

**Future time perspective and it's relation to substance-use in adolescents: a scoping
review**

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22.07.2022

Abstract

Introduction: The years during adolescence are crucial for activities and behavior relevant for health. Physical, psychological, social, emotional, as well as cognitive developments are part of the many changes during these years. Cognitive developments specifically include a shift towards an increased concern for the future. Future-time-perspective (FTP), i.e. "the timing and ordering of personalized future events", has been related to proactive coping behaviors, learning motivation and the use of efficient self-regulation strategies. Because during adolescence the tendency to initiate substance use is high, recent research has focused on characterizing and preventing substance use disorders and suggests that FTP can predict substance use. To gain insight in this emerging field of research, in this study a scoping review was conducted to depict assessment methods, general findings, key concepts and implications for substance-use interventions. **Methods:** This scoping review explored the databases Scopus, Web of Science and PsychInfo (EBESCO) and conducted the search based on the main terms "adolescents", "future-time-perspective" and "substance-use". Articles were excluded if they measured concepts other than FTP (conceptualized as general future orientation) or substance-use. **Results:** In total, 11 studies were selected to be included in this scoping review. Most studies used cross-sectional designs (n=9). FTP was measured using the ZTPI (n=9), scales that resemble the ZTPI scales (n=1) or the ATPI-TA (n=1). Substance use was measured using various self-report questionnaires. Some studies (n=4) observed a direct-, some studies observed an indirect-relationship (n=3), with mediators and moderators, of FTP and substance use in adolescence. However, findings varied, depending on the kind of substance (n=4). Drug-oriented perception and desire for control were observed to be a mediator or moderator in the relationship of FTP and substance use. Also, FTP was considered to be a mediator between maternal connectedness and avoidance of risk behaviors. Important concepts, the authors of the studies noted in line of this research, were drug-oriented-perception, delay discounting as well as sensation-seeking. Most studies (n=10) mentioned authors' suggestions for using time perspectives in intervention programs. **Discussion:** The field that examines FTP in relation to substance use, currently uses designs that are not sufficient to make robust claims about this relationship. Conducting studies with more complex designs is needed that include the measurement of mediators and moderators as well as the previously mentioned important concepts. This will help improve FTP-based substance-reduction-intervention for adolescents.

Keywords: Adolescents, Future-time-perspective, Time-perspectives, Substance-use

Table of contents

Future Time Perspective and Substance-use in adolescents	3
Future Time Perspective	4
Measuring Future Time Perspective	5
Adolescence & FTP	6
State of the art.....	7
Objective & Contribution to research.....	8
Methods	10
Search strategy.....	10
Study selection criteria	11
Data extraction.....	11
Results	11
Selection of studies	11
Secondary findings: Study characteristics	12
Participant characteristics	12
Primary findings: Study design of the included studies	18
Significant relationship of FTP and substance-use.....	20
Other processes playing a role in the relationship	22
The concept of FTP and substance use and its usefulness in practice.....	25
Discussion	26
Main findings.....	26
Strengths and Limitations	30
Conclusion	32
References	34

Future Time Perspective and Substance-use in adolescents

Adolescence is a time period in which young individuals experience diverse and crucial changes (Dahl, 2004). Their bodies, interests, desires but also responsibilities are changing and developing. The World Health Organization described adolescence as the time period between the ages of 10 and 20 years (1977). According to Sawyer et al., (2018) however, adolescence is more fittingly defined by an age range of 10 to 24 years. These years are critical for activities and behavior relevant for health in general. Essentially, adolescence can be summarized by physical, psychological, social, emotional, as well as moral, educational and cognitive developments (Kapur, 2015).

When looking at these cognitive developments that occur in an adolescent, one aspect that is important to highlight is the concept of time. Researchers have noted that adolescence is characterized by a greater attribution of importance to the future (Meeus et al., 2002). The concept of Future-time-perspective (FTP) incorporates the anticipation of future goals (Nuttin, 2014). More specifically, FTP has been defined by Wallace (1956) as "the timing and ordering of personalized future events". It has been shown to be related to proactive coping behaviors (Elissa & Bandura, 1999), learning motivation and the use of efficient self-regulation strategies (de Bilde et al., 2011).

Since, adolescence involves complex developmental changes, adolescents are furthermore, especially at risk to initiate risk behavior like problematic substance use and develop substance-use disorders (Gray & Squeglia, 2018). Because of the high prevalence of substance use in adolescents, recent research has increasingly focused on characterizing and preventing substance use disorders. Interestingly, some research suggests that FTP can indeed predict substance-use (Smart, 1968). Other research does not see this relation (Duangpatra et al., 2009). To date no scoping review exists that assesses the characteristics of research about the relationship of FTP and substance use in adolescents, including assessment methods, other processes playing a role as well as general findings and implications for substance-reduction-interventions. Because, nowadays substance-reduction interventions for adolescents especially focus on reducing risk- and increasing modifiable protective factors (Harrop & Catalano, 2016), focusing on FTP might be an important protective component in such programs. Since adolescents who abuse drugs are at risk for psychological problems, including FTP in interventions might therefore help to address and diminish these and prevent further unhealthy drug use.

In the remainder of this review, scientific insights are presented that give theoretical background on the basic concepts of FTP and its relation to adolescence and substance-use.

Future Time Perspective

Time perspective theory states that our view of everything around us is filtered through temporal cognitive processes (Boyd & Zimbardo, 1997; Zimbardo, Keough, & Boyd, 1997). This involves our view about the world, our relationships as well as our selves. We learn to categorize our experiences into the future the present or the past. The importance and the influence of FTP on human behavior have been stressed very early by Frank (1939). Nevertheless, it was Lewin who made this concept relevant in modern psychology (1948, 1951) and defined it as “the totality of the individual’s views of his psychological future and psychological past existing at a given time.” (1951).

In the past decades, the importance of the ability to imagine and think about one’s future to determine present actions has been highlighted (Bandura, 1986). The anticipation of future time influences one’s personal goals, plans as well as actions related to achievement and well-being. FTP was noted to be related to decreased psychopathology (Wallace, 1956) as well as more adaptive general coping strategies in homeless adults (Epel et al., 1999). Furthermore, a higher level of FTP has been shown to be related to increased delay of gratification (Davids & Falkof, 1975), which is defined as the preference for a larger reward that is distant in the future over a smaller immediate reward (Mischel, 1961).

The research field is characterized by inconsistency about conceptualizing FTP, its dimensionality as well as its assessment methods (Kooij et al., 2018). Some researchers focus more on the cognitive aspect of FTP (Husman & Shell, 2008; Ringle & Savickas, 1983; Seijts, 1998), including dimensions like extension (how far one can project into the future (Ringle & Savickas, 1983)) or directionality (the extent to which one feels like moving closer to ones imagined future)(Husman & Lens, 1999)). Other researchers focus more on the affective aspect of FTP (De Volder & Lens, 1982; Ringle & Savickas, 1983), including the either optimistic or pessimistic view of the future and the importance of goals (delay of gratification; Mischel, 1961). Most prominently in research about time perspective in student samples, FTP is conceptualized as general future orientation (Kooij et al., 2018). This involves an attitude of planning for and achievement of future goals as well as conscientiousness (Zimbardo et al., 1999).

Overall, many studies have focused on different dimensions of time perspectives and have conceptualized the construct in different ways (Wallace & Rabin, 1960). These diverse approaches often lead to inconsistent findings in the study of FTP. The highlighting of different features of the concept is causing this interpretive issue in FTP research (De Volder & Lens, 1982; Husman & Lens, 1999; Trommsdorff, 1983).

