**Tools for Public Health Policy: Nudges and Boosts as Active Support of the Law in
Special Situations such as the COVID-19 Pandemic**

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such as the COVID-19 Pandemic

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Abstract

In recent years, “nudging” has become a standard behavioral intervention at the individual level and for the design of social policies. Although nudges are effective, such interventions seem to be limited to a given space and time, and there is only scant evidence to support the contrary view. On the other hand, choice architects may utilize another type of intervention called “boosting,” which shows the promise of generalized and lasting behavioral change. The government can use these tools to shape public policy. Behavioral interventions such as policy-making tools have their boundaries, as does the law. We argue that nudging and boosting may serve as active local or global aids in support of the legal system under certain circumstances. Nudging and boosting can also support the legal system especially in relation to emerging social issues or events that are unprecedented, such as the recent global COVID-19 pandemic, where certain behavioral patterns are expected, but it would be hard or impossible to enforce them through the law alone.

Keywords: boosts, nudges, law, COVID-19

1. Introduction

On the 9th of November, Pfizer was the first company in the world to announce the effectiveness of its vaccine, which was approximately 95% in producing immunity against the novel coronavirus (1). Thus far, the global pandemic has directly affected more than 179 million individuals, leading to 3.89 million casualties (2). Whether the vaccine is available to all citizens or not, one effective way of taking back control over the increase of infections is to follow the simple rules of social distancing, wearing masks, and disinfection, supported by the reliable education of society. These measures were widely adopted as official means of disease prevention recommended by the World Health Organization (3). Despite these recommendations, which were usually imposed by governments in the form of temporary measures, some individuals have not necessarily complied with these new public health measures (4,5). The prescriptive (how one should behave) legal system might be vulnerable if individuals tend to ignore new restrictions, leading to the inefficiency of new laws (6). Legislation and laws have their boundaries, and behavioral interventions, such as nudges and boosts, as presented in following sections, may serve as active aids to support such prescriptive systems.

In recent years, governments and public officials have shown a growing interest in using the behavioral sciences to promote policy goals. An example is an Executive Order issued by the US President Barack Obama, which recommended federal agencies to use behavioral science to shape public policies (7). In Europe, a similar approach has been proposed by the Behavioral Insights Team (8). Such strategies assume that the use of tools from the behavioral sciences can guide human behavior and achieve public policy objectives. Apart from the effectiveness of the behavioral sciences in shaping an individual's choice, the question is whether and to what extent it is possible for the state to use behavioral intervention tools.

The main aim of the current paper is to show how the law can be supported by behavioral interventions. Although previous research has proposed the use of the law in combination with one behavioral intervention – i.e., “nudging” (9), we further propose the use of “boosting” to achieve governmental and individual goals. In our view, nudges and boosts are an integral part of (and not a substitute for) the formal regulations of modern societies, where freedom of choice and autonomy should be promoted concurrently in line with public goals. In further sections, we accomplish our main aim by introducing and defining nudges and boosts, outlining classical law-based approaches to behavioral change, showing examples of the boundary areas in which additional enhancement is needed, and providing tools (i.e., nudges and boosts) by which this can be accomplished. Furthermore, we provide extended taxonomies of nudges and boosts, followed by examples of the most popular interventions used so far in such domains as finances, the environment, and health. We argue, that the legal

system or behavioral interventions do not exist in vacuum. Understanding of the boundaries of the legal system, and treating behavioral interventions as active support of the law, may yield stronger policies, and therefore provide real change in societal or individual level. To our knowledge, this is also the first attempt to collate a coherent theoretical framework with examples of behavioral interventions used during the COVID-19 pandemic, which stems directly from the presented taxonomies.

2. Tools for behavioral change – nudges and boosts

One of the most widely used approaches for behavioral change at the individual or societal level is nudging. The definition of “nudge” has several different forms in the literature, most often differing in: the number of categories of interventions included in nudging; the function of behavioral interventions; and how nudges influence the architecture of the decision-making situation as well as the decision-makers themselves (10). However, the main concepts entailed in the nudge approach are based on the definition proposed by Thaler and Sunstein (2008), who define the concept of nudge as “any aspect of the choice situation architecture that predictably changes behavior, without prohibiting any options, or significantly changing economic benefits.” The introduction of nudging has prompted intensive discussions about the ethics, hopes, and potential applications of the concept of nudging to social policy (10). Due to its usually low implementation costs, the nudge approach, which by definition does not take into account financial incentives or penalties, has become intensively developed, especially in the domains of financial, health, and environmental decisions (13).

Although nudging has been promoted as an effective means of changing human behavior by interfering with the architecture of the decision-making situation (14), it is not the only approach that can be used to change behavior effectively. The second method is more recent but no less promising, namely the “boost” approach proposed by Grüne-Yanoff and Hertwig (2016). While the main aspect of the impact of a nudge is the architecture of the decision-making situation, which consequently influences decision-making behavior, the main aim of a boost is to increase the competence of the decision-maker to make the best possible decisions, according to the decision-maker’s preferences and whatever is appropriate in a given situation (16). Despite operating in similar areas concerning choice architecture, supporters of the boost approach distinguish several differences between nudging and boosting. Most importantly, they postulate that nudging in contrast with boosting: (1) can have a potential impact on the autonomy of the decision-maker; (2) can have possibly reversible effects when the intervention is withdrawn; and (3) uses cognitive bias as the basis for its impact. Furthermore, the proponents of boosts claim that they do not disrupt the decision-maker's autonomy, cause long-

term effects, affect the decision-maker's competence, or strengthen the ways of making decisions (16). Although the proponents of the boosting approach claim that boosts do not disrupt decision-makers' autonomy, in our opinion this statement is not entirely true. When boosts are chosen on a subjective, individual level, freedom of choice is maintained; however, when political or ideological reasons are used to advocate boosts, they may limit the autonomy of choice, just as nudges do. Although this type of intervention looks more neutral, when suggested by a higher authority a certain style of action in a given situation may be imposed.

3. Taxonomies and popular examples of nudges and boosts

The taxonomies of nudges and boosts, which we present in this section, are derived from the work of Sunstein (2014) and Hertwig and Grüne-Yanoff (2017). The taxonomy of nudges presented below originally consisted of ten different interventions (17). Hummel and Maedche (2019) in their meta-analysis went further, in proposing two categories of interventions, noting that theirs may not be the complete list of nudge types, though it appears to be the most exhaustive (18). In other words, the taxonomy presented in Table 1 assumes that choice architects in different contexts may wish to nudge people by presenting them with a chosen, limited set of particular options, or by presenting the options in a particular way. The category of nudges *structuring the choice task* refers to what to present, whereas the category *describing choice options* represents how choice options are presented. We decided to exclude a tool called *Implementation intentions* from the second category because this paper generally assumes that this tool is a boost that can be taught to individuals, rather than being an automatic nudge that is incorporated into a setting. Implementation intentions was a strategy developed originally by Gollwitzer (1999), which links imagined situations with prepared responses; for instance, “Whenever situation x occurs, I will initiate response y.” The effective use of this tool demands individually conscious planning, which is a skill more likely to be applied by someone with a good awareness of the topic. Following Hertwig and Grüne-Yanoff (2017), we have included this in the boost taxonomy.

