Babeș-Bolyai University
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Developing public health policies: Behavioral economics theories and experiments

Summary of the PhD thesis

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The rationale behind this research

The fundamental assumptions of traditional economics theory imply that humans are perfectly rational beings motivated by self-interest, who select the option that would maximize their utility at the end of a decision process (Simon, 1955). This entails that individuals: (1) have access to complete information related to their environment and the decision to be made; (2) are capable to deal with choice complexity and compute the utility of all decision alternatives by taking into account external events and scenarios, and to calculate their associated probabilities; and (3) are not influenced by their emotions or contextual factors when making the decision. In reality, humans better fit the description that behavioral economists have put forward for them. That is, humans are "boundedly rational" beings. Herbert Simon, who first introduced this concept in 1957, argues that: "The capacity of the human mind for formulating and solving complex problems is very small compared with the size of the problems whose solution is required for objectively rational behavior in the real world — or even for a reasonable approximation to such objective rationality" (Simon, 1957).

Recent neuroscientific evidence posits that behaviors are driven by automatic and unconscious deliberations instead of extensive, outcome-oriented reflections. Therefore, focusing on involuntary and spontaneous cognitive processes has the potential to positively influence health risk behaviors and avert diseases, with the ultimate goals of improving health and reducing healthcare costs. Behavioral economics, the combination of psychological insights and economics to predict individual decision-making, could be used to generate and advance positive changes in health-conducive behaviors through improved public policies. Recognizing that policy outcomes depend on human behaviors and, in turn, human behaviors are influenced by a wide range of personal and environmental/contextual factors represents the first step in designing better policies (Joint Research Center, 2016). More specifically, understating individual behaviors and their assumptions is crucial for the development of cost-effective policies (Joint Research Center, 2016). As such, behavioral economics insights have tremendous potential to improve public health policy.

The long-term objective of my PhD research was to contribute to a better understanding of health behaviors in order to support the development of improved public health policies, by employing a behavioral economics framework. In order to attain this objective, I conducted four stand-alone, methodologically-diverse studies (reported in chapters 2-5 of my thesis) on the use of behavioral economics insights to alter human behaviors. In Chapter 1, I provided an introduction to my work, to support and provide a rationale for chapters 2 to 5. Chapter 2 reports

on a systematic literature review that I conducted to identify behavioral economics-based strategies that can be used to reduce the four shared and modifiable health risk factors (tobacco use, alcohol abuse, poor nutrition, and lack of physical activity) of non-communicable diseases (cardiovascular diseases, diabetes, respiratory diseases, and cancers), which are the leading cause of morbidity and mortality worldwide. The results highlighted in this chapter can support policy makers to make better decisions when developing public health policies designed to prevent and reduce the lifestyle risk factors of non-communicable diseases.

Chapters 3 and 5 look more in-depth at the behavior of policy makers and the ethical character of behavioral economics-informed initiatives. More specifically, Chapter 3 represents a qualitative research on the use of behavioral economics insights to inform the policy adoption process by using the Romanian legislation banning smoking in public places as a case study. The results of this chapter are unique since they enabled me to develop and propose a behavioral economics-informed policy tool to be used in the policy adoption process, to foster the support of policy makers for public health legislation. This policy instrument can potentially be used to gain the support of policy makers in the policy-adoption process in countries with volatile political context and no continuity in political support across governments. Yet, the issue of manipulation of policy makers has arisen from this chapter, which I further detailed in the last chapter of my thesis.

Next, my long-term research interest and experience in tackling tobacco use during and around pregnancy, as well as my need to understand pregnant women's low interest in enrolling in smoking cessation programs, resulted in the design and implementation of the online field quasi-experiment reported in Chapter 4. The aim of the quasi-experiment was to test the effects of behavioral economics insights (through the implementation of the behavioral diagnosis and design framework) on Romanian pregnant women's engagement with the free Quit Together smoking cessation randomized controlled trial. The results of this chapter lend support to integrating behavioral economics insights in the recruitment and enrollment process of randomized controlled trials and public health programs. In particular, since program enrollment and participation rates are significantly lower among people in the lower levels of the socio-economic status as opposed to their more affluent counterparts (Schmidt, Gerber, & Stock, 2009), my results could further contribute to reducing health and social inequalities by boosting program participation rates in these populations.