Measuring Future Time Perspective

As already mentioned, FTP is furthermore, measured in many diverse ways, especially in different age groups (Brothers et al., 2014). One way to measure FTP, conceptualized as general future orientation in adolescents that has been repeatedly validated is the Zimbardo's Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999). This approach assumes that individuals tend to orient to only one time perspective; the past, the present or the future. Specifically, Zimbardo and Boyd posit that time perspective incorporates 5 different facets. The ZTPI consists of 56 items with response scales from 1 (very uncharacteristic) to 5 (very characteristic). The facets of past-negative- (10 items) and past-positive- (9 items) perspectives comprise an unpleasant and a sentimental look at the past. The present-hedonistic perspective (15 items) involves risk-taking and pleasure-oriented views of life, whereas a present-fatalistic perspective (9 items) incorporates a helpless view towards life. Finally, the future perspective consists of planning towards goals and rewards as well as a general focus on the future. Future perspective is assessed with 13 items and involves statements like "I am able to resist temptations when I know that there is work to be done," (Zimbardo & Boyd, 1999). Often short validated forms of this ZTPI are used to measure specific time perspectives.

However, not only the ZTPI is used in research to measure FTP. Another measure to assess time perspective is the Adolescent Time Perspective Inventory-Time Attitudes (ATPI-TA; Mello & Worrell, 2007). The ATPI-TA was developed to give an alternative to the ZTPI that is shorter and involves a negative future perspective scale. The ATPI-TA consist of 30 items, involving the following six subscales (5 items each): past positive, past negative, present positive, present negative, future positive, and future negative. These subscales are also scored on a 5-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree). Examples of the items assessing future perspective are: "I am excited about my future" or "thinking about my future makes me sad".

There are also other measures used to assess FTP conceptualized as future orientation. In the review and meta-analysis from 2018, Kooij et al. found that among others, the Future Time Orientation scale (FTO; Gjesme, 1975, 1979) as well as the Future Time Perspective scale (H&M; Hershey & Mowen, 2000), are assessment methods of future orientation as well. These measures were used less often and included conceptualizations of future orientation like “the extent to which individuals plan for and enjoy thinking about the future” (Hershey & Mowen, 2000) and “the general capacity to anticipate, shed light on and structure the future” (Gjesme, 1975, 1979). The Consideration of Future Consequences scale (CFCS; 24 items; Strathman et al., 1994) was also observed to be often used to measure FTP, however conceptualized as “the extent to which individuals consider the potential distant outcomes of their current behaviors and the extent to which they are influenced by these potential outcomes”.

Adolescence & FTP

FTP is a concept that plays an important role in adolescence (Nurmi, 1991; Seginer, 2003). Adolescents are faced with many cognitive developments, including the development of the ability to think and reason (Kapur, 2015). Many tasks, that adolescents are faced with, by their parents, teachers or peers concern decisions important for their future (Dittmann-Kohli, 1986). These future-oriented decisions relating for example to their school career or lifestyle influence their adult life. Accordingly, the way adolescents see their future is an important part of their identity formation (Marcia, 1980). Studies claim that by the age of 8 children can distinguish historical periods, by the age of 11 adolescents can understand historical chronology and by the age of 14 they can really understand future perspectives (Kapur, 2015).

Research supports the conception that during adolescence individual's time perspectives change (Erikson 1968; Piaget 1955). Some studies have found that during adolescence, the adolescents often report an increase in positive attitudes towards the future (Worrell and Mello 2009). Lessings (1972) studied 9 to 15 year old adolescents and found that the older the adolescents were, the greater their emphasis on their future became. Other studies have not replicated these results (Lennings 1994 ; Lennings et al., 1998) and rather say that there is no difference of prospection into the future in adolescents compared to children. Yet, there is a variety of literature that studies the relation of FTP and adolescent problem behaviors (Stein et al., 1968).

State of the art

A problematic behavior often observed in adolescents is the abuse of substances (Gray & Squeglia, 2018). The researchers in the field of FTP and its relation to substance-use often mention previous fundamental studies like the study of Keough et al. in 1999, which examined that there is a link between time perspectives and substance use in adolescents. Before this study, there was only little research done in this field (Keough et al., 1999). However, one study that is worth mentioning is the study of Smart (1968). He hypothesized that the tendency of adult alcoholics to tolerate 'punishments' like blackouts and hangovers, might be caused by a difference in their time orientation. He found that individuals that had an alcohol dependency tend to have less coherent FTPs than so called social drinkers. Subsequent studies by Manganiello (1978) and Alvos et al., (1993) found that adult heroin addicts had a foreshortened FTP and that individuals that injected drugs could not conceptualize the future as good as individuals that did not inject drugs.

Other studies, looking at related time perspective concepts found an existing relation between the time perspective concepts and substance use in adolescents. Gomez et al., (2010) for example, noted that future expectancies are predicting the level of substance use of homeless young individuals. Furthermore, a few studies hint at a bidirectional relationship between substance use and time preference as well as substance use and future orientation (conceptualized as motivation, planning and evaluation (Nurmi, 1989)) (Do et al., 2007, Brooks et al., 2018). Some mediators that were found to influence the relation between time perspectives and substance use were behavioral coping and anger coping (Wills et al., 2001) as well as maladaptive coping in general (Chua et al., 2015). Interestingly however, also the observation of no association between time perspectives and drinking of young adolescents was made (McKay et al., 2012).

The substances that most research in the field of time perspectives is about are alcohol (McKay et al., 2013; Henson et al., 2006; Levy & Earleywine, 2004; Smart, 1968); tobacco (Barnett et al., 2013; Do & Shin, 2017); cannabis (Apostolidis et al., 2006) and "general substance use" including alcohol, tobacco, cannabis, and other illicit drugs (Keough et al., 1999; Wills et al., 2001; Lavell et al., 1991). Substance use is often assessed in a self-report by measuring the frequency of substance use by means of nine items with 5 response options ranging from 1= never to 5= very often (Wills et al., 2001). Other approaches include asking a survey question about the frequency of use with the possibility of answering "yes" or "no"

(Do & Shin, 2017) or the measurement of past substance use behavior with five consumption levels ranging from 1=experimental to 5=daily (measures past lifetime, past 12 months and last month use; Fieulaine & Martinez, 2011).

Self-report-questionnaires like the Health and Risk Questionnaire (37 items, 5-point-scale)(Keough et al., 1999), the Risk and Reckless Behavior Questionnaire (RRBQ, measures frequency of risk behavior, 24 items)(Bradley & Wildman, 2002), as well as the Daily Drinking Questionnaire (DDQ; measures drinking behavior the past 30 days; Collins et al., 1985) are among others, frequently used questionnaires to assess substance-use (Braitman & Henson, 2015). To be comprehensive, the Adolescent Alcohol Involvement Scale (AAIS; measures alcohol use and its effects;14 items; Mayer & Filstead, 1979), as well as the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST v 3.0; 9 items; binary variables (yes=1; no=0); World Health Organization, 2010) are furthermore used to measure substance-use (Loose et al.,2018; Cheong et al.,2014).

When it comes to the measurement of FTP and its relation to behavior in adolescents, the ZTPI and the ATPI-TA are often used to assess this (Aronowitz & Morrison-Beedy., 2004; Apostolidis et al., 2006). Due to different conceptualizations of FTP and often with different instruments measured, related concepts like time attitudes (Finan et al., 2022) or future consequences (McKay et al., 2013), it is important to give an overview of the research that has been done in the field of FTP.

