indeed generated a crowding-out effect among participants who reported they were willing to get vaccinated even when no incentives were suggested to them, with negative incentives inducing a stronger crowding-out effect. However, the findings also show that both types of incentives had a similar enhancing effect on people who initially opposed or hesitated to get vaccinated. More specifically, among people who initially reported they did not plan to get vaccinated or were uncertain about getting the shot (without any incentives offered), positive and negative incentives had the same mobilizing effect.

These findings stress the need to consider the heterogeneity in citizens' motivation during vaccination incentivizing policy design. More specifically, we suggest applying a gradual and adaptive incentives architecture and criteria for adapting these incentives (Underhill, 2016), that will maximize vaccination rates of all compliance-intentions-based target groups: vaccination accepters, hesitators, and opposers.

This study has the potential to make five important contributions. First, it may enhance the public health literature by shedding light on the effectiveness of both positive and negative health behavior incentivizing strategies during an on-going global health crisis, which is an unprecedented context of research. Second, it may contribute to the policy design scholarship as it emphasizes the need to design policies to compliance-intentions-based target groups (accepters/opposers/hesitators). In other words, in the future, theories of policy design may benefit from regarding policy target groups on the basis of their intentions to comply with a specific policy. Third and similarly, this work offers a contribution to the behavioral public policy literature as it provides insights as to how the disposition of policy targets may impact their behavioral responses to policy interventions. Fourth, this study may shed light on the importance of gradual/temporal policy design/incentives architecture during an on-going crisis. Last, from a practical perspective, this study can provide policy makers with a tool to enhance vaccination compliance in the current and in similar pandemics in the future.

2. LITERATURE REVIEW AND HYPOTHESES

2.1. Vaccine compliance

Vaccine compliance is one of public health's major challenges (The WHO, 2019). Ever since the development of modern vaccinations, the public's willingness to get vaccinated has been a key factor in eradicating and containing diseases and pandemics and promoting public health (Breakwell, 2020). The strict regulations and rigorous protocols that precede a formal authorization of vaccinations are meant to assure the public of their safety and effectiveness. However, while most people agree to get vaccinated, some remain hesitant or reluctant to do so (Paterson et al., 2016). Research has identified several factors which affect vaccine compliance aside from technical or financial accessibility to vaccines. These factors align with the Health Belief Model (HBM; Rosenstock, 1974; Janz & Becker, 1984), which is the most commonly used theoretical framework for predicting vaccine compliance to this day (Dyda et al., 2020). The HBM emphasizes the role one's beliefs and perceptions regarding health behaviors and measures, such as getting vaccinated (e.g., their benefits/efficacy, risks, barriers), have on one's health behavior (Davis et al., 2013; Janz & Becker, 1984). These factors range from concerns regarding the effectiveness of the vaccine, its safety and its side effects (Opel et al., 2017), perceptions about the severity of the disease the vaccine is meant to prevent, one's susceptibility of catching it (Freimuth et al., 2017; Rebmann et al., 2012) and even trust in health authorities according to some (Ahluwalia et al., 2021). The HBM is a rational model for behavior, emphasizing the cognitive process of weighing the benefits against the costs of performing a health behavior (Janz & Becker, 1984). Hence, it is often viewed as associated with the behavioral economics framework, which emphasizes utility (the outcome of perceived benefits minus costs) as the prime determent of human behavior (Gennetian et al., 2019; Mogler et al., 2013). From this perspective, positive and

negative incentives for vaccination, which can be either monetary or of any other kind of penalizing or rewarding governmental rules and regulations aimed to direct citizens' choice regarding the adoption or avoidance of specific health behaviors (Nuffield Council on Bioethics, 2007), may affect the utility function of the citizen, consequently determining whether individuals will get vaccinated (Vlaev et al., 2019).

2.2. Pro-vaccination policies as a case of citizen mobilization

In the policy design literature, the process of making the mass public voluntarily support and comply with policies governments wish to promote, is termed mobilization (Cobb et al., 1976; John, 2013; May, 2016). It is often referred to as the "effort to marshal many people to perform behaviors that impose a net cost on each individual who complies and provide negligible collective benefit unless performed by a large number of individuals" (Rogers et al., 2018, 358). In this regard, herd immunization is a policy that requires mass cooperation of individuals, in the form of vaccination.

For years, public health authorities and researchers have tried to tackle the challenge of vaccine compliance enhancement by trying to sway the citizens' pros and cons equation of getting vaccinated to the pros direction (Attwell et al., 2018). Pro-vaccination policies have been classified into three groups (Thomsen, 2017): (1) Soft policies—these entail making vaccine information accessible for the public; (2) Moderate policies—"nudges." These are forms of interventions aimed at affecting rational thinking and form cognitive bias toward a desired decision or act, without exerting harsh psychological pressure. Periodical recalls and reminders are examples for vaccine promoting nudges; (3) Hard policies—costs. These include various forms and levels of fiscal and non-fiscal penalties for people who choose not to be vaccinated or to vaccinate their children. Similarly, benefits (i.e., rewards and positive incentives) are also included in this group, but they are not considered as hard and intrusive as negative incentives (Nuffield Council on Bioethics, 2007). Nevertheless, there is no generic "one tactic fits all" and the criteria for preferring one tactic over another is yet unclear. The optimal solution for enhancing vaccine compliance in each country probably lies in a combination of several elements (Luigi et al., 2020). Indeed, many governments apply a combination of all three types of policies, and the literature suggests that hard policies, which include costly outcomes for those who are not vaccinated, are crucial for increasing vaccine compliance (Lawler, 2017; Thomsen, 2017). Hence, aside from soft and moderate tactics, many countries have adopted vaccine mandating policies (Attwell et al., 2018). For example, in Australia, the United States, France, Germany, and Italy, incompliance with childhood vaccination programs prevents parents from enrolling their children into public schools and daycare, and in some cases even requires them to pay fines. However, in some countries, exemptions are granted for religious reasons (Attwell et al., 2018; CDC, 2016; Li & Toll, 2021). These hard policies were found to be accountable for an increase of about 4% in vaccine compliance compared to countries that did not apply such policies (Vaz et al., 2020). Although positive incentives are considered a prominent policy tools for a successful mobilization in general (Cobb et al., 1976; May, 2016), they are rarely applied by governments (Attwell et al., 2018), and therefore it is hard to assess their effect on real vaccination rates. However, their effect has been tested in many public health studies, that demonstrate their effectiveness (Mantzari et al., 2015; Higgins et al., 2021; Schumacher et al., 2020; e.g., Giles et al., 2014).

