Public Health and Behavioral Economics. “Nudging” Behaviors through Wearable Technology

by

Alina Maria Neațu
Bucharest University of Economic Studies
alina_neatu@yahoo.com

Abstract. Public health has always been a matter of great concern for a great number of stakeholders, such as: governments, ministries, health groups, non-governmental organizations, political leaders, private partners, health professionals or various business communities. Long-term improvements in the overall health and wellbeing of the population can now be more easily achieved by encouraging people towards a healthier, more active lifestyle using innovative prevention and monitoring tools and technologies. Among many other given benefits, wearable technology entails the potential to deliver public health support on a previously unimaginable scale, for example by helping individuals autonomously manage their eating, sleeping and physical activity and reducing pressure on their personal health and the healthcare systems created to support them. Behavioral economics provides the means to potentially increase awareness, reduce disparities, inform people and motivate them in this regard. Focusing on the relatively predictable mind paths and mental shortcuts (heuristics) humans employ to make decisions, the emerging field of behavioral economics can provide valuable insights for policy makers when developing strategies to motivate people in leading a healthier life. The present paper describes how several behavioral economic principles in decision-making can influence health attitudes and behaviors and what are some of the most useful and appealing wearable technologies in 2015, that health practitioners and private individuals can employ and promote when considering health improvement, monitoring and feedback. The research concludes with summarizing downsides, awareness, technical challenges, acceptance and implementation of modern wearable technologies in day-to-day life, also proposes various recommendations and future research questions to urge this promising area of research and practice.

Key words: Behavioral Economics, Decision-Making, Nudging, Public Health, Wearable Technology.

JEL classification: I12, I18, O33, P46

1 Introduction

The worldwide number one increasing health condition is obesity; statistics show that figures have nearly doubled since 1980. According to World Health Organization estimates, more than 1.9 billion adults, 18 years and older, were overweight in 2014, with more than over 600 million of them being obese. Percentage wise this means 39% of adults aged 18 years and over were overweight and 13% were obese in 2014 (WHO, 2015). Moreover, a significant extent of the world's population concentrates in countries where overweight and obesity kill more people than underweight does. Even so, obesity is a preventable condition.

Many governments and member states of the World Health Organization keep busy in designing health plans and strategies meant to alleviate what is considered to be one of the most threatening public health problems of our time. As expected, in most public healthcare plans, increased physical activity together with dietary modification is advised. Which seem to be a very sensible and effective recommendation not only in tackling excess weight problems, but also in lowering the occurrence of many non-contagious and less evident health conditions such as cardiovascular disease, cancer and diabetes.

Despite all this, a global concern still remains; one in three adults does not exercise or move their body sufficiently. Bearing this in mind, it should be noted that physical inactivity is the fourth leading risk factor for death worldwide, causing over 3.2 million deaths annually (Lim et al, 2010).

This article explores how insights from behavioral economics may reduce these disparities by providing tools to increase physical activity and health monitoring through the usage of wearable technology. The aim of
the paper is primarily to describe general concepts of behavioral economics and to demonstrate practical use when applying behavioral insights to the modeling of individual decisions by suggesting appropriate behavioral methods. For this purpose, the relevant literature in the field has been reviewed in order to identify and present the most representative concepts and ideas; another scope of the research is to make suggestions and recommendations of how such findings could be implemented.

The structure of the paper is closely tied to these objectives. The first and second part briefly present research and evidence from recent literature confirming the high interest in the study of behavioral economics. The third part explains important concepts and ideas in the field of nudging and the utility of knowledge and implementation of such results. In the fourth part, wearable technology is described and behavioral insights methods are suggested as ways for improving individuals' health behaviors through the usage of such instruments, also to be found here are limitations and concerns regarding the research. In the end of the paper a brief conclusion summarizes suggestions and future research opportunities.

2 Behavioral Economics

Using behavioral economics principles in regulating preferences and decisions of individuals is not a newly adopted practice, but more likely, an increasingly global trend. The methods characteristic to behavioral economics are often used to shape public policies in the sense of designing behavioral changing strategies based on the actual behavior of individuals and not a hypothetical one. Governments like the ones in the United States, Australia and Great Britain have been successful in implementing such policies and opening new ways of thinking and regulating public policies based on behavioral economics insights, choice architecture and nudging.

