

Article

Episodic future thinking for the prevention and treatment of health risk behaviors

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ABSTRACT

Non-communicable diseases (i.e., cardiovascular, oncological, respiratory, and endocrine diseases) represent the main cause of death and morbidity in the world, with tobacco and alcohol use, an unhealthy diet, and a sedentary lifestyle being the main risk factors. From reinforcer pathology theory, based on behavioral economics (BE), these health risk behaviors are understood as choice disorders, characterized by an excessive valuation of the reinforcer (e.g., the drug) and a preference for immediate reinforcers over delayed ones. Episodic future thinking (EFT) is a psychological intervention that consists of vividly visualizing future events and projecting oneself into them, in order to increase the valuation of the reinforcers associated with the execution of a healthy behavior. This technique shows promising results in reducing impulsive decision-making and increasing health-related behaviors (e.g., abstinence, diet, physical activity).

Pensamiento episódico futuro para la prevención y el tratamiento de conductas de riesgo para la salud

RESUMEN

Las enfermedades no transmisibles (i.e., enfermedades cardiovasculares, oncológicas, respiratorias y endocrinas) representan la principal causa de muerte y morbilidad en el mundo, siendo el consumo de tabaco y alcohol, una dieta no saludable y un estilo de vida sedentario los principales factores de riesgo. Desde la teoría de la patología del refuerzo, sustentada en el modelo de la Economía Conductual (EC), estas conductas de riesgo para la salud se entienden como trastornos de elección, caracterizados por una valoración excesiva del reforzador (p.ej., droga) y una preferencia por los reforzadores inmediatos en detrimento de los demorados. El pensamiento episódico futuro (PEF) es una intervención psicológica que consiste en visualizar vividamente eventos futuros y proyectarse en ellos, con el fin de incrementar la valoración de los reforzadores asociados a la ejecución de una conducta saludable. Esta técnica presenta resultados prometedores en la reducción de la toma de decisiones impulsiva y en el aumento de conductas relacionadas con la salud (p.ej., abstinencia, dieta, actividad física).

Palabras clave

Pensamiento episódico futuro
Economía conductual
Patología del refuerzo
Adicciones
Enfermedades no transmisibles

Behavioral economics and public health

Non-communicable diseases such as, for example, cardiovascular, oncological, respiratory, and endocrine diseases, are the leading cause of disability and loss of quality of life, as well as death and morbidity in the world, leading to a very high social-health cost (Stanaway et al., 2018). Tobacco and alcohol consumption, an unhealthy diet, and a sedentary lifestyle are the main risk factors for developing these types of diseases (Benziger et al., 2016; Rehm & Shield, 2019). For these reasons, the prevention of the aforementioned risk factors and the promotion of healthy behaviors is one of the main objectives of public health.

Traditional economic models have conceptualized human beings as *homo economicus*, understanding people's choices as extraordinarily stable, made after a highly rational evaluation of their utility and cost-benefit according to the information available to them and their preferences (Schettkat, 2018). From this perspective, it is assumed that, for example, a person consuming psychoactive substances is aware of the short- and long-term effects of consumption and chooses to consume after an a priori rational evaluation (at least from the person's perspective) where the benefits of consumption outweigh the advantages of abstinence. In congruence with these models, many public health initiatives have an essentially informative approach, with the aim of making people understand the health consequences of their choices and thus make better decisions (e.g., awareness campaigns by the Spanish Directorate General of Traffic). However, many of the health risk behaviors are unplanned, automatic, and impulsive, which causes purely informational interventions to have low effectiveness (Marteau et al., 2012; Matjasko et al., 2016).

The behavioral economics (BE) model attempts to overcome the limitations of the classical perspective in order to prevent public health problems more effectively. The origin of BE is to be found in the seminal works of Herbert Simon (1955) and Kahneman and Tversky (1972; 1973), and it was in the 1990s when interest in the discipline grew exponentially. This model uses the methodology and procedures of economics and psychology, and aims to understand how people make decisions, paying special attention to the context in which the behavior takes place, integrating both individual variables (e.g., their preferences, the information available to them) and contextual variables (e.g., legal regulation) (see Matjasko et al., 2016 for a review).