In Chapter 5, a narrative review, I refocus on the issue emerging in Chapter 3 and I expand it to debate the issue of government influence and manipulation when implementing behavioral

economics-informed public health policies and programs, and the ethical character of behavioral economics-informed initiatives targeting both the general public and policy makers. The main outcome of this chapter reside in an assessment tool based on three ethical frameworks (Faden and Sirine's ethical approach to public health; the values of an ethical state; and the Nuffield Council on Bioethics' "intervention ladder"), which can be used to evaluate proposed policies for their ethical soundness.

A detailed description of each chapter is provided below.

Thesis summary

Chapter 1. Behavioral economics and public policy-making

This chapter represents an introduction into the topic of my thesis and sets the foundation for the other four chapters of my dissertation.

Behavioral economics lies at the intersection of economics and psychology, and involves the integration of behavioral and psychologic insights into economic models, to predict the decision-making process of individuals (Mullainathan & Thaler, 2000). The field of behavioral economics is built on three main pillars: (1) heuristics, or rules of thumb/cognitive shortcuts, used by individuals when making decisions based on their common sense and experience (Tversky & Kahneman, 1974); (2) cognitive biases, which are systematic errors that stem from heuristics and are responsible for mistakes in reasoning and judgement, most often due to personal preferences (Tversky & Kahneman, 1974); and (3) contextual influences, such as the way in which decision alternatives are presented or framed, which can easily influence the outcome of the decision-making process.

The traditional, neoclassical model of economic decision making is translated in the field of health through Grossman's rational model of health capital (Grossman, 1972). This model of health-related rational decision-making describes how individuals should make decisions about their health. The model depicts "good health" as a commodity and is built on the assumption that individuals own a certain amount of health capital, which inherently declines with age. To support this health capital, people can spend their time and money to make "investments" in healthy, preventive behaviors and good healthcare services. In the light of this model, harmful health behaviors are considered negative investments in "good health". These are predicted to continue as long as people maximize their health utility. That is, up to the point when the costs (time, money, health status) of engaging in such behaviors equal the benefits (the pleasure

resulting from engaging in such behaviors). When the costs are disproportionate to the benefits in terms of health utility, individuals are predicted to stop engaging in unhealthy behaviors. However, this is seldom the case, as shown by Thaler and Sunstein (Thaler & Sunstein, 2008). Instead, individuals continue to engage in behaviors that minimize their health utility, such as smoking, drinking, or eating unhealthy.

Heuristics, cognitive biases, and contextual influences impede individuals to maximize their utility when making a decision and prompt them to make decisions which are not in their best interest and in line with policy objectives. The role of behavioral economics is to map the reasoning shortcuts emerging in the decision-making process due to individuals' bounded rationality and make use of these in order to improve the outcomes of the decision making-process. Since policy outcomes largely depend on how individuals act and behave in relation to the objective of the policy, understating individual behaviors and their assumptions is crucial for development of cost-effective policies. Nonetheless, recognizing that policy outcomes depend on human behaviors and, in turn, human behaviors are influenced by a wide range of personal and environmental/contextual factors represents the first step in designing better policies (Joint Research Center, 2016). Behavioral economics has been credited with the power to help policy makers in designing better public policies and avoiding the development and implementation of cost-intensive, ineffective programs (Mcauley et al., 2007).

Authors and working groups have worked in recent years to translate behavioral economics principles and insights in lay language and tools to be used by policy makers. Such tools include the New Economics Foundation's Behavioral economics – seven principles for policy-makers (Dawnay & Shah, 2005); MINDSPACE: Influencing behavior through policy (The Behavioral Insights Team, 2010); and EAST: four simple ways to apply behavioral insights (Service et al., 2014). As a consequence, in the last years, behavioral economics has been used intensely by international organizations such as European Commission (within its own Foresight and Behavioral Insights Unit) (Joint Research Center, 2016), the Organization for Economic Co-operation and Development (OECD, 2017), or the World Bank (The World Bank, 2015). Nonetheless, governments around the world have set up Behavioral Insights Teams within their structure, to support the integration of behavioral insights in the development and implementation of their policies.