2.3. When motivations and incentives interact

By definition, compliance enhancement programs try to appeal to those who oppose or hesitate to comply with the desired behavior. In accordance, the expected (non) compliance rates of target groups to specific policies are considered a prime consideration for choosing some policies over others (Howlett, 2018; Weaver, 2014, 2015; Wu et al., 2015). However, the vaccination enhancement literature (e.g., Giubilini, 2019; Mantzari et al., 2015), and, more abundantly, the legal and policy design scholarship (Beretti et al., 2019; Boussalis et al., 2018; Feldman & Lobel, 2010; Hollander-Blumoff, 2011; Kingston et al., 2021; Underhill, 2016), consider not only the expected response rates of opposers and hesitators when designing policy, but also the response rate of citizens who would agree to comply with the desired policy, that is, to get vaccinated, without any incentive. The reason for this is the concern regarding the ramifications of the crowding-out effect, that may reduce compliance motivation among those who are already intrinsically motivated to comply (Frey & Jegen, 2001; Frey & Oberholzer-Gee, 1997; Lohmann et al., 2016).

The crowding-out effect was theoretically originated in the Self-Determination Theory of motivation (SDT; Frey & Oberholzer-Gee, 1997; Frey & Jegen, 2001; Deci & Ryan, 1985). The SDT builds upon the psychological principle of intrinsic and extrinsic motivation (Rode et al., 2015; White, 1959). Intrinsic motivation relates to behaviors and activities one performs simply because he/she likes to do or derives satisfaction from. Extrinsic motivation refers to behaviors and activities one is motivated to carry out in response to an "outside demand" in order to avoid punishment or to gain rewards (Frey & Oberholzer-Gee, 1997). The SDT relates to situations in which external incentives are introduced to a person that already has intrinsic motivation to perform the specific behavior the incentives are aimed to promote. This theory postulates that external incentives can either reinforce this intrinsic motivation and create a crowding-in effect, or they can undermine and weaken the intrinsic motivation, creating a crowding-out effect (Frey & Jegen, 2001; Frey & Oberholzer-Gee, 1997; Lohmann et al., 2016).

A preliminary condition for determining whether an external incentive will reinforce or weaken intrinsic motivation is the way it is perceived by the agent (i.e., the motivated individual, as opposed to the principal, which exerts the incentive. Regulatee and regulator, respectively, in our context) (Deci et al., 1999; Frey & Oberholzer-Gee, 1997; Pedersen et al., 2018). When an incentive is perceived as controlling and expresses the principal's mistrust in the agent, it is likely to undermine intrinsic motivation and create a crowding-out effect. On the other hand, an incentive that is perceived as supportive and expresses the principal's trust in the agent, is likely to reinforce intrinsic motivation and create a crowding-in effect (Deci & Ryan, 1985; Frey & Jegen, 2001; Frey & Oberholzer-Gee, 1997; Pedersen et al., 2018; Rode et al., 2015).

In the context of vaccine compliance, when no incentives are offered for getting vaccinated, vaccine-accepters are intrinsically motivated to get vaccinated (Mantzari et al., 2015), while vaccine hesitators and opposers lack the sufficient internal motivation for getting vaccinated. Given the possible negative effect external incentives may have on intrinsically motivated people, it is important to design vaccination compliance-enhancing strategies that maximizes hesitators' and opposers' compliance, while maintaining and reinforcing the cooperators' compliance. Yet, in terms of policy design, this is a complex challenge, since "the law cannot tailor itself to different populations" (Hollander-Blumoff, 2011, 65) and therefore requires impartial application to all citizens. In order to understand if this premise should be challenged in times of a global crisis, we must understand the effects incentivizing policies have on extrinsically motivated people in such circumstances.

As described above, according to the SDT, the way in which the incentive is perceived by the motivated person (who has intrinsic motivation), that is, either controlling and mistrusting or supportive and trusting, affects his/her intrinsic motivation to carry out the promoted behavior. While negative incentives are usually perceived as controlling, and therefore can potentially form a crowding-out effect, positive incentives can be perceived as either supportive or controlling and therefore may form either a crowding-in or a crowding-out effect (Frey & Jegen, 2001; Rode et al., 2015). While research has shown that it is possible that the same positive incentive will induce different responses in different people, depending on the way it is perceived by the individual (Frey & Jegen, 2001; Frey & Oberholzer-Gee, 1997), it has yet to examine whether special circumstances, beyond any individual differences, effect these perceptions as well.

2.4. The effect of incentives during a severe crisis

The extreme unprecedented situation the current Coronavirus pandemic has created, may alter the benefits and impact of what have previously been regarded as vaccine compliance-enhancing factors, such as the ones pointed out by the HBM. Such extreme conditions, are most likely to change the levels of perceived threat and risk posed by the disease (i.e., risk perception) as well as by the speed the vaccine was developed (i.e., barriers and efficacy), compared to other health threats and vaccines. In addition, times of national and global crises may shape normative behavior and present vaccine opposers and hesitators with a modified set of considerations for their behavior, which could emphasize additional and more pronounced social benefits for getting vaccinated. In other words, the average opposer to childhood or flu vaccines is not necessarily the average opposer to the COVID-19 vaccine.

Furthermore, the unique and stressful conditions the pandemic has inflicted on most of human society (Bao et al., 2020; Horesh & Brown, 2020; Liu et al., 2021; Taylor et al., 2020), may affect the decision-making process

of opposers and hesitators, once presented with positive and negative incentives. Until recently, research has shown, that stress is negatively associated with loss aversion (Pighin et al., 2014; e.g., Molins, Serrano, & Alacreu-Crespo, 2021; Molins & Serrano, 2021). However, this evidence relates mostly to physiological stress. Recently, Molins, Serrano, and Alacreu-Crespo's (2021) showed that emotional stress reduces the loss aversion bias as well. This is explained by the reward-alignment hypothesis (Metz et al., 2020), which posits that stress increases rewards salience due to enhanced dopamine activity in the neural reward-system regions caused by stress, which consequently reduces loss aversion. In addition, Sanders et al. (2021), that investigated the effect of gain and loss framing of messages on UK citizens' intentions to adhere to public health guidelines during the current pandemic, discovered that the loss aversion effect did not take place and did not enhance participants' intentions to comply with the guidelines to a greater extent than the gain-framed messages.

