WITH A LITTLE HELP OF A NUDGE: ENVIRONMENTAL HEALTH REGULATION

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RESUMO

O *nudge* é uma abordagem complementar às intervenções motivacionais para a mudança dos comportamentos de saúde, na qual se destaca o facto de o comportamento ser influenciado pelo contexto em que ocorre. Este artigo está dividido numa secção teórica, na qual se apresenta esta abordagem, os seus objectivos e a influência dos processos automáticos no comportamento dos indivíduos. A tipologia dos tipos de intervenção, os mecanismos subjacentes e uma breve discussão sobre os principais objectivos e considerações éticas são apresentados previamente a um conjunto de exemplos de estratégias de intervenção para uma variedade de comportamentos. Na secção empírica, focada sobretudo num conjunto de comportamentos de saúde relevantes para o contexto escolar, descrevem-se diversos *nudges* e destaca-se um comportamento de saúde em particular, a alimentação saudável. Sumaria-se investigação empírica sobre um importante tipo de *nudge*, o enquadramento das mensagens, ao serviço do aumento da alimentação saudável. Finaliza-se com uma conclusão e áreas de investigação futuras.

Palavras-chave: abordagem *nudge*; regulação do ambiente de saúde; alimentação saudável.

ABSTRACT

Nudge is a complementary approach to health behavior change interventions, drawing attention to the fact that behavior is influenced by the context in which it takes place. This article is divided into a theoretical part, in which the nudge approach is presented, its aims, and the influence of automatic processes on behavior. A typology of nudges, the underlying mechanisms and a brief discussion of the main objections and ethical considerations are presented prior to document examples of micro-interventions in a range of behaviors. In the empirical part, with focus mainly on the relevant health behaviors for school settings, an array of nudges are described, and one particular health behavior, healthy eating, is highlighted. Empirical research conducted on a prominent type of nudge, namely framing, with a view to increasing healthy eating, is summarized. A conclusion and areas for further research are pointed out.

Keywords: nudge approach; environmental health regulation; healthy eating.

INTRODUCTION

Behavior is strongly influenced, often automatically, by the context or situation in which it occurs. Double-sided printing as a default setting in order to save paper, text messages reminding us of overdue bills, and healthy products more easily accessible than unhealthy ones in shops increase the individual, social and environmental protective behaviors of people. In the same vein, increasing the number of healthier food and drink options in vending machines, using standing desks, and explaining the differences in wages of college and high school graduates by comparing a Mercedes to a KIA car in high schools, increase the likelihood of healthier eating choices, burnt calories, and the number of pupils enrolling in higher education respectively. These examples show that personal choices can be improved by nudging people in certain directions. Gently changing people's environment to help alter behaviors was coined as nudge, in 2008, by behavioral economist Richard Thaler and law scholar Cass Sunstein in their seminal book *Nudge: Improving decisions about health, wealth, and happiness*. Nudges can target different behaviors such as financial, consumer and health behaviors and be developed at different levels, such as in government and large scale corporation policies and at a micro level. In this article we have focused on its potential for promoting health in small-scale physical environments such as neighborhoods, restaurants, shops, schools and homes. Our aim is to review the existing literature in order to present the nudge approach, and to document examples of micro-interventions in a range of behaviors, starting with a definition of the nudge approach, its aims and how it relies on automatic characteristics of human behavior. A typology of nudges which may help to think about their mechanisms of action and underlying ethical principles will also be introduced before gearing our attention towards nudging in health education and promotion.

Examples and the explanatory mechanisms of micro-interventions in a range of behaviors will be documented, and will focus mainly on relevant or inspiring health behaviors for the school setting. Given that a more in-depth research on healthy eating has been conducted by the authors of this article, a description of nudge interventions for this health behavior will be highlighted.