The remainder of the chapter concentrates on the four main types of arguments brought forward by critics of behavioral economics: (1) lack of a unifying theoretical framework of the field; (2) use of vague/ unclear definitions, especially for the concept of nudge; (3) methodological

concerns and lack of evidence to support the use of this approach; and (4) the potential unethical character of some behavioral economics-informed initiatives.

Chapter 2. Use and effectiveness of behavioral economics in interventions for lifestyle risk factors of non-communicable diseases – a systematic review with policy implications

Behavioral economics offers powerful tools that can be harnessed to make "healthy behaviors automatic and easy" (World Economic Forum, 2017). This is extremely important in the context of the current public health burden of disease and their associated human and healthcare costs. For example, chronic diseases are responsible for 39.5 million of deaths worldwide (World Heath Organization, 2017). Even so, World Health Organization's burden of disease estimates for the next decades suggest a continuous rise in the prevalence of these conditions. For example, in 2015 only, 15 million deaths were due to ischemic heart disease and stroke (World Health Organization, 2017c). Most NCDs-related deaths occur in low and middle income countries, such as Romania. To put this into perspective, in 2014, NCDs were estimated to account for 92% of all registered deaths in Romania (World Health Organization, 2014). This upward trend is partly due to the ageing of the population and the decline in communicable, infectious diseases. However, one important element in this mix is individuals' engagement in four modifiable lifestyle risk factors: overeating, lack of physical activity, tobacco consumption, and alcohol abuse (World Health Organization, 2017b). Since most individuals understand the importance of personal health and are aware of the long-term negative effects of these lifestyle risk factors but continue to engage in them (Willis Towers Watson, 2015), behavioral economics can offer a better understanding of the factors that prompt these harmful behaviors (Thorgeirsson & Kawachi, 2013).

The potential impact of behavioral economics in reducing morbidity and preventing deaths, especially in relation to non-communicable diseases, has also been highlighted by The Human-Centric Health Project, in a recent report (World Economic Forum, 2017). This report proposes a shift from the classic healthcare model which is focused on health professionals/providers, to a focus on a system of stakeholders jointly engaged in prevention of non-communicable diseases.

Based on the results of a systematic literature review, this chapter offers new insights into how behavioral economics can be used to tackle tobacco use, overeating, alcohol abuse, and physical inactivity from a policy perspective. The systematic review is based on a review

protocol that follows the guidelines listed in the Preferred Reporting Items for Systematic review and Meta-analysis Protocols (PRISM-P) (Moher et al., 2015; Shamseer et al., 2015).

I searched Medline, Embase, PhycINFO, and EconLit for studies published between Jan 2002 and July 2016 using a search strategy adapted for the characteristics of each of the four databases and involving six search themes and a combination of 70 search words. The search rendered a total of 2378 articles. The identified articles were screened against the pre-set eligibility criteria by two independent coders (κ=.759, 95% CI, p<.000, 96% agreement between raters). Next, the full text of 117 (10 studies on alcohol use, 45 studies on nutrition, 37 studies on physical activity, and 25 studies on tobacco use) articles was read and assessed for methodological quality using an adapted methodological quality rating system (Seymour, Yaroch, Serdula, Blanck, & Khan, 2004). I used the full text of the selected articles to abstract for information on publication details, methodology, and outcomes of the studies included in the review. This information was the basis of a narrative synthesis analysis.

As main results, I found that studies focusing on alcohol use are of poor methodological quality, allowing for no conclusions to be drawn regarding the use and effectiveness of behavioral economics insights to reduce alcohol abuse. I also found that the behavioral economics concepts employed across the studies included in the review vary by the nature of the targeted behavior. For example, studies focusing on reducing tobacco use employed the concept of incentives, framing, priming and pledges. Studies designed to improve nutrition mostly used choice architecture and default rules. On the other hand, studies aiming to increase physical activity integrated the concepts of anchoring, nudging, and incentives in their interventional design. My results also emphasized several behavioral economics strategies to reduce smoking (i.e. positively framed anti-smoking public service announcements, offering information to smokers regarding the age of their lungs), poor nutrition (incorporating traffic-light labels and changes in serving lines), and physical inactivity (implementing commitment contracts or money deposit components; nudging individuals by offering constant feedback) which warrant future research, due to their potential policy implications.