Thus, based on the principles of behavioral economics, that stress the effectiveness of incentives in motivating individuals for complying with desired behavior (Vlaev et al., 2019), and given previous evidence regarding the effectiveness of both positive and negative incentives on vaccine acceptance (Mantzari et al., 2015; e.g., Higgins et al., 2021; Schumacher et al., 2020), it is likely that both types of incentives will enhance vaccination compliance among opposers and hesitators. Thus, we hypothesize that:

H1a. *Both positive and negative incentives will increase vaccination compliance intentions among citizens who oppose getting the COVID-19 vaccination.*

However, following the latest findings regarding stress and loss aversion association, we predict that negative incentives suggested during these stressful times will be less effective than positive ones since loss aversion bias is likely to be minimized and rewards salience is likely to be increased, given these unique conditions. Hence, we hypothesize that:

H1b. *Positive incentives will increase vaccination compliance intentions among people who oppose getting the COVID-19 vaccination to a greater extent than negative incentives.*

Psychological research suggests that contextual circumstances can indeed affect the way people perceive and accept government interventions and instructions. Theoretical and empirical work shows that in situations during which the ability to control one's own life is reduced, much like has been demonstrated in the COVID-19 pandemic (Elemo et al., 2021), the psychological mechanism of compensatory or alternative control is activated (Kay et al., 2008; Landau et al., 2015). As Kay et al. (2008) revealed in their studies, when individuals experience fluctuations and decreases in their perceived control, they seek and welcome the control of external sources - compensatory control sources - such as God and the government. In fact, participants in their study who experienced reduced control, reported to favor more controlling and intrusive government actions at the expense of their own autonomy. In our case, it is possible that the severe uncertainty, social disruption and changes in sense of control, that are some of the prominent psychological outcomes of this pandemic (Dennis & Wheaton, 2021; Elemo et al., 2021; Rettie & Daniels, 2020), will make sanctioning and controlling incentives seem like a responsible and desired act of management and a legitimate way to take control of an unstable *situation*. Furthermore, vaccination opposers may be perceived as free-riders (Betsch et al., 2017), that is, individuals who refuse to cooperate with society's joint effort of achieving a collective good, but enjoy its benefits (i.e., herd immunization). A plethora of research stresses the human tendency to punish free-riders and deviants of social norms (e.g., Fehr & Gächter, 2000; Irwin & Horne, 2013). Therefore, when people who wish to get vaccinated are presented with the possibility that those who refuse to do so will be sanctioned, they may support this policy as it may seem not targeted at them, but at the "deviants" who refuse to cooperate with the national effort to overcome and contain the pandemic. Following this logic, vaccination accepters will not be discouraged to get vaccinated when presented with either positive or negative incentives, even if they may seem controlling, but rather support this policy without it affecting their vaccination intentions. Hence, we hypothesize:

H2. *Both positive and negative incentives will not induce a crowding-out effect.*

3. MATERIALS AND METHODS

3.1. Study design and data collection

Following the approval of the ethics committee of the Social Sciences faculty of the University of Haifa (#292/20), in December 2020, after the second lockdown the country endured was lifted and the number of severely ill patients was relatively low (IMH, 2021), we performed an online survey with a sample of 1184 adult Israeli participants. At the time of the data collection, the national vaccination rollout campaign was about to begin. The Pfizer vaccine was already approved by the US Food and Drug Administration (FDA) and the Israeli Ministry of Health, and the Israeli media reported on the government's preparations to gradually vaccinate different age and risk groups in the upcoming days (e.g., Jaffe-Hoffman, 2020). Like all other vaccinations in Israel, the COVID-19 vaccination too was recommended by health authorities but not mandatory (IMH, 2022), and the campaign at this point, did not include any incentives of any kind, nor any incentivizing policies were officially discussed and applied by Israeli policy makers or health authorities. Nonetheless, the potentially high hesitancy rate was discussed by journalists and public health experts in the media and various incentives were suggested (e.g., Gorali, 2020).

Participants were recruited via two survey companies, gave their informed consent to take part in the survey and were offered a reward of about $5 (U.S., 16.5 NIS) for their participation. The sample was composed of members of the general Jewish population ($N = 617$), the ultra-Orthodox minority ($N = 302$) and the Arab minority ($N = 265$). We used data from the Central Bureau of Statistics in Israel to stratify the general population and the ultra-Orthodox community by age, gender, income, and residence area. Given the known difficulty in recruiting participants from the Arab minority for survey-based studies (Gordoni & Schmidt, 2010), this sample was stratified by age, income, and residence area.

First, participants were asked to answer a number of questions relating to the control variables. Next, participants were asked to state whether they will get vaccinated against COVID-19. We referred to this as their vaccine acceptance baseline. Next, the participants were asked whether they intended to be vaccinated if the government would apply positive incentives, such as tax exemptions and grants, and then whether they intended to be vaccinated given negative incentives, such as banning participation in public events and use of public transportation for un-vaccinated people. We chose these incentive examples carefully, aiming to maximize their plausibility and authenticity. Since Israel was one of the first countries to commence its vaccination rollout (Goldman et al., 2021), we could not borrow COVID-19 vaccination-incentivizing policies applied in other countries, as our incentivizing examples. Furthermore, since Israel does not apply any incentivizing strategies for vaccination against other diseases (IMH, 2022), we could not apply locally familiar vaccination promotion practices. Therefore, we chose incentive examples that were in line with vaccination incentivizing strategies practiced and recommended in other countries against other diseases, for example, immunization grants for childhood vaccines (Community Preventive Services Task Force, 2015; Curchin, 2019) and that match the policies the Israeli government applied in order to manage the COVID-19 pandemic, that is, tax benefits (Dobrovizki, 2020; Levozon-Yanay, 2020). Furthermore, we used incentive examples that were suggested by the Israeli media, in the preceding weeks of our survey, as possible incentives for COVID-19 vaccination, either in Israel or in other countries (Arlozerov, 2020; Gorali, 2020; Punny, 2020; Shtarkman & Linder, 2020; Yanko, 2020). For example, limiting access to public venues was pronouncedly discussed in the Israeli media (e.g., Arlozerov, 2020), and the notion of a monetary grant as a positive incentive was suggested in the United States (e.g., George & Cryder, 2020; Konish, 2020; Mankiw, 2020), and was covered with great interest in the Israeli media (e.g., Harel, 2020).

This specific order of incentivizing conditions, that is, introducing the positive incentives before to the negative ones, was chosen in order to simulate a plausible course of action by the Israeli government, given the following circumstances. First, governments usually avoid applying sanctioning policies against non-vaxxers, particularly in high-income countries (Jarrett et al., 2015; Thomsen, 2017), such as Israel (The World Bank, 2021). When negative incentives and sanctioning policies are applied, they are adopted, in many cases, after softer choice-directing interventions, such as reminders, health professionals recommendations and rewards, have been implemented and have not yielded satisfactory vaccination coverage (Attwell et al., 2018; Attwell & Navin, 2019; Curchin, 2019; Klapdor & Grove, 2015). Therefore, given that positive

