The Effect of Time Perspective on Addictive Behavior and Its Mechanisms

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Abstract

Addiction behaviors pose serious harm to both individuals and society. Research on time perspective among addicted populations has emerged as a novel perspective for investigating the onset and development of addiction behaviors. Individuals oriented toward past-negative, present-hedonistic, and present-fatalistic time perspectives demonstrate greater vulnerability to addiction behaviors, whereas future time perspective orientation functions as a protective factor, not only reducing the incidence of addiction behaviors but also promoting recovery. Investigating behavioral mechanisms such as self-regulation and impulsive decision-making, alongside neural mechanisms in the prefrontal cortex, can facilitate a deeper understanding of how time perspective influences addiction behaviors. Future research may further examine the consistency and specificity of time perspectives across different addiction populations; employ longitudinal methodologies to investigate the dynamic trajectories of time perspective changes in addicts; and implement interventions targeting addicts' time perspective—enhancing future time perspective while reducing past-negative and present orientations—to help them achieve temporal balance and thereby improve treatment outcomes.

Full Text

The Influence of Time Perspective on Addictive Behavior and Its Mechanism

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Abstract

Addictive behaviors have inflicted serious harm on both individuals and society. Research on time perspective in addicted populations has emerged as a novel framework for investigating the emergence and development of addictive behaviors. Individuals oriented toward past-negative, present-hedonistic, and present-fatalistic time perspectives are more likely to exhibit addictive behaviors, whereas future time perspective orientation serves as a protective factor. It not only reduces the incidence of addictive behaviors but also facilitates recovery. Behavioral mechanisms such as self-regulation and impulsive decision-making, along with the neural mechanisms of the prefrontal cortex, can deepen our understanding of how time perspective influences addictive behaviors. Future research should further explore the consistency and specificity of time perspective across different addictive behaviors, employ longitudinal methods to investigate the dynamic evolution of addicts' time perspective, and intervene on time perspective by enhancing future orientation while reducing past-negative and present orientations to help addicts achieve a balanced time perspective and improve abstinence outcomes.

Keywords: time perspective; addictive behavior; decision-making; mechanism

Addictive behaviors are primarily categorized into behavioral addictions (pathological gambling, internet addiction, mobile phone addiction, etc.) and substance addictions (cigarette, alcohol, and drug addiction) (Liu Qinxue et al., 2017; Peng Juan & Feng Tingyong, 2014). In recent years, researchers have increasingly focused on the causes and underlying mechanisms of addictive behaviors while continuously exploring effective prevention and intervention methods. Time perspective (TP) has emerged as a crucial individual difference variable that can help effectively explain and prevent addictive behaviors (Przepiorka & Blachnio, 2016). Time perspective refers to relatively stable psychological and behavioral characteristics exhibited in individuals' cognition, experience, and actions (or action tendencies) toward time. It represents a relatively stable personality trait reflecting people' s consistent views of the past, present, and future, and can be distinguished into past, present, and future time perspectives (Agarwal, 1993; Huang Xiting, 2004). The Zimbardo Time Perspective Inventory (ZTPI), developed by Zimbardo and Boyd (1999), assesses individuals' cognitive, emotional, and behavioral patterns toward the past, present, and future, and has been widely used to examine the relationship between time perspective and addictive behaviors. The inventory divides time perspective into five dimensions: (1) Past Negative (PN), expressing a negative, pessimistic attitude toward the past; (2) Past Positive (PP), reflecting emotional and pleasant experiences of the past; (3) Present Hedonistic (PH), referring to the desire and pursuit of present enjoyment; (4) Present Fatalistic (PF), indicating the belief that uncontrollable external forces determine one' s fate; and (5) Future (F), referring to thinking and planning for long-term future goals (Lü Houchao & Du Gang, 2017).

