

Nudging, intervening or rewarding: A discussion on the constraints and the degree of control on health status

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Abstract

Public health policies typically assume that there are characteristics and constraints over health that an individual cannot control and that there are choices that an individual could change if he is nudged or provided with incentives. We consider that health is determined by a range of personal, social, economic and environmental factors and we discuss to what extent an individual can control these factors. In particular, we assume that the observed health status of an individual is a result of factors within the individual's control and constraints the individual faces. We suggest three different constraints: budget, time and psychological constraints and position various determinants of health according to increasing levels of constraint and increasing degrees of individual control. We finally discuss public health policies such as nudging, intervening and rewarding within this new framework and show that the level of constraints and the degree of individual control on health status are essential dimensions to consider when designing and implementing public health policies.

Keywords

Behavioural economics, equality of opportunity, health determinants, health public policy, individual agency, psychology

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Introduction

From both a theoretical and an empirical point of view, health status is assumed to be determined by a number of interrelated factors, known as determinants of health, which include demographic, cultural, social and economic factors; physical environment; behaviours and lifestyles; biology and genetics and health services (Evans and Stoddart, 1990). Hence when simply observing people's health status, it is impossible to tell whether it is the outcome of determinants of health on which individuals have a degree of control or the outcome of determinants of health that are constraints beyond their control. Nonetheless, in practice, this distinction matters particularly for the fairness and the effectiveness of public health interventions. Many public health policies are implemented to compensate people for poorer opportunities, for example, disability benefits, free health coverage for the poorest share of the population or genetic testing with a family history of a genetic disorder. The idea behind these policies is that individuals can face constraints which are beyond their control and which influence their opportunities in health, and so health policymakers have a supportive role to play to ensure health equity. On the other hand, contemporary public health decisions about health promotion have turned towards providing incentives or nudging people into changing their poor lifestyles, for example, five-a-day campaign, food vouchers within smoking cessation programs or immediate financial reward for weight loss achieved targets.¹ This other type of policy initiatives assumes that individuals have a certain degree of control on their health choices, and so the role of public health policies is to shape the context of choice to guide individuals towards behaviour change but leave them with the final decision-making.

In this article, we contribute to this debate and discuss the extent to which health status is the result of the exercise of individual control or of constraints on individual choices and how this influences individual opportunities in health. Opportunities are considered in a positive sense² similarly to the perspective taken by Sen (1985a, 1985b, 1992), and they include a set of potential choices and the degree of control individuals have on the use of this set. We provide a conceptual framework that evaluates both the degree of control individuals have and the level of constraints that they face for changes in each health determinant. We then discuss the public policies that are likely to matter within the conceptual framework.

Three constraints for individual choices

Inspired by the philosophical concept of equality of opportunity developed by Dworkin (1981a, 1981b), Roemer (1998) and Fleurbaey (2008), a number of recent publications in health economics have focused on drawing the line between legitimate and illegitimate³ causes of health inequalities (Rosa-Dias, 2009, 2010; Fleurbaey and Schokkaert, 2009; Jusot et al., 2013; Trannoy et al., 2010). The main argument of these studies is that differences in observed health outcomes are explained by some factors for which individuals should not be held responsible, which lead to illegitimate inequalities, and by some other factors for which they can be held responsible, which are legitimate inequalities. The distinction between factors is essentially based on normative judgements about what makes an individual responsible for some outcome. Here, we set aside the debates initiated

by Dworkin (1981a) on how best to draw a distinction between factors for which individuals should and should not be held responsible (Arneson, 1989; Barry, 2005; Cohen, 1989; Fleurbaey, 1995; Roemer, 1998). Our purpose is to discuss how individual health decisions can be pictured as placed on a spectrum, from full control over health status to total absence of control, and are affected by the existence of constraints on the implementation of a decision. The approach basically assumes that the extent to which individuals control a particular health determinant is a matter of degree of control and a matter of level of constraints that are defined by their own characteristics. For example, if other smokers surround a smoker at home and at work, the smoker's lack of smoking cessation is further towards the absence of control end of the spectrum than if his partner has stopped smoking and his colleagues are non-smokers. Similarly, if an individual lives on a farm with plenty of fresh fruits and vegetables freely available, his lack of commitment to a healthy diet is further towards the full control end of the spectrum.⁴ In our opinion, control is comparable to individual agency. Sen (1985b) defines agency freedom as:

what a person is free to do and achieve in pursuit of whatever goals or values she or he regards as important.

In this framework, we focus on one's control over health status. The degree of control and the level of constraints may be linked to the distinction between 'cost' and 'difficulty' made by Cohen. Cohen (1989) considers that:

What I call 'difficulty' and 'cost' are two widely conflated but importantly distinct ways in which it can be hard for a person to do something. (It is costly, but not difficult, for me to supply you with a check for £500, or for me to tell you some secret the revelation of which will damage me. It is extremely difficult for me to transport you to Heathrow on the back of my bicycle, but it is not costly, since I love that kind of challenge, and I have nothing else to do today. At the far end of the difficulty continuum lies the impossible, but it is the unbearable which occupies that position in the case of costliness. (Cohen 1989: 918–919)

He takes the example of a man who has legs paralysed and who is very good at moving his arms whilst suffering from severe pain in his arm muscles after having moved them. It could be very costly to move his arms but not difficult. The degree of control is therefore close to easiness or difficulty, whereas the constraints have to do with the bearable or unbearable. If we turn back to our previous two examples, a smoker could easily quit smoking at home if his spouse does not smoke but it will be difficult to do the same at work if colleagues continue to smoke. In addition, if the smoker has specific reason to conform to his colleagues, quitting smoking might involve increased difficulty. Similarly, quitting smoking will involve increased costs, if the degree of addiction is high and withdrawal symptoms burdensome.