BEHAVIOR CHANGE: DELIBERATE AND AUTOMATIC INFLUENCES

It is widely acknowledged that knowledge and motivation fall short of changing one's lifestyle and enhancing health behaviors, and even when a behavior is valued it is frequently not attained. In other words, will is not enough to act accordingly and to successfully attain behavior (Godinho, Alvarez, Lima, & Schwarzer, 2014). Thus, a great deal of research has underscored that the shift from rather static motivation to more dynamic self-regulatory processes represents a promising step towards a better understanding of health behavior change (e.g. Mann, de Ridder, & Fujita, 2013; Schwarzer , 2008). A reflective, goal oriented system, driven by our values and intentions, underlies this perspective, instilling people to reflect on their behavior. People are seen as being capable of exerting control over their behavior, through sticking to the goals they set, mobilizing planning and executing actions in order to attain them. Indeed, many health decisions imply reflective thinking associated with the deliberative, effortful, and conscious processing of information. The dieter might have to choose from an array of options such as several diet plans, the products to have available at home and at work when buying and cooking them, what to do when tempted by high caloric food, what to choose when no healthy options are available. Likewise, knowing that obstacles may prevent planned outdoor physical activity, people may reflect on what those obstacles might be, what to do in order to maintain the activity, whether or not to do it alone or with company in order to increase the odds of putting their decisions into practice. Accordingly, most health interventions aimed at changing health-related behaviors target reflective processes. However, will itself and implementation intentions are frequently overridden by actions, especially in the case of habitual behaviors, such as taking the habitual route straight home, when intending to stop off somewhere on the way, or in taking high caloric food because it is part of a usual diet, despite having started a healthy diet, or not getting off the bus sooner in order to walk and take some exercise, because it is a habit to get off at the closest bus stop to the destination. People themselves acknowledge they are practicing health-harming behavior against their will. Therefore, much behavior reflects non-deliberation and is characterized by being instinctive, effortless, driven by immediate feelings and triggered by the environment.

In the nudge approach, the authors have drawn attention to the dual process theory which distinguishes reflective and automatic thinking and asserts that behavior can result from either mode of thinking. The most innovative feature

of their work is the attention given to the automatic processes, thus providing a compelling basis for understanding why, despite information and motivation, behaviors have been resistant to change, and consequently, placing personal choice-making in the context of societal option-setting, which should provide ready access to health promoting options.

Since then, many authors have followed this perspective, holding that there is a need to consider other influences on health behavior, beyond deliberation based on the consequences of actions, cued by environmental stimuli that set in motion automatic processes in health decisions (e.g. Marteau, Hollands, & Fletcher, 2012; Strack & Deutsch, 2004). Both types of processes, reflective and non-reflective, are involved in health behaviors, and ideally complement each other. One, goal-directed, based on explicit beliefs and motives, but slow, absorbing our attention, and unnecessarily costly when facing routine situations. The other, automatic, fast and effortless, enabling cognitive resources to be freed for other tasks, while engaging in complex health behaviors. However, particularly in health behaviors, this energy and resource saving increase the probability of pulling away from conscious motives, encompassing people in behaviors they do not want. This occurs as people have conflicting health desires, such as wanting to exercise but giving priority to relaxing on the couch, wanting to eat healthfully but adoring sweets, and wanting to dental floss but preferring to go to bed a few minutes earlier.

Other authors embrace the nudge approach and emphasize behavioral research which shows that individuals do not make decisions rationally, despite information and incentives (e.g. Quigley, 2013). Many health behavior change models presuppose that individuals are rational in their choices, that is, they are capable of listing all the possible alternatives of a decision, attributing probabilities, duly assessing their outcome, structuring them consistently in a single index and acting so as to maximize the expected usefulness of their choices. Hence, these models accept arguments on normative theories and believe that the variance or loss of rationality may be corrected through guidance. The build-up of proof that decisions systematically diverge from the premises held up by these theories - stronger aversion to losses than affinity for gains, being influenced by things that seem relevant and vivid, actions shaped by emotional associations - , particularly the identification of typical judgement bias, driven by the work of Tversky and Kahneman (Kahneman, Slovic, & Tversky, 1982), have served to undermine the vision of individuals as rational processors of information (see Alvarez, 2005).

In short, people tend to follow the path of "least resistance", do not have complete self-control, as their resources get depleted in face of multiple demands, and are not the kind of rational, advantage-seeking decision-makers which some rational choice models predict. In contrast, individuals use subtle changes and elements of the behavioral and decision-making context to deal with their limited processing abilities. Insights into how and why context affects

individuals' decisions may be used to improve them.

WHAT IS NUDGE (AND ITS AIMS)

Thaler and Sunstein defined nudge as "… any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives" (p. 6, 2008).