Current research on the relationship between time perspective and addictive behavior manifests in two main aspects. On one hand, different dimensions of time perspective show varying relationships with addictive behavior. Most studies indicate that past-negative, present-hedonistic, and present-fatalistic perspectives positively correlate with addictive behavior, future time perspective negatively correlates with it, while past-positive perspective shows no significant correlation (Keough, Zimbardo, & Boyd, 1999; Mckay, Percy, & Cole, 2013; Mckay et al., 2016; Petry, Bickel, & Arnett, 1998). On the other hand, different types of addicts show both consistency and specificity in time perspective. For instance, behavioral, alcohol, and cigarette addicts exhibit past-negative, present-hedonistic, and present-fatalistic orientations with less future orientation, whereas drug addicts more prominently display present-hedonistic orientation (Beenstock, Adams, & White, 2011; Cheong, Tucker, Simpson, & Chandler, 2014). Deepening our understanding of the relationship and underlying mechanisms between time perspective and addictive behavior can help uncover the fundamental causes behind addictive behaviors and holds significant practical implications for prevention and intervention. Therefore, based on a review of recent research, this paper first elaborates on the relationship between time perspective and addictive behavior from risk and protective perspectives, then analyzes the underlying mechanisms of addictive behavior through the lens of time perspective, and finally outlines future research directions.

2 The Relationship Between Time Perspective and Addictive Behavior

Past-negative, present-hedonistic, and present-fatalistic time perspectives (with the latter two hereafter collectively referred to as present time perspective) constitute risk factors for addictive behavior, increasing both the likelihood of addiction and the difficulty of intervention. In contrast, future time perspective serves as a protective factor, reducing the probability of addictive behavior and helping addicts achieve abstinence (Chavarria, Allan, Moltisanti, & Taylor, 2015).

2.1 Risk Time Perspective

For addictive behavior, past-negative and present time perspective orientations represent risk factors. On one hand, individuals with these orientations are more prone to addictive behaviors, exhibit greater addiction severity, and face greater difficulties in abstinence, with these perspectives significantly predicting addictive behavior. On the other hand, compared to non-addicts, addicted individuals generally display past-negative and present time perspective orientations (Mckay, Andretta, Magee, & Worrell, 2014).

This relationship has been validated across pathological gambling (Donati, Sottili, Morsanyi, & Primi, 2018; Dai Yaling et al., 2009), internet addiction (Chittaro & Vianello, 2013), mobile phone addiction (Jung & Han, 2014), cigarette

addiction (Kovač & Rise, 2007; Merson & Perriot, 2011), alcohol addiction (Cole, Andretta, & Mckay, 2015; Laghi et al., 2012; Roos & Albers, 1965), and drug addiction (Alvos, Gregson, & Ross, 1993; Apostolidis et al., 2006; Fieulaine & Martinez, 2011; King & Manaster, 1975; Melges et al., 1971; Moskalewicz, 2016). For example, Noël et al. (2017) found that pathological gamblers displayed greater past-negative and present time perspective orientations compared to non-gamblers, with higher present orientation correlating with increased impulsivity and risk-taking. Chittaro and Vianello (2013) surveyed 149 Facebook users and found that past-negative and present-fatalistic perspectives significantly predicted pathological internet use, suggesting that time perspective should be considered as an individual difference variable in understanding problematic internet use. Similarly, in substance addiction, research indicates that present-oriented individuals report higher frequencies of cigarette, alcohol, and illicit drug use, with present perspective significantly predicting substance use frequency (Chua, Milfont, & Jose, 2014; Peters et al., 2005; Wills, Sandy, & Yaeger, 2001).