We acknowledge the existence of three different constraints that would summarize all the dimensions of constraints that can be exerted on individual choices: budget, time and psychological constraints. The choice of a focus on these constraints is motivated by the fact that the two first ones are at the core of the reasoning about cost–benefit calculus

inherent to economic rationality standard models, whereas the psychological constraints may capture new insights related to limited rationality. Budget- and time-related constraints are typically included in utility maximization problems reflecting the idea that the availability of financial resources and the availability of time restrict individual choices (see the theoretical model of decision-making from Becker, 1965). However, maximizing a utility function under a psychological constraint is more unusual,⁵ and psychological obstacles or constraints are usually incorporated as the marginal disutility of a good whatever the good is.

Altogether these three dimensions of constraints are largely independent from each other and provide us with a more complete economic perspective about the kinds of constraints that mainly balance the set of choices one has in life and over the life cycle. Even if the time-related constraint could also be expressed in monetary terms, there are pure time-related constraints, which cannot simply be converted into monetary terms. For example, a life-threatening emergency such as escaping from a house on fire is exclusively a time constraint. Similarly, the psychological constraint over an action of health prevention such as taking the stairs instead of the lift might be psychologically important to an individual but is not budget constrained. The psychological constraint can also clearly be independent of a time-related constraint; in the case of switching from smoking cigarettes to nicotine spray, there is no time constraint; however, the psychological constraints can be important as smokers might miss the physical contact with a cigarette in their hand.

The new framework we present here considers three different models where the determinants of health are positioned according to the degree of individual control and the alternative constraints of budget, time and psychological obstacles. In each model, we particularly focus on the extent to which constraints exert their force according to different degrees of control. We adopt a four-quadrant perspective where the horizontal axis represents the spectrum of individual control (from complete absence of individual control to full individual control) and the vertical axis represents a spectrum of level of constraints. The idea behind is that constraints act at different levels on individual health choices (from not constraining at all up to strongly constraining). Different determinants of health will be able to belong to the same level of constraints insofar, as they exert a similar degree of inertia on individual health choices. We will use the term of layers to describe the groups of determinants that are affected by the combination of a certain level of constraints and a certain degree of individual control. A similar approach was adopted by Burchardt and Le Grand (2002) to study individual control on voluntary or involuntary participation in employment, using layers of predictors to work supply.

Degree of control and budget constraint

The budget constraint classically represents the maximum budget that the individual could use to invest in changes for health status.⁶ Let us consider all the determinants of health within a framework where only the budget constraint and the individual degree of control are considered. In Figure 1, the horizontal axis is the spectrum of individual control related to health status: the far left side shows the absence of individual control and the far right side shows a full control. The vertical axis is the spectrum of the budget

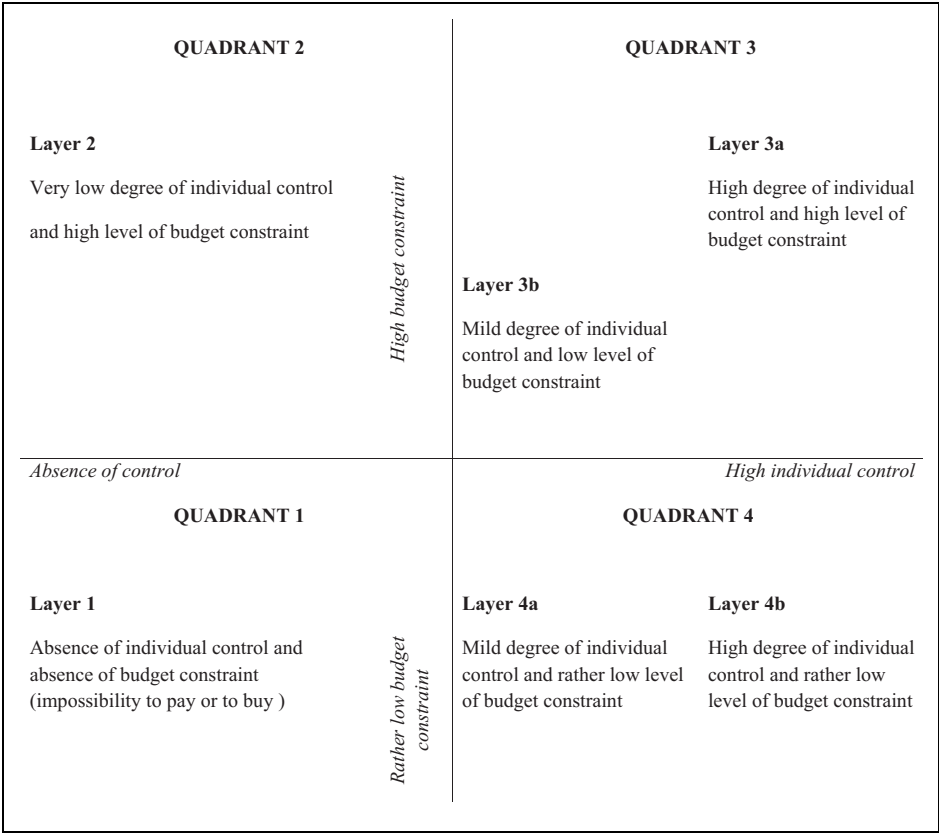


Figure 1. Degree of individual control and level of budget constraint.

constraint: the top end shows high budget constraint and the bottom end shows low budget constraint or even monetary savings.