It is part of this choice architecture to render health options more salient or more interesting, easier or a default option, instead of using restrictions (orders or bans) or significant economic incentives or disincentives, such as taxes, subsidies, or fines. In short, it implies non-coercive changes instead of direct and indirect regulation and legislation. Furthermore, the choice involves not "forbidding any options", which requires that those responsible for the intervention act in accordance with the interests of the nudged person, as judged by this person (Hansen & Jespersen, 2013; Thaler & Sunstein, 2008). Hence, nudges involve different ways of presenting rather than removing choices. For instance, when making healthy products more available in a self-service, by strategically positioning them to be easily selected, unhealthy food options, although still available, are more difficult to reach. Proximity intends to set in motion more automatic decisions, whereas unhealthy choices require active decision-making. Likewise, nudges promote choices or behaviors which are concerned with the benefit of the target individual and not the profit of companies, although what is regarded as being in people's own interest is not easy to discern, since it is arguable that people know what is best for them, what their preferences are, and what welfare is (Vallgarda, 2012).

Nudge has been coined by its authors as a libertarian paternalistic strategy (Thaler & Sunstein, 2008). It is considered libertarian in the sense that it is based on choice, but paternalistic because choices are selected and presented in a certain manner in order to favor healthier behaviors. Despite being considered a liberty-preserving approach that steers people in particular directions, while allowing them to go their own way, it is still the target of criticism. Several authors disagree that there is libertarianism in this proposal, alleging that it is a return to behaviorism, involves psychological mechanisms that work best in the dark as the effects are likely to disappear in the presence of transparency, it encourages power abuse on the part of technocrats, and impairs autonomy and the ability to make free choices (for further details see Hansen & Jespersen, 2013). The fact that our behavior is affected by context, regardless of whether it is organized intentionally, is not a convincing argument of choice preservation. Rather, it is precisely what gives the "choice architects" an important degree of responsibility in the outcomes, since their intervention is purposeful. On the other hand, arguing that individuals are always in possession of freedom of choice and are not obliged to take any specific action, when the nudge approach stems precisely from the fact that our choices may not always be the best, is evoking a principle

whose doubtful efficacy is precisely at the root of this new approach (Hansen & Jespersen, 2013). Therefore, we advocate the importance of not burdening those who do not adhere to the envisaged behaviors, but organizing nudges in such a way as to be far more beneficial than a cause of inconvenience.

Several authors highlight the use of minimal conscious engagement in most nudge interventions, although they recognize the possibility of varying degrees of consciousness (Hollands et al., 2013). Other authors state that nudging always affects automatic modes of thinking, however some nudges influence behavior without necessarily involving reflective thinking (e.g. reducing plate-size to decrease calorie intake), while others influence attention and reflective thinking (e.g. framing in which a decision problem is formulated) (Hansen & Jespersen, 2013).

The principles of nudging can be found in traditional psychological and sociological theories, showing how environments shape and constrain human behavior (see Marteau, Ogilvie, Roland, Suhrcke, & Kelly, 2011). Indeed, in 1976, Nancy Milio referred to the fact that change-making in the living environment, coupled with information and motivation, both triggered and enhanced health-generating life patterns of populations. In her slogan "Making healthy choices the easy choices", a pyramid of decisions, where macro-decisions taken at an organizational level affect options available at an individual or micro-decision level, was implicit. Therefore, nudge itself is not a new concept, however its novelty lies in using behavioral economics and social psychology to explain why people behave in ways that deviate from rationality. Furthermore, it embeds the strategies proposed in a political philosophy which sets out to influence individuals by changing their living environment, while guided by self-interest and maintaining availability of the unhealthy options.

The goal of many nudges is to render life simple but especially safer for people. It may be stated that it is an approach to environmental change that alters social and physical environments to shift behavior in healthy, self-interest directions, acknowledging that it may be more effective and easier to redesign products, places and services to spur health behavior change.

CATEGORIES AND PRINCIPLES OF NUDGE

With a view to clarifying and defining the typology of choice architecture applications, some authors have proposed dividing nudge interventions into two main categories. Interventions either altering the properties of objects or stimuli within the environment, or the place occupied by those objects and stimuli, or both (Hollands et al., 2013). Properties of objects or stimuli can be changed within a number of scopes: ambience (e.g. altering environment aesthetics or atmosphere), functional design (e.g. adapting or designing equipment), labelling (e.g. providing information), presentation (e.g. altering sensory or visual qualities), and sizing (e.g. changing size or quantity). Place changes may occur through availability (e.g. adding behavioral options), and proximity (e.g. making

behavioral options easier or effortless). Priming (e.g. placing incidental cues in the environment to influence a non-conscious behavioral response), and prompting (e.g. using non-personalized information to promote or raise awareness of a behavior), involve changes in both typologies (Hollands et al., 2013).