Future research on the topic of behavioral economics and strategies designed to alter the health risk behaviors non-communicable diseases should aim to: (1) implement better methodological quality studies (especially in the area of alcohol abuse prevention), (2) involve more diverse populations over longer periods of time, and (3) compare results of behavioral economics-based programs with the ones of well-established health promotion interventions.

Chapter 3. Use of behavioral economics insights to inform the policy adoption process – a case study on the Romanian legislation banning smoking in public places

Recognizing that individuals do not act as rational agents and that some of their decisions have long-term, negative individual and societal effects, policy-makers are increasingly interested in using behavioral economics insights to inform the development of better public policies (Joint Research Center, 2016). In this context, a rapidly growing body of research examines and identifies tools to help policy makers incorporate behavioral economics precepts in their programs, to positively influence citizens' behavior. As a consequence, policy tools which encompass the use of behavioral economics insights for policy development have been developed for the use of policy-makers. Their purpose is to help policy-makers develop legislation that will generate positive and cost-efficient changes in the society.

Yet, there are much fewer studies that evaluate how behavioral economics-informed approaches are used to influence the official public policy makers in order to lend support to certain policies through the policy adoption process. This study aims to fill in this gap, by using the process by which Romania adopted the legislation banning smoking in public places as a case study.

Romania is a semi-consolidated democracy with a communist past, and, according to the International Monetary Fund, has a developing economy (2015). Romania is also a country with short ministerial time in office, particularly in the case of the ministers of health, having 14 different Ministers of Health between 2008 and 2016 (with an average of 6.8 months in office/ individual). The topic of banning smoking in enclosed public places was first discussed in the Romanian political context in 2010, when tobacco policy and medical experts met with members of Health Commissions in the Chamber of Deputies and the Senate, to try to convince policy-makers to adopt a legislation banning smoking in public places. Another similar initiative took place in 2012, but the bill was blocked for several years, only for it to be revived at the beginning of 2015 with the help of Aurelia Cristea, Social Democratic Party deputy, and the "Romania Breaths" Coalition. The coalition gathered support from more than 250 non-governmental organization and 50 public figures who engaged in a sustained, 9-month awareness and advocacy campaign to support the smoke-free public places legislation. After being challenged in the Romanian Constitutional Court in December 2015 by a group of senators, the law was finally promulgated on January 29th 2016 and came into force on March 17th 2016.

The aim of this chapter was to explore the use of behavioral economics insights (either deliberately or not) in the policy adoption process as a means to foster the support of policy makers for new public health legislation.

Guided by elite interviews methodology, I conducted nine semi-structured interviews (Jan-Feb 2017) with key stakeholders involved in the development, support, promotion, and adoption of the 2015-2016 legislation endorsing smoke-free public places in Romania. The selection criteria of the respondents were their importance and type of role during the entire public policy process involving the anti-smoking legislation. Interviews were conducted face-to-face (n=3), over the telephone (n=4), or through video-conferencing (n=2), depending on subjects' preferences and availability. I transcribed all interviews and analyzed them using a hybrid deductive-inductive thematic analysis strategy at the semantic level, to identify and explore any behavioral economics insights used by stakeholders to gain the support of policy makers.

I found nine behavioral economics principles/insights used by the subjects to support the Romanian smoke free legislation in public places in the policy adoption process. Most of the time, these principles were used unknowingly. In addition, I found support for the fact that behavioral economics principles increased the influence of the anti-smoking actors and, by this, contributed to the adoption of the smoke free legislation. I used the insights I gained from these interviews to develop a behavioral economics-informed policy instrument which can potentially be used to gain support of policy makers in the policy-adoption process.

Behavioral economics principles can be effective both in influencing citizens and policy makers. Although it should be applied and tested in other policy case studies to assess its validity, the proposed policy instrument could be especially relevant for policy makers from countries with volatile political contexts and no continuity in political support for legislative efforts across governments, who aim to advance public health legislation.