Objective & Contribution to research

Overall, it can be noted that there seems to be an emerging field relating time perspective to substance use and increasingly also to substance use of adolescents. Because of the already mentioned different approaches to FTP, different conceptualizations of FTP have been made like time attitudes or delay of gratification (Wallace & Rabin, 1960) leading to differing results. Koj et al. mention in their review about FTP in general research from 2018 that greater attention in time perspective research should be especially given to the dimension of FTP. Until today there is no study that reviews the state of the art of this research field, including research results in adolescents, key concepts, and research gaps and implications for practice.

Because of the high prevalence of substance-use disorders it seems needed to conduct a review observing studies that conceptualize FTP as general future orientation, and study its

relation to substance use in adolescents. Before doing a meta-review on this however, it seems important to investigate the extent to which this research field of FTP, conceptualized as general future orientation is in fact an emerging field that is sufficient to make claims. Conducting this scoping review could help in informing how big the field is and how valid, diverse and robust the research that is being done is designed. Therefore the aim of this review is to map the literature on the topic of FTP and it's relation to substance use in adolescents and identify key concepts, types of evidence to inform future research as well as implications about the inclusion of FTP in intervention programs for adolescents. In reviewing literature on FTP and its relation to substance use in adolescents this study will shed more light on the topic of FTP and its power to predict substance use to answer the research question: How is the nature of the relationship of FTP and substance-use in adolescents depicted and what are characteristics of the research in the scientific field?

This research question is divided into the following sub-questions:

- 1. How are the studies designed that examine the relationship of future-time-perspective, conceptualized as general future orientation, and substance-use in adolescents?*
- 2. How is the relationship of FTP and substance-use portrayed in the reviewed articles?*

The answers to these questions will highlight the current state of research in the field of FTP and substance-use in adolescents as well as show how these concepts have been assessed.

- 3. Are there other processes/ concepts mentioned that potentially play a role in the relationship of FTP and substance-use in adolescents?*

By answering this question a clearer view will be provided on the relationship of FTP and substance-use, by highlighting possible influences from related concepts.

- 4. What do the authors of the included articles mention about the concept of FTP and substance use and its usefulness in practice like in prevention programs or interventions?*

By reviewing the literature with this question in mind, useful implications and resources for future substance-reduction interventions can be derived.

Methods

This literature review can be classified as a scoping review. Scoping reviews are conducted to identify and map existing research in a given field and to clarify key concepts as well as factors related to them (Munn et al., 2018). Furthermore, scoping reviews enable the identification and analysis of research gaps. The present scoping review was conducted based on the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR; Tricco et al., 2018).

Search strategy

For the purpose of answering the research question: "How is the nature of the relationship of FTP and substance-use in adolescents depicted and what are characteristics of the research in the scientific field?" the databases Scopus, Web of Science and PsychInfo (EBESCO) were used as search engines. Since the topic of the review at hand is rooted in the research field of Psychology these three databases were used. All of the three databases cover the domain of Social Sciences including Psychology. One article (Keough et al., 1999) was chosen to be included, because it was mentioned in the majority of articles as a fundamental study. The search was performed from April 2022 to May 2022. The concepts of "adolescents", "future-time-perspective" and "substance-use" represent the basis of the constructed search string. Based on these keywords and related search terms as well as the use of the Boolean operators "AND" and "OR", the following search string was created:

Table 1 Search strategy

Databases	Search string
Scopus & Web of Science & PsychInfo (EBESCO)	("adolescents" OR "youth") AND ("future-time-perspective") AND ("substance-use" OR "substance-misuse" OR "substance-perception")

Study selection criteria

As a first step, articles were searched through the mentioned databases. Subsequently, duplicates were recognized and removed by means of the reference manager EndNote Web. Using EndNote Web, articles can be exported into the EndNote Web library to then identify duplicates and organize the selected references (Web, 2021). Thirdly, the titles and abstracts of the articles were screened. Articles were selected for the review if they (1) measured FTP in adolescents, (2) measured the concept of FTP specifically, (3) measured the substance-use of adolescents and (4) were written in English. Exclusion criteria entailed (1) the measurement of FTP and risky behavior not including substance use, (2) the measurement of FTP and attitudes towards substance use, (3) the measurement of concepts not involving FTP conceptualized as general future orientation directly, like future consequences, or time attitudes (4) adults as participants and (5) book chapters. The book chapter has been excluded because the content of the chapters only included little reviewing of general time-perspective and adolescents substance use.

Data extraction

Subsequently, information was excerpted based on the PRISMA-checklist (Tricco et al., 2018). The general information of the articles like author and year of publication were extracted in a first step. Secondly, study and participant characteristics such as sample size, age and design of the studies were recorded. This also included method of assessment of FTP, as well as the drugs that have been assessed. The outcome of the found relationship of FTP and substance-use including processes playing a role in this relationship were furthermore presented. Lastly, the authors view on the concept of FTP and its usage in prevention programs to reduce adolescent substance use was portrayed.

Results

Selection of studies

Through the search in the databases Scopus, Web of Science and PsychInfo (EBESCO) 309 studies have been generated (see Figure 1). Of these 309 generated records, 26 records were identified as duplicates and removed. Flowingly, the title and abstract of the remaining 283 articles were screened which led to an exclusion of 219 articles that did not

meet the exclusion criteria (see Figure 1). Subsequently, the full text of the remaining 63 articles was scanned. 54 articles of them met the exclusion criteria and were therefore further removed. Together with the hand searched article, the selection process resulted in 11 studies included in this review.

Secondary findings: Study characteristics

The included studies were published between 1999 and 2022 (See Table 1). The study that was implemented first was the study of Keough et al. (1999). After that Aronowitz and Morrison-Beedy (2004), Apostolidis et al. (2006), Duangpatra et al. (2009) and Fieulaine and Martinez (2011) conducted their studies. Most of the studies, were implemented in the last 10 years (Barnett et al., 2013; Cheong et al., 2014; Braitman & Henson, 2015; Loose et al., 2018; Assylkhan et al., 2021; Lee & Liao, 2022). The majority of the studies were conducted in the United States of America (Aronowitz & Morrison-Beedy, 2004; Assylkhan et al., 2021; Barnett et al., 2013; Braitman & Henson, 2015; Cheong et al., 2014; Keough et al., 1999). Furthermore, three of the studies were conducted in Europe in France (Apostolidis et al., 2006; Fieulaine & Martinez, 2011; Loose et al., 2018). The two other studies were implemented in Southern Taiwan (Lee & Liao, 2022) and in Australia (Duangpatra et al., 2009).

Participant characteristics

Subjects included in the studies of this review were aged between 13 and 24 years. Nine of the eleven studies included participants aged 13 to 20 which falls into the age range described by the World Health Organization as the time range of adolescence (10-20 years) (1977). The other two studies included participants aged 21 to 24 (Duangpatra et al., 2009; Keough et al., 1999) which rather falls into the age range of adolescence defined by Sawyer et al. (10-24 years) (2018).

One of the studies consisted of a sample that was only female (Aronowitz & Morrison-Beedy, 2004), whereas other studies included samples of males and females with the females most of the time being represented more strongly ranging from 52,6% to 90,4% (Apostolidis et al., 2006; Assylkhan et al., 2021; Braitman & Henson, 2015; Cheong et al., 2014; Fieulaine & Martinez, 2011; Keough et al., 1999, Loose et al., 2018). The sample size varied from 206 to 1310 with most of samples ranging from 206 to 791 participants and one study including a sample of 1310 participants (Barnett et al., 2013).