Still considered a relatively young branch of the economic discipline, behavioral economics seeks to identify and explain the ways in which individuals make decisions by employing theories derived from psychology and sociology in studying the human economic behavior. Additionally, behavioral economists are interested in researching the motivations and factors determining such, often considered irrational, behaviors (anchoring, overconfidence, framing, herd mentality, etc.) observed in different socio-economic backgrounds.

Behavioral economics concepts like social norms, individual preferences, judgment, decision-making, choice architecture could prove useful in enhancing existent public health strategies that target improvements in the overall wellbeing, exercising, dieting, screening and monitoring, by providing new insights into people’s behavior and decision-making patterns when engaging (or not) in activities of the kind. Many important research concepts in behavioral economics study people’s tendency to subjectively assess the probability of an outcome or event (Kahneman, 2003). Extended psychological and behavioral economics studies have shown that such judgments, notably those in situations where people have insufficient experience or information, are often likely to be influenced by presumably irrelevant factors. (Tversky & Kahneman, 1974)

When analyzing judgments from a behavioral perspective, various mental biases such as availability, representativeness or unrealistic optimism can be considered responsible for hindering the decision to engage in healthy behaviors, like fitness and exercising, in order to improve physical shape and prevent the likelihood of bodily illnesses in the future. The tendency to estimate the probability of an event occurring in the future, such as a heart condition diagnosis, based on the power of imagining that event taking place or recalling similar events from the memory is known as the availability bias (Tversky & Kahneman, 1974). For example, someone who recently found out about a family member suffering from diabetes is more likely to consider dieting and exercising as the probability of getting ill as well becomes highly “available” in memory.
Representativeness is known as the judgmental bias that enables peoples to “foresee” the probability or frequency of an event based on its consistency with one’s past experiences or assumptions (Kahneman, 2003). Practitioners could use knowledge on both availability and representativeness biases to improve the perception of risk and highlight the benefits of constant health-conscious behaviors and monitoring, by providing memorable information about the benefits of regularly performed workout activities, technological diffusion and adoption of health monitoring wearable devices among peers.

Illusion of control is the tendency to overestimate the influence one may have over other external events. This bias occurs when people experience a sense of control over outcomes that they demonstrably do not influence, for example personal state of health. (Thompson & Rüdiger, 2004).

Overconfidence effect is a well-known bias describing people’s excessive confidence in their own answers to questions, it occurs when subjective confidence in the own personal judgments is reliably greater than the objective accuracy of those judgments. For example, for certain types of questions, answers that people rate as "99% certain" turn out to be wrong 40% of the time (Lichtenstein et al, 1982).

 Unrealistic optimism is a frequent bias that occurs when individuals manifest exceptionally low estimates of their own susceptibility to harm or tend to exceedingly estimate of their chances of success or benefit (Weinstein et al, 2005). It is very often, that people tend to underestimate their chances of getting sick in the future.

Ambiguity effect, a cognitive bias where decision making is affected by a lack of information, or "ambiguity" and is characterized by the tendency to avoid options for which missing information makes the probability seem "unknown". (Frisch & Baron, 1988) Relevant social marketing campaigns that provide accurate information about life-threatening conditions caused by insufficient physical activity and the popularity of new technologies available should increase self-conscious monitoring and prevention among population and, to a certain degree, counter fight the tendency for unrealistic optimism.

Decision-making is concerned with how information is presented.

Framing bias refers to the disposition of people to change their individual preferences based on the manner available choices are displayed (framed). Personally tailored information such as that made available on wearable devices can be very useful when physicians address and encourage healthy behaviors among the general population.

Ostrich effect is a judgmental biased referring to the tendency of people to ignore an obvious (negative) situation. Implementing dieting and physical exercise programs, breaking health goals into chunks, monitoring progress and receiving feedback from professionals are now easier to achieve through the usage of wearables. Adequately presenting these options may counteract this effect.

Messages about public health monitoring and prevention measures may also be framed to appeal to one’s sense of fairness (Rabin, 1993). When perceiving policies and public system as unfair (e.g., low levels of perceived tolerance, discrimination, uncertainty) people are generally less trusting and receptive to recommendations that encourage preventive health behaviors.

An important bias that needs to be considered when designing healthcare policy measure is that of reactance, which refers to people’s reverse psychology or urge to do the opposite of what is advised out of a need to resist a perceived attempt to constrain their freedom of choice (Brehm, 1966).