[Table 1 about here]

The taxonomy of boosts (Table 2) focuses on three categories: *risk literacy boosts* (risk and probability knowledge), *uncertainty management boosts*, and *motivational boosts* (16). These interventions are divided into separate categories in order to emphasize their vital aims: *risk literacy boosts* are targeted at developing competences that help individuals better understand statistical information, *uncertainty management boosts*

establish step-by-step rules to make good decisions or predictions, and *motivational boosts* aim to develop a person's ability to individually fine-tune his/her own motivation, cognitive control, and self-control overall. Furthermore, there is a new tool in the boost taxonomy that was not included by Hertwig and Grüne-Yanoff (2017). This is called "inoculation strategy," which was identified as a boost by Kozyreva et al. (2020). Inoculation refers to the process of giving a psychological vaccine to individuals by training them in the process of recognizing particular information (21). It was assigned to the category of Uncertainty management in this taxonomy due to its potential for reducing uncertainty (22). The two taxonomies of nudges and boosts presented in Tables 1 and 2 appear to be the most exhaustive categories, taking into account the most prominent research concerning ways of constituting choice architecture.

[Table 2 about here]

4. The legal system and its boundaries.

Inspection of the relationship between the state and the law is fundamental to considering whether the state can use behavioral tools, such as nudges and boosts, and whether the state can choose its tools freely. First, the law determines the framework for the functioning of the state, including the areas of permitted interference by authority. The law defines the systemic framework for the functioning of authorities and determines their tasks. The relationships between the state and the law are connected to the functions of the state. Second, the law is the basic tool of state activity, and in this sense it is related to the internal functioning of the state. The external function includes the activity of the state in the area of international relations, which mainly involves the protection of its interests, and issues of external security, such as the development of international relations (e.g., international politics, economy, and culture), whereas the internal function involves the relationships between the state and society and the individual within the structure of a specific state. Therefore, the internal function is related to the issues of ensuring public safety and order, the protection of property, securing durability in the internal structure of social relations, and the protection of health and the environment. Here, the state regulates the activities of individuals, focusing on behaviors that are desirable or undesirable from the point of view of implementing a specific task for which the state was established. Thus, by using tools that are within the state's authority, the state can influence the behavior of an individual, including its use of specific coercion. This leads to the adoption of an attitude considered by the state to be socially desirable. This internal domain concerns

issues regarding the relationship between individual interests, in which the state does not interfere, and above all, the public interest.

The issue of the limits of the legal system emerges in the area of the internal function of the state. When serving this function, the law is understood as an instrument for exercising the power of the state. The question about the limits of the law in this sense is de facto a question of how far the state can intervene using this tool. This is a universal question that individual states and state authorities have considered for many years, and lies beyond the scope of this article. However, it is important to attempt to delineate those boundaries for which the relationship between public and private interests are important. This relationship is closely related to the system adopted by a given state. There is no doubt that public and private interests in a totalitarian or authoritarian state will have different meanings than in a democratic state ruled by law. Thus, depending on the political system, the rules defining the object of state power, the directions of state activity (related to the public interest), and issues related to civil rights and freedoms (private interest) will be different.

The system of the state determines the areas of the state's activity that can be implemented by the state within its framework and based on applicable law. The scope of possible interference of the state authority is, in other words, the permissible limits of the operation of the law as the basic tool used by the state, as adopted by the state under a specific system. At the same time, it seems reasonable to say that these boundaries are now becoming narrower, because states also use the tools of behavioral intervention, doubtless because in some cases these appear to be effective.

Apart from the law, which is still the traditional tool for the exercise of state power, there are other tools that sometimes replace it. Therefore, the question arises of whether – since we can talk about the boundaries of the law understood as a limit of the activity of state power established within a specific system, or leaving a specific sphere free from regulation – we can talk about the boundaries of using other tools that are not traditional (including behavioral interventions). It seems that the answer lies in the relationship between public and private interests, and more specifically, in determining the interference with civil rights and freedoms. This issue is related to the implementation of the internal function of the state, and therefore, the solving of problems that arise with regard to public policies that should be implemented based on and within the law¹.

¹ Due to the fact that the subject of these considerations is related to public policy in the field of health implemented by the state, we refer to this concept as a systematic activity undertaken and implemented by public authorities, implemented within and on the basis of applicable laws and aimed at solving problems with various areas of social life. For other definitions of policies undertaken by entities other than the state, see Howlett & Cashore (2014)

To ensure the effectiveness of actions taken as part of public policies, the state uses specific tools that can be combined. In this sense, the law, as the basic tool of the state for shaping public policy, can be supported by other tools aimed at shaping specific behaviors by individuals (nudging or boosting).

5. Traditional approaches to the public health system, recommendations, and legal instruments

One of the areas that falls within the scope of public policy concerns is health policy, as related to public health in particular. We can define public health as: “an empiric and multidisciplinary field whose goal is to assure conditions in which people can be healthy” (23). The literature on the subject indicates that health policy has both practical and scientific dimensions (24). The WHO defines health policy as: “health goals at the international, national, or local level, and specifies the decisions, plans, and actions to be undertaken to achieve these goals” (25). The WHO also states that “public health policies are developed through highly complex processes that involve different levels of government, and numerous stakeholders with diverse needs and interests” (25). Authorities achieve health policy objectives through health system governance, which, according to the WHO definition, should be understood as “a wide range of steering and rule-making related functions carried out by governments/decisions-makers, as they seek to achieve national health policy objectives that are conducive to universal health coverage” (26). The concept of health system governance in the health policy refers also to “the processes, structures and organizational traditions that determine how power is exercised, how stakeholders have their say, how decisions are taken and how decision-makers are held to account” (27,28). It is up to the authorities of particular countries to define the objectives of this policy; hence, policy is generally implemented at the national level. Implementation of public health policy takes place, among others things, through the organization of prevention programs, financing public healthcare, and financing or co-financing specific medicines or medical devices. As a rule, health policy goals are long-term and are implemented over time. An important practical aspect of health policy is teaching members of society to be responsible for their own behaviors that affect health (29). To achieve this goal, the state can use various tools to change people's behavior.

The importance of health policy and the role of the state in shaping it have gained new meaning in the face of the COVID-19 pandemic. Taking action to prevent the spread of the virus is not just part of the domestic policy of a particular country, because the pandemic has affected the whole world. Therefore, the actions undertaken were also coordinated at the international level. The WHO also developed recommendations to combat the pandemic, dividing the required tasks into sixteen areas (3). All these recommendations were aimed

at countries in order to help fight the pandemic. The implementation of these solutions as well as the search for new ways of fighting the pandemic took place traditionally, i.e., through the introduction of appropriate legislative solutions. In the fight against the virus, the law became the first tool to be used by state authorities.