The change of these properties is intended to constrain or shape responses to make the healthier response the most likely. Taking the lift instead of the stairs is usually easier, however making the lift take longer and having to wait extra time for the doors to open and close, may make the stairs a more attractive option. The piano stairs in the subway, where every step is a note which is played whenever stepped upon, next to escalators, widen the options available, with a view to increasing the physical activity of people, and even more so by using humor.

Five of the ten important nudges/principles distinguished by Sunstein (2014) are highlighted due to their relevance for health behavior change, namely (1) default options such as sugar-free beverages displayed in a vending machine where sugar is only available upon request is considered one of the most effective nudges and is related to a phenomenon known as the "status quo bias" (Samuelson & Zeckhauser, 1998); (2) use of norm principles, which involves emphasizing what most people do, especially when it is as local and specific as possible, such as "seven out of ten sexually active Portuguese adolescents use condoms"; (3) increases in ease and convenience, such as making healthy options the visible, easier and fun option, like the aforementioned piano stairs; (4) warnings and graphics, with large fonts, bold letters, and bright colors, accompanied by a description of specific steps that can be taken to reduce risks, such as the warnings on cigarette packets; (5) reminders by email or text message to cope with forgetfulness, those of which are particularly helpful when sent at close notice, such as receiving a text message reminding the individual of a doctor's appointment the following day. A further two potential useful principals for health behavior, (6) incentives for motivating people, such as when they are offered a small sum of money for their healthy behavior (e.g. picking up their HIV test results), and (7) the use of salience and affect that are triggered by novel, personally relevant and vivid examples and explanations, for instance a video showing either a smoker or a loved one having a heart attack, have been reported by Blumenthal-Barby and Burroughs (2012).

Thus, the methods used are multiple. Nudges work mainly through informing people (e.g. reminders), making choice easier (e.g. increase in ease and convenience), arranging the options presented, counting on the power of inertia and procrastination (e.g. default rules), creating emotional associations (e.g. increase salience and affect), and by changing the anchors through which different options are described (e.g. framing the arguments to promote healthier choices).

Non-conscious processes involved in nudging may constitute a form of manipulation of people's choices, an idea, in fact, defended by many. Hence, a

distinction proposed by Hansen and Jespersen (2013) must be addressed. Besides proposing the above mentioned two types of nudges - only automatic or both automatic and reflective thinking - they proposed another axis of categorization, based on whether nudges were transparent or not. Transparency is a measure of how recognizable the intention underlying the nudge is for the individual, as well as the means by which behavior change is pursued. This resulted in a conceptual framework of four broad types of nudges, transparent with (e.g. seat belt alarms) or without reflective thinking (e.g. relaxing music while passengers board a plane), and non-transparent with (e.g. framing when choosing between medical treatment) or without reflective thinking (e.g. changing of background defaults). In addition to being a functional tool to reflect upon what is at stake in each nudge, it constitutes a useful framework to analyze and decide whether a nudge empowers, influences or manipulates[1] people, thus acting as an analytic tool of the responsibility of the policy-maker. Transparent nudges are viewed as empowering and influencing people, while non-transparent nudges are likely to involve greater manipulation. Non-transparent nudges with reflective thinking are the most controversial. Although people are free to choose otherwise, lack of transparency makes this choice unlikely while, at the same time, rendering individuals fully responsible for their actions, as their decisions are reached by means of reflective decision-making (Hansen & Jespersen, 2003). Hence, special care is required with regard to the processes used when one intends to help change.

NUDGE IN HEALTH EDUCATION AND PROMOTION

Applications of the nudge approach to health education and promotion have increased, and many countries have become clearly interested in this perspective. For instance, the UK has a Behavioural Insights Team ("Nudge Unit") and the USA has a White House Social and Behavioral Sciences Team, whose main aims are to create decision-making contexts in order to promote behavior that is both beneficial to us as individuals, and to society at large. There has already been practical outcomes of these offices with proposals for new pension schemes in the States, the ban of super-sized sodas in New York City, and a decrease in alcohol consumption among UK youths (see Hansen & Jespersen, 2013). However, relatively few applications of nudging in the school policy arena (Castleman & Page, 2015) have been observed until recently. Nevertheless, in terms of principles, there is no opposition between nudge and education, as freedom of choice should not be compromised, and desirable nudges should not undermine autonomy or welfare but rather contribute to both.