incentives are considered a softer and less intrusive type of incentives (Grabosky, 1995; Nuffield Council on Bioethics, 2007), this particular order of incentives' presentation simulates a realistic scenario. Second, Israel's routine vaccination policy is based on recommendations only and non-vaxxers are not susceptible for any sanctions (IMH, 2022). This makes a penalizing strategy for enhancing vaccination acceptance in Israel unlikely, particularly as a first line option. Third, the policies the Israeli government applied since the beginning of the COVID-19 pandemic and prior to our study reflected a supportive approach of compensation for those harmed by the pandemic including special grants and tax benefits (Dobrovizki, 2020; Filut & Milman, 2020; Levozon-Yanay, 2020). Hence, negative incentives would seem not to fit the general policy of the Israeli government during the pandemic. Therefore, we had a reason to believe positive incentives were the plausible alternative at the time and that the Israeli public anticipated policies that were in line with the current vaccination policy and with the previously-issued pandemic-related policies. Specifically, we aimed to avoid the prospected effects of the surprise and skepticism that may have arisen among the participants, had the negative incentives been presented first. Therefore, we presented the more reasonable positive incentives first and did not randomize the order of incentivizing conditions. This approach is favorable when examining decision making processes in real-life contexts, such as was done in this study, as it avoids the distortion of the investigated context and its consequential decision making process (Charness et al., 2012; Englund & Hellström, 2012). Possible answers to all three vaccination-intentions questions were "Yes," "No," and "I don't know."

Then, we asked the participants to assess the social norm within their close environment regarding getting the vaccine. Next, participants were presented with questions regarding the risk they perceive the vaccination entails. The survey was completed with a battery of demographic questions.

3.2. Measures

3.2.1. Dependent variable

Inspired by Dodd et al. (2021), *Vaccination intentions* were measured by a single item question asking whether the participants will get vaccinated once the vaccine is available. Possible answers were "Yes," "No," and "I don't know." We classified the respondents as following: those who replied "Yes" as "vaccination accepters"; those who replied "No" as "opposers" and those who replied "I don't know" as "hesitators." Surly, these classifications are metaphorical and do not imply the actual prospected behavior of the participants but rather symbolize their reported likelihood of getting the shot. For simplicity purposes, they will herein be referred to according to their symbolic classification.

When measuring for vaccination intentions under the different incentives (see *Independent variable*) these classes were dichotomously coded to "Intends to be vaccinated" for those who answered "Yes" (1) and "Does not intend to be vaccinated" for those who answered "No" or "I don't know" (0).

3.2.2. Independent variable

Incentive type was manipulated by framing the questions regarding vaccination intention in the context of three different types of incentives: no incentives/positive incentives/negative incentives: "Will you get vaccinated against COVID-19 once the vaccine is available/if the government would apply positive incentives, such as tax exemptions and grants/if the government would apply negatives incentives, such as banning participation in public events and use of public transportation for un-vaccinated people?"

3.2.3. Control variables

Aiming to isolate the effect of incentive type on vaccination compliance intentions, the following four variables were measured and controlled for, as health behavior literature indicates they may affect vaccination behavior:

3.2.3.1. Trust in government. The cynicism/trust scale was used to measure the level of trust in the government (Kang & Van Ryzin, 2019; Miller, 1974). The scale assesses perceptions regarding the professional and personal integrity of the government and the people running it, using five items with answers ranging from 0 to 100, with 0 indicating low levels of trust. A sample item is: "How much of the time do you think you can trust the government to do the right thing?" Following an inter-item reliability check (Cronbach's $\alpha = 0.885$), items were averaged to form a single 0–100 scale.

3.2.3.2. Risk perceptions about the virus. Inspired by studies on previous pandemics and natural disasters (Bults et al., 2011; Freimuth et al., 2017; Shim & You, 2015), we used the following three items to measure both cognitive and emotional perceptions of health related risks posed by the virus: (1) "How likely do you think it is that you would become sick with coronavirus?" (1 = not at all likely—5 = very likely); (2) "How severe would your condition be if you did become sick with coronavirus?" 1 = not at all—5 = very severe); and (3) "To what extent are you worried about the possibility of becoming sick with coronavirus?" (1 = not at all to 5 = very much). An inter-item reliability check, indicated a relatively low, yet acceptable value (Cronbach's $\alpha = 0.685$; Taber, 2018; van Griethuijsen et al., 2015). Hence, the scores were averaged to form a single scale ranging from 1 to 5.

3.2.3.3. Vaccination social norms. regarding the vaccination were measured by a single question asking the participants to assess the rate of their close friends and relatives who will get vaccinated once the vaccination is available. Answers could range from 0 (no one) to 100 (everyone).

3.2.3.4. Vaccination risk perceptions. Following Freimuth et al.'s (2017) work on flu vaccinations, we measured *vaccination risk perceptions* using two items focusing on side effects likelihood and severity: (1) "how likely are you to have side effects following the COVID-19 shot?" (1 = likely to little extent, 4 = likely to great extent); (2) "How severe do you think the side effects would be?" (1 = not at all severe, 4 = very severe). Answers to both questions were highly correlated (Pearson's $r = 0.76$) and averaged to a single 1–4 scale indicating low to high vaccine risk perceptions respectively.

3.2.3.5. Demographic variables. We controlled for age (in years), gender (0-female; 1-male), and parenthood (0-not a parent; 1-is a parent). We also controlled for income level, as stated by the participants to be one of the following options, referring to the average household income in Israel, after the average income in the past year was presented to them: (1) much lower; (2) lower; (3) about the same as; (4) higher (5) much higher. Education level was measured on a 6-point scale, ranging from (1) elementary; (2) partial high School; (3) full high school; (4) above high school; (5) a bachelor's degree; (6) a master's degree and beyond. In addition, given previous evidence regarding social minorities' different compliance patterns during the COVID-19 pandemic (Goren et al., 2021), we controlled for social group affiliation (General Jewish, Ultra-Orthodox, and Arab).

3.3. Statistical analysis

Following a descriptive statistics review, we performed a repeated measures binary logistic analysis to test for any significant differences in compliance intentions among vaccine accepters, hesitators and opposers, given the different types of incentives.

In addition, single proportion *Z*-tests were conducted in order to examine the significance of crowding-out effects given positive and negative incentives. For descriptive reviews and analyses that did not include social group as a control variable, the sample weight was corrected by social group proportion, according to the social stratification in Israel (general Jewish population 69%; ultra-Orthodox 11%; Arab 20%; CBS, 2018). We used IBM SPSS Statistics package 27.0 for the analysis and visualization of the data.