Designing mechanisms to resolve issues of trust and other such barriers through improved communication, cultural competence, engagement in health decision-making, and by providing better information regarding preventive options may improve people’s desire to autonomously commit to personal wellbeing and physical shape improvement. Measures that encourage undergoing a healthy diet and exercise can also be framed in terms of social and cultural norms (Gigerenzer, 2008). Such
efforts may depict the majority of a peer group engaging in those behaviors. Affect, or emotional response, is considered to have a major influence on decisions-making as well (Slovic et al., 2002). It can prove effective to frame health messages to induce positive affect about a healthy lifestyle or counter undermining affect concerning health conditions. For example, describing the peace of mind people will experience when constantly being able to monitor and keep an excellent health record or the sense of pride that comes with taking care of their health may be more effective than addressing the fear of developing a threatening condition.

Also worth mentioning is the fact that, people tend to discount future rewards, or focus on immediate enjoyment and fulfillment rather than keeping in mind the longer-term benefits (Camerer & Loewenstein, 2004). Thus, it may be compelling to reframe the costs of preventing behaviors and monitoring, and pinpoint immediate benefits, such as self-satisfaction or the ability to prevent health problems. Another viable strategy from behavioral economics, that may balance future discounting, is rewarding health conscious behaviors and allowing the activities involved to have an immediate and tangible benefit that may counteract the inconvenience or discomfort of good health habits.

3 Nudging

One of the key aspects relating to behavioral economics is how it can be used to better the decisions of individuals and organizations. The idea of providing a guiding hand in the decision making process has come to be known as a nudge, due in no small part to the book with the same name written by Thaler and Sunstein. A nudge is defined as ‘an aspect of choice architecture that alters people’s behavior in a predictable way without forbidding any options or significantly changing their economic incentives. Therefore, in order for a certain policy to be considered a nudge it must abide by the following conditions (Thaler & Sunstein, 2008, p. 109): 1) proper alignment of incentives, 2) appreciation of how individuals understand the consequences of their decisions, 3) sensible default options, 4) appropriate feedback, 5) allowance for expected errors, and 6) clear presentation of information for making complex choices.

Choice architecture, defined as “organizing the context in which people make decisions” constitutes an interesting starting point for policy makers when designing measures to improve public health (Thaler & Sunstein, 2008). A very significant feature of human behavior often studied in behavioral economics is the tendency of people to accept the status quo when an option is presented as standard, which is known as the default option bias. From a nudging perspective, defaults can prove powerful tools in promoting healthy behaviors. While guiding people into a pre-designed direction, it is still possible to respect individual preferences by offering an opt-out option (Madrian & Shea, 2001). Noticeable advancements in field of choice architecture and nudging are often achieved by simply making the desired behavior the default option and requiring people to opt out (Halpern et al., 2007).

Choice architecture also accounts for tracking performance and offering feedback. Wearable technologies can allow practitioners to identify, remind, and provide feedback to both providers and users, all of which are remarkably promising strategies for increasing health awareness. Positive feedback is more likely to be desired, but prompts and measures of encouragement should also be made available to motivate people into a healthier lifestyle. Offering financial incentives (like financial discounts on health insurance premiums), rankings or stimulating a sense of pride can prove useful when promoting long-term measures for health improvement. This may counteract the tendency to discount future rewards by adding proximal, immediate benefits.

People should be helped to better understand the consequences of a risky unhealthy lifestyle through reasonable means that rely on both
traditional presentations of risk and the principles of behavioral economics outlined here. In accordance with the aforementioned behavioral principals, a well-performing system should acknowledge room for errors, making it easy for individuals to correct the “absence” of self-conscious health behavior and offer support in joining a health program anytime. Explicitly, when designing ways to raise awareness and promote healthy behaviors, policy makers should include elements of choice architecture, such as default options, feedback, incentives, and allowance for errors. (Thaler & Sunstein, 2008). For example, practitioners may consider a “default option” approach to health improvement measures (with an opportunity to opt out) that integrate and financially support wearable technology as feature for keeping and updating electronic medical records, particularly for the lower-class population who might be inclined to use such technologies but cannot yet afford to purchase it.