Let us begin with the bottom left quadrant, quadrant 1. In this quadrant, we position the layer of health determinants influencing individual health status for which both the budget constraint and individual control over health status are low or absent. Specifically, this quadrant characterizes constraints with very high inertia on the ability of individuals to change something concerning health. Moreover, the budget constraint is low mainly because it is not possible for individuals to pay to make a change over their health status or there are laws prohibiting such changes like procedures on genes, for example. This layer 1 will include ethnicity, childhood circumstances, genetic endowment, ageing, gender and nationality. The ethnicity of the individual cannot be changed; similarly, the circumstances in childhood, by definition, are past and gone and cannot even be changed. Genetics heritage can also hardly be affected. Ageing cannot be avoided. Gender can be changed with only great difficulty and it is likely that it is not the budget constraint that will matter the most for such a change. Nationality can also be changed but this would happen at no budget and would not even really depend on individual control.

If individual health is affected by any of the health determinants in this quadrant, individuals will not be able to change any of these determinants to improve their health.

We progress up on the vertical axis within quadrant 2. In this quadrant, we set the layer 2 consisting of a low degree of individual control on health and a high budget constraint to individuals. This quadrant includes cultural, institutional or macroeconomic characteristics of the country in which individuals live and that would affect their health status such as benefit from welfare state, access to education, access to employment or healthcare system, prevention policies regarding health and safety at work and public health laws (for example, smoking ban and prohibition of drugs). The degree of individual control on health is extremely low on any of those characteristics even through voting or being involved in community or charity activities, and making a change for health is potentially very costly, for example, expatriating and infinite financial cost of a cultural change.

In quadrant 3 are included determinants of health on which individuals have a higher degree of control on health and which would induce a budget constraint. We distinguish here health determinants between a high degree of individual control and a high budget constraint (layer 3a) from health determinants with a lower degree of individual control and lower budget constraint (layer 3b). Layer 3a includes mainly individual life choices such as marital status, having children, place of residence, housing status, having a public or private job and investment in higher education. Any of these determinants of health are more under individual control⁷ than the health determinants in the previous quadrants and making a change in any of these health determinants could be financially costly to the individual such as the fact of moving, divorcing or changing jobs. Layer 3b includes life habits, anchored tastes and preferences for health; these health determinants can be quite expensive to change as the individual might start buying healthcare or eat differently but they are likely to be closely related to individual's degree of control.

Finally, health determinants in quadrant 4 are determinants individuals can increasingly control with no budget constraint. We can distinguish layer 4a where individual control on health is lower than individual control in layer 4b. Layer 4a includes addictions; individuals have a limited control on their addictions as addictions are also biological and psychological factors. Changing these addictions is also likely to require a budget such as paying for support, care or counselling; if individuals pay themselves for this, layer 4a is likely to be included in layer 3b; otherwise if this is supported by the National Health Service, it will remain in quadrant 4. In layer 4b, we include healthy behaviours such as not smoking, not drinking alcohol, eating healthy, exercising, treatment compliance and so on. Individuals have a high degree of control on those health determinants particularly when it is the case of reducing or increasing a behaviour that they have already adopted and it is likely that there will be no constraint in relation to budget or even a potential compensation between an initial cost (for example, a gym membership) and future savings (for example, reduced expenses in alcohol and tobacco).

Degree of control and time constraint

The time-related constraint represents the amount of time allocated by the individual to health production. It is a standard hypothesis made within Beckerian models, which are



Figure 2. Degree of individual control and level of time constraint.

related to investment in human capital. There are two main high time constraints: emergency or long-term impact. For example, escaping a fire shows a high time constraint on a very short term (emergency), whereas the impact of a change or a treatment on health can take a very long time. Typically, the impact on health might require some medical examinations with specific timelines too. There will also be a high time-related constraint when there is no possible substitution between time and another dimension (either budget or psychological).

Let us consider all the determinants of health within a framework where only the level of the time constraint and the individual degree of control would matter. In Figure 2, the horizontal axis is the spectrum of individual control on health as defined in Figure 1; the

vertical axis is the spectrum of the level of time-related constraint: determinants towards the top end require a lot of time to change and determinants towards the bottom end would take no time to be changed.

Let us begin with the bottom left quadrant (quadrant 1). In this quadrant, we position the health determinants that would influence individual health status and for which both the level of the time constraint and the degree of individual control are low or absent. Specifically, we consider in layer 1, the circumstances during childhood, by definition, they represent what is past and gone and so they cannot fundamentally be changed. The genetic endowment as well as ethnic origin and the ageing process cannot be changed either. Layer 1 is characterized by the impossibility to use time to improve individual health.

We now consider quadrant 2 where we set layer 2 including health determinants on which individuals have a low degree of control and that could be changed on the long term. Layer 2 includes nationality or gender, they both can be changed following a long time process, but individual control remains restricted as the change is fundamentally made or operated by somebody else than the individual. Layer 2 also includes the cultural, institutional or macroeconomics characteristics of the country in which individuals live. There is a time-related inertia to such changes and a significant path dependency within institutional processes. However, changes could happen on the long term and positively affect health mainly if there is a change in government; nevertheless, individual control is extremely low on any of these determinants even through voting or being involved into community or charity activities.