Several of the restrictions aimed at preventing the spread of the virus pandemic were introduced at the national level in almost all the countries affected by the pandemic through the introduction of orders and bans that include the threat of sanctions. For example, there is an order to cover the mouth and nose, and obligatory quarantine for those who have been in contact with an infected person. Temporary limitations introduced through legal acts are not always an effective way to fight a pandemic, however. The restrictions affect individual rights and freedoms, which the state had not previously considered. There is no doubt that laws are fast and efficient tools for shaping public policy and influencing human behavior. However, in the face of an increasing number of restrictions, many individuals refuse to comply with them, and as a consequence, these tools become less effective. In Poland, an example of such behavior was seen in the recent protests by women and other social groups (related to the ruling of the Constitutional Court regarding eugenic abortion) that took place despite the current ban on gatherings of more than five people. However, apart from the issues related to the observance of the law, we need to examine the limits of the permissibility of the state's interference in the rights and freedoms of individuals in order to implement the overriding interest of public health. Moreover, if the traditional tool for shaping public policy is ineffective, should the state turn to behavioral interventions as tools? And what are the possible conditions for their use?

6. Areas for enhancement by the application of behavioral tools

When discussing the boundaries of the law and the possible boundaries of the state's use of other tools (i.e., nudges and boosts), the conditions for their use, and their scope and boundaries, we must first consider the areas of state activity (its functions) and second, the relationship between public and private interests.

6.1. Boundaries of the law depend on the areas of state activity.

We propose a theoretical framework to depict possible paths the state can follow when deciding whether to use behavioral interventions either alone or in combination with classical legal instruments (Figure 1). Using the criteria of state functions and tasks performed by the state, on the first level (Figure 1, row A), we distinguish two main scenarios differing in whether: (1) the particular area is subject to the authority of the state, and (2) the area that is not subject to the state's authority. The first includes the area of social and individual life which,

from the point of view of the functions (both internal and external) of the state, belong to it, and the state can and should regulate them because they fall within the tasks entrusted to it. As a rule, the state's activities are undertaken in pursuit of the public interest (interest of society), and public interest prevails over private interest. Where the area is not subject to the state's authority, there is a sphere that is beyond the scope of the state to regulate. There may be various reasons for this. First, because the autonomy of the individual is left to the individual, there are rights and civil liberties granted to him/her that the state should not violate. This is related to the specific system in force in a given country. For this reason, depending on the adopted state system, the area of the lack of authority over the life of an individual due to the protection of his/her rights may vary between countries. Second, the state is not interested in certain actions or activities of individuals and even of society as a whole. In simplified terms, some of this sphere can therefore be assigned to activities falling within private interests, which in this case may outweigh the public interest.

Depending on the system adopted in a given country, and also on the specific objectives of public policies, individual areas and the problems solved within them may vary. In both of these aspects, however, it is possible to make a further division into those issues in which the state has an interest and those in which it does not (Figure 1, row B).

[Figure 1 about here]

Fig. 1 Decision flowchart showing the conditions in which the state may choose behavioral interventions and/or standard legal instruments to change behavior at the individual or societal levels.

Scenario I within level A in Figure 1 is one in which the state can regulate a specific sphere of social life or individuals. However, not every issue that falls within this sphere will be subject to such regulation, because the state may not deem it expedient in every case to undertake actions to exercise its authority in cases that fall within this sphere. This lack of regulation may be justified, for example, by a practice that already exists in society, which realizes the goal set by the state. Thus, this makes it unnecessary to take imperative action: i.e., there is no need to regulate something that is already functioning efficiently and achieving the intended purpose. However, if a state is interested in regulating a specific sphere, it chooses the tool that will be used to achieve the assumed goal. The traditional tool used by the state is the law, although as already indicated, it is not the only tool that the state can use. From the foregoing, the following division follows at level B: (1) an area where

the state can regulate activity in which it is interested; and (2) an area where the state can regulate activity, but it is not interested in so doing.

When considering the main topic, which is the use of the law, nudges, or boosts, the area of interest is that where the state can impose regulations and is interested in doing so. A “no-visitor policy” in hospitals is a useful example of public policy in the field of health. The health policy is part of the state's activity and, as a rule, when taking action in this area, the state may use the tool of the law. In this situation, the public interest is the health of society as a whole, and the private interest is both the health of the individual and the rights and freedoms granted to them, in which the state should not interfere. A no-visitor policy serves a health-protection purpose for patients, staff, and potential visitors. Thus, it serves to protect the health of society as a whole, and to protect the health of individuals at the same time. The duty to ensure the efficient functioning of health services belongs to the state, and therefore it may enter this area and establish such a prohibition. In this case, the state uses the tool of the law.

In Scenario II (Figure 1), where the state cannot intrude upon social life, or the life of individuals, the implementation of tools depends strongly on the state’s interest. There are various reasons for the state’s inability to regulate a specific sphere of an individual's life, which are based mainly on the model of the system adopted in a given country, including the rights and freedoms of citizens, but not only on this. There are types of activities in which the state is not interested at all, e.g., whether a certain individual wears gloves in winter or not. Within this scenario, however, there are spheres of individual activity that the state is interested in because the specific behaviors of an individual serve society or achieve the goals of a specific policy. In this sense, it can be said that although the state has "agreed" not to enter a given sphere, it is interested in the activities undertaken within its framework, because these are related to the implementation of specific tasks of the state. From the foregoing, at level B the following divisions follow: (1) an area that the state cannot regulate in which the state is interested; and (2) an area that the state cannot regulate in which the state is not interested.

An example of health policy during the COVID-19 pandemic is illustrated by donations of blood plasma. Introduction of a legal obligation to donate blood would violate the rights and freedoms of an individual granted by a legal act of the highest order. In such a situation, the state cannot create such an obligation. However, it is in the interest of the state that as many people as possible donate blood plasma, because this addresses the objective of having a more efficient fight against the pandemic, and thus influences the implementation of the health policy goals of the state. However, the state is interested in the attitudes of citizens towards donating blood. The inability to exert authority over some of an individual's activities in this sphere

using a traditional tool, which is the law, therefore raises the possibility of using the tools of behavioral intervention and the conditions for their use. This issue also falls within the framework of the considerations undertaken.

There may be some exceptions that are not illustrated in Figure 1. The state may foresee extraordinary situations in which civil rights and freedoms may be limited to a greater degree than the standard adopted in the act of the highest order. In such a case, the rules and conditions under which the restriction of rights and freedoms may occur (e.g., the state of emergency mentioned in the Polish Constitution) are defined. In these exceptional cases, the state will also be able to regulate the area which, as a rule, lies outside the scope of its authority. The possibility of introducing limitations on the rights and freedoms of an individual may only take place exceptionally and under strict conditions. In this exceptional case, the sphere that as a rule falls outside the scope of the state's regulatory authority is included in the scope of this authority.