1 The notion of nudge presented by Thaler and Sunstein is extended by Hansen and Jespersen (2013) to broaden the scope of nudging related to the difference between behavior and choice, the cornerstone of the proposed conceptual framework.

There is good reason to be concerned about the promotion of health behaviors in Portuguese youths. The last survey on Health Behaviour in School-Aged Children (Matos, Simões, Camacho, Reis, & Aventura Social, 2015) revealed that less than half of the adolescents eat fruit and vegetables on a daily basis, only 16% engage in daily physical activity, and 35% are the target of threatened violence in school once a week. This is of utmost importance given the evidence confirming that food preferences and lifestyle habits are shaped early in life, often persisting into adulthood (Devine, Connors, Bisogni, & Sobal, 1998; Nicklaus, Boggio, Chabanet, & Issanchou, 2005).

The use of intelligent context changes, capable of promoting beneficial health behavior change for oneself, increases when based on sensitive psychological principles. An example is a change in violence and aggression in emergency rooms. Instead of putting physical barriers between the staff and hospital users or signs warning visitors that the police will be called in response to problem behavior, changing has been more easily attained when frustration triggers have been identified by psychologists. The nudge involved providing comfortable seating, displaying live information on waiting times and the number of patients being looked after (see King, Thompson, & Daizi, 2014).

One of the most famous and unusual nudge interventions is the fly-in-the-urinal, used for the first time in Schiphol airport in Amsterdam, with a view to capturing the attention of users in addition to their decision of whether or not to aim at the fly, thus increasing the likelihood of the user focusing on the actual act of urinating. As a consequence, spillage has been reduced by 80% (Thaler & Sunstein, 2008).

Stickers placed next to elevators referring to the possibility of using the stairs instead (Blamey, Mutrie, & Aitchinson, 1995), increasing the time taken for elevator doors to close, and "look right" painted on the streets of London (see Hansen & Jespersen, 2013) are examples of very simple nudges that influence people's safety and health condition. Other examples, some more controversial than others, use the change of defaults from opt-in to opt-out for registering for organ donation (Thaler & Sunstein, 2008) or HIV-screening as routine in health care settings (Hanssens, 2007).

Letting people know what others do to influence their behavior, as in "Most of Us Wear Seatbelts" developed in Montana, has resulted in a significant increase of seatbelts. In the same vein, other interventions give people information about their exercise and lifestyle choices by means of comparison with their peer group or present relative information (your risk is x% more and other people's is y%) instead of absolute (your risk is x%) (see Blumenthal-Barby & Burroughs, 2012). Another example is to reduce the proximity and density of retail outlets for alcohol, tobacco, and junk food in order to decrease purchase and consumption (Reitzel et al., 2011).

One example of the use of framing in which options are chosen is the "Asian

Disease Problem" studied by Tversky and Kahneman, which illustrates how the frame in which a decision is formulated can affect our reflective choices by associations made in relation to the frame. In this decision-making problem, participants are asked to imagine that the country is preparing for an outbreak of a new disease, called "Asian Disease", which is expected to affect 600 people. They are then asked to select one of two possible treatment options. Option A, whereby 200 people will be saved or Option B, affording a one-third probability of saving 600 people and a two-third probability that nobody will be saved. When the problem is presented in this way, focusing on the number of lives saved, most people tend to select the safe option, i.e., Option A. However, when the two options are presented otherwise – Option A, whereby 400 people will die or Option B, affording a one-third probability that nobody will die and a two-third probability that everyone will die – most people tend to choose the risky option, i.e., option B. This occurs, despite the fact that the outcomes of both options are equal across the two versions, the only difference lying in the way they are described, i.e., by making reference to the number of lives saved vs. the number of deaths. This is a classic demonstration of framing effects that has called attention to violations in rational decision-making. Hence, contrary to what might be expected from a rational choice, preferences are affected by variations of irrelevant features of options or outcomes (Kahneman, 2003).