With quadrant 3, we consider that the degree of individual control increases and that there is a time-related constraint on the change in the health determinants. We distinguish three layers. Layer 3a includes health determinants having a mild degree of individual control and a high time-related constraint, such as addictions. For example, smoking is often associated with present-oriented pleasure seeking. Layer 3b gathers health determinants with a high degree of individual control and high time-related constraint perhaps a little higher than in layer 3a. This includes, for example, life habits and health preferences, which are often early rooted or associated with other persons in the household. Layer 3c represents determinants with a high degree of individual control and a high time-related constraint, such as individual life characteristics, including having children, having a public or private job, and investment in higher education. For example, individuals investing in higher education might see some improvements on their health but this might be on the long term only.

Finally, in quadrant 4, the degree of individual control on health determinant is relatively high, and the time constraint is absent, that is, changes on health might happen quickly. Layer 4 includes health determinants in relation to some types of behaviours. For example, switching from driving to work to cycling might have no time constraint⁸ when commuting time is exactly the same: the driver is usually stuck in traffic whilst the cyclist goes ahead, and the improvement on health might be valuable.

Degree of control and psychological constraint

The psychological constraint is supported by a number of motivational models in psychology and social psychology (for example, the health belief model (Rosenstock

et al., 1988), the theory of planned behaviour (Ajzen, 1991) or the trans-theoretical model (DiClemente and Prochaska, 1982) and the social cognitive theory (Bandura, 1986)) and also by some behavioural economic models (for example, Loewenstein, 1999; Laibson, 2001). The psychological constraint represents the way more or less strong beliefs influence choices, taken as a vector of limited rather than pure rational choices. Whilst strong beliefs are determinants of preferences considered as exogenous, weak beliefs may be considered as more endogenous and so preferences could change more easily in this context. We consider here a simplified way to explain how individuals are psychologically constrained where more or less strong patterns of preferences and beliefs are observed. Some individual beliefs can be changed over the life cycle and through individual experiences (for example, age-specific eating diet and no alcohol during a pregnancy) within a specific context, whereas some other beliefs are subject to strong social norms and one will face high psychological constraints to change (for example, men who endorse more traditional masculine norms underutilize healthcare and cannot change despite access to free healthcare). Similarly, some preferences can be deeply rooted and shape individuals' life so that it would require major upheaval, which is likely to be outside of individual control, to change them.

Beyond beliefs, however, some behaviours may be irrepressible despite the individual knowing that it contradicts her/his beliefs. Such behaviours are described through the models of non-standard rationality. For example, Loewenstein (1999) emphasized the role of visceral influences on choices, which drives individuals to an irrepressible consumption of psychoactive substances and leads them to maximizing a false utility function. Such visceral influences may be associated to what psychologists call stress (Folkman and Moskowitz, 2000; Lazarus and Folkman, 1984), which leads individuals to adopt coping strategies resulting in short-term/long-term positive/negative adaptation of their behaviour. They can be considered as constraints, which can be included within the set of what we call psychological constraints. Conversely, Laibson (2001) suggests that if the individuals are sophisticated enough to be conscious of the influence of environmental signals on their behaviours, they will adopt perfect rational strategies to control their behaviours when the cost/benefit calculus is at their advantage. Within this latter model, the psychological constraint is a trade-off between the costs and the benefits relating to the implementation of the strategy.

All in all, the degree of control of individuals over their health and health behaviours partly depends on the strength and the inertia (which we call 'level') of the psychological constraint relating to visceral influences or stress and the efficacy of the coping strategies that he/she can implement to alleviate the weight of those constraints.

Let us now consider all the determinants of health within a framework where only the level of the psychological constraint and the degree of individual control would matter. In Figure 3, the horizontal axis is the spectrum of individual control on health as defined earlier in Figures 1 and 2; the vertical axis is the spectrum of the psychological constraint: determinants towards the top end are related to high levels of psychological constraint, whereas determinants towards the bottom end would not involve any psychological constraint.

Let us begin with the bottom left quadrant (quadrant 1) where we position a layer of health determinants for which individuals have no control at all and the psychological