The divisions presented in Figure 1 indicate the boundaries of the law, i.e., the state's use of a tool such as the law. The state can only use "the law" if it operates in an area it can regulate (both in terms of the principle and the exception). In turn, the boundaries of the state's use of nudges and boosts will depend on whether or not the state is interested in a specific area of individual activity.

6.2. Boundaries of the law depend on the relationship between public and private interest.

The second boundary comes from the relationship between public and private interests. It is their mutual relationship that determines the scope of state interference through the use of a specific tool for shaping the behavior of an individual. In turn, the relationship between public and private interests should be linked to a specific system in a given country. These relationships are therefore different from the priority of the public interest over the private interest (to a different degree), and there is a certain balance between them. It seems appropriate to illustrate these connections using the example of a democratic state ruled by law, where a certain balance is assumed between these two interests. In this system, private interest is manifested, *inter alia*, in several rights and freedoms granted to citizens in a legal act of the highest order, which may be limited in this system only in exceptional cases. As a rule, the state does not enter this sphere.

The public interest is seen in a general clause, reference to which can be found in almost every legal system. Depending on the legal context in which this clause is applied by the legislator, it allows the authorities applying the law to refer to values that are common and important for the whole society, and in particular, are based on the values indicated in legal acts on which a specific system is based in the law (in Poland it is the

Constitution). In a specific situation, the public interest may justify the limitation of human and civil rights and freedoms because the benefit to society as a whole from a certain state objective is of greater value than the private interest. Private interest, on the other hand, is the interest of the individual, and the relationship between an objective state and the assessment of this state from the point of view of the benefit that it brings or may bring to the individual (30).

It has been noted that two areas remain within our scope of interest. The first is the area that the state can regulate and is interested in. The second is the area the state cannot regulate and is interested in. In both cases, it is necessary to choose the tool that the state can use to achieve the assumed goal. There is no doubt that in the first case there is a choice between the law (the traditional tool), nudges, and boosts. In the latter, the choice is limited only to the tools of behavioral intervention, because this is an area that, in principle, the state cannot regulate. It thus remains to be considered what criteria the state should follow when selecting a specific tool, and after making a decision, the selection of a specific solution. In this case, the relationship between public and private interests is also important.

7. The proportionality principle

The choice of a specific tool should respect the principle of proportionality, which is applied when the use of a specific tool would limit or violate the rights and freedoms guaranteed by the state. Both the European Convention on Human Rights and the Charter of Fundamental Rights of the European Union (EU) provide for the possibility of restricting a specific right or freedom to protect the public interest in the broad sense (31,32). The meaning of public interest, as developed in the case law of the EU Court of Justice, includes, *inter alia* public policy, public security, public safety, public health, preserving the financial equilibrium of the social security system, the protection of consumers, recipients of services, and workers, the fairness of trade transactions, combating fraud, the protection of the environment and the urban environment, the health of animals, intellectual property, the conservation of the national historic and artistic heritage, social policy objectives, and cultural policy objectives (33). In compliance with EU law, the proportionality principle is in the public interest (34). Additionally, Art. 52 Sec. 1 of the Charter of Fundamental Rights of the European Union (35) defines the criteria that must be applied for a specific regulation that limits rights and freedoms to meet the requirements of the principle of proportionality. According to that Article, any limitation on the exercise of the rights and freedoms recognized by this EU Charter must be provided for by law and must respect the essence of those rights and freedoms. Subject to the principle of proportionality, limitations may be made only if they are

necessary and genuinely meet the objectives of general interest recognized by the Union or the need to protect the rights and freedoms of others. This provision clearly shows that when analyzing the proportionality of a tool used by the state, it is necessary to examine whether this tool meets each of the three auxiliary criteria, i.e., suitability, necessity, and proportionality *sensu stricto*.

When examining whether the criterion of suitability is met, it is necessary to examine the relationship between the purpose, which the introduction of a specific regulation serves, and the measures applied by the state. A measure is suitable when it is capable of achieving its intended purpose, which was previously determined by the state (36).

Investigating whether the established restrictions within the scope of exercising certain freedoms meet the criterion of necessity requires an answer to the question of whether "the same goal could not be achieved by using other means, less burdensome for the citizen, because they interfere less with his rights and freedoms" (37,38).

On the other hand, the examination of whether the applied tool will meet the proportionality criterion in the strictest sense comes down to a balanced between the assessed values. When applying these criteria, it is necessary to examine the relationship between the usefulness of the applied legal measure for the general good of a given Member State and the limitations experienced by treaty freedoms (39,40). The application and evaluation of tools, such as nudges and boosts, must be viewed through the prism of Article 52, Section 1 of the EU Charter of Fundamental Rights, which enables the assessment of their admissibility from a legal perspective.

8. General examples of successful implementation of nudges and boosts

Additional advantages obtained due to the application of the proportionality rule might also be economically practical for the authorities. Behavioral interventions usually have a low cost of implementation. Examples show that low-budget solutions affecting choice architecture (13) are prevalent in social policy. Applications of nudges and boosts can be observed in such programs as the Employee Capital Plans in Poland (41) or Save More Tomorrow in the USA (42). The core of those two programs is one of the most prominent nudges – a default rule (17). It affects individuals by preselecting a particular option, thereby increasing the probability of an alternative planned by the choice architect. Defaults underlie a wide range of programs using automatic enrolment in education, health, and savings, which has been proven to be effective, and are the most effective (17) and the most widely studied types of nudges (18).

The second most often tested nudges in scientific articles are warnings – i.e., a broad category of cues drawing individuals’ attention to the most important information an individual should know (18). The third most studied type of nudge appears to be the social norms nudge. The main idea of this intervention is to create a choice suspended in a social context, i.e., emphasizing what other people do (17). One of the most effective uses of the social norm nudge was reported by Hallsworth et al. (2017), where the researchers used it to increase payment rates for overdue taxes. This was achieved by sending reminder letters containing additional messages. The most effective message contained a descriptive social norm, referring to the rules one should obey – here, paying taxes on time. As an outcome, they yielded an additional 9.3 million pounds within the first 23 days of the experiment.

One of the more promising boosts is the inoculation strategy (20), enabling individuals to recognize disinformation, such as online fake news. The intervention created by Roozenbeek and van der Linden (2019) refers to the inoculation theory developed by McGuire and Papageorgis (1961). Metaphorically, just like a medical vaccine, weakened versions of misinformation can make individuals immune to fake news (21). Roozenbeek and van der Linden (2019) created a web browser game that allowed participants to experience fake news production from the inside. To score points, they had to use techniques commonly used in misinformation, such as spreading conspiracy theories or trolling people online. Thus far, the results have shown that after such training, participants are significantly better at recognizing and resisting any fake news they encounter online (21).