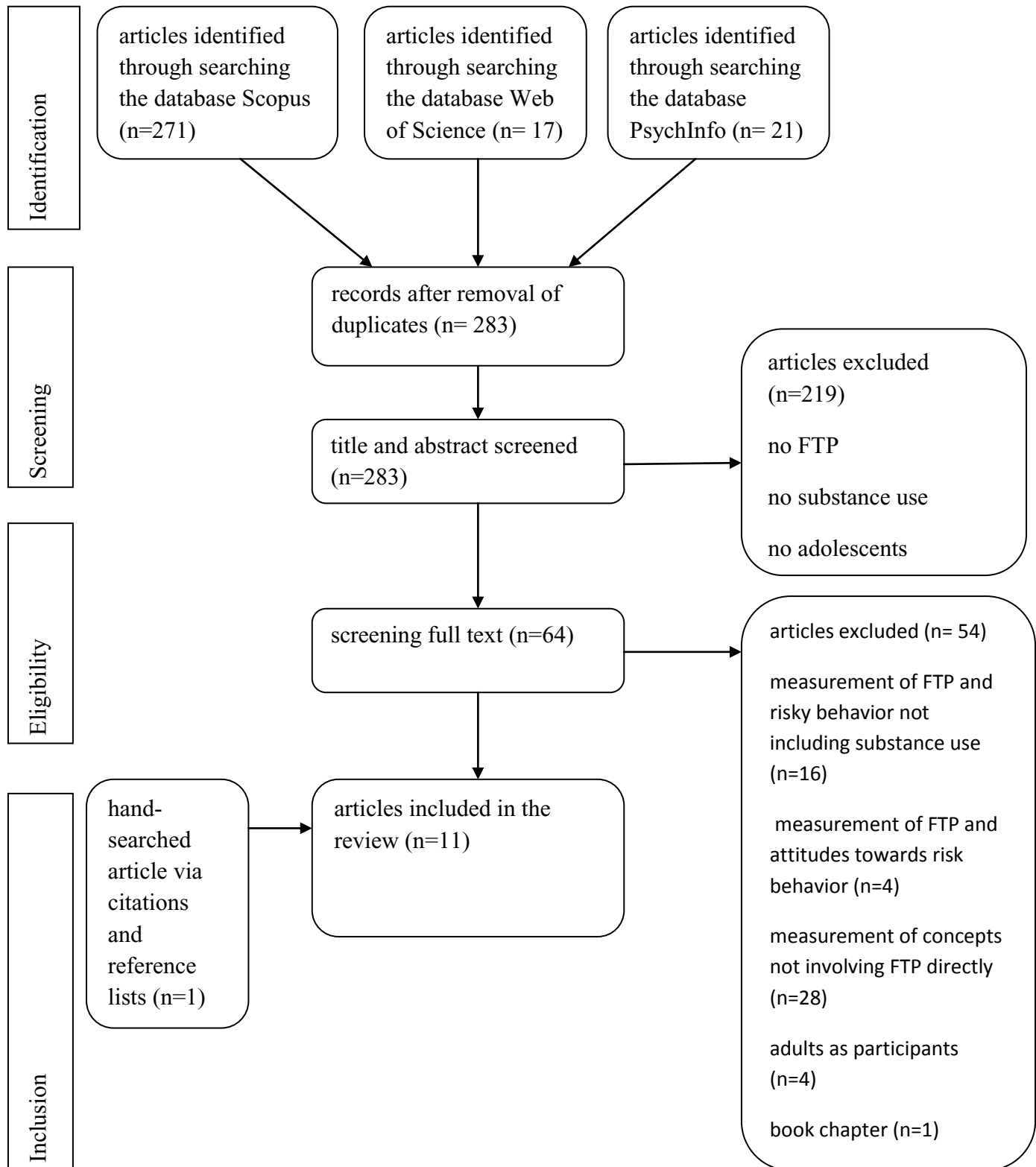


Figure 1. Flowchart of the selection process

Study Characteristics

Table 2

Overview of Characteristics of included studies

Study characteristics			Assessment method					
First Author & year of publication	Sampl e size (n)	Age in years (mean)	Design	Method for assessing FTP	Drug(s) assessed	Relationship FTP and substance-use	Other processes playing a role in the relationship	Thoughts about prevention focused programs
Apostolidis et al. (2006)	276	15.6	cross- sectional	ZTPI subscale (12 items)	tobacco	indirect; p<.05	drug- oriented perception	include substance- perception
Aronowitz& Morrison- Beedy (2004)	443	14	cross- sectional	ZTPI- like scales (5 items)	tobacco, cannabis & alcohol	indirect; p<.05	resilience, connectedness to mother	increase resilience by promoting FTP

Assylkhan et al. (2021)	791	15.82	cross-sectional	Adolescent Time Perspective Inventory-Time Attitudes	tobacco, cannabis, alcohol & “illicit substances”	direct; p<.01	x	target time-perspective dimensions
Barnett et al. (2013)	1310	16.8	longitudinal	ZTPI subscale (10 items)	tobacco, cannabis, alcohol & “hard drugs”	direct; hard drugs: p<.001 cigarettes: p<.03 (alcohol: not sig.: p=.06)	x	adding FTP exercises into interventions
Braitman & Henson (2015)	431	20.41	cross-sectional	ZTPI scale (56 items)	alcohol	direct; p<.05	x	identify high risk time profiles

Cheong et al. (2014)	344	18.86	cross-sectional	ZTPI scale (56 items)	tobacco, cannabis, alcohol & "illicit drugs"	direct; p<.01	x	lengthen time-perspectives & promote views of future possible selves
Duangpatra et al. (2009)	607	21	cross-sectional	ZTPI subscales (37 items)	cannabis, "designer drugs", "illicit drugs"	no relationship	x	Psychoeducation; benefit of FTP
Fieulaine & Martinez (2011)	464	16.7	longitudinal	ZTPI subscale (15 items)	cannabis	indirect; p<.05	desire for control	time perspective and desire for control should be used more efficiently to reduce

								vulnerability and increase competence
Keough et al. (1999)	206	23.63	cross- sectional	ZTPI subscale (22 items)	tobacco, cannabis, alcohol & “other drugs”	direct; p<.001	x	consider time perspectives
Lee & Liao (2022)	435	13.3	cross- sectional	ZTPI subscales (37 items)	alcohol	no relationship p<.953	x	enhance value of future goals
Loose et al. (2018)	219	20.37	cross- sectional	ZTPI scale (56 items)	alcohol	no consistent relationship p<.142	x	x

Note. FTP: Future Time Perspective, p-value: significant at .05, indirect relationship: mediator or moderator involved, x: not mentioned in the article

The included participants were recruited from junior-high-schools and high-schools as well as from universities and colleges as undergraduate students. Some studies included only impoverished participants that were only included if they met the income eligibility for reduced price meals at their school (Aronowitz & Morrison-Beedy, 2004) as well as high risk-youth in so-called continuation highschools that students attend who do not have enough school credits (Barnett et al., 2013). Also adolescents that live in disadvantaged urban neighborhoods were examined in one study (Cheong et al., 2014). Not every study mentioned the ethnicities of the participants included in the samples (Duangpatra et al., 2009; Fieulaine & Martinez, 2011; Apostolidis et al., 2006; Lee & Liao, 2022; Loose et al., 2018). From the studies mentioning the ethnicities of participants, two observed a predominantly White/Caucasian sample (Braitman & Henson, 2015; Keough et al., 1999), while two observed a predominantly African American (Cheong et al., 2014; Aronowitz & Morrison-Beedy, 2004) and another two a predominantly Hispanic/Latino (Assylkhan et al., 2021; Barnett et al., 2013) sample.