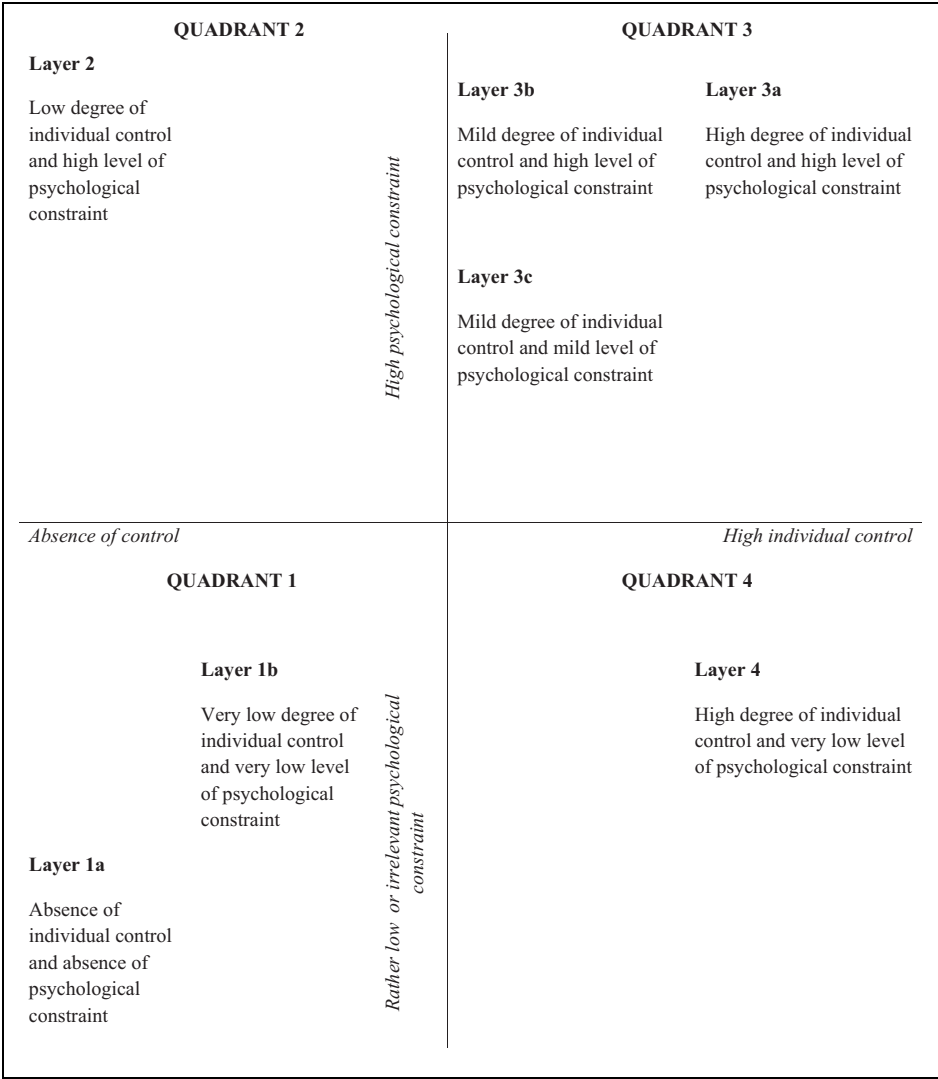


Figure 3. Degree of individual control and level of psychological constraint.

constraint can be considered as not relevant (layer 1a) and a layer of health determinants for which individuals have a rather low degree of control and the psychological constraint is very low too (layer 1b). Layer 1a includes the past personal history that individuals cannot change. There might be individual psychological consequences from the impossibility to change the past; however, we consider here only a descriptive framework of the ways the psychological constraints are weighing on opportunities to change health determinants and underlying health status. Therefore, in this context, psychological consequences are not relevant. Layer 1b includes the cultural, institutional or

macroeconomic characteristics of the country in which individuals live are impossible or very difficult to be changed and such modifications are neutral from a psychological constraint point of view unless they are occurring through wars and violence and are highly correlated to the standard of living of individuals otherwise.

We continue our analysis by progressing up the vertical axis into quadrant 2. In this quadrant, we set layer 2 consisting of a low power of individual control but a high psychological constraint. It includes typically changes in gender or nationality, which are difficult to change but can be changed and will represent a high psychological constraint to the individual.

Within quadrant 3, by definition, we deal with individual choices. We distinguish three layers of health determinants. Layer 3a shows both a high degree of individual control and a high level of psychological constraint; typically, it includes health behaviours and lifestyles, which often are difficult to quit but are not full addictions. Layer 3b concerns health determinants individuals can control to an extent that is lower than in layer 3a, and the psychological constraint remains as high as in layer 3a. For example, layer 3b includes individual life choices such as having children, place of residence, housing status, type of job, education investment as well fact of moving, divorcing and changing job. Finally, layer 3c exhibits a low degree of individual control and a potential high level of psychological constraint. It includes addictions and tastes or preferences for health, which may be psychologically difficult to quit insofar, as they are deeply rooted. For example, an addiction to drugs allows users to cope with anxiety and so it will be hard to quit when anxiety increases as soon as drugs consumption is ended. The distinction between layer 3a and layer 3c is based on the degree of individual control, and determinants in layer 3a are heavily correlated with individual control. As a strategy of coping, the ability of mobilizing social network or support is an important feature that makes interaction between individuals a relevant health determinant. Such interactions may have a good influence – for example, in the case of patient support groups – or a poor influence – for example, in the case of a network of injected drug users – on health behaviours and health status in general, depending on the kind and the intensity of the ties involved (Berkman and Glass, 2000). We tend here to consider that the ability to mobilize a social network to improve one's health is greatly influenced by the psychological resources of the individuals which can be considered either as high level of psychological constraints (in the case of a poor social network influence) or as low level of psychological constraints (in the case of a good influence of social network influence).

Finally, quadrant 4 would include health determinants on which individuals have a high degree of control, and the level of the psychological constraint is very low almost irrelevant. Layer 4 includes, for example, unhealthy choices, which are non-addicted behaviours such as taking the lift instead of the stairs and having skimmed milk instead of full-fat milk.