4. RESULTS

4.1. The association between incentives and vaccination intentions predisposition

Figures 1 and 2 illustrate the main research procedure and participants' responses to each of the incentivizing conditions respectively. In the overall sample, 46% of the participants stated their positive intention to get vaccinated without any incentives involved (acceptance baseline). The possibility of applying positive and negative incentives increased this number by 6% and 4% respectively. A repeated measures binary logistic analysis indicated this increase was significant for both types of incentives (positive incentives vs. no incentives: $B = 0.486$; $SE = 0.062$; $p < 0.001$; negative incentives vs. no incentives: $B = 0.293$; $SE = 0.068$; $p < 0.001$). The odds of a person agreeing to get vaccinated upon positive incentives and negative incentives are 1.63 and 1.34 (respectively) times higher than compared to when no incentives are suggested (see Table 1 for correlation matrix and descriptive statistics and Table 2 for the logistic analysis). Additional similar analysis, with negative incentives as a

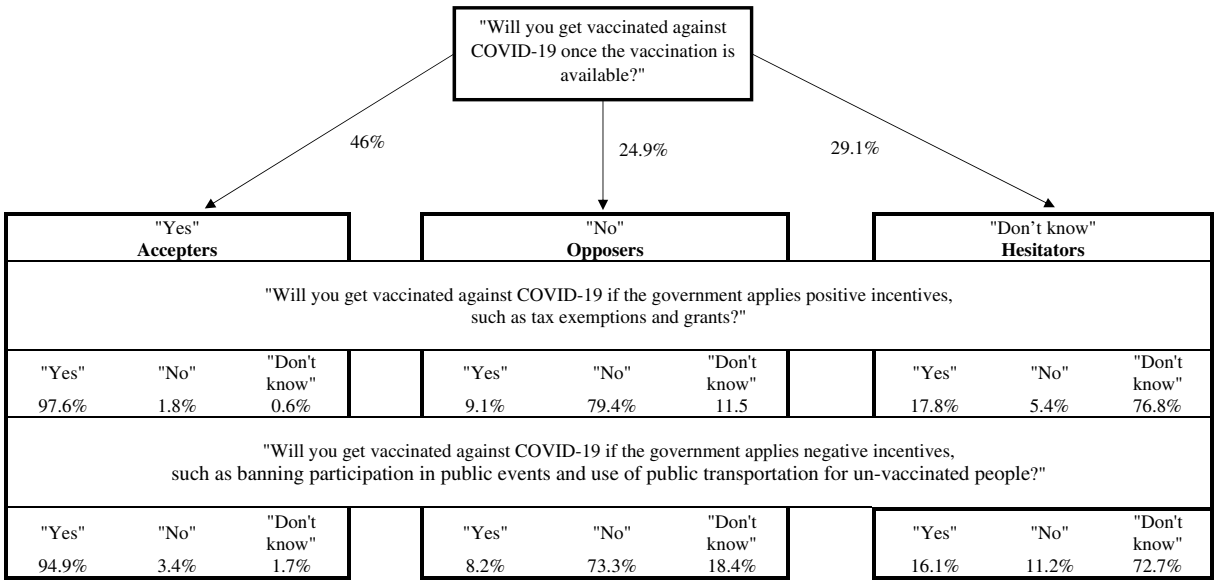

FIGURE 1 A flow diagram of the main research procedure and participants' responses

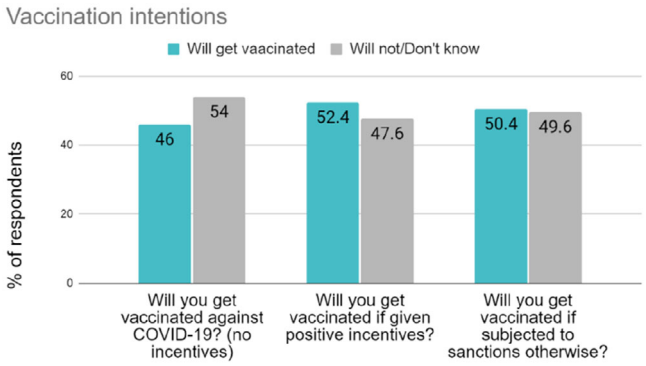

FIGURE 2 Vaccination intentions against COVID-19 in the Israeli population under no incentives, positive incentives, and negative incentives

reference group, revealed a small but significant advantage for positive incentives compared to the negative ones ($B = 0.193$; $SE = 0.067$; $p < 0.01$). That is, the odds that a person is likely to get vaccinated upon positive incentives are 1.21 times higher compared to upon negative incentives.

4.2. Incentives' associations with opposers' and hesitators' vaccination intentions

As Figure 3 shows, both types of incentives changed the position of some of the opposers and hesitators. In the overall sample, about 8%–9% of opposers and 16%–18% of hesitators stated they would get vaccinated given at least one type of incentive. A repeated measures logistic analysis indicated no significant difference in compliance rates when comparing negative to positive incentives (opposers: $B = -0.162$; $SE = 0.249$; $p =$ N.S.; hesitators: $B = -0.169$; $SE = 0.178$; $p =$ N.S). Simply put, both types of incentives increased the likelihood of vaccine opposers and hesitators to report they would get vaccinated by the same extent (see Table 3, model 1 for opposers and model 2 for hesitators). These results support H1a that predicted that both types of incentives will enhance vaccination intentions among vaccine opposers and hesitators. However, they do not support H1b that hypothesized that positive incentives would have a stronger positive effect on vaccination intentions compared to negative ones.

TABLE 1 Means, standard deviations, and correlations

Variable	Mean	S.D.	Gender	Age	Education	Parenthood	Income	Trust in Government	COVID-19 risk perception	Vaccination social norm	Vaccination risk perception	No incentives vaccination intentions	Pos incentives vaccination intentions
Gender[1]	0.46	0.499											
Age[2]	38.05	14.056	0.062*										
Education[3]	4.09	1.314	0.039	0.080**									
Parenthood[4]	0.45	0.498	−0.006	0.174**	0.114**								
Income[5]	2.54	1.276	0.156**	0.149**	0.194**	0.072*							
Trust in Government[6]	34.3708	23.96997	0.126**	0.037	0.006	0.047	−0.025						
COVID-19 risk perception[7]	2.8224	0.87092	−0.057*	0.114**	0.021	0.007	−0.020	0.016					
Vaccination social norm[8]	59.67	28.115	0.151**	0.210**	0.081**	−0.010	0.187**	0.125**	0.144**				
Vaccination risk perception[9]	2.3966	0.83630	−0.215**	−0.099**	−0.016	−0.048	−0.184**	−0.081**	0.189**	−0.349**			
No incentives vaccination intentions[10]	0.46	0.499	0.244**	0.173**	0.031	0.032	0.190**	0.058*	0.099**	0.550**	−0.433**		
Pos incentives vaccination intentions[10]	0.52	0.500	0.249**	0.147**	0.092**	0.071*	0.196**	0.034	0.066*	0.521**	−0.423**	0.837**	
Neg incentives vaccination intentions[10]	0.50	0.500	0.212**	0.157**	0.056	0.046	0.199**	0.069*	0.125**	0.561**	−0.394**	0.821**	0.821**

Note: Number of valid responses was $N = 1184$, except for education level ($N = 1182$), parenthood ($N = 1120$), income level ($N = 1038$), and vaccination social norm ($N = 1129$); [1]: Female = 0, male = 1; [2]: in years; [3]: a 6-point scale ranging from 1-"elementary school" to 6-"Master's degree and higher"; [4]: 0 = does not have children, 1 = has children; [5]: a 5-point scale ranging from 1-"much lower than the average household income" to 5-"much higher than the average household income"; [6]: a scale ranging from 0 = low trust to 100 = high trust; [7]: a scale ranging from 1 = low risk to 5 = high risk; [8]: a scale ranging from 0 = no one to 100 = everyone; [9]: a scale ranging from 1 = low risk to 4 = high risk; [10]: 1 = Will get vaccinated, 0 = Will not get vaccinated. *$p < 0.05$; **$p < 0.01$.