The most recent theoretical developments in BE are based on the hypothesis that people's decisions do not follow such a rational and stable procedure as was assumed in the classical models, but that different variables influence the decision to adopt a given behavior. Thus, decision-making is not only explained by individual variables, but by the person-environment interaction, i.e., it is influenced by the context, by social norms, and by legal regulation, among other variables (Zimmerman, 2009). Choices are not, therefore, stable and rational, but influenced by a multitude of biases. For example, a smoker may lack information or have biased knowledge about the damage caused by smoking, may be overconfident that he or she will not suffer from smoking-related diseases, may exaggeratedly value the immediate pleasure of a cigarette to the detriment of future consequences, or may want to quit smoking, but does not do so because of a tendency to resist change.

One of the key concepts in the BE framework is that of the 'nudge'. It is based on the premise that people do not make use of a quick, automatic, intuitive choice system without deliberate reflection, so the nudge operates directly on behavior rather than on information or people's attitudes and beliefs (Bhargava & Loewenstein, 2015; Thaler & Sunstein, 2009). In short, the nudge refers to the modification of the social and physical context that makes the occurrence of the target behavior more likely. These changes respond to an increase in the accessibility of healthy alternatives and an increase in the response cost of health risk behaviors (Ledderer et al., 2020). This approach has been shown to be more effective in achieving behavior change (Hummel & Maedche, 2019; Ledderer et al., 2020) than strategies based on a classical perspective (Burgess, 2012).

In the same vein, there are many examples of public health policies based on the BE model (see Table 1). Specifically, in Spain, different regulatory actions aimed at restricting tobacco consumption in public spaces have been enacted (Ley [Law] 28/2005 and Ley [Law] 42/2010), and others aimed at food control, such as the tax on sugar-sweetened beverages (Decreto Ley [Decree Law] 13/2019) or the labeling system (Real Decreto [Royal Decree] 1412/2018). These BE-based regulatory measures have been shown to have a significant impact on people's health, in terms of tobacco consumption, exposure to environmental tobacco smoke or associated morbidity (Unidad de Prevención del Tabaquismo [Smoking Prevention Unit], 2016, 2020), as well as in reducing the consumption of sugar-sweetened beverages (Royo-Bordonada et al., 2022). Additionally, preventive interventions have been promoted based on the transmission of truthful information about different health behaviors, in order to undo myths and cognitive biases related to different behaviors and increase the perception of risk or provide social skills that improve

Table 1.
Examples of public health policies based on the model of behavioral economics

Environmental prevention measures	<ul style="list-style-type: none"> - Availability of fruit or water in vending machines instead of unhealthy foods - Increasing the salience of appropriate information (e.g., calories of a food). - Eliminating unhealthy food from the supermarket checkout environment - Changing the display order of a menu - Defaulting to the most desirable option (e.g., organ donation).
Treatment measures	<ul style="list-style-type: none"> - Choosing the day and time to get vaccinated - Providing feedback on the behavior to be modified (e.g., measurement of weight or nicotine values). - Monitor target behavior (e.g., through activity wristbands that track physical activity) - Text message reminders, cash deposits that they get back if they reach a goal (e.g., lose weight) - Behavioral contracts where the person commits to achieving the target behavior - Including psychological components in standard treatments (e.g., incentive-based contingency management) aimed at increasing the response cost of the behavior to be modified (e.g., smoking).

decision-making (Delegación del Gobierno para el Plan Nacional sobre Drogas [Government Delegation for the National Plan on Drugs], 2022).

Reinforcer pathology theory

Reinforcer pathology theory, supported by the principles of BE, has received much attention and empirical support in explaining different behaviors and/or health risk factors, such as drug use, obesity, or risky driving behaviors (Bickel et al., 2017; Katelyn et al., 2011). Based on this theory, health risk behaviors are understood as a choice disorder, characterized by two processes: excessive valuation of the reinforcer (i.e., high demand) and impulsive decision making (see González-Roz et al., 2020 for a review). Demand is a variable that alludes to the desire or motivation to consume, which is closely related to limits on its access, such as the price of the reinforcer (substance, food). Delay discounting (DD) refers to impulsive decision making explained by the loss of the value of a reinforcer as time passes. Thus, a person with a high level of DD shows an excessive preference for immediate reinforcers of small magnitude rather than for reinforcers delayed in time, but of greater magnitude or value. DD has been shown to be a transdiagnostic indicator of various physical and psychological health problems (Amlung et al., 2019; Levitt et al., 2022).