9. Examples of nudges, boosts, and behavioral interventions used in alleviating COVID-19 pandemic effects

Behavioral interventions in the form of nudges and boosts can be employed to alleviate the effects of the COVID-19 pandemic in different areas (45). A wide range of interventions has been adopted to promote the WHO recommendations: social distancing, wearing masks, and disinfection (46). Apart from these, there are interventions to target socially unwanted behavior, a side effect of a pandemic: stockpiling behavior (47), chronic loneliness (48), and what might be called an “infodemic” (49). The infodemic or massive spread of misinformation and disinformation about COVID-19 became a threat to the efficacy of pandemic measures and the health of individuals (49). Due to the different specifics of the interventions for the pandemic and the effects of infodemics, they are considered separately below.

9.1. Interventions improving the efficacy of implemented measures and alleviating pandemic effects

Behavioral interventions can be used to support government efforts to reduce the effects of the COVID-19 pandemic. Depending on the circumstances, nudges and boosts can be applied according to the specific situation, exploiting the design advantages of particular interventions. One such useful tool is the acronym DDM (Disinfection, Distance, Masks), a type of simple heuristic (a boost) proposed by the Polish Ministry of Health, which aims to equip citizens with a brief instruction, overcoming the uncertainty related to the current situation (50). The actual effectiveness of the intervention is yet to be assessed, but the DDM phrase has been cited by various media, providing a standard for citizens' behavior. Furthermore, in some countries sanitation experts think the drop of 50% in the number of people falling ill from the flu, compared to the previous year, is a side-effect of introducing the DDM rule (51).

Decreasing individuals' uncertainty can improve judgment or reduce unnecessary behavior. In many countries, hoarding behavior was identified as an unwanted behavior occurring at the beginning of the pandemic in February and March (52). Although it seemed an extraordinary phenomenon, hoarding behaviors have been observed before in cases of natural disasters, such as tornadoes (53), and they usually are explained as a way for individuals to regain a sense of control. An intervention targeting stockpiling behavior was proposed by Kim et al. (2020). The problem appears when consumption is excessive and individuals buy much more than they actually need. To address this problem, Kim and colleagues designed a nudge that provided participants with additional relative statistical information. In their study, researchers compared the threat caused by coronavirus with the threat caused by car accidents or the flu. The results show that presenting comparative statistics reduces the level of the perceived threat and stockpiling intentions (47).

Disinfection and overall hygiene is another area that is important from the perspective of strategies against COVID-19. The emergence of unwanted behavior has forced researchers and authorities to apply various solutions. In most countries, attempts to increase hygiene have involved hanging instructional posters adjacent to sanitation apparatus (e.g., sinks in the public/office bathrooms) to convince people to wash their hands more thoroughly (54). Other methods can be based on the proposition of implementation intention techniques based on the Gollwitzer (1999) method to stop touching the face or "T-zone" (T stands for *touch*) (55) or by nudging people to use hand hygiene (56). Recent findings show that hygiene can be effectively supported with either boosts or nudges (57), however it may not always be true with nudges (56).

9.2. Interventions targeting the effects of the infodemic

According to the WHO (49), the coronavirus pandemic has led to an "*overabundance of information, both online and offline*," which can weaken attempts to decrease the effects of the pandemic on society. It is important to recognize that we can consider the use of both boosts and nudges in this area. The accuracy nudge (58) can considerably increase truth discernment in the sharing intentions of participants. Pennycook and colleagues used a simple accuracy reminder, which was to ask participants to assess the accuracy of particular headlines. The results showed that asking participants about their appraisal of the reliability of information was a much better strategy than asking them whether they wanted to share the information. When assessing one's own sharing intentions, participants may be biased by the rewards given by social media platforms. Usually, instead of thinking about the trustworthiness or accuracy of particular information, we can be tempted by the instant gratification given by "likes" or other positive reactions (59). Thanks to the accuracy nudge, it might be possible to switch an individual's attention from those immediate social reinforcements to accuracy or reliability. From the other perspective, the research emphasizes the lack of attention given by Internet users to information encountered online – the more users we can put back on the right attentive tracks, the less fake news can be passed on to others.

A fake news inoculation technique was also proposed in the context of COVID-19 (22). According to the authors of the Bad News game, their practical intervention based on the idea of active inoculation against fake news can be conveniently transformed to target the COVID-19 context. Furthermore, their original game has already been played by over 1 million people, which means it may not be just a tool of widespread dissemination but also a means of creating a kind of "herd immunity" against the infodemic (22). In the case of fake news "viruses" it is not always important to immune the whole society – it might be enough to get a sufficiently large number of people immune in order to break the chain of transmission.

9.3. Limitations of behavioral intervention approaches during the COVID-19 pandemic

Although the rapid pace of research during the past year was extremely important for fighting the COVID-19 pandemic, there were drawbacks (60). One of them is the blurring of the definitions of nudges, boosts, and other interventions within the behavioral sciences. Blurring can lead to situations where researchers wrongly label the overall communication created by the Government of India as nudging (61). Eventually, such misunderstandings can lead to losses in the actual effectiveness of interventions, which originally comes from their unique form and distinctive key characteristics. It is important to emphasize that not all of the interventions

that involve governmental communication are nudges. Some of them are simply public press releases, which can be an effective intervention, but clearly are not nudges, according to the classic literature (17). By establishing a well studied and coherent framework, it is possible to obtain a firm basis for effective public policy strategies. We also recognize the fact that the popularity of nudge theory can draw attention from different domains, leading to unnecessary misconceptions. Therefore, we believe it is crucial to rely on a comprehensive approach like that presented in this paper, based on established theories. Mixing nudging and boosting may effectively enrich the policy maker's toolbox. However, it should be remembered that if the government decides to use a nudge or boost, it should always do so in accordance with the principle of proportionality, and it should therefore consider whether this measure is necessary and suitable for the protection of the common good in the form of public health.

10. Conclusions and further directions

Nudges and boosts have been effective in cases of regular, continuous problems, and they may be of crucial assistance in the face of new challenges such as the COVID-19 pandemic, especially in areas where effective action is needed. Such a behavioral approach presents a challenge for effective implementation; however, as indicated by the gathered evidence, it supports the prescriptive nature of the legal system. The key weakness in the behavioral science approach is that there is relatively little evidence that favors one intervention over another. We are aware of only two empirical studies that compared nudges and boosts directly (12,62). Only by such a methodical approach can researchers obtain a theoretical map to support the empirical findings, thereby informing us when it is better to use one intervention or another, or when they may be used interchangeably. Furthermore, for more complex systems and environments, it might also be possible to see additive or backfire effects in situations where both types of interventions are applied simultaneously. Exploration of synergy or exclusion effects must be the next avenue of research, which may result in multi-intervention programs exploiting the real potential of nudges and boosts.