TABLE 2 A repeated measures binary logistic analysis of vaccination intentions of positive and negative incentives versus no-incentives in the overall sample

	B	*S.E.*	OR [CI]
Intercept	−2.131***	0.5347	0.119 [0.04–0.34]
Negative incentives vs. no-incentives	0.293***	0.0677	1.340 [0.17–1.53]
Positive incentives vs. no-incentives	0.486***	0.0623	1.626 [1.44–1.83]
Arab sector vs. general Jewish	−0.940***	0.2020	0.391 [0.26–0.58]
Ultra-Orthodox sector vs. general Jewish	−0.521*	0.2162	0.594 [0.39–0.91]
Gender	0.650***	0.1565	1.916 [1.41–2.60]
Age	−0.001	0.0056	0.999 [0.99–1.01]
Education	0.004	0.0585	1.004 [0.89–1.23]
Parenthood	0.354*	0.1550	1.425 [1.05–1.93]
Income	0.038	0.0656	1.038 [0.91–1.18]
COVID-19 risk perception	0.445***	0.1022	1.561 [1.28–1.91]
Vaccination social norm	0.046***	0.0035	1.047 [1.04–1.05]
Vaccination risk perception	−1.031***	0.1077	0.357 [0.29–0.44]
Trust in Government	−0.001	0.0032	0.999 [0.99–1.00]

Note: $N = 2832$ (944 participants).
*$p < 0.05$, ***$p < 0.001$.

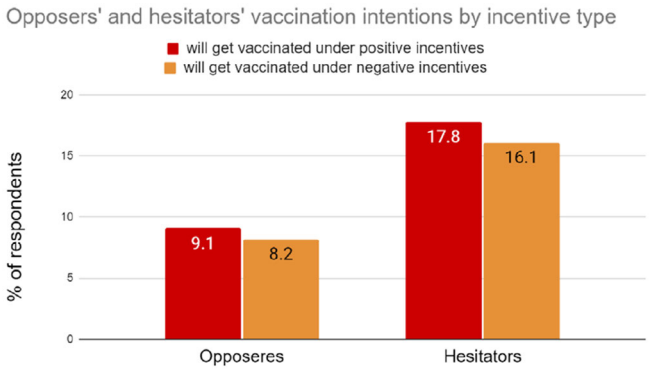

FIGURE 3 Vaccination opposers and hesitators vaccination intention once positive and negative incentives suggested

4.3. Incentives' associations with accepters' vaccination intentions

Both positive and negative incentives slightly reduced the rates of intentions to get vaccinated in our sample as a whole in 2.4% and 5.1% respectively. While these decreases seem minor, in vaccination acceptance literature any change in acceptance rates is clinically meaningful and has a snowball protective effect on the overall population (e.g., Bauer et al., 2021; Jansen et al., 2018). A repeated measures logistic analysis (Table 3 model 3) indicated that negative incentives had decreased the willingness to get vaccinated within vaccination accepters to a greater extent compared to positive incentives ($B = -1.243$; $SE = 0.379$; $p < 0.01$). Next, we examined the statistical significance of what may be interpreted as a crowding-out effect, that is, a decrease in the number of accepters stating they agreed to get vaccinated once incentives were suggested. We conducted a single proportion *Z*-test that examined whether the proportion of the accepters who changed their minds was significantly different than 0. Results indicate that both positive and negative incentives induce a significant crowding-out effect (positive: $Z = 15.95$; $p < 0.01$; negative: $Z = 36.23$; $p < 0.01$). These results do not support H2, that predicted that neither positive nor negative incentives will generate a crowding-out effect.

TABLE 3 A repeated measures binary logistic analyses of vaccination intentions of opposers, hesitators, and accepters upon positive versus negative incentives

	Model 1[a] Opposers		Model 2[b] Hesitators		Model 3[c] Accepters	
Examined group	*B*	*S.E.*	*B*	*S.E.*	*B*	*S.E.*
Intercept	−2.201	1.2617	−3.607**	1.1791	1.746	1.0751
Negative incentives vs positive incentives	−0.162	0.2497	−0.169	0.1782	−1.243**	0.3789
Arab sector vs. general Jewish	0.060	0.5568	−0.486	0.4102	−0.975	0.5379
Ultra-Orthodox sector vs. general Jewish	0.500	0.6038	−0.054	0.4241	−0.643	0.6900
Gender	1.380**	0.4226	0.379	0.3186	−0.565	0.4688
Age	−0.028	0.0277	−0.010	0.0104	−0.002	0.0135
Education	−0.031	0.1453	0.255*	0.1253	0.211	0.1917
Parenthood	0.600	0.5438	0.351	0.3241	0.399	0.5024
Income	−0.097	0.1826	0.164	0.1324	−0.059	0.1750
COVID-19 risk perception	0.393	0.2749	0.125	0.2071	0.220	0.2675
Vaccination risk perception	−0.452*	0.2262	−0.260	0.2118	−0.458	0.2542
Vaccination social norm	0.003	0.0077	0.024**	0.0081	0.031***	0.0081
Trust in Government	−0.002	0.0087	−0.007	0.0054	0.007	0.0095

[a]$N = 516$ (258 participants). [b]$N = 548$ (274 participants). [c]$N = 824$ (412 participants). *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

5. DISCUSSION AND CONCLUSIONS

Our findings demonstrate several insights. First, they indicate that in the overall population, respondents report that the application of either positive or negative incentives would increase their likelihood of getting vaccinated, and that positive incentives may have a stronger effect on their vaccination acceptance intentions (at least when they are presented before the negative ones, as is likely in reality). These findings coincide with previous work that highlights the advantage and acceptability of positive incentives over negative ones in inducing health behavior change and in vaccination acceptance (Hoskins et al., 2019; Niza et al., 2014). Simultaneously, these findings do not support the assumption regarding the superiority of negative incentives in promoting health behavior change, due to the loss eversion effect (e.g., Giubilini, 2019; Vlaev et al., 2019). These results coincide with other studies performed during the COVID-19 pandemic, that demonstrated the absence of loss aversion bias (Sanders et al., 2021). This suggests that the unique conditions of the pandemic may have affected basic psychological and cognitive mechanisms of individuals' decision making. These conditions relate to the mental and emotional effects of the pandemic, and particularly to emotional stress (Bao et al., 2020; Horesh & Brown, 2020; Liu et al., 2021; Taylor et al., 2020), which was recently found to significantly reduce loss aversion (Molins, Ayuso, & Serrano, 2021). These findings indicate, that during the current pandemic and in similar stressful times, citizens, that is, regulatees, may be less susceptible to regulation approaches that entail negative incentives than compared to less stressful contexts. Hence, policy designers and regulators should consider the context, as policy tools that may be effective during routine un-stressful times may yield different results during a full-scale global crisis and hamper the government's ability to achieve its policy goals and undermine its governance.