Not all nudges are "good" nudges, either due to their consequences or the principles on which they are based, namely non-transparency affecting decision-making. An example of the former is the case of labelling a particular choice as a healthy choice. This has proven to lead to ironic effects, such as people reporting more hunger after eating this kind of food choice as a healthy choice. Such emphasis on the healthy qualities of food possibly signals that this choice is not a default and is something that people may be convinced of (Finkelstein & Fishbach, 2010). A few examples of non-transparency are nudges constructing compliance in subtle ways, such as by putting up posters with human faces to increase compliance rates with the norm, such as cleaning up after oneself or paying for coffee, and using lotteries to get people to overestimate the chance of obtaining a rare effect with a view to encouraging tax reporting (see Hansen & Jespersen, 2013).

NUDGES IN HEALTHY EATING

Nowadays, in the affluent societies of developed countries, high-calorie, nutritionally poor food is widely available and marketed, at a relatively inexpensive price. Today's food environment has thus been coined as "obesogenic" (Swinburn, Egger, & Raza, 1999), as it makes it easy and often less costly to choose palatable unhealthy foods that are high in sugar, salt and fat, ingredients for which we have positive genetic predispositions, even when those choices are opposed to long-term goals of eating healthily or losing weight. The result is that long-term benefits

of healthy options are frequently overridden by the immediate gratification and pleasure obtained by eating tasty, albeit unhealthy food.

While many interventions on healthy eating promotion have been geared towards the provision of nutritional information and education, the influence of contextual factors on behaviors that have an impact on health, such as eating, is now widely acknowledged (Morris & Halkitis, 2015). On the other hand, the knowledge that decisions are, to a large extent, shaped by automatic, non-conscious processes stemming from habits, has fostered interest in the use of the nudge approach to promote healthy dietary choices and habits.

People tend to follow default options, which also applies to when we sit at a restaurant table. Although many of us would not mind being served smaller portions, virtually nobody requests them (Schwartz, Riis, Elbel, & Ariely, 2012), and many would not bother to substitute the french fries presented on the menu for a healthier side dish. Contrarily to the idea that the amount of food one eats is mainly dependent on how hungry one is, it turns out that the larger the portion is, the more one will end up eating. In an experiment where bowls were made bottomless and automatically refilled with soup, participants ended up eating 73% more than tablemates with normal bowls, without even noticing (Wansink, Painter, & North, 2006). Besides status quo bias and mindless eating, portion sizes and food packages are powerful nudges in so far as they convey the norm of what is reasonable to eat in one meal and provide a reference value for making judgments regarding food quantity. When frying chicken, people used 23% more oil from a 32-ounce bottle than a 16-ounce one, and served 30% more pasta when given a two-pound in comparison to a one-pound box (Wansink, 1996).

Reducing portion sizes and inviting people to downsize the quantity they order at a restaurant, with a view to saving some calories have proven to be effective nudges in reducing overall calorie intake (Ello-Martin, Ledikwe, & Rolls, 2005; Schwartz et al., 2012). However, these nudges may be less effective or even ineffective when people are aware of them, as they may compensate for those changes when they are totally transparent and preset in mind. For example, labeling food as healthy may result in an underestimation of calories and consequent excess consumption (see Marteau et al., 2011). In the same vein, when M&M´s were presented as "low-fat", people ended up eating more (Wansink & Chandon, 2006), and showed an overall increase in caloric intake when trying to reduce fat intake, as they were substituting it for carbohydrates (Marantz, 2010). In spite of these findings, some have argued that "the best diet is the one you don´t know you're on" (Wansink, 2006). Another study demonstrated that while individuals ate more when arriving home after having dinner at a restaurant when calorie information was provided after their meal, showing calorie information on menus before they ordered was a good nudge, leading to a reduction in the quantity of food that was ordered and consumed (Roberto, Larsen, Agnew, Baik, & Brownell, 2010). This is an important insight into why displaying caloric information at the

point of purchase, as is now mandatory in some countries such as the United States, may not always produce the intended effects.

Another important aspect is how nutrition information is communicated. Displaying menu items from lower to higher caloric content, using a dish shape to convey dietary recommendations, and translating caloric values into more accessible metrics, such as minutes one would have to walk in order to burn them, are good ways of simplifying the information and rendering healthier food choices easier (Liu, Roberto, Liu, & Brownell, 2012; Riis & Ratner, 2011; Thorndike, Sonnenberg, Riis, Barraclough, & Levy, 2012). Another example is to place evaluative labels on food products, such as through the use of traffic lights indicating different levels of nutrients, in addition to the more complex standard nutritional information tables.