Primary findings: Study design of the included studies

The majority of the studies (nine of 11 studies) used cross-sectional designs (Apostolidis et al., 2006; Aronowitz & Morrison-Beedy, 2004; Assylkhan et al., 2021; Braitman & Henson, 2015; Cheong et al., 2014; Duangpatra et al., 2009; Keough et al., 1999; Lee & Liao, 2022; Loose et al., 2018), the relationship between FTP and substance use of adolescents at one time-point. Nearly half of the studies (five of 11 studies) furthermore additionally measured related concepts. Apostolidis et al. (2006) looked at the potential mediator cannabis perception, Aronowitz and Morrison-Beedy. (2004) examined resilience and connectedness to mother, and Cheong et al. (2014) measured delay discounting in adolescents. Also, sensation seeking and anti-social peer influence (Duangpatra et al., 2009), as well as self-schemas (Lee & Liao, 2022) were studied when looking at the relationship of FTP and substance use in adolescents. These concepts will be looked at more extensively in later parts of this review.

Of the two longitudinal study designs, Barnett et al. (2013) examined the existence of a longitudinal, bidirectional relationship between FTP and past 30-day use of substances (Barnett et al., 2013). They measured baseline FTP and drug-use at a one-year follow-up as well as baseline substance-use and FTP at a one-year follow-up. The other longitudinal study by Fieulaine and Martinez (2011) was designed as a prospective measure. Here, desire for

control, time perspective as well as cannabis perceptions were assessed at one time-point and substance use behavior was assessed at a second time point.

Looking at the measurement of FTP in the 11 selected studies, most studies (nine of 11) included the measurement of FTP by means of the ZTPI. In three of the 11 studies all the 56 items of the ZTPI were used to measure FTP as well as the other time perspectives (Braitman & Henson, 2015; Cheong et al., 2014; Loose et al., 2018). This five-factor structure of the ZTPI has been evaluated as having convergent, predictive and discriminant validity (Zimbardo and Boyd 1999) and has been tested in many countries including France (Apostolidis & Fieulaine 2004), Australia (Horstmanshof & Zimitat, 2007), Spain (Diaz-Morales 2006) and Portugal (Ortun˜o and Gamboa 2009). It was also noted of having an acceptable internal consistency and test-retest-reliability (Akirmak, 2021). Two articles measure only future and present-time perspectives and therefore use 37 items of the ZTPI (Duangpatra et al., 2009; Lee & Liao, 2022). Other studies use validated short forms of the ZTPI that include 10 to 15 items measuring only FTP (Barnett et al., 2013; Apostolidis et al., 2006; Keough et al., 1999; Fieulaine & Martinez, 2011). Aronowitz and Morrison-Beedy (2004) overall included five items of only two scales similar to scales in the ZTPI, whereas Assylkhan et al. (2021) measured FTP by means of the ATPI-TA (Mello & Worrell, 2007). Mello and Worrel (2007) found that the reliability estimates of the ZTPI were in the mediate range and therefore developed this alternative, which shows good structural validity and reliability (Buhl & Lindner, 2009; Konowalczyk, Mello, Röske, Buhl, Heim, & Worrell, 2018).

When it comes to measuring substance-use in the adolescent participants, many different approaches are used in the included studies. Some of the studies only focus on the measurement of a specific substance. Alcohol use for instance was assessed by measuring the frequency of alcohol use during the past month with dichotomized response options (yes/no) (Lee & Liao, 2022). Also, the AAIS is used to measure and identify alcohol abuse in the adolescent participants (Loose et al., 2018), similarly as the Daily Drinking Questionnaire (Braitman & Henson, 2015). The AAIS has been reported to be strongly reliable including a good test-retest reliability (0.91) by Mayer and Filstead (1979). Also the Daily Drinking Questionnaire has demonstrated good internal reliability in recent research (.83) (Gearhard et al., 2009).

Other studies measured substance use through self-report questionnaires, categorizing five levels of consumption, ranging from experimental to daily use (Apostolidis et al., 2006). Cannabis-use was measured as past lifetime, last 12 months and last month use and level of use was categorized into five levels of consumption (Fieulaine & Martinez, 2011). The same self-report questionnaires were used by other studies were the use of item scales and response options differ from seven-item scales with a 0-15 response range (Aronowitz & Morrison-Beedy, 2004), nine-item scales with 1-5 response options (Assylkhan et al., 2021), to 12 response categories to measure past 30-day substance use (Barnett et al., 2013). The other two of the 11 studies measured substance use with the ASSIST v 3.0 (World Health Organization, 2010) (Cheong et al., 2014) and with the RRBQ (Bradley & Wildman, 2002) (Duangpatra et al., 2009). The ASSIST was reported to have good construct, concurrent and discriminant validity (Humeniuk et al., 2008) and the RRBQ was found to have an adequate internal consistency, as well as a good test-retest reliability (.80-.90) (Bradley & Wildman, 2002).

Significant relationship of FTP and substance-use

Some of the studies observed a direct relationship of FTP and substance use in adolescents. Assylkhan et al. (2021) for example noted that higher future orientation is associated with less use of tobacco, alcohol, marijuana, and illicit drugs ($p < .01$) and that time perspective dimensions are consistent correlates of substance-use ($p < .01$) and distant to personality traits. In 2015, Braitman and Henson came to a similar conclusion, they looked at different naturally occurring time profiles and noted that participants with a profile that included a high FTP and low other temporal perspectives reported fewer alcohol drinking days, drinks, binge-episodes, days passed out, and lower peaks ($p < .05$). This protective time perspective profile was also associated with lower overall alcohol use ($p < .05$). Nonetheless they mention that it is difficult to extract the influence of a single time dimension and that the observation of the individual time dimensions in isolation might not show the complete picture.

A direct relationship between FTP and substance use was also found by Cheong et al. (2014). A lower orientation to future goals was associated with higher use of tobacco, alcohol and illicit drugs (cannabis, cocaine, amphetamine-stimulants, inhalants, sedatives/ sleeping pills, hallucinogens, opioids) in adolescents living in a disadvantaged urban neighborhood ($p < .01$). Similarly, they found that participants reporting substance use also reported a greater ZTPI orientation toward present pleasures. In line with these results, also Keough et al. (1999)

found that FTP was negatively related to substance use ($p < .001$). Present time perspective on the other hand was found to be a predictor of reported substance use after controlling for personality traits ($p < .001$).

The just mentioned results all hinted at a direct relationship of FTP and substance use. There are however also some studies that observed a rather indirect relationship between both concepts. The mediators and moderators mentioned in this part will be presented in more detail in the next part of this review. In 2006, Apostolidis et al. found that FTP played a rather indirect predictive role in cannabis use. Here, FTP seemed to be a significant predictor of substance use ($p < .05$) while drug-oriented perception mediated this relationship. Similarly, Fieulaine and Martinez (2011) noted that the relationship between time perspective and the intention to use cannabis was moderated by desire for control. Having a low FTP and a high desire for control was therefore related to higher intention to use cannabis. Interestingly, Aronowitz and Morrison-Beedy in 2004 observed FTP to rather be a mediator between connectedness to mother and resilience to risk behavior like substance use (cigarettes, alcohol, and marijuana) in impoverished African American girls. They state that rates of risk behaviors are very high especially among impoverished girls and that FTP might be the key influence on risk avoidance.