Individuals with past-negative and present orientations are more susceptible to addiction, and addicts show greater tendencies toward past-negative, present-fatalistic, and present-hedonistic perspectives, along with short-sighted future perspective. This may stem from poorer self-regulation abilities. Self-regulation is viewed as an attitudinal or trait factor influencing whether individuals can successfully control their behavior, with low self-regulation potentially triggering unconscious behaviors (Cheng Cuiping & Zhang Yonghong, 2011). Beyond self-regulation, past-negative and present-oriented individuals often experience more depression and anxiety (Davies & Filippopoulos, 2015), tending to satisfy immediate emotional venting with little concern for the future. Even when they do consider the future, they often feel hopeless, focusing instead on immediate pleasure and gratification without considering how current actions might affect their future or believing such effects are possible. This constitutes an important reason for their vulnerability to addiction. Research shows that past-negative-oriented individuals experience more negative emotions that continuously affect their present and future behavior, while present-oriented individuals prefer immediate gratification and exhibit high impulsivity. This explains why addicts typically show high impulsivity, seeking immediate rewards while ignoring future negative consequences (Mackillop et al., 2006b; Nigro, Cosenza, & Ciccarelli, 2017).

2.2 Protective Time Perspective

Future time perspective refers to individuals' cognition, emotion, and behavior (or tendencies) regarding future social and self-development, particularly future self-development possibilities (Song Qizheng, 2004). It strongly correlates with attitudes, behavioral intentions, and perceived behavioral control, featuring anticipatory, motivational, and dispositional characteristics (Andre, van Vianen, Peetsma, & Oort, 2018). Research consistently demonstrates a

significant negative relationship between future time perspective and addictive behavior across both behavioral and substance addictions, with future-oriented individuals showing fewer and less severe addictive behaviors, while addicts exhibit less future orientation. Enhancing future time perspective can not only reduce addictive behavior but also facilitate abstinence and recovery (Alm & Låftman, 2016; Chodkiewicz & Nowakowska, 2011; Lennings, 1994). This relationship has been validated in mobile phone addiction (Chang Ruosong et al., 2017; Peng Xing, 2016), cigarette addiction (Adams, 2009; Adams & Nettle, 2009), alcohol addiction (Cole, Andretta, & Mckay, 2015; Wells et al., 2018), and drug addiction (Apostolidis, Fieulaine, & Soulé, 2006). For instance, a survey of smokers (N=10,341) and non-smokers (N=4,955) across five countries (Scotland, France, Germany, China, and Malaysia) found that non-smokers were more likely to be future-oriented. After controlling for country, age, gender, education, and ethnicity, time perspective significantly predicted smoking status, with future-oriented individuals more likely to be non-smokers (Sansone et al., 2013).

Another important dimension is past-positive time perspective, which reflects emotional and pleasant past experiences. Research shows that past-positive perspective positively correlates with healthy lifestyle (primarily diet, sleep, and exercise) and predicts healthy lifestyle choices (Cui Mengmeng et al., 2014; Zhen Yifan et al., 2015). However, studies on time perspective and addictive behavior generally find no significant relationship between past-positive perspective and pathological gambling (Donati et al., 2018; Noël et al., 2017), internet addiction (Chittaro & Vianello, 2013; Ding Kai, 2009), alcohol use disorder (Loose et al., 2018), or drug addiction (Cheong et al., 2014).

Based on these findings, we propose that future time perspective can serve as a potential protective factor against addictive behavior, a view supported by theoretical and empirical research (Zajenkowski, Carelli, & Ledzińska, 2014). Expectancy-value theory (Wigfield, 1994) posits that individual behavior motivation is determined by outcome expectations and value assessments, with future time perspective influencing delay of gratification by affecting the expectancy and value of choice alternatives. Construal level theory also suggests that future time perspective promotes attention to high-level features (i.e., delayed rewards), devaluing immediate gratification while increasing the value of delayed goals (Pang Xue et al., 2014). Impaired self-control and inability to effectively choose delayed gratification represent key features of addicts (Zhou Hongli, 2015). Delay of gratification refers to the tendency to forego immediate satisfaction for more valuable long-term outcomes, representing an aspect of self-control and psychological maturity based largely on future-oriented self-regulation (Hao Chundong & Liu Xiaoyan, 2006). Achieving delayed gratification requires self-regulation strategies including monitoring, help-seeking, time management, self-evaluation, and critical thinking. Zimmerman' s (2008) self-regulation cyclical model posits that delaying behavior involves a self-monitoring regulatory cycle (forethought, performance, and reflection) when pursuing future goals, explaining the association between delay of gratification and future time perspective