As a conclusion, decision-makers and practitioners should include appropriate framing in their social marketing communications regarding the benefits of self-conscious dieting and exercises, emphasizing the benefits of such activities and contentment made possible by wearable technologies.

4 Wearable technology

In this paper, it is argued that behavioral economics principles can prove to be useful to practitioners when generating innovative and effective public health strategies that target behavior change. One exhilarating and fast spreading trend in literally “touching people’s hearts” and improving their health behavior could be achieved through the employment of wearable technology in healthcare policy architecture. In the process of promoting, guiding and monitoring public health individualized, contextually-responsive, behavior changing solutions can be delivered, as wearable devices hold the potential of getting that close to their users as no one ever imagined before.

First, what is as wearable technology? In most experts’ acceptance – but not all – it represents any body-worn computer that is “designed to provide useful services, while the user is performing other tasks”. Here we can refer to nearly all strapable devices such as fitness monitors, music players, smart watches, sport garments, HUD systems, and even smartphones (depending on how they are used). All these devices come with both advantages and disadvantages for the average inexperienced user, moreover they come with certain technical limitation and challenges such as: power and heat, on and off-body networking, mobile input, display, etc. Privacy represents such a significant challenge, that it deserves its own article. Due to the intricacies involved, at this time, the topic will not be discussed in greater detail. However, this present paper only focuses on the usage and implementation of wearable technologies as a tool to improve, encourage and monitor public health, stimulate health awareness and preventive behaviors.

Wearable technology is becoming more and more spread in people’s everyday life. The real impact of wearable technology is only expected to increase, according to the latest report available on researchandmarkets.com the “wearable technology market will be worth USD 22.7 billion in 2015 rising to USD 173.3 billion by 2020”.

Wearable technology has the potential to improve life-standards and make healthcare more efficient, convenient and effective for multiple stakeholders. Whereas physicians would typically rely on patients to communicate them their state of health, wearables would make it possible for medical professionals to appreciate the general health condition of their patients even before they walk into the exam room. Insurance companies can also benefit by allowing practitioners to leverage data from users and provide discounts on premiums. Many of these devices are already available for everyday use, but integrating this information into electronic medical records will be a time costly complicated process. Challenges like standardizing the information, reporting it, saving it and secure it, in a way that makes it
easily accessible for medical professionals across different departments will have to be considered. Indubitably, data ownership and privacy will constitute other major concerns around any such implementations. Even so, an increase in usage of wearable technology is easily foreseeable, especially as shown above, in the medical sector where it can be used as an effective tool for doctors and hospitals to work and experiment with it. Although, it is yet premature to expect doctors to officially use biometric data collected by wearables of their patients for diagnosis, it is safe to assume that the relationship between the doctor and patient will continue to change in the future.

5 Health insurers and the mobile app market

The first steps toward including wearables have already been taken in the health industry. On November 18, 2014, the international insurance group Generali announced its cooperation with Discovery and the planned introduction of the "Vitality" mobile app health products on the European market, respectively in Germany, France and Austria. Currently the Vitality products are still under development, as they need specific tailoring to individual needs, legal frame and the market requirements they address. But the developers of the health program hope to gradually cover many more aspects via wearable technology and monitoring, such as life, disability and health insurance.

The concept behind "Vitality" is quite simple. At the beginning, right after joining the program, the users create a profile, identify their personal health and fitness levels and set the individual goals they want to achieve over the course of the program. In the second step, they work towards these goals. For achieving milestones they receive points with which - depending on how many they have collected - they attain a certain status. Depending on the status level, they are then offered different discounts and coupons. The points can be accumulated in various ways, for example, including medical screening prescriptions (comparable to the dentist bonus health records), fitness and exercise, as well as for purchasing healthy food items.

The aim is to promote health-oriented behaviors: all participants are offered the same starting conditions and opportunities to earn bonus points regardless of their initial health status. Also for undergoing the same activities, participants receive the same corresponding number of points awarded to a specific activity. Generali often proudly promotes its "Vitality" as a product that meets today's needs and habits of many consumers and thus the program actively accessing the needs of the customer. Moreover, according to a study by YouGov every third person would transmit personal health and fitness data to their health insurance company, if she would receive benefits.