The remaining four studies observed differential effects depending on the kind of substance. In accordance with the previously mentioned findings, Lee & Liao (2022) found that FTP was associated with alcohol problems, defined as problems that occurred during or as a result of drinking like passing out or being involved in a fight ($p < .05$). Surprisingly, this however did not include alcohol use ($p < 0.953$). Secondly, Barnett et al. (2013) aimed at finding out if a bidirectional relationship exists between FTP and substance use. They observed an increased FTP to be protective against drug use (cigarette, marijuana, cocaine, hallucinogens, stimulants, inhalants, ecstasy, pain killers, tranquilizers, other drugs like phencyclidine, steroids, gamma-hydroxybutyric, and K) since an increased FTP at one time point predicted less drug use of the participants at a second time point ($p < .001$) which is in line with the before mentioned articles, but similarly as Lee & Liao (2022) they did not find this significant effect for alcohol use ($p < .06$). One reason for this that they mention might be the normative nature of alcohol among adolescents including a lower risk perception. Furthermore, looking at a relationship in the other direction, they found that baseline substance use did not predict changes in FTP one year later.

Duangpatra et al. (2009) found that FTP predicted reckless sexual behavior but was not related to substance use. They rather observed present time perspective to be related to reckless use of alcohol, marijuana, “designer” drugs (e.g., angel dust, ecstasy), as well as other illicit drugs, including amphetamines, cocaine, hallucinogens ($p < .01$). Similarly, Loose et al. in 2018 noted that time perspective is not significantly and consistently predicting alcohol-use. In their study the ZTPI scores showed no consistent correlation with alcohol use or alcohol problems ($p < .142$).

Other processes playing a role in the relationship

Drug oriented perception

As shown in Table 2 there are other processes mentioned in the studies that play a role in the relationship of FTP and substance use in adolescents. The already mentioned concept of drug oriented perception was noticed to be a potential mediator in the relationship of FTP and substance use (Apostolidis et al., 2006). Drug-oriented perception was related to FTP ($p < .001$) as well as to cannabis use ($p < .0001$). It is defined as the perception of cannabis being a drug and appeared to be an important factor negatively linked to cannabis use. To measure drug oriented perception, Apostolidis et al. created a nine-item questionnaire, containing statements about cannabis like “cannabis is a drug”, with a five-point likert answering scale ranging from 1=strongly disagree to 5=strongly agree. This meditational finding according to Apostolidis et al. suggests that the role of time perspective in predicting substance use might be more complex and mediated by cognitive constructs such as substance perception. A lower FTP might therefore include a less drug oriented cannabis perception that encourages cannabis use.

Resilience

Aronowitz and Morrison-Beedy (2004) observed that the connectedness of adolescent, impoverished girls to their mother may act as an enabling agent to foster FTP. Maternal connectedness was significantly related to FTP ($p < .01$) and FTP was significantly related to the resilience to use substances ($p < .05$). Maternal connectedness has been observed to increase resilience in girls (Aronowitz, 2002) and describes the daughter’s perception of being cared for as well as maternal involvement and presence. In the study of Aronowitz and Morrison-Beedy (2004) maternal connectedness is measured by three scales (Resnick et

al.,1998) which involve maternal caring (5 items; assessing girls' perception of maternal relationship), mother-adolescent activities (10 items; assessing number of shared activities in the past four weeks) and maternal presence (4 items; assessing frequency of maternal presence at home and during the day). According to Aronowitz & Morrison-Beedy, FTP in turn might act as a mediator, influencing resilience/ avoidance of risk behaviors like substance use in these young girls.

Desire for control

Desire for control as already mentioned is furthermore noted as potentially being a moderator in the relationship of time perspective and the intention to use substances. Fieulaine and Martinez (2011) mention the definition of desire for control by Burger and Cooper (1979), namely that it corresponds to the desire to be in charge of own activities, to make own decisions and the motivation to maintain this control. In their study, desire for control was measured by means of the Desire for Control Scale (DCS; Burger & Cooper, 1979), which consists of a 20 item self report questionnaire with different statements and a seven point likert answering scale ranging from 1=strong disagreement to 7=strong agreement. The DCS assesses the desire for control over life events, making one's own decisions, taking preventive actions, controlling or avoiding situations. Fieulaine and Martinez (2011) observed that adolescents with low FTP and a high desire for control reported higher intention to use substances ($p < .05$). They state that the desire for control might therefore act as a moderator, buffering the effect of time perspectives on cannabis use.

Other concepts mentioned in relation to this line of research

Four of the 11 studies furthermore mentioned and measured concepts related to the topic of FTP and substance use which are important to highlight. Cheong et al. in 2014 studied whether individual differences in delay discounting were related to substance use in adolescent participants living in disadvantaged urban neighborhoods. Delay discounting was measured by a computer-administered hypothetical money choice task (HMCT; Richards, Zhang, Mitchell, & de Wit,1999), where participants have to choose between a smaller, immediately available or a larger after a delay available amount of money. Cheong et al. highlighted the conceptual similarities between FTP and delay discounting but found that delay discounting did not predict substance use and therefore needs further investigation.

Delay discounting was also mentioned and measured by Lee and Liao in 2022. They aimed at observing the relationship between delay discounting, self-schemas and as previously mentioned time perspective and the relationship to alcohol use. Because self-schemas have been previously observed to be relevant to alcohol use in adolescents (Lee, Corte, & Stein, 2018; Lee & Feng, 2020; Lindgren et al., 2016) they decided to measure this additional concept and its relation to delay discounting, substance use and time perspective. Delay discounting in this study was measured by means of the 27-item Monetary Choice Questionnaire (Kirby et al., 1999) and self-schemas were assessed with a self-schema rating scale that involved 15 trait adjectives with an 11-point answering scale (1 = definitely does not describe me, 11 = definitely describes me) (Markus, 1977). In this study, delay discounting was found to be associated with alcohol use ($p < .024$) and drinker self schema (a self-schema relevant to alcohol use) was associated with alcohol use ($p < .01$) and alcohol problems ($p < .01$). They conclude that both constructs are independently associated with drinking behavior.

Apart from delay discounting and self-schemas another concept mentioned in the two other studies is sensation seeking. In Duangpatra et al. (2009) sensation seeking and anti-social peer influence are measured and hypothesized to be further predictors of substance use. Sensation-seeking is identified as “the need for varied, novel and complex sensations and experiences, and the willingness to take physical and social risks for the sake of such experience” (Zuckerman, 1979, p. 10) and observed to be associated with risk behaviors in young adults (Rolison and Scherman, 2003, Rosenbloom, 2003). In this article it is measured by the Arnett Inventory of Sensation Seeking (AISS: Arnett, 1994) which includes 10 items and a 4 point-scale answer range from 1 = describes me very well to 4 = does not describe me at all. To measure antisocial peer influence, the Emerging Adult Peer Pressure Inventory (EAPPI: Bradley & Wildman, 2002) is used. It measures the feeling of peer pressure to engage in prosocial and antisocial behaviors and includes eight items with a 5-point answering scale. Duangpatra et al. observed that sensation seeking predicted self-reported risk behaviors ($p < .01$) and reckless sexual behaviors ($p < .01$), while peer influence predicted self-reported reckless substance use ($p < .01$) and reckless sexual behaviors ($p < .01$).

Sensation seeking also was amongst other constructs assessed by Keough et al. in 1999. Apart from their studying of time perspective they furthermore observed how personality traits play a role in this relationship. These involved sensation seeking which was measured with the

Sensation-seeking scale (SSS; Zuckerman, 1994; Zuckerman, Eysenck, & Eysenck, 1978) that contains 40 items on which the participants could choose one item that described their preferences most accurately. Apart from sensation seeking, also aggression ($p < .0001$), depression ($p < .0001$), consistency ($p < .0001$) and ego resiliency ($p < .05$) were assessed and noted to be significant predictors of substance use.