Chapter 4. Using behavioral economics to engage pregnant women in a smoking cessation trial – an online field quasi-experiment

This chapter reports on the implementation of behavioral economics insights to engage smoker Romanian pregnant women in the free Quit Together smoking cessation randomized controlled trial.

Maternal tobacco use during pregnancy has been associated with a wide range of poor child health outcomes such as preterm birth, low birth weight, fetal growth retardation, cognitive

impairments, and chronic diseases (Keegan, Parva, Finnegan, Gerson, & Belden, 2010). As a health and pregnancy risk behavior, it has been estimated that smoking during pregnancy accounts for a large number of infant deaths (Salihu, Aliyu, Pierre-Louis, & Alexander, 2003). Yet, smoking during pregnancy is an important and potentially modifiable maternal risk factor (Behrman & Butler, 2007).

The pre-pregnancy smoking rate in Romania is of 30%, with only half of the women quitting before becoming pregnant or during pregnancy (Blaga, Brînzaniuc, Rus, Cherecheș, & Wallis, 2017). With the national STOP smoking program being underfunded, smoking cessation resources and programs targeting pregnant women are scarce (Blaga, Brînzaniuc, Rus, Cherecheș, & Wallis, 2017). Yet, even when smoking cessation programs are available, women do not accessed them. This is the case of many public health programs addressing underserved and socially disadvantaged populations.

The mere existence of public health programs and services does not ensure that people will access and use them (Remler & Glied, 2003). Evidence shows that behavioral economics and behavioral insights can be used to foster uptake and efficient delivery of public programs with only small and low-cost changes (Richburg-Hayes et al., 2017). The behavioral diagnosis and design framework is a 5-step plan designed to help with the translation of behavioral insights into solutions intended to increase program participation and engagement rates.

The aim of this chapter, and my original contribution, is to report on the application of this framework to engage pregnant Romanian women in the free Quit Together smoking cessation randomized controlled trial. Enrollment in the Quit Together program implies online promotion through Facebook Ads, a dedicated project website with direct links to randomized controlled trial surveys hosted electronically on the secured Qualtrics platform, self-assessment of eligibility criteria by potential eligible subjects, and an auto-administered consent form and baseline survey.

I implemented an online field quasi-experiment with a one-group pretest-posttest design between October 22nd 2017 and March 12th 2018, to examine the impact of behavioral economics insights on smoker pregnant women's engagement with the Quit Together randomized controlled trial. I decided on two main outcome variables: the percentage of women who click the QT Facebook Ads and the percentage of women who initiate the self-assessment of their eligibility status. Therefore, I proposed a two-component, behavioral economics-based intervention: a Facebook Ad component and a website component.

Sample size calculations at one-tail α=0.05 and 80% power rendered sample sizes of 420 participants for the Facebook Ads component and a sample size of 180 participants for the website component. The final sample consisted of 745 and 31 participants for the two components.

For the purpose of this experiment only aggregate Facebook Ads and Google Analytics data was available (as opposed to individual-level data). Variables of interest were: (1) the Facebook Ads conversion rate (percentage of people who saw the ad vs who clicked the ad and ended on the project's website; pretest conversion rate of 1.6%) and (2) the percentage of individuals who reach the project's website and who initiate the process of assessing their eligibility to participate in the randomized controlled trial (pretest conversion rate of 9.9%). Additional variables of interest are: (3) the average time spent on the website (of 35 seconds; 93% of the visitors spent less than 10 seconds on the website) and (4) the proportion of women who enrolled in the randomized controlled trial (by signing the informed consent) assessed against the number of subjects who initiated the self-enrollment process. This proportion was of 8.54% based on the pretest data (82 potential subjects finalized the eligibility assessment and 7 signed the informed consent); and (5) the proportion of couples who enrolled in the trial (couples for which the partner has signed the informed consent) assessed against the number of women who enrolled in the randomized controlled trial. In the pretest, this proportion was of 71.4% with 5 partners signing the informed consent out of a number of 7 women who signed the consent.