The way in which the dietary information is presented is also very influential over decisions and behaviors, as demonstrated in the "Asian Disease" example presented above. Framing can render certain aspects more salient and contribute to "health halos", i.e., a cognitive bias, whereby a general positive or negative impression of a food item influences the ratings of other specific properties. For example, a menu presenting sweet potato fries as "rich in beta-carotene" which is a true statement, may lead consumers to choose it more because it is "a healthy option". In the same vein, meat that is described as being "85% lean" is likely to be perceived as a balanced option, in comparison to when it is described as "15% fat". This kind of framing, involving highlighting specific aspects of an object has been defined as "attribute framing" (Levin, Schneider, & Gaeth, 1998).

Another type of framing that may impact eating choices is "goal framing", i.e., where the positive (or negative) consequences of choosing (or not) to perform the behavior are emphasized (Levin et al., 1998). For example, if one wants to promote the public's adherence to nutrition recommendations regarding the eating of fruit and vegetables, two options of framing its consequences are possible: "If you *eat* five portions of fruit and vegetables a day you may *prevent* several diseases, such as cancer" (gain frame) or "If you *do not eat* five portions of fruit and vegetables a day you may *suffer from* several diseases, such as cancer" (loss frame). An important question then is knowing which frame works best when trying to persuade people to change their diets.

A substantial amount of research conducted so far has indicated that individuals' characteristics, namely whether they tend to self-regulate primarily as a way of preventing losses or obtaining gains is generally indicative that a loss or gain frame should be, accordingly, more effective (Covey, 2014 for reviews; see Updegraff & Rothman, 2013). In two studies we have conducted, matching the frame of a very brief, two-minute message, to participants' motivational orientation (i.e., the dominant motivational system involved in the regulation of behavior) was enough to nudge Portuguese and American university students to increase their fruit and vegetable intake over the following week (Godinho,

Alvarez, & Lima, 2016; Godinho, Updegraff, Alvarez, & Lima, submitted). As expected, in comparison to those in the mismatched conditions, those who self-regulated mainly in order to prevent losses (prevention-oriented) increased their fruit and vegetable intake after watching the loss-framed message, whereas those who self-regulated mainly in order to obtain gains (promotion-oriented) showed higher levels of intake when they had been exposed to the gain-framed message. Thus, the choice of focusing on the benefits of attaining dietary recommendations or the costs of not attaining them is a subtle way of fostering changes in eating behaviors through tailored nutrition education interventions.

CONCLUSIONS

According to several authors, nudge intervention evaluation is really scarce, as far as sustained change in the health domain is concerned (King et al., 2014; Marteau et al., 2011). Single and multiple nudges (e.g. signage, taste testing), or multiple nudges concurrent with price reductions envisaged to promote healthy dietary behaviors did not influence the sale of healthy items at a community pool. However, in a subset of patrons' purchases, there was an increase in these sales when multiple nudges were implemented, and maintained in follow up (Olstad, Goonewardene, McCargar, & Raine, 2014). In another study on the adoption of renewable or conventional energy, six types of nudges were used (e.g. default, priming, framing, social norms) and only one, the default, revealed a significant effect (Momsen & Stoerk, 2014). In order to promote low-fat milk consumption over a three-month period, a sign "Pick me! I am low calorie" was placed in a university kitchen. Nudging promoted an increase in low-fat but also in full-cream milk, pointing to the possibility of spillover effects due to increasing the salience of milk (Wilson, Bogomolova, & Buckley, 2015). It may be stated that neither is compelling evidence that nudging can improve population health, although its potential certainly deserves further investigation.

In view of the state of the art in nudge intervention, we firstly highlight the need for primary research to examine the effectiveness and acceptability of nudging interventions, which most certainly will not be cut-and-dried, and should be constructed on the basis of a set of questions, namely those which consider what works, for whom, under which circumstances and for how long, as, indeed, stated by other researchers (King et al., 2014; Marteau et al., 2011). Secondly, a systematic synthesis of existing evidence is still needed to assess differences in effectiveness and the processes that explain the impact of different types of nudge interventions (Marteau et al., 2012). Finally, we point to complex, context-specific patterns of effectiveness that suggest that nudging should be complemented by the use of other proven strategies (e.g. Olstad et al., 2014). Hence, nudging may be more effective when integrated in multicomponent interventions, due to its subtle influence which may be hampered by more aggressive strategies, such as other environmental factors, and although we

psychologists are in possession of the behavioral principles, we need assistance from creative agencies to translate them into effective nudges (de Ridder, 2014).

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