The concept of FTP and substance use and its usefulness in practice

As it is shown in table 2, most of the included articles (10 of 11) contain implications for possible future intervention programs to reduce substance use in adolescents. Eight of the 11 articles found a significant relationship and base their implications on these results. Keough et al. (1999) for instance advise future interventions to consider time perspectives when planning preventive intervention programs. They note time perspectives to be multidimensional and highlight that it might be important to keep psychological, behavioral and social factors involved in the relationship of time perspectives and substance use in mind. Aronowitz and Morrison-Beedy (2004) describe that it might be beneficial to increase resilience to risk behavior by promoting FTP through the connectedness to mother. So including mothers into programs to help their daughters to develop a FTP might be important for future interventions. Apostolidis et al. (2006) furthermore mention that it might be beneficial to consider the finding of a potential mediating role of socio-cognitive constructs related to substance perception in future comprehensive interventions. Despite not finding a significant relationship between FTP and reckless substance use, Duangpatra et al. (2009) highlight the possibility of a positive effect of including psychoeducation about FTP into interventions targeting substance use in adolescents. They mention that this might include strategies to build social skills, the highlighting of benefits of FTP by describing long-term consequences of substance use, as well as encourage sensation seeking in more appropriate contexts like sports.

Two years later, in 2011, Fieulaine and Martinez advice, that it might be important to identify distal predictors of health behaviors like socio-economic status and self-regulation and to include them together with time perspective and desire for control into interventions. Also Barnett et al. (2013) consider it important to include FTP exercises into intervention programs to change substance use behaviors. In 2014 Cheong et al. elaborated on the benefit of lengthening time perspectives and promote enriched views of future possible selves in interventions aiming at reducing substance use in adolescents. This includes the fostering of

adolescents abilities to envision themselves and their future as successful. Braitmann and Henson in 2015 added that it could be of benefit to identify high risk time profiles in students to find students that are most in need of an intervention. In 2021, Assylkhan et al. agree with many of the previously mentioned implications and states that it could be useful to use time perspective dimensions to target substance use in interventions. They elaborate, that changing time perspectives in a way that past, present and future are equally emphasized might help to reduce substance use in adolescents. Also Lee and Liao (2022) who did not find a significant relationship between FTP and alcohol use, agree that for future interventions it might be important to enhance the value of future goals, to delay gratification. According to Lee and Liao this could be useful to prevent the development of alcohol-dependent self-schemas.

Loose et al., (2018) similarly, did not find a significant relationship and do not mention any implications or advise for future interventions. They rather highlight the importance of studying outcomes not only in relation to ZTPI profiles but also profiles with other multidimensional measures/ instruments before pointing interventionists into a specific direction.

Discussion

The aim of the present scoping review was to explore the characteristics of research examining the relationship between FTP and substance use in adolescents. To be precise, this includes the exploration of the design of the studies examining this relationship, how the relationship was observed to be, other processes/ concepts that play a role in the relationship, as well as what the authors of the studies mention about usefulness in practice like in substance use prevention-focused programs.

Main findings

Looking at the design of the conducted studies most of the included studies used cross-sectional designs and only two studies used a longitudinal design (Barnett et al., 2013; Fieulaine & Martinez, 2011). The majority of studies conducted in the field of time perspectives and substance use, generally uses cross-sectional designs. Therefore the observations of this scoping review in this context reflect the state of the research in the field of time perspectives and FTP. Research shows that cross-sectional studies allow the assessment of many outcomes and risk-factors and does not risk a loss of participants to

follow-up (Levin, 2006). However, when using cross-sectional data, authors and readers are commonly advised to be careful with causal inferences (Kesmodel, 2018). Without longitudinal evidence, the causal relationship of FTP and substance-use cannot be declared (Barnett et al., 2013). Using a cross-sectional design, FTP can therefore also only be tentatively considered a protective factor when it comes to avoiding use of substances. Longitudinal studies generally have the advantage to evaluate and declare for example causal relationships and follow change over time (Caruana et al., 2015). Prospective studies furthermore minimize recall bias of participants (Sedwick, 2013). Therefore it is recommended to conduct more longitudinal studies in this field.

FTP was, in the included studies, mainly measured by means of the ZTPI, except for two studies that used different assessments of FTP. This is consistent with empirical research investigating FTP; the ZTPI, the CFCS and the Future Time Perspective Scale (Shell & Husman, 2001) being used as principle assessment methods in FTP research more generally (Kojj et al., 2018). FTP was assessed isolated from other time perspectives in half of the studies, only measures of FTP in the ZTPI where used there (Barnett et al., 2013; Apostolidids et al., 2006; Keough et al., 1999; Fieulaine & Martinez, 2011). Other articles assessed FTP together with present time perspective and some studies measured FTP but also all other time perspectives using the 56 items of the ZTPI. According to Braitman and Henson in 2015 it might not be of advantage to measure FTP as a separate time perspective in isolation since this might not show the whole picture. This highlights the notion of a measurement of all time perspectives when investigating FTP and its relation to health behaviors. Finan et al. (2021) investigated multiple dimensions of time perspective and observed less reporting of substance use in individuals that emphasize the past the present and the future equally. This hints at the consideration that a balanced time orientation might be an important factor when trying to prevent substance use. Since, half of the included studies measured FTP in isolation of the other time perspectives there seems to be the need for future research in which FTP is being measured consistently and together with the other time perspectives to ensure the investigation of more complete time perspective profiles. This involves the recognition of the whole picture to ensure the best possible recommendations for intervention-programs.

The assessment of substance-use was conducted with diverse questionnaires, with some measuring the use of a specific substance, like alcohol and others measuring the use of

many substances including tobacco and 'illicit drugs'. Self-report measurements as a form of substance use assessment is very common, since it is a generally valid assessment method (Winters et al., 1996). Here, it might be of advantage for the assessor to supervise the adolescent participants if they for instance have poor reading skills (Winters & Kaminer, 2008). On the other hand the use of self-reports might be impacted by social desirability, especially considering that some participants are for example under the legal drinking age (Finan et al., 2022) as well as concerns for privacy when reporting use of illicit drugs. Generally, the use of differing assessment methods is common when measuring substance use in relation to time perspectives (eg.: Wills et al., 200; Do & Shin, 2017; Levy & Earleywine, 2004; Smart, 1968). Despite the reliability and validity of many of the used questionnaires and measures it is important to mention that it is difficult to compare responses on substance use-related self-report measures. This also affects the results of this review. Not only is it difficult to compare the measures because they are administered in different settings but also because participants might interpret different questions differently depending on the differing response options (Schwarz, 1999). In future research it is therefore of great importance to find a reliable, valid and continuous measure to assess substance use in adolescents in a way that is comparable.

Using the just mentioned designs, the findings of the current scoping review indicate that the notions about the relationship of FTP and substance use are mixed. Some studies noting a direct relationship in the adolescent participants, are in line with research of other FTP conceptualizations and substance use in adolescents. Future expectancies (Gomez et al., 2010) for example were found to be directly related to substance use of adolescents. Similarly, FTP, conceptualized as the extent to which individuals consider the potential distant outcomes of current behaviors and how much this influences them, was assessed by means of the CFCS (Strathman et al., 1994; McKay et al., 2012). FTP was significantly related to adolescent drinking. Other studies in this scoping review (three of the 11 studies) noted a rather indirect relationship between FTP and substance use. Drug oriented perception was found to be a mediator and desire for control a moderator. This will further be discussed in the following parts. Also FTP was found to be a mediator between maternal connectedness and resilience to risk behavior in this scoping review. Similarly, in current research FTP conceptualizations were reported to be a mediator in the relationship between substance use and other concepts. Higher consideration for future consequences was found to be a moderator between trait aggression and reported alcohol use in females (McKay et al., 2015).