Second, our findings confirm the occurrence of the crowding-out effect, even under harsh conditions of a global pandemic, which could have affected the psychological mechanisms responsible for the crowding-out effect. Contrary to our expectation and to the alternative control model (Kay et al., 2008; Landau et al., 2015), the special circumstances of the pandemic, that is, the severe uncertainty, social disruption and changes in sense of control (Dennis & Wheaton, 2021; Elemo et al., 2021; Rettie & Daniels, 2020), did not affect intrinsically motivated people's tolerance for controlling interventions and regulation. This emphasizes the cross contextual relevance of the SDT and the crowding-out effect.

Third, a close examination of vaccination accepters, hesitators and opposers, indicated that the superiority of positive incentives was significant only among vaccine accepters. That is, those with intrinsic motivation to get vaccinated even when no incentives are suggested. We discovered that incentive type does not affect vaccination

intentions of vaccine opposers and hesitators, but it does affect those of vaccine accepters. In other words, intrinsically motivated individuals are affected by the *type* of incentive in a different manner than extrinsically motivated individuals. These results may add new insights to the historical debate and mixed evidence regarding the effectiveness of positive vs. negative incentives on health behavior (Niza et al., 2014), as they suggest that type of motivation may be a prime predictor of the variance in response to positive and negative incentives.

The compliance intentions of intrinsically motivated people can be explained by the classic features of the SDT which predict a negative reaction to controlling messages, and the likelihood that negative incentives are perceived as controlling to a greater extent than positive ones (Frey & Jegen, 2001; Rode et al., 2015). In this regard, it seems that the crowding-out theory remains relevant even in the unique context of the current pandemic. However, when trying to explain the changes in vaccination intentions of extrinsically motivated people (opposers and hesitators), we face a more complex picture. Since neither type of incentive was more effective in enhancing vaccination intentions than the other, neither the classic prospect theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1991) and its innate advantage to negative incentives due to the loss aversion tendency, nor the context dependent expectations, that is, the extremely stressful conditions of the pandemic, which highlight the value of rewards over losses (Metz et al., 2020; Molins, Ayuso, & Serrano, 2021), seem to provide an adequate explanation for this behavior. In this context, it is worth noting that while both types of incentives had a similar effect on the opposers and the hesitators, not all members of these groups were indifferent to the type of incentive offered to them. About 50% of the hesitators and opposers did prefer one type of incentive over the other (either positive or negative). However, in the group-level analysis, these preferences were counter balanced. Therefore, we suggest that the uniquely stressful conditions of the current pandemic may affect extrinsically motivated individuals in a different manner. While for some they may enhance reward over loss salience, for others it may not. These counteracting effects may explain the similar effect both types of incentives had on the accumulated intentions of these groups.

Importantly, our findings present some practical insights for policy designers and regulators during an ongoing pandemic. The study shows that it could be most beneficial to construct a vaccination enhancement policy design that considers the varied effectiveness of different mobilizing policies on vaccine accepters and opposers. When striving for a speedy herd immunization, it is crucial to maximize vaccination rates while avoiding any crowding-out damages. Since, as our findings demonstrate, both negative and positive incentives result in crowding-out, the most efficient way to prevent this, may be by applying a gradual regulatory program. Such program should target vaccine accepters first and start-off the vaccination campaign without offering any incentives, in order to avoid the crowding-out effect. Next, after a reasonable period of time, that depends mostly on logistics, accessibility and vaccine distribution parameters, providing accepters sufficient opportunities to get vaccinated, incentives should be introduced to the campaign. As our findings demonstrate, either positive or negative incentives are likely to increase opposers' and hesitators' reported acceptance rates to the same extent. Therefore, once accepters have been vaccinated, policy designers can choose their mobilizing policies and regulations more freely.

5.1. Real-time evidence: The COVID-19 vaccination campaign in Israel

The Israeli ministry of health began its extensive and swift vaccination campaign shortly after the data for this study was collected. This allowed us to review our findings regarding vaccination intentions in light of the actual vaccination rates registered in the country. The vaccination rollout was conducted by the four national health maintenance organizations, which provide all citizens with affordable and accessible health insurance and services throughout the country (Wilf-Miron et al., 2021). Vaccination rates increased rapidly. Within 2 months, the coverage rate of the adult population over the age of 16 reached 40% (for 2 doses) and in another 3 months it reached 78% (IMH, 2021). During the campaign, the Israeli ministry of health introduced the "green pass," a certificate allowing people with immunity, either by being vaccinated or by recovering from COVID-19, to enter and participate in social and cultural venues and events, such as shows, gyms, hotels, and restaurants. The green pass also exempted people with immunity from self-isolation if exposed to a positive COVID-19 case. From an incentivizing perspective, the green pass demonstrates a model of negative incentives, which penalize the unvaccinated by preventing them from performing acts that otherwise were permitted (Wilf-Miron et al., 2021).

Since the green pass was applied at the onset of the vaccination rollout, it is hard to assess its effect, as a negative incentive, on differently motivated persons and on general vaccine compliance compared to positive ones. Nonetheless, given our findings regarding the effectiveness of incentives of both types, it can be assumed that the green pass did have an enhancing effect on vaccine compliance.

5.2. Limitations

Like any study, our study has some limitations. First, it was performed on a single state sample. Hence, cultural and socio-political factors may affect citizens' vaccination intentions and response to incentives. Therefore, our findings should be treated with caution as they may not represent other democratic countries. Considering the challenge in sampling the Arab population in Israel (Gordoni & Schmidt, 2010), our sectorial samples include only basic demographic stratifications, not a full demographic representative profile. This is a common methodological difficulty in Israel focused research, and many studies result to using samples that are only partially representative (Marciano et al., 2020; Taragin-Zeller et al., 2020; Yagil & Rattner, 2002). As a result, our findings should be treated with caution as they do not necessarily represent male Arab Israeli citizens.