Evidence has shown that people with obesity and individuals with diabetes have a higher rate of DD compared to people with normal weight or without diabetes (DeHart et al., 2020). In addition, this indicator has been related to poorer medication adherence, poorer diet, and low levels of physical activity (Epstein et al., 2020). Substance users also have a higher rate of DD compared to non-users (Bickel et al., 2020). In addition, DD has been shown to be a strong predictor of addiction onset and severity, as well as treatment outcomes (abstinence and relapse; Amlung et al., 2017; Bickel et al., 2019; García-Pérez et al., 2021; Kräplin et al., 2020).

Given the relationship between DD and these health risk behaviors, the development of interventions capable of modifying impulsive decision making is a highly relevant goal. One of the interventions that has received the most attention in this regard is episodic future thinking (EFT) (Rung & Madden, 2018; Scholten et al., 2019). Its foundations, principles, and evidence of efficacy are described in the following section.

Episodic future thinking

EFT refers to a person's ability to imagine future events and to project themselves into them. It is related to substance use (El Haj et al., 2019; Moustafa, Morris, Nandrino, et al., 2018), overweight or obesity (Hayes et al., 2018; Yang et al., 2019), and other psychological disorders, such as depression or anxiety (Cha et al., 2022; Du et al., 2022; Moustafa, Morris, & Elhaj, 2018).

EFT emerged as a psychological construct in the early 2000s, closely associated with the definition of prospective memory (Atance & O'Neill, 2001). In the beginning, it had special interest in working with children (Russell et al., 2010) and with people with autism spectrum disorder (Crane et al., 2013; Terrett et al., 2013). In 2013, EFT began to be investigated as a psychological intervention aimed at people with obesity to reduce caloric food

intake and promote appropriate decision making (Daniel et al., 2013b, 2013a).

As a psychological intervention, EFT is a cognitive technique that consists of vividly describing and visualizing a future event. Its aim is to improve decision-making processes by increasing the valuation of delayed reinforcers associated with the performance of the healthy behavior (e.g., abstinence from drugs, physical exercise, or reduced food intake) over other health risk behaviors (Morris et al., 2020; Schacter et al., 2017). At the procedural level, the therapist guides people to generate future events including a multitude of details (i.e., where, when, how, with whom), in order to make the situation as realistic as possible and, thus, facilitate its visualization. Participants can generate a short sentence evoking the event to facilitate its recall (e.g., "in one week I am going on a trip with my partner"). The event is written down, visualized for 2-5 minutes, and different characteristics of that visualization (e.g., realism, vividness, enjoyment, importance, personal relevance) are scored to ensure correct practice (Hollis-Hansen, O'Donnell, et al., 2019).

Early applications of EFT to the healthcare field (Daniel et al., 2013b, 2013a) were conducted in controlled experimental settings and were characterized by a single EFT session, where immediately after visualization of the created event, participants completed the DD task (see e.g., Stein et al., 2016, 2018). Today, EFT is applicable to the general and clinical population (Ye et al., 2022). Moreover, it is no longer only conducted in experimental laboratory settings, but also in clinical settings, targeting both people with obesity or diabetes (O'Neill et al., 2016; Stein et al., 2017) and substance users (Aonso-Diego et al., 2021; Forster et al., 2021; Patel & Amlung, 2020).

Effectiveness of episodic future thinking in reducing and eliminating health risk behaviors

The most recent systematic reviews indicate that EFT reduces the rate of DD in the general population and in specific populations (Ye et al., 2022), such as, for example, in substance users, both legal and illegal (see e.g., Athamneh et al., 2021, 2022; Sofis et al., 2021; Voss et al., 2022), or people with diabetes (Epstein, Paluch, et al., 2022).

EFT has also been shown to be effective in reducing substance use (González-Roz et al., 2021), increasing medication adherence in people with diabetes (Epstein, Jimenez-Knight, et al., 2022), decreasing caloric intake (Hollis-Hansen, Seidman, et al., 2019; Sze et al., 2017), reducing body weight (Epstein, Paluch, et al., 2022; Sze et al., 2015), and increasing physical activity (Epstein, Paluch, et al., 2022).