Layers concept and public health policies

The analytical and positive framework presented above may lead to some normative implications concerning the implementation of public health policies. In this section, we only consider the way public health policy instruments can be affected by the kind

of constraints that impact on choices without considering the possibility of conflicts between instruments. First, the health status in each quadrant depends on the kind of constraints that impact on people's choices. In particular, the psychological constraint is very specific to people's personal history and the living conditions they have known during childhood. Childhood conditions specifically may greatly influence their ability as an adult to take decisions with regard to their health status. Second, the pathways, according to which decisions with regard to health are taken, depend on more or less deeply rooted beliefs in relation to the degree of control people have over their health. For example, the control people think they might have on the health outcome can be strongly related to beliefs and could explain the persistence of addictive behaviours. Note, however, that addictive behaviours may not always be considered as a misfortune for an individual, and the public policy will have to account for the perception an individual has on the addiction itself in the implementation of a policy or the priority setting to be adopted. Consider, for example, that Arnie has an addiction to anabolic steroids, Beth has an addiction to cannabis, and both addictions are beyond individual control and have similar health-jeopardizing consequences in terms of heart diseases. If Arnie regards his enhanced level of testosterone as a piece of good fortune and Beth regards her addiction as a piece of misfortune, then it could be understandable that Arnie's claim to protection against the consequences of testosterone is somewhat weaker.⁹ Similarly, a high-level budget constraint may be considered as a disadvantage for individuals, *ceteris paribus*, if some individuals have developed in this poverty context adaptive preferences when others have not. In other words, the same budget constraint may not have the same impact, and again, the public policy will have to account for the perception an individual has on the constraint itself in the implementation of a policy or the priority setting.

From a normative point of view, the present framework implies that public health policies cannot assume that health is the result of individual choices only. This is particularly important as even if everyone would agree that all variations in health status cannot be explained by variation on individual choice, a number of newspaper articles and health-related public sources opened the public debate on whether some people are less deserving than others for care because they are smokers,¹⁰ obese,¹¹ alcoholic¹² or foreigners.¹³ Our framework emphasizes that if the level of the constraint of cost, time or psychology is very high, then public health policies have to focus on the health outcome and should compensate for poor health outcomes. In other words, the design and the implementation of public health policies will depend on the constraint that appear the most relevant. Our framework is restricted to a behavioural perspective, where each constraint may weigh on the control of one's health. However, we capture only a partial picture of the situation, as the three constraints could be cumulated and reinforce each other, and we will discuss this limitation hereafter.

There are three types of public health policies that are worth discussing with regard to the various layers of the different constraints and individual control: nudging, intervening and rewarding. These policies are particularly adapted to target changes into some health determinants either as a single policy or mixed with other instruments. Compensating could also be considered particularly when the level of constraint is extremely high on the health determinants or on the health outcome, for example, in the case of disability.

After defining each kind of policy, we will discuss which policy is likely to be appropriate for the layers of level of constraint and the degree of control being considered.

Nudging as mentioned by Thaler and Sunstein (2009: 6) is:

any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates.

We refer to nudging here as including an automatic process of decision taken with a low level of constraint for the individual.¹⁴ Nudging is therefore useful and efficient when health determinants can be changed at a low level of budget, time or psychological constraints.¹⁵ Turning to our conceptual framework, nudging would therefore be appropriate in the quadrants where the level of constraint is considered as low or mild. For example, nudging is appropriate in layer 4 in Figure 3 because the level of psychological constraint to change the health determinants in that layer is low and because the degree of individual control over health determinants and health is high. People could easily substitute when the psychological constraint is absent and so be easily nudged. When focusing on the budget constraint in Figure 1, nudging could be useful in layer 4b in combination with other policy instruments, especially pricing, as the degree of individual control is high. In layer 3b, the degree of control is mild and nudging could be considered along with an ex post reward. In the time-related framework (Figure 2), nudging could be used especially in layer 3b where the degree of individual control is mild and the change on a health determinant could be reached rather fast.

We refer to intervening as a set of policies going from legislation (coercion and bans), regulation and fiscal measures (either pricing or taxing) to facilitating individual support to change what affects their health. Legislation is particularly appropriate when the degree of control people have on the health determinants is low and when a long-term perspective is needed for people to make a change. Regulation through restrictions may be particularly adapted to protect specific populations from unhealthy behaviours (for example, children or adolescents). Fiscal measures are potentially efficient when a poor health determinant can be changed in a short or longer term (first criterion) or when the degree of control over the health determinants is either mild or high (second criterion). Lastly, individual support to change is appropriate and potentially efficient when people face high constraints, particularly with high psychological or time constraints. Considering our quadrants framework, we would then consider that legislating is appropriate in Figure 2 (time constraint); for layer 2, the degree of individual control is rather low and the health determinants in this layer may be changed on the long term. Regulating through pricing would also be particularly adequate for layer 3c in Figure 2 when the individual control on behaviour is high and when the health determinants can be changed within a medium or long term. In a lesser extent, legislating could also be used when there is a high degree of individual control and a rather low level of budget constraint as layer 4b in Figure 1. Finally, legislating through taxing is more appropriate when the psychological costs are high and when the degree of individual control is mild such as layer 3c in Figure 3.

Rewarding via incentives is sometimes used in public health policies when people receive rewards in kind or in money for their efforts towards health¹⁶; this is particularly used in lifestyle changes but also in health insurance contracts. Rewarding would typically be efficient for a high budget constraint such as layer 3a in Figure 1. It could also be used when there is a high psychological constraint such as layers 3a and 3b in Figure 2 in combination with regulating. Rewarding will however not be useful in a high time-related constraint context. To understand this, we can take two examples. The first example is associated with a medical examination that has to be taken following given, regular and fixed timelines related to efficiency or risk for the patient. This is typically the case of a patient undergoing of a colonoscopy. Colonoscopy is associated with a high psychological constraint and a high time constraint insofar individuals have to wait a long time between two examinations due to efficiency and risk of the examination. In this context, a public health policy using rewarding mixed with facilitating through individual support would be appropriate to the high psychological constraint, but this would not help with the high time-related constraint where a certain duration has to be respected between two examinations. Rather for this latter constraint, legislation would be more appropriate by setting a compulsory examination where pricing could be used: Individuals would have to pay a higher price if they do not respect the deadline between the two examinations. The second example can be given by the time that is taken from a behaviour change to impact health, there will often be a delay for the impact; typically, recovering full lung capacity takes a long time after quitting smoking, and an ex-post rewarding might not be appropriate in this context.