My results show that using behavioral economics insights in the development of Facebook Ads and the project's website has doubled the rate of individuals who visited the project's website (out of those reached by the Facebook Ads) and has increased the time spent on the website by 4.3 times, the proportion of women who enrolled in the randomized controlled trial (out of those who went through the eligibility self-assessment process) by 2.6 times, and the proportion of couples who enrolled in the randomized controlled trial by 28.57% in the 21 days in which posttest data was collected.

These findings lend support to integrating behavioral economics insights in the recruitment and enrollment process of randomized controlled trials and public health programs.

Chapter 5. The ethics of behavioral economics

This chapter largely deals with issues of government influence and manipulation when implementing behavioral economics-informed public health policies and programs. The solution

I proposed to meet these ethical concerns on government manipulation entails making nudges transparent and assessing proposed policies through three frameworks: Faden and Sirine's ethical approach to public health; the values of an ethical state; and the Nuffield Council on Bioethics' "intervention ladder", a tool designed to help with the ranking of public health interventions based on their coerciveness. I used two case studies to exemplify the application of the solution I put forward: a case study on the use of bots and botnets to change social norms towards vaccination, and a case study on amending the Law no. 457/2004 on advertising and sponsorship of tobacco products.

For several decades now for-profit companies have been using insights from psychology and economics to influence their consumers' behaviors in an attempt to increase revenues. As shown in Chapter 1, governments have set up "behavioral insights teams" to inform policy strategies that would nudge citizens to make decisions which are in their best interest and in line with policy objectives. Yet, this approach raises several ethical considerations, some related to the balance between government influence and manipulation, other similar to the issues that have been raised against public health in previous decades, such as the protection of individual liberties against the attainment of collective benefits.

The aim of this chapter was two-fold. First, I proposed a solution to meet the ethical concerns related to government manipulation when implementing behavioral economics-informed public health policies. This solution entails policies to be assessed through and meet the criteria of three frameworks: Faden and Sirine's ethical approach to public health; the values of an ethical state (welfare, autonomy, dignity, and self-government, as described by Cass Sunstein); and comply with the Nuffield Council on Bioethics' "intervention ladder".

Second, I discuss ethical concerns on using behavioral economics insights to influence policy makers themselves (previously discussed in Chapter 3) to foster their support in order to advance public health legislation. More specifically, I focus on how the shortcomings of policy makers (they can be subjected to the same cognitive biases, heuristics, and contextual influences to which regular citizens are) could be exploited to gain political support for public health legislation. Yet, in order to ensure that policy makers are neither coerced nor maliciously manipulated to support a policy that would not make citizens better off, I propose several prerequisites for this endorsement: the public policy in need for support is in line with Faden and Sirine's (2016) ethical framework; it does not infringe upon the values of an ethical state: welfare, autonomy, dignity, and self-government; and, concerning the autonomy and liberty of

policy makers, the behavioral economics-informed initiative targeting them is situated on Steps 2-5 of coerciveness on the Nuffield Council on Bioethics' "intervention ladder".

The structure of our societies, democratic or not, is based on rules. Depending on where the state is found on the tyranny–democracy continuum, the state's rules are more or less invasive or coercive of the individual. Yet, rules are inherently needed for societies to be able to function, grow, and advance (Brennan & Buchanan, 2008). However, it is debatable to what extent these regulations should invade citizens' privacy, influence, and manipulate their behaviors, especially in democratic states that promote individual liberty and welfare. There is no shield that can protect citizens against manipulation, irrespective if the means of influence/ manipulation are grounded or not in behavioral economics. To put it more simply, a gun can work as a good-promoting instrument in the hands of a policeman or a bad-promoting instrument in the hands of a thief. The gun itself is neither good nor bad, the individuals handling the gun possess these characteristics.

Based on the arguments and examples brought in this chapter, it is true that behavioral economics can be manipulative at times, but its manipulative character can be diminished by making nudges transparent (and this does not make them less effective) and by ensuring that proposed initiatives meet the requirements of the three frameworks previously discussed in this chapter: Faden and Sirine's ethical approach to public health; the values of an ethical state (welfare, autonomy, dignity, and self-government, as described by Cass Sunstein); and the Nuffield Council on Bioethics' "intervention ladder".