The government's application of a specific tool aimed at achieving public policy objectives requires the principle of proportionality. This is a basic condition for using both a specific tool (law, nudges, or boosts) and specific solutions within it (e.g., the choice of a specific standard in the case of law). It is possible, and in some cases also desirable, to use more than one tool (behavioral or legal). Given the need to shape health policy during the COVID-19 pandemic, where the state can regulate social life if it is interested in doing so, it can use any of the three tools. Therefore, it can use the traditional tool (i.e., law) or behavioral interventions. In this area,

nudges and boosts can support the law in the first place, and therefore the state can use the traditional tool along with behavioral interventions in parallel to increase the chances of achieving its goals. Unlike Lepenies and Małecka (2015) who proposed the use of nudging as one of two approaches to lawmaking (the law as an instrument and the law as certain norms to be followed), we propose this approach, which we believe is more transparent without reducing the power of the interventions. Furthermore, behavioral tools can support obedience to the law – legal norms that use behavioral interventions in their content. Despite resorting to the law as a traditional policy-making tool, the legislator can use the nudge construct that becomes the content of the law. Nudges and boosts can also be independent tools for shaping public policy by the state. In the second case, when the state cannot regulate a specific area in which it is interested, and therefore it cannot look to "the law," nudges and boosts may serve as independent tools.

We have demonstrated that an interdisciplinary approach that merges psychology and law adds nudges and boosts to the public policy toolbox, making legal regulations easier to follow and understand. The COVID-19 pandemic has highlighted the importance of rules that are transparent and easy-to-follow, and what can be achieved using behavioral interventions. The use of new or misunderstood restrictions in times of high uncertainty may lead to considerable non-compliance, risking the health or life many individuals (4,5). It is essential to use behavioral science to explain the law or public policy tools to lay people, especially during global crises such as pandemics. Only the firm partnership between public policy and behavioral science is the most effective way of leading societies through uncertain times. It is also important to acknowledge and be aware of the law and its boundaries. The most effective ways of combining the law and behavioral interventions are yet to be determined.

References:

1. Mahase E. Covid-19: UK approves Pfizer and BioNTech vaccine with rollout due to start next week. BMJ [Internet]. 2020 Dec 2;371:m4714. Available from: <http://www.bmj.com/content/371/bmj.m4714.abstract>
2. Worldometers. COVID-19 CORONAVIRUS PANDEMIC [Internet]. 2021 [cited 2021 Jun 23]. Available from: <https://www.worldometers.info/coronavirus/>
3. WHO. Strengthening the Health System Response to Covid-19 Recommendations for the WHO European Region [Internet]. 2020 [cited 2021 Jan 4]. Available from: <https://apps.who.int/iris/bitstream/handle/10665/333072/WHO-EURO-2020-806-40541-54465-eng.pdf?sequence=1&isAllowed=y>
4. Nivette A, Ribeaud D, Murray A, Steinhoff A, Bechtiger L, Hepp U, et al. Non-compliance with COVID-19-related public health measures among young adults in Switzerland: Insights from a longitudinal cohort study. Soc Sci Med. 2021 Jan;268.
5. Roy-Chowdury V, Perera D, Tagliaferri G, Mottershaw A, Egan M. Young men are hardest to engage on coronavirus guidance [Internet]. 2020. Available from: <https://www.bi.team/blogs/young-men-are-hardest-to-engage-on-coronavirus-guidance/>
6. Burris S, de Guia S, Gable L, Levin D, Parmet WE, Terry N. Assessing legal responses to COVID-19. 2020) Assess Leg Responses to COVID-19 Bost Public Heal Law Watch. 2020;
7. The White House Office of the Press Secretary. Executive Order -- Using Behavioral Science Insights to Better Serve the American People [Internet]. 2015 [cited 2021 Jan 4]. Available from: <https://obamawhitehouse.archives.gov/the-press-office/2015/09/15/executive-order-using-behavioral-science-insights-better-serve-american>
8. Halpern D. Inside the nudge unit: How small changes can make a big difference. Random House; 2015.
9. Lepenies R, Małecka M. The Institutional Consequences of Nudging – Nudges, Politics, and the Law. Rev Philos Psychol [Internet]. 2015 Sep 24;6(3):427–37. Available from: <http://link.springer.com/10.1007/s13164-015-0243-6>
10. Marchiori DR, Adriaanse MA, De Ridder DTD. Unresolved questions in nudging research: Putting the psychology back in nudging. Soc Personal Psychol Compass. 2017 Jan;11(1).
11. Thaler RH, Sunstein CR. Nudge: Improving Decisions about Health, Wealth, and Happiness [Internet]. Yale University Press; 2008. Available from: <https://books.google.pl/books?id=dSJQn8egXvUC>

- 565 12. Bradt J. Comparing the effects of behaviorally informed interventions on flood insurance demand: an
566 experimental analysis of ‘boosts’ and ‘nudges.’ *Behav Public Policy* [Internet]. 2019;1–31. Available
567 from: [https://www.cambridge.org/core/journals/behavioural-public-policy/article/comparing-the-effects-](https://www.cambridge.org/core/journals/behavioural-public-policy/article/comparing-the-effects-of-behaviorally-informed-interventions-on-flood-insurance-demand-an-experimental-analysis-of-boosts-and-nudges/47B35632F9BE3F60D20CA7BF31B4A13A)
568 [of-behaviorally-informed-interventions-on-flood-insurance-demand-an-experimental-analysis-of-boosts-](https://www.cambridge.org/core/journals/behavioural-public-policy/article/comparing-the-effects-of-behaviorally-informed-interventions-on-flood-insurance-demand-an-experimental-analysis-of-boosts-and-nudges/47B35632F9BE3F60D20CA7BF31B4A13A)
569 [and-nudges/47B35632F9BE3F60D20CA7BF31B4A13A](https://www.cambridge.org/core/journals/behavioural-public-policy/article/comparing-the-effects-of-behaviorally-informed-interventions-on-flood-insurance-demand-an-experimental-analysis-of-boosts-and-nudges/47B35632F9BE3F60D20CA7BF31B4A13A)
- 570 13. Behavioural Insights Team. The Behavioural Insights Team - Update Report 2013-15 [Internet]. 2015.
571 Available from: [https://www.bi.team/publications/the-behavioural-insights-team-update-report-2013-](https://www.bi.team/publications/the-behavioural-insights-team-update-report-2013-2015/)
572 [2015/](https://www.bi.team/publications/the-behavioural-insights-team-update-report-2013-2015/)
- 573 14. Sunstein CR. Nudges Do Not Undermine Human Agency. *J Consum Policy* [Internet]. 2015;38(3):207–
574 10. Available from: <https://doi.org/10.1007/s10603-015-9289-1>
- 575 15. Grüne-Yanoff T, Hertwig R. Nudge Versus Boost: How Coherent are Policy and Theory? *Minds Mach.*
576 2016 Mar 23;26(1–2).
- 577 16. Hertwig R, Grüne-Yanoff T. Nudging and Boosting: Steering or Empowering Good Decisions. *Perspect*
578 *Psychol Sci.* 2017 Nov 9;12(6).
- 579 17. Sunstein CR. Nudging: a very short guide. *J Consum Policy.* 2014;37(4):583–8.
- 580 18. Hummel D, Maedche A. How effective is nudging? A quantitative review on the effect sizes and limits
581 of empirical nudging studies. *J Behav Exp Econ.* 2019;80:47–58.
- 582 19. Gollwitzer PM. Implementation intentions: strong effects of simple plans. *Am Psychol.* 1999;54(7):493.
- 583 20. Kozyreva A, Lewandowsky S, Hertwig R. Citizens Versus the Internet: Confronting Digital Challenges
584 With Cognitive Tools. *Psychol Sci Public Interes.* 2020 Dec 16;21(3).
- 585 21. Roozenbeek J, van der Linden S. Fake news game confers psychological resistance against online
586 misinformation. *Palgrave Commun* [Internet]. 2019;5(1):65. Available from:
587 <https://doi.org/10.1057/s41599-019-0279-9>
- 588 22. van der Linden S, Roozenbeek J, Compton J. Inoculating Against Fake News About COVID-19
589 [Internet]. Vol. 11, *Frontiers in Psychology* . 2020. p. 2928. Available from:
590 <https://www.frontiersin.org/article/10.3389/fpsyg.2020.566790>
- 591 23. Schmitt NM, Schmitt J. Definition of public health. *Encycl Public Heal Kirch, W, Ed; Springer*
592 *Dordrecht, Netherlands.* 2008;37–192.
- 593 24. Agénor P-R. Public capital, growth and welfare: Analytical foundations for public policy. Princeton
594 University Press; 2013.