throughout self-regulation. According to this model, individuals with higher future time perspective invest more in the forethought phase, using self-motivation beliefs to achieve delayed goals; during performance, they engage more in volitional management (self-instruction, self-monitoring, self-experimentation); and in reflection, they better evaluate behaviors, test causal attributions, assess satisfaction, and develop adaptive responses. Thus, future time perspective may protect against addictive behavior because future-oriented individuals possess stronger achievement motivation, self-regulation, and self-control, enabling them to set clear future goals and persistently adjust their behavior (Kim et al., 2017; Pang Xue et al., 2014).

In summary, across both behavioral and substance addictions, time perspective as an important individual difference variable closely relates to the onset and development of addictive behavior. Past-negative and present orientations constitute risk factors, while future time perspective represents a crucial protective factor. Past-negative-oriented individuals are more likely to carry negative past experiences into the present, while present-oriented individuals may disregard past and future in favor of immediate gratification (Barnett, Melugin, & Hernandez, 2018; Hyun et al., 2014). In contrast, future-oriented individuals continuously self-regulate and self-control, willing to forego immediate satisfaction for more valuable distant outcomes (Przepiorka & Blachnio, 2016). Consequently, past-negative and present orientations increase addiction vulnerability, whereas future orientation reduces addiction likelihood and aids abstinence. Addicts also show more past-negative and present perspectives alongside less future perspective, leading researchers to encourage replacing past-negative and present orientations with future time perspective (Chan & Hyun, 2014).

3 The Internal Mechanisms Linking Time Perspective and Addictive Behavior

Building upon the relationship between time perspective and addictive behavior, understanding its internal mechanisms can illuminate how time perspective influences addiction and provide a theoretical foundation for clinical intervention. Both behavioral mechanisms (self-regulation, impulsive decision-making) and neural mechanisms can further our understanding of this relationship.

3.1 Behavioral Mechanisms

Self-regulation refers to the ability to control or modify one' s thoughts, emotions, impulses, and behaviors to meet ideals, values, morals, and social expectations, thereby gradually achieving long-term goals (Baumeister, Vohs, & Tice, 2010; Gailliot et al., 2007). Research demonstrates close relationships between self-regulation and the onset, development, abstinence, and relapse of addictive behavior (Baumeister & Vonasch, 2015). Studies on time perspective and self-regulation reveal significant positive correlations between future time perspective and self-regulation, and significant negative correlations with

present-fatalistic and past-negative perspectives (Bilde, Vansteenkiste, & Lens, 2011). This suggests that future-focused individuals better regulate their behavior in planned, purposeful ways, whereas past- and present-focused individuals cannot plan reasonably, instead tending toward immediate gratification and impulsive behavior (Miller & Brickman, 2004; Stanescu & Iorga, 2015). Thus, self-regulation ability plays a crucial role in the time perspective-addiction relationship. Past-negative and present-oriented individuals cannot effectively control and modify their behavior in a timely manner, leading to more impulsive actions and greater addiction vulnerability, whereas future-oriented individuals show the opposite pattern.

Decision-making represents a complex cognitive function with behavioral impulsivity as its external manifestation, closely related to poor decision-making (Su Zhonghua et al., 2014). Impulsivity as a personality trait involves rapid, unplanned reactions to internal or external stimuli without considering negative consequences for oneself or others (Moeller et al., 2001; Zhou Liang et al., 2006). Both behavioral addiction (pathological gambling, internet addiction, mobile phone addiction) and substance addiction (cigarette, alcohol, drug addiction) groups exhibit high impulsivity and impulsive decision-making (Tang et al., 2017; Xu Sihua, 2012; Yan WanSen et al., 2011; Zhou Pingyan et al., 2014). Time perspective is an unconscious process through which individuals filter experiences through temporal categories, influencing information processing, decision-making, and goal setting, ultimately affecting behavior (Griva, Tseferidi, & Anagnostopoulos, 2015). Time perspective itself closely relates to impulsivity (Ciccarelli et al., 2016). Present-oriented individuals tend toward unthinking impulsive actions, making rapid decisions without future planning to achieve immediate satisfaction without considering future consequences. Future-oriented individuals tend to consider future consequences and make rational decisions for longer-term benefits (Agarwal & Srivastava, 1981). Therefore, past-negative and present-oriented individuals are more vulnerable to addiction because past-negative individuals bring negative emotional experiences into the present, affecting decision-making, while present-oriented individuals prefer immediate gratification and make impulsive decisions. Conversely, future-oriented individuals make more rational decisions, reducing addiction likelihood.