Second, the value of the incentives we presented to our participants was not clear as they did not include an absolute monetary cost/ reward. This could have caused variance in the value attributed to them by the participants. However, two joint considerations made us choose this tactic. The first is our interest in the effect of the incentive *type* and not in the particular effect of types of monetary incentives. The second consideration is our intention to simulate plausible incentives. As described in the study design and data collection section, all the examples we presented to the participants were inspired by known vaccination incentivizing practices in other countries, suggested and discusses in the Israeli media and were put on the Israeli public agenda in the days preceding our data collection. The chosen scenarios were indeed realistic and eventually adopted in Israel (i.e., the "green pass" mentioned above). Those that were not applied in Israel, were adopted or suggested in other countries later on (e.g., grants and payments for vaccinated individuals in Serbia, Hong Kong and the United States; Jecker, 2021; and tax exemptions in the United States; Zaretsky, 2021).

Third, the application of a non-experimental simple survey without randomizing the order of incentive's introduction raises concerns regarding order and carry-over effects (de Jong et al., 2012). Since the positive incentive was introduced first to all the participants, it is possible that the order of presentation had an effect on the participants' appraisal of the incentives. This, in turn, may have caused some participants to perceive the negative incentive as harsher than it would have been if presented prior to the positive one, as such scenario may enhance the appraisal of loss prospected to occur given the negative incentives. Consequently, it is possible that had the incentives been presented in a different order, the results would have been different. Nonetheless, we chose this method in order to simulate a feasible course of action of the Israeli government (as explained in the Study design and data collection section), which is favorable in studies that investigate real-life decision-making (Englund & Hellström, 2012). Moreover, the order and carry-over effects may be limited in the current study, as the un-randomized consecutive questions examining vaccination intentions under different incentives met some conditions that reduce these effects: 1. The questions were simple and not complex (Auspurg & Jäckle, 2017); 2. They dealt with a presumingly relevant issue for the participants (considering the context of the pandemic and the novelty of the long-awaited vaccine) (Auspurg & Jäckle, 2017); and 3. They were composed of a relatively short sequence of similar questions with similar response options (i.e., only two questions or three in total, including the baseline question) (de Jong et al., 2012). Furthermore, similar surveys in public health literature examining intended compliance with alternative government policies, without randomization, were common and practiced during the COVID-19 crisis (e.g., Bodas & Peleg, 2020a, 2020b). This may be supported and attributed to evidence refuting order effects of experimental stimuli in health beliefs and attitudes research (Darker et al., 2007). Nonetheless, our findings should be treated with caution and considered valid only for the specific investigated context and order of suggested incentives.

A fourth limitation of this study is the use of vaccination intentions rather than actual vaccination behavior as an indicator for vaccination acceptance. However, according to the theory of planned behavior (Ajzen, 1985), a well empirically-supported behavioral theory, intentions to perform a behavior, and particularly health behavior, are considered a strong predictor of actual behavior (Hagger & Hamilton, 2021) and are very often used in

vaccination acceptance-focused studies, including ones on the COVID-19 (e.g., Bults et al., 2011; Freimuth et al., 2017; Head et al., 2020; Persad & Emanuel, 2020). In addition, as in other studies that measure behavior intentions regarding normative or illegal behaviors by self-report, our results are subject to a social desirability bias (Bradburn et al., 1978; Gonzalez-Ocantos et al., 2012; Krumpal, 2013; Richman et al., 1999; Tourangeau & Yan, 2007). However, both the anonymous on-line nature of the survey and the fact that participants were asked to report their intentions regarding a *hypothetical* behavior, that was not yet practical and promoted by the government, reduce this risk (Darker et al., 2007; Goren et al., 2021). Moreover, our results attest to the effect of incentives above and beyond any social desirability effect. If participants were indeed biased, their responses to all the questions regarding their vaccination intentions, with or without incentives, would have been biased. The fact that we found significant effects for the incentives, in spite of a possible social desirability effect, is an indication of the robustness of our results.

A fifth limitation is our study's validity only to the precursory stage of the vaccination campaign, that is, before the actual rollout has begun. Though vaccination intentions are considered good predictors of actual vaccination behavior, this usually refers to well-known and researched vaccines, administered usually regardless of actual morbidity rate. The conditions under which the rollout is performed, newly discovered side effects, and social norms regarding the vaccination during the vaccination campaign may either increase or decrease vaccination rates, regardless of citizens' preliminary intentions. Despite this significant caveat, based on the theory of planned behavior (Ajzen, 1985) intentions are still an adequate indicator of future behavior in a changing environment, including a variety of health-related behaviors (Hagger & Hamilton, 2021).

Another limitation is our choice of a dichotomous measure for vaccination intentions. This prevented us from assessing subtle changes in vaccination intentions that may have been induced by the different incentives. Though dichotomous questions are commonly used in vaccination intentions research (e.g., Dodd et al., 2021), they may conceal the true effect of the incentives on intentions. Nonetheless, since vaccination behavior is a dichotomous one-off behavior on its own (Giles et al., 2014, 2016), our measure created an authentic decision-making setup, and "forced" our participants to simulate their real behavior under the different conditions.

Our findings indicate that crowding-out occurs even under extreme conditions of a global and significantly disrupting crisis. Furthermore, they show that vaccination opposers and hesitators, or more specifically, people who do not initially intend to get vaccinated, are in overall indifferent to the type of the incentive offered to them. This stresses the need to adjust vaccination mobilizing regulation approaches to differently motivated individuals, particularly when striving to reach herd immunization. In order to maximize vaccination rates, incentivizing policies and regulations should be applied, while taking the measures to avoid the crowding-out effect. We suggest applying a gradual policy architecture that will target vaccine accepters first. Once the vaccination potential of accepters was fulfilled, incentives should be introduced to the vaccination campaign. As our findings demonstrate, both types of incentives are predicted to contribute to opposers' and hesitators' vaccination acceptance to the same extent. Therefore, once accepters have been vaccinated, policy designers and regulators can choose their regulatory tactics more freely. This study sheds light on the effect of the unique conditions created by the Coronavirus pandemic on the effectiveness of vaccination mobilization regulatory instruments. By doing so, it contributes to the regulation literature by highlighting the effectiveness of regulatory approaches and instruments for achieving compliance with public health policies and enhancing governance, at least in the context of vaccination during an ongoing crisis. Similarly, it contributes to the public health, policy design and behavioral public policy literature as well as to policy designers. Future research should consider examining larger and multi-national samples, explore different stages in the vaccination campaign, while considering more complex tactics of incentivization, such as a combination of rewards and penalties.

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CONFLICT OF INTEREST

None.

DATA AVAILABILITY STATEMENT

Data will be provided upon request from the authors.

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