Discussion

Our focus is on the study of health determinants and health behaviours rather than on the study of standard of living in the perspective of basic functionings à la Sen (1985a, 1981b, 1992), Nussbaum (2001) or Wolff and de Shalit (2007), for example. But focusing on health determinants through three main constraints and through the way the degrees of control may exert has allowed us, we believe, to pay greater attention to the relevant mechanisms and provide a detailed discussion on how health status can be altered. Two main limitations to the present framework are relevant to discuss. First, public interventions may generate an additional set of constraints for individuals that we will discuss. Second, the three constraints of budget, time and psychological factors may be observed cumulatively and so reinforce the level of constraints on individuals.

Limitation 1

It appears important to underline that public interventions may generate their own set of constraints and hence alter the choice set of individuals and prevent them from actually exercising their degree of control. In this context, the distinction between negative and positive liberty made famous by Berlin (2002) is particularly of relevance. Whereas negative liberty is the absence of barriers, limits or constraints, positive liberty is the possibility to choose or act or the fact of choosing or acting. If we turn back to each of the public policy instruments suggested in this framework, let us consider when and how

likely they are to generate additional constraints to individuals or to reduce the capacity individuals have to choose or act freely, that is, eventually how likely they are to limit negative or positive liberty.

First, a fiscal policy increasing taxes (as an instrument of regulation) on unhealthy diet or addictive consumption (for example, the fat tax) is not systematically designed in the way that taxes are alleviated for potential substitutes of those products. Hence, the positive freedom of individuals, particularly if they face a high budget constraint, is unlikely to change towards healthier behaviour. The only potential result is that individuals have a reduced negative freedom.

Second, a nudge policy could limit individuals' positive freedom of choice. In this context, Saghai (2013) gives insights into two conditions to be added so that nudges not only preserve negative freedom but also do not limit the positive freedom of choice. The first condition is the choice-set preservation, 'A preserves B's choice-set when the choice-set is unaltered or expanded compared to a baseline representing B's situation prior to A's influence'. As for the second condition, it introduces substantial non-control according to which 'A's influence to get B to X is substantially non-controlling when B could easily not X if she did not want to'. The latter condition is particularly relevant, and Saghai (2013) underlined that the pressure made by A on B must be effortless to B, B 'has the capacity to become aware of A's pressure to get her to X (attention-bringing capacities)' and B has 'the capacity to inhibit her triggered propensity to X (inhibitory capacities)'. This condition implies a low level of both the time and the psychological constraints where individuals need time to have attention capacities and need to be stressless to show inhibitory capacities. In our framework, we suggest that nudges are efficient in the case of low or mild levels of constraints particularly concerning psychological constraints. In this case, we could consider that individuals have the capacity to inhibit their triggered propensity to X. However, it could be the case that some particular conditions of cumulative constraints even if each is of a low level may result in an inefficient effect of the nudge policy.

Third, rewarding with incentives may be considered as generating an extra benefit that is not the automatic consequence of an action nor a deserved reward but rather a stimulation that can induce a response from an individual favouring a specific different choice than those he/she could have done without incentives (see the definition of Grant, 2011). If incentives can be efficient in the case of a high budget constraint, it can also generate additional constraints. It is, for example, possible that an individual facing a high budget constraint is unable to pay for preventive care and then use a financial incentive to engage in such a prevention. But it is also possible that another preventive care has precedence for the individual but no incentives are given. Then, the incentive towards the first preventive care could then divert the individual to adopt the most useful preventive behaviour and lead to a deterioration of health status.

Limitation 2

If the constraints (budget, time or psychological) accumulate, it is necessary to define which group of people is the least disadvantaged and propose a ranking according to which the level of constraints will be very high for the three constraints, the level of constraints

will be very high for two constraints and medium for the third constraint, and so on. The combinations of three degrees of levels of constraints among the three levels of controls would lead us to $3 \times 3 \times 3$ subgroups. It would be too complex in terms of the combinations of instruments of public policies considering that the public policies may additionally generate their own set of constraints as mentioned above for example. Wolff and de Shalit (2007) underline, for example, the need for priority setting in the design of the public intervention when people face different constraints of different levels, particularly because this will lead to reinforcing constraints. Rather than speaking about constraints and degrees of control, the authors speak about disadvantages (such as the achievement of low or insecure functionings), and they define the priority setting using individual experience of clustering disadvantages in six main functionings: health, life, bodily integrity, affiliation, control over environment and sense of imagination and thought.

We have instead considered another perspective that focuses on health status and not on the set of basic functionings like Wolff and de Shalit. Facing this limitation, then, we suggest following three steps according to which the public policy could be defined. Step 1 – we focus on each constraint insofar it is the only way to have a very precise and powerful description of the mechanisms by which health status may be altered. Step 2 – we propose to focus on the more constrained people in the three dimensions, that is, that we then define the least disadvantaged group for whom the greater attention should be paid when we have to observe the impact of the public policies. We then have to describe the ways the different instruments could conflict as means to deal with the health status of people belonging to such a disadvantaged group. Step 3 – we focus of the conflicts of instruments that the public health policies may generate whatever the precise level of constraints people have to face. In doing so, we believe that public policies implemented to care about poor health behaviours and then poor health status and to improve them will also be designed in a way that will be the most efficient they should be.