3.2 Neural Mechanisms

Neuroimaging research indicates that different time perspective orientations (past, present, future) show both consistency and differences in brain activation patterns (Carelli & Olsson, 2014; Chen, Guo, & Feng, 2018; Coull, Vidal, Nazarian, & Macar, 2004). Key activated regions include the anterior cingulate, temporal cortex, parietal lobe, and prefrontal cortex. For example, compared to future time perspective (which activates the ventral prefrontal cortex, Brodmann area 47 more), past and present perspectives show greater medial prefrontal cortex activation (past perspective activates Brodmann area 10 more, present perspective activates Brodmann area 32 more). Past-negative

and past-positive perspectives activate the medial prefrontal cortex more, while present-fatalistic and present-hedonistic perspectives relate more to the anterior cingulate cortex, Brodmann area 32, and superior medial frontal cortex (Tao Anqi, 2014; Carelli, Olsson, Wiberg, & Sircova, 2012). Researchers have also found that activity in the medial prefrontal cortex and medial temporal lobe (including the hippocampus) reflects differences in time perspective ability (Suo Tao, 2012), and ventromedial prefrontal damage affects future time perspective (Fellows & Farah, 2005).

The dual-system theory of addiction posits that addiction results from imbalance between the brain' s Reflective System and Impulsive System (Bechara, 2005; Stacy & Wiers, 2010; Yan WanSen et al., 2016). The impulsive system' s neural basis primarily involves the amygdala-striatum system, which plays a key role in emotional and motivational effects of natural and drug rewards, representing a relatively implicit, unconscious, automated system. The reflective system' s neural basis mainly involves the prefrontal cortex, which is crucial for impulse control, planning, decision-making, and emotion regulation, representing a relatively explicit, conscious, controlled system. When prefrontal-centered reflective control declines and striatum-centered impulsive function becomes hyperactive, behavior becomes impulsive and uncontrollable. Studies on gambling addiction (Balodis et al., 2012), alcohol addiction (Courtney, Ghahremani, & Ray, 2013), and cocaine addiction (Ersche et al., 2011) have all found abnormal fronto-striatal circuit function in addicts. Therefore, the prefrontal cortex may constitute an important neural basis for time perspective' s influence on addictive behavior.

In summary, both behavioral and neural mechanisms highlight the important roles of self-control and decision-making in the time perspective-addiction relationship, with these factors also interacting with each other (Dou Kai et al., 2014; Xiong Suhong & Sun Hongjie, 2017). The relationship between time perspective and addictive behavior is thus complex, and current research on internal mechanisms remains insufficient. Future studies should further explore deeper mechanisms, particularly the internal pathways and neural mechanisms linking different time perspective dimensions to addiction.

4.1 Consistency and Specificity of Time Perspective Across Different Addictive Behaviors

Although existing research demonstrates a close relationship between time perspective and addictive behavior, with addicts generally showing past-negative and present orientations along with future myopia, different addictive behaviors exhibit both consistency and specificity in time perspective patterns (Akamatsu, 2014; Georgiou, 2014; Miura, 2017). For example, Barnett et al. (2013) found that future time perspective could prevent cigarette, marijuana, and hard drug use but had no effect on alcohol. This may reflect differences in risk perception between alcohol and other drug addicts. Research shows that attitudes and cognition toward time relate closely to risk perception, with past-oriented