- 595 25. WHO. Health policy [Internet]. [cited 2021 Jan 4]. Available from: [https://www.euro.who.int/en/health-](https://www.euro.who.int/en/health-topics/health-policy/health-policy)
- 596 [topics/health-policy/health-policy](https://www.euro.who.int/en/health-topics/health-policy/health-policy)
- 597 26. WHO. Strategizing national health in the 21st century: a handbook [Internet]. 2016. Available from:
- 598 [http://www.who.int/healthsystems/publications/nhpsp-handbook/en/%0A %0A](http://www.who.int/healthsystems/publications/nhpsp-handbook/en/%0A%0A)
- 599 27. Gill M. Building Effective Approaches to Governance [Internet]. 2002. Available from:
- 600 <https://nonprofitquarterly.org/governancevoice/113-building-effective-approaches-to-governance.html>
- 601 28. Birgand G, Castro-Sánchez E, Hansen S, Gastmeier P, Lucet J-C, Ferlie E, et al. Comparison of
- 602 governance approaches for the control of antimicrobial resistance: Analysis of three European countries.
- 603 *Antimicrob Resist Infect Control* [Internet]. 2018;7(1):28. Available from:
- 604 <https://doi.org/10.1186/s13756-018-0321-5>
- 605 29. Resnik DB. Responsibility for health: personal, social, and environmental. *J Med Ethics* [Internet]. 2007
- 606 Aug 1;33(8):444 LP – 445. Available from: <http://jme.bmj.com/content/33/8/444.abstract>
- 607 30. Bartoň M, Mates P. Public Versus Private Interest—Can the Boundaries Be Legally Defined? *Czech*
- 608 *Yearb Int Law*. 2011;172–89.
- 609 31. Broniowski v. Poland. European Court of Human Rights, no. 31443/96, § 149 [Internet]. 2004.
- 610 Available from:
- 611 [https://etpcz.ms.gov.pl/etpccontent/\\$N/9900000000000001_I_ETPC_031443_2096_Wy_2004-06-](https://etpcz.ms.gov.pl/etpccontent/$N/9900000000000001_I_ETPC_031443_2096_Wy_2004-06-22_001)
- 612 [22_001](https://etpcz.ms.gov.pl/etpccontent/$N/9900000000000001_I_ETPC_031443_2096_Wy_2004-06-22_001)
- 613 32. Jahn and others v. Germany. European Court of Human Rights 46720/99, 72203/01 and 72552/01, § 80.
- 614 European Court of Human Rights; 2004.
- 615 33. European Parliament, European Council. Directive 2006/123/EC of 12 December 2006 on services in
- 616 the internal market. 2006. p. 0036-0068 (Article 4 section 8).
- 617 34. Bosphorus Airways v. Ireland. European Court of Human Rights, Judgment of 30 June 2005, no
- 618 45036/98, § 150 [Internet]. 2005. Available from:
- 619 [https://hudoc.echr.coe.int/app/conversion/pdf/?library=ECHR&id=003-1375632-](https://hudoc.echr.coe.int/app/conversion/pdf/?library=ECHR&id=003-1375632-1436174&filename=003-1375632-1436174.pdf)
- 620 [1436174&filename=003-1375632-1436174.pdf](https://hudoc.echr.coe.int/app/conversion/pdf/?library=ECHR&id=003-1375632-1436174&filename=003-1375632-1436174.pdf)
- 621 35. European Parliament, European Council. Charter of Fundamental Rights of the European Union, art. 52,
- 622 sec. 1 [Internet]. 2012. Available from: [https://eur-lex.europa.eu/legal-](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A12012P%2FTEXT)
- 623 [content/EN/TXT/?uri=CELEX%3A12012P%2FTEXT](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A12012P%2FTEXT)
- 624 36. Tridimas T. Proportionality in European community law: searching for the appropriate standard of