Still a great deal of third-party media coverage and critics concerning the Vitality fitness app focuses on issues such as privacy and handling of personal data so far. Whereas the Generali Group repeatedly argued that the sensitive and trustworthy handling of personal data is one of the core competencies of the insurer and the storage and processing of the data correspond to the high European data protection requirement, it stated that the customers are informed accurately and transparently about what data should be collected and can decide on their own whether to participate in the program and what data they transmit.

On July 13, 2015 the advancements in the introduction of the fitness app were made public by its developers and its implementation has been scheduled for first half of 2016. To mitigate the privacy debate, the Generali Group had the Public Health Programme "Vitality" modified. The app should be active first in Germany, then in France and Austria.

It is clear that modern individuals give away more and more data on their own nowadays - partly voluntarily, partly involuntary. Still many experts argue that, especially in the public health sector, good behaviors should be rewarded. This reward thought may appear quite conclusive for a car insurance, where one may be more willing to divulge their data on their own on safety grounds. But what does this
concept mean for the health insurance sector? When the plans of the insurer first became public, a storm of protest were raised - among other things because privacy concerns. Finally, the plan of the insurer was to grant discounts if customers demonstrate a healthy lifestyle via smartphone app. For this, however, policyholders have to divulge sensitive information about them and monitor their health data electronically. This should be done with the help of the so-called "telemonitoring". For this purpose, the main developer of the health program cooperates with the South African insurer Discovery, which is already in cooperation with various insurers on the market in other countries, for example, in the US and UK.

The supplier from overseas has developed the Public Health Programme "Vitality" so that it rewards customers with coupons and discounts, if they have a healthy behavior. The data collection concept provided via app gathers precautionary dates documenting health appoints, steps counts and sporting activities, even a healthy diet belong to the package. In a first stage, the intended rewards include travel vouchers and fitness classes.

Critics of the program abound, especially the ones coming from its competitors. Birgit König, head of the Allianz Insurance in Germany, stated in a contribution of the German Magazine Wirtschaftswoche: "As tempting as that may sound to some, that’s how wrong is this approach," arguing that the data collection is made disproportionately and that Allianz is opposing the idea of offering insurance rates and discounts only on the presence of regular exercise.

Not only Generali, Allianz also, Axa and other insurers are working on similar projects in Europe, promising customers to help them toward a healthier lifestyle. All insurers stress that they only use data the individuals provide them voluntarily. However, the companies want to know their customers as accurately as possible in order to offer them individual rates. Retrieving information about their health or driving style through such programs could prove highly problematic for individuals especially when referring to the issue of privacy. However a private health insurer knows already a lot about a person's health status, especially through his access of medical bills and prescriptions for each individual customer.

Although encouraging individuals toward more healthy lifestyles, individualized tariffs pose a great danger, they lead the principle of insurance to absurdity. Health insurers cover different risks arising among many customers and also over time, that is the core principle of their business. With the new individualized payments rate the insurance companies are now only trying to win the "best" risks on their side - in the hope that the competitors will have to deal with many more "bad" risks on their own. Further data and research will be needed in order to establish if such health programs, like Vitality, are in the best interest of the user or the developer.

6 Conclusion

As people become more aware of the possibilities offered by the wearable technology, they will start to understand their own bodies better and acquire a deeper sense of control and responsibility in consciously measuring physical parameters and autonomously monitoring overall health.

Using behavioral findings to enhance population’s awareness and generate self-conscious behaviors regarding personal health improvement through the usage of wearable technology (for example, such as Vitality for the self-monitoring of physical activity, sleeping and dieting) will only lead to faster developments and advancements benefiting both social and economical environments.

However, such public health programs, although often useful, involve a certain degree of risk and a great deal of care is needed when designing their specific features, especially in choosing and defining default options and incentives. Another important issue will constitute facilitating reliable consumer protection measures and a stable legal work frame for all parties involved.
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Permission

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Author description

Alina Maria Neațu is a graduate of the Faculty of Economics, Bucharest University of Economic Studies, where she obtained a bachelor’s degree in Economics and a master’s degree in business communication. Currently she is a PhD Candidate at the Faculty of Economics, where she is preparing a thesis entitled "The theoretical influence of behavioral economics on the functioning of the markets” which deals with the importance played by behavioral economics. Moreover, for the last seven years she has been working for an international agency specializing in the marketing of banking and financial services. Her future research interests focus on market research and analyses, behavioral economics and conspicuous consumption.