Despite the short history of EFT, several meta-analytic studies have examined the characteristics or parameters that moderate the efficacy of EFT (Rösch et al., 2021; Ye et al., 2022). Studies regarding the content of the event created indicate that EFT has a greater impact if the event is directly related to the behavior to be modified. On the other hand, EFT has a greater effect on the rate of DD when the valence of the created event is positive than when it has a neutral or negative character (see Table 2).

With respect to the number of practices required, the most recent evidence suggests that more EFT practice has a greater impact on DD, both in substance users (García-Pérez et al., 2022; Mellis et al.,

Table 2.
The most relevant results of systematic reviews and meta-analyses concerning episodic future thinking

Authors	Aim	Number of studies included	Results
González-Roz et al., (2021)	To examine the effectiveness of EFT on DD, demand, and drug use in substance users.	15	EFT reduces impulsive decision making in 12 of the 15 articles. EFT reduces some of the demand indicators in 7 of the 15 articles. No firm conclusions can be drawn about the impact of EFT on substance use.
Rösch et al., (2021)	To examine the impact of EFT on DD.	48	EFT had a significant impact on DD (moderate effect size, $g = 0.43$). The effect is greater when the visualized events are positive, more vivid and related to the future choice. EFT has a greater effect on people with a high rate of DD.
Ye et al., (2022)	To examine the effectiveness of EFT on DD.	47	EFT had a significant impact on DD (moderate effect size, $g = 0.52$). The effect is greater when future EFT events have a positive valence.

Note. EFT = episodic future thinking; DD = delay discounting.

2019) and in people with obesity (Mansouri et al., 2020), with the effect on DD increasing as the number of sessions increases. Regarding the application format, EFT has mostly been implemented in a face-to-face format, although its feasibility in an online format has recently been evaluated (Sofis et al., 2020; Sze et al., 2015).

On the other hand, although EFT has been carried out mainly in isolation, some studies have combined it with other treatments (e.g., cognitive behavioral therapy, contingency management) obtaining excellent results (García-Pérez et al., 2022).

Table 3 shows a summary of the characteristics and parameters of EFT that have been shown to be effective.

Table 3.
Characteristics related to the effectiveness of episodic future thinking

Number of sessions	A single visualization has a significant impact on DD. However, there is increasing evidence that repeated practice produces a greater effect.
Application format	The feasibility of implementing EFT in a face-to-face and online format has been evidenced. In addition, some recent studies point to virtual reality to facilitate visualization.
Temporary window	The time frame of the events created ranges from two weeks to one year.
Combination with other treatments	EFT has mostly been implemented alone, but some studies combine it with cognitive-behavioral therapy and contingency management.

Conclusions

Reinforcer pathology theory, supported by the BE model, provides a theoretical and empirical framework for understanding and preventing health risk behaviors. Based on this theory, EFT is an intervention that consists of creating and visualizing future events in order to increase the salience, and subjective value, of the reinforcer associated with engaging in health behaviors (e.g., balanced diet). This technique shows promising results in reducing impulsive decision-making and increasing health-related behaviors in experimental settings, with increasing evidence in clinical settings.

One of the future challenges for improving the effectiveness of EFT is to increase adherence to treatment (Aonso-Diego et al., 2021). Studies propose different strategies to improve adherence to

visualization practices and, therefore, to improve the effectiveness of EFT. Sending reminders in the form of text messages, audio recording the event created in the therapy session, or providing incentives in exchange for practice may be useful strategies to achieve greater adherence.

The use of technology offers several advantages in investigating the effectiveness of EFT. For example, ambulatory assessment (Fonseca-Pedrero et al., 2022) would allow assessment through electronic devices (e.g., activity bracelets, cell phones) of the vividness of the visualizing practice, daily caloric intake, level of physical activity, or substance craving. At the same time, it is possible that the systematic assessment of health parameters itself may have some effect on modifying unhealthy behaviors.

Finally, implementing EFT through virtual reality (Wang et al., 2019) would allow visualization of the created future event with a greater amount of detail, especially for people with episodic memory problems.

In conclusion, EFT is a novel psychological intervention that shows promising results in the reduction of health risk behaviors, such as substance use, caloric intake, body weight, and a sedentary lifestyle. As it is a relatively recent intervention, the evidence is still scarce, so more studies are needed to implement EFT, particularly in clinical settings, in order to obtain evidence of its effectiveness.

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