individuals potentially underestimating risks of current behavior on future outcomes, leading to more risk-taking, while future-oriented individuals show increased risk perception of addiction-related harm, reducing addiction likelihood (Zajenkowski, Carelli, & Ledzińska, 2014). Some studies also find non-significant differences in time perspective across certain addictions, with some dimensions (e.g., past-positive) showing no significant correlation with addictive behavior. For instance, Mackillop et al. (2006a) found no time perspective differences among non-pathological, potential, and pathological gamblers, possibly because the sample consisted of university students rather than clinical populations. Although the three groups differed in gambling behavior, as a non-clinical sample they did not differ in psychological distress. As Hodgins and Engel (2002) noted, time perspective differences may result from distress rather than addiction itself. Moreover, the complex structure of time perspective means not every dimension directly relates to addictive behavior. Additionally, time perspective is influenced by age, gender, personality traits, social roles, values, emotions, and other factors (Lü Houchao & Huang Xiting, 2005). Therefore, research shows both consistency and specificity in time perspective-addiction relationships, and future studies should examine these patterns across different addictions while incorporating more influencing factors and exploring the underlying mechanisms of this specificity.

4.2 Longitudinal Approaches to Investigating Dynamic Changes in Addicts' Time Perspective

As a personality trait composed of past, present, and future, time perspective is a relatively changing process. Thus, time perspective possesses both stability and malleability, evolving with individual development and environmental changes. Zimbardo and Boyd (1999) termed the simultaneous expression of all three temporal tendencies as Balanced Time Perspective (BTP) capability—a high-level time perspective ability characterized by high past-positive orientation, moderate present-hedonistic and future orientations, and low past-negative and present-fatalistic orientations. Individuals with balanced time perspective can face the present realistically, assess situations wisely, seize opportunities timely, and maintain long-term vision, thus better adapting to rapidly developing society and achieving success. Research shows that addicts generally exhibit past-negative, present-hedonistic, present-fatalistic, and future-myopic perspectives, representing clear deviations from balanced time perspective. However, previous research has predominantly used cross-sectional methods to examine addicts' current time perspective status and its predictive effects, with few longitudinal studies revealing the dynamic evolution of addicts' time perspective, particularly what factors cause individuals to deviate from balanced time perspective toward past-negative and present-hedonistic orientations, ultimately leading to addiction. Dynamically revealing this deviation process may prove more valuable for addiction intervention. One study showed that drug addicts beginning abstinence develop higher past-negative perspective due to past drug experiences, whereas those abstinent for over one year start ignoring negative

past experiences and shift focus to the future (Zentsova & Leonov, 2013). Therefore, future research should employ longitudinal tracking to investigate the dynamic developmental processes of time perspective, particularly the deviation from balanced time perspective in addicts, to guide addiction prevention and recovery.

4.3 Enhancing Future Time Perspective in Addicts to Achieve Balanced Time Perspective

Balanced time perspective holds more positive significance for individuals (Boniwell & Zimbardo, 2004). However, both behavioral and substance addicts show clear deviations from balanced time perspective, leaning toward past-negative and present orientations while lacking future orientation. Deviations from balanced time perspective positively correlate with depression, anxiety, stress, and other negative emotions (Mooney, Earl, Mooney, & Bateman, 2017). As a protective factor, future time perspective is thus crucial for addiction prevention and abstinence. Moreover, time perspective is amenable to intervention. Research shows that future time perspective significantly predicts smoking cessation attempts eight months later, and enhancing smokers' future orientation can increase quit attempts (Hall et al., 2012). For alcohol abusers, increasing future time perspective can reduce alcohol-related harm (Acuff et al., 2017). However, current research lacks studies on preventing and intervening in addictive behavior from the time perspective framework. Future research should explore methods for intervening on time perspective and their effectiveness in preventing addictive behavior. Additionally, for addicts, future studies should investigate how to enhance future time perspective while reducing past-negative and present orientations to help achieve balanced time perspective, enabling better social adaptation and improving abstinence outcomes (Do & Shin, 2017).

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