Concluding remarks

To conclude, nudging, intervening and rewarding in public health policies are not likely to work in every contexts and it is important to consider jointly the degree of control over the health determinants and the level of budget, time and psychological constraints that may exist for individuals. It is also important to consider the possibility of cumulative or reinforcing constraints leading to defining a priority setting on the way the public policy may be implemented towards the least disadvantaged group. There are a number of health determinants that are significantly important for the health outcomes but that individuals could not change. In this context, nudging, intervening and rewarding would not be efficient on those layers of health determinants, and policymakers could then turn towards compensation policies, incorporating priority setting in this context as well.

Our approach suggested three different constraints individuals could face when they have to improve their health. This framework is very speculative and presented two main limitations we have discussed earlier. In addition, one could argue that there are other types of constraints that restrict individual control, and others could even argue that an unobserved constraint is the major constraint to individual control towards health improvement. A potential way to test this conceptual framework would be to undertake

an empirical analysis using secondary data at the individual level. The analysis would use a progressive model enhancement where the different layers of determinants from the absence of individual control to full control and from the absence of constraint to high level of constraint would be introduced in the model one after the other and their impact on the outcome be estimated.

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Notes

1. For a review of policies aiming at changing health-related behaviours, see for example Cawley and Ruhm (2011).
2. This definition differs from perspectives taking into account *real functionings* only, which would be what the individual can do or becomes with a given set of constraints to face. The closest concept to our definition is the concept of *refined functioning* as defined by Sen (1987, 1992). That means that to assess well-being as resulting from health opportunities, we must observe achieved *functionings* together with the capability set. For example, starving from hunger because of poverty is not the same thing as starving from hunger because of fasting in relation to religious beliefs or political convictions (Fleurbaey, 2006; Sen 1985a). Within the context of healthcare, there is a similar distinction between a lack of healthcare because of financial barriers and a lack of healthcare by choice and despite having been informed about consequences.
3. Legitimacy, here, is considered as justice preserving, whereas illegitimacy refers to justice undermining.
4. We adopt here a standard Roemerian view on the definition of responsibility being purged from the correlation with circumstances beyond the control of individuals. However, this is not uncontroversial amongst philosophers to argue that the correlation between circumstances and responsibility will always lead to revise judgements about culpability and liability of the individual. In his comment on Roemer in the Boston Review symposium on Equality of Opportunity in 1995, Scanlon takes the example:

70 year old citizens of Wisconsin with incomes over \$150,000 per year consistently vote for candidates who have taken a position favorable to them on Social Security and Medicare, we would not normally conclude, on this basis alone, that they had “effectively no

opportunity” but to do so. When factors “beyond their control” give people in a given class strong reasons for acting a certain way, a uniform pattern behavior may result, but these people may still be fully responsible for what they do. (Scanlon, 1995)

He then adds the:

citizens of Wisconsin in my example are clearly responsible in this sense for their voting behavior, and this makes it reasonable to argue about whether that behavior shows them to be greedy or just reasonably prudent.

It is therefore important to underline here that one may debate whether we should revise our judgements about responsibility for smoking-related illness merely because of circumstances.

5. As far as we know, Masatlioglu and Ok (2014) is the only reference where the rational choice model has been generalised under psychological constraints being induced by individual initial endowment. The authors speak about a psychologically constrained utility maximization (see figure 1, page 3 of their paper).
6. There might be some interactions between budget constraints and behaviour; stopping smoking, for example, would free up a significant amount of money but it is also likely that other addictions become substitutes to tobacco. For the sake of simplicity, we consider here *single* behaviour that is not correlated with other behaviours; however, an empirical application of the framework could take into account such interactions.
7. The life choices made by individuals can also be partly determined by past circumstances, and according to the philosophical positions adopted, they could be seen as more or less under individual control.
8. We uniquely consider the time constraint in this framework; however, switching from driving to cycling could present a budget and/or a psychological constraint, which is not relevant here.
9. We are grateful to Andrew Williams who has drawn our attention on this point and provided the example.
10. See the short report ‘Should smokers get treatment on the National Health Service’. Available at: <http://www.rpharms.com/museum-pdfs/smoking-debate-cards.pdf>
11. See the Guardian newspaper article on ‘Doctors back denial of treatment for smokers and the obese’. Available at: <http://www.theguardian.com/society/2012/apr/28/doctors-treatment-denial-smokers-obese>
12. See the Observer newspaper article on ‘Who deserves a new liver? Anyone who needs one’. Available at: <http://www.theguardian.com/commentisfree/2014/apr/05/liver-transplants-ethical-means-testing>
13. See on BBC News Health, the piece entitled ‘NHS “can save £500m” on foreign care’. Available at: <http://www.bbc.co.uk/news/uk-politics-24616801>
14. We consider here basic nudging as being a short message given, often referring to social norms (what others do), which can be translated without being costly for the individual switching their behaviour. According to us even processed within an automatic system of cognitive decision as described by the two authors, the quick changing behaviour obtained through nudging nevertheless implies a high individual degree of control on health as related to agency freedom.
15. Thaler and Sunstein (2009) write:

people will need nudges for decisions that are difficult and rare for which they do not get prompt feedback and when they have trouble translating aspects of the situation into terms that they easily understand (p. 79)

However, we consider that nudges in health are more likely to be efficient if the level of constraint to changing for the individual is low.

16. Conversely to meritocracy based on achievement, rewarding via incentives, is future oriented and aims for efficiency.

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