- 625 scrutiny. na; 1999.
- 626 37. Polish Constitutional Tribunal. Judgement no. 7, pos. 113, K 42/97. 1998.
- 627 38. Polish Constitutional Tribunal. Judgment no. 1, pos. 3, P 11/98. 2000.
- 628 39. Alemanno A, Sibony A-L. Nudge and the Law: A European Perspective by Alberto Alemanno and
629 Anne-Lise Sibony (Eds) Oxford: Hart Publishing, 2015. Eur J Risk Regul [Internet]. 2017/01/20.
630 2015;6(2):331–40. Available from: [https://www.cambridge.org/core/article/nudge-and-the-law-a-](https://www.cambridge.org/core/article/nudge-and-the-law-a-european-perspective-by-alberto-alemanno-and-annelise-sibony-eds-oxford-hart-publishing-2015-336-pp-50-hardcover/8106BAD7B6323C9FA591FC8B4E2209EE)
631 [european-perspective-by-alberto-alemanno-and-annelise-sibony-eds-oxford-hart-publishing-2015-336-](https://www.cambridge.org/core/article/nudge-and-the-law-a-european-perspective-by-alberto-alemanno-and-annelise-sibony-eds-oxford-hart-publishing-2015-336-pp-50-hardcover/8106BAD7B6323C9FA591FC8B4E2209EE)
632 [pp-50-hardcover/8106BAD7B6323C9FA591FC8B4E2209EE](https://www.cambridge.org/core/article/nudge-and-the-law-a-european-perspective-by-alberto-alemanno-and-annelise-sibony-eds-oxford-hart-publishing-2015-336-pp-50-hardcover/8106BAD7B6323C9FA591FC8B4E2209EE)
- 633 40. Van Aaken A. Constitutional limits to paternalistic Nudging: A proportionality Assessment [Internet].
634 Forthcoming in: Alexandra Kemmerer, Christoph Möllers, Maximilian Steinbeis, Gerhard Wagner
635 (eds.), Choice Architecture in Democracies, Exploring the Legitimacy of Nudging (Oxford/Baden-
636 Baden: Hart and Nomos, 2015). 2015. Available from: <https://ssrn.com/abstract=2606189>
- 637 41. Jedynak T. Pracownicze plany kapitałowe jako instrument mobilizacji dodatkowych oszczędności
638 emerytalnych w Polsce. Zesz Nauk Uniw Ekon w Krakowie. 2019;980(2):113–30.
- 639 42. Thaler RH, Benartzi S. Save more tomorrow™: Using behavioral economics to increase employee
640 saving. J Polit Econ. 2004;112(S1):S164–87.
- 641 43. Hallsworth M, List JA, Metcalfe RD, Vlaev I. The behavioralist as tax collector: Using natural field
642 experiments to enhance tax compliance. J Public Econ [Internet]. 2017;148:14–31. Available from:
643 <http://www.sciencedirect.com/science/article/pii/S0047272717300166>
- 644 44. McGuire WJ, Papageorgis D. The relative efficacy of various types of prior belief-defense in producing
645 immunity against persuasion. J Abnorm Soc Psychol. 1961;62(2):327.
- 646 45. Bavel JJ Van, Baicker K, Boggio PS, Capraro V, Cichocka A, Cikara M, et al. Using social and
647 behavioural science to support COVID-19 pandemic response. Nat Hum Behav. 2020 May 30;4(5).
- 648 46. Michalek G, Schwarze R. The strategic use of nudging and behavioural approaches in public health
649 policy during the coronavirus crisis. 2020;
- 650 47. Kim J, Giroux M, Gonzalez-Jimenez H, Jang S, Kim S (Sam), Park J, et al. Nudging to Reduce the
651 Perceived Threat of Coronavirus and Stockpiling Intention. J Advert [Internet]. 2020 Aug 29;1–15.
652 Available from: <https://doi.org/10.1080/00913367.2020.1806154>
- 653 48. Nault KA, Rogers BA, Sezer O, Klein N. Behavioral insights for minimizing loneliness during the
654 COVID-19 pandemic. 2020;

49. WHO. Managing the COVID-19 infodemic: Promoting healthy behaviours and mitigating the harm from misinformation and disinformation [Internet]. World Health Organization. 2020 [cited 2021 Jan 4]. p. 9–11. Available from: <https://www.who.int/news/item/23-09-2020-managing-the-covid-19-infodemic-promoting-healthy-behaviours-and-mitigating-the-harm-from-misinformation-and-disinformation%0Ahttps://www.who.int/news-room/detail/23-09-2020-managing-the-covid-19-infodemic-promotin>
50. Polish Ministry of Health. Zero tolerancji dla nieprzestrzegających zasad bezpieczeństwa [Internet]. 2020. Available from: <https://www.gov.pl/web/zdrowie/zero-tolerancji-dla-nieprzestrzegajacych-zasad-bezpieczenstwa>
51. Godlewska I. Koronawirus pogonił grypę? O połowę mniej zachorowań. Gazeta Wyborcza Trójmiasto [Internet]. 2020; Available from: <https://trojmiasto.wyborcza.pl/trojmiasto/7,35612,26599662,koronawirus-pogonil-grype-o-polowe-mniej-przypadkow-ukrywamy.html>
52. Baddeley M. Hoarding in the age of COVID-19. *J Behav Econ Policy*. 2020;
53. Yoon J, Narasimhan R, Kim MK. Retailer’s sourcing strategy under consumer stockpiling in anticipation of supply disruptions. *Int J Prod Res*. 2018;56(10):3615–35.
54. Behavioural Insights Team. Testing the efficacy of coronavirus messaging [Internet]. 2020. Available from: <https://www.bi.team/wp-content/uploads/2020/03/BIT-Experiment-results-How-to-wash-your-hands-international-comparison.pdf>
55. Hallsworth M, Behavioural Insights Team. How to stop touching our faces in the wake of the Coronavirus [Internet]. 2020. Available from: <https://www.bi.team/blogs/how-to-stop-touching-our-faces-in-the-wake-of-the-coronavirus/>
56. Weijers RJ, de Koning BB. Nudging to increase hand hygiene during the COVID-19 pandemic: A field experiment. *Can J Behav Sci / Rev Can des Sci du Comport*. 2020 Nov 5;
57. van Roekel H, Reinhard J, Grimmelikhuijsen S. Improving hand hygiene in hospitals: comparing the effect of a nudge and a boost on protocol compliance. *Behav Public Policy* [Internet]. 2021/05/03. 2021;1–23. Available from: <https://www.cambridge.org/core/article/improving-hand-hygiene-in-hospitals-comparing-the-effect-of-a-nudge-and-a-boost-on-protocol-compliance/44EFD0FF5B87C54332342835337B7C17>
58. Pennycook G, McPhetres J, Zhang Y, Lu JG, Rand DG. Fighting COVID-19 Misinformation on Social

685 Media: Experimental Evidence for a Scalable Accuracy-Nudge Intervention. Psychol Sci [Internet].
686 2020 Jun 30;31(7):770–80. Available from: <https://doi.org/10.1177/0956797620939054>

687 59. Brady WJ, Crockett MJ, Van Bavel JJ. The MAD Model of Moral Contagion: The Role of Motivation,
688 Attention, and Design in the Spread of Moralized Content Online. Perspect Psychol Sci. 2020 Jul
689 8;15(4).

690 60. Dinis-Oliveira RJ. COVID-19 research: pandemic *versus* “paperdemic”, integrity, values and risks of
691 the “speed science.” Forensic Sci Res. 2020 Apr 2;5(2).

692 61. Debnath R, Bardhan R. India nudges to contain COVID-19 pandemic: a reactive public policy analysis
693 using machine-learning based topic modelling. arXiv Prepr arXiv200506619. 2020;

694 62. Franklin M, Folke T, Ruggeri K. Optimising nudges and boosts for financial decisions under
695 uncertainty. Palgrave Commun. 2019;5(1):1–13.

696 63. Howlett M, Cashore B. Conceptualizing public policy. In: Comparative policy studies. Springer; 2014.
697 p. 17–33.

698

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