Furthermore, some studies found no relationship between FTP and substance use or a relationship between FTP and substance use but not for FTP and alcohol use. The normative nature of alcohol among adolescents and a resulting lower risk perception is mentioned as an explanation for this. This is also in line with current research, a nonexistent relationship between temporal profiles and problematic alcohol use of young adolescents was found by McKay et al. (2017). The study of Barnett et al. (2013) moreover aimed at investigating if a bidirectional relationship between FTP and substance use exists and observed that baseline substance use did not predict changes in FTP one year later. Recent research on future orientation conceptualized as aspirations, expectations, and planning shows opposing results (Brooks et al., 2018). Future orientation was found to have a significant bidirectional relationship with all substance use outcomes. These opposing results reflect the need of further investigating a possible bidirectional relationship by means of longitudinal studies, trying to replicate the findings in different samples. This also involves controlling for the length of usage of the different substances to possibly confirm FTP as a predictor of substance use and vice versa in longitudinal studies.

In the context of the relationship between FTP and substance use in adolescents also other concepts were investigated. Apart from drug-oriented perception, resilience and desire for control, other factors were not found to play a direct role in the relationship. Delay discounting, self-schemas, sensation seeking and antisocial-peer-influence as well as aggression, depression, consistency and ego-resilience were mentioned and assessed. Delay discounting and sensation seeking have been measured and mentioned in more than one study. Delay discounting was found to be associated with alcohol use in one study and not being able to predict substance use in another study. It might therefore be important to investigate this concept in future research. Sensation seeking was noted to be related to self-reported risk behaviors and a significant predictor of substance-use. It is therefore, similarly of importance to include both concepts into future research. Behavioral coping, anger coping and maladaptive coping in general are mediators found to influence the relation between time perspective and substance use in recent research (Wills et al., 2001; Chua et al., 2015). Furthermore, as previously mentioned, aggression was among the variables measured in this scoping study but also in current research observing considerations of future consequences and its relation to alcohol use (McKay et al., 2015). Subsequently, including trait aggression or other personality traits as well as considering the factor of maladaptive coping is also of advantage when further investigating the relationship between FTP and substance use in

adolescents. Generally, in future research the integration of the just mentioned concepts could be helpful to provide a broader picture of the relationship of FTP and adolescent substance use, by investigating possible influences and factors important for interventions.

Finally, due to and in connection with these findings, the authors of the majority of the included studies describe their thoughts and advice on including FTP in possible future substance use prevention-focused-interventions. These implications for practice involve the addition of FTP exercises into existing programs, the lengthening of time perspectives to emphasize all perspectives equally, as well as seeing time perspectives as multidimensional constructs. The enhancement of future goals, the consideration of socio-cognitive constructs like substance perception, the inclusion of mothers to help their daughters to develop a FTP, as well as the encouraging of sensation-seeking tendencies in the direction of for example sports are furthermore mentioned. Also the identification of distal predictors of health behaviors like self-regulation and economic status and to identify high risk time profiles in students to find the individuals most in need of an intervention is proposed. These opinions, to include the promotion of time perspectives and especially FTP in substance use interventions is shared by many authors in the field (Brooks et al., 2018; McKay et al., 2011; Mello & Worrell, 2015). Interventions using FTP to target individual's physical activity (Hall & Fong, 2003), career planning (Marko & Savickas, 1998) as well as school attendance (Danish, 1997; Oyserman et al., 2002) already show effects of FTP on behavior change. This reflects the opinion of the majority of the authors mentioned in this scoping review, adding FTP exercises to intervention programs seems viable and warranted. However, it still is important to keep in mind the need for further research on concepts like delay discounting as well as different measurements of FTP in relation to substance use.

Strengths and Limitations

This study has some limitations and strengths which are important to be mentioned to be able to interpret the results and make inferences accordingly. First, it is important to keep in mind that this scoping review only included studies that conceptualized FTP as general future orientation. Other conceptualizations of FTP like studies about delay of gratification or attitudes towards time were excluded. Only looking at this research field might be beneficial to gain more knowledge about this specific conceptualization and characteristics as well as specifics of this field. However, it does not allow an overview of all conceptualizations of FTP including all possible assessment methods and all findings about a possible relation

including implications for future interventions. In line with this, also the majority of studies looked at time perspective in a one-dimensional way, so only FTP and no other time perspectives were assessed. This is noted to be not beneficial, since it might be difficult to extract the influence of only the dimension of FTP individually on substance use (Braitman & Henson, 2015). This might not do justice to the whole picture of this relationship.

The selection and search of the studies included in this scoping review was conducted by one person only. The data acquisition was furthermore not randomized which could lead to a confirmation/ selection bias which defines the tendency of researchers to select studies confirming their prior beliefs (Nickerson, 1998) and is unrelated to the motivation and attempt to avoid it (Stanovich et al. 2013). Studies that did not suit the author of this review could have been excluded based on personal preferences even if they might have dealt with a similar topic that this study intended to review. Due to the small scope of this review, which includes the usage of only 3 databases, the generalizability of the results might be influenced, despite trying to be as comprehensive as possible. By using more databases in a study with a bigger frame, possibly more studies with various designs could have been identified. Also the search string used is a natural limitation of this scoping review, other search terms might also exist which naturally might have led to the inclusion of other studies. Search terms like “prospection”, “drug-use” or “drug-misuse” might lead to more extensive results of studies. In future studies with a larger scope this could be taken into consideration.

However this study also has important strengths; considering that as far as it is known to the author of this review, no other scoping review has been conducted to observe the field about the relationship between FTP and substance use in adolescents. This scoping review, in accordance with research about time perspectives and substance use, points out the diverse designs and assessment methods. The mixed results on the relationship are furthermore depicted and give an overview of weaknesses of the field. The overview of research done in the field of the specific time dimension FTP furthermore, shows the authors thoughts on implications for practice as well as possibly important concepts linked to the relationship and therefore give an overview of the possibilities of this field. These findings can be relevant to interventionists, researchers trying to enhance substance use prevention interventions by observing time perspectives' role in it as well as to researchers generally studying time perspectives as predictors to health behaviors.

Conclusion and Directions for future research

Overall, this study shows that the field of FTP and its relation to substance use in adolescents mainly includes cross-sectional studies, with differential forms of assessment of the constructs FTP and substance use. Because of these differences in design and also the different sample mean ages and demographics, the design of the included studies does not seem to be sufficient to make robust claims. These differences in design might be the reason for the mixed findings about the relationship of FTP and substance use in adolescents. The included mediators, moderators and further mentioned concepts might be furthermore causing the differences in results, including the notions of an indirect, direct and no relationship at all between FTP and substance use in adolescents. Therefore, the authors' thoughts about the use of FTP in substance-prevention interventions are mixed and include various implications about the use of findings in practice. In the future it will therefore be useful to conduct studies with more complex designs including repeated studies and longitudinal designs. Also, it might be important to measure all time perspectives when trying to measure FTP to gain an overview of the bigger picture of its relation to health behaviors. Studying a possible bidirectional relationship and including mediators like delay discounting might be beneficial since there are no consistent findings about its relation to substance use. Adding personality traits like trait aggression might moreover be important to be able to make more robust claims about the relationship between FTP and substance use in adolescents.

It could be also useful to conduct other scoping reviews about the different conceptualizations of FTP to gain more information on the bigger picture and to compare and draw conclusions. Studying delay discounting and its relation to substance use for instance might be important. Those conclusions might be different than the conclusions from the conceptualization of FTP in this study and therefore could give different reliable recommendations for substance intervention programs or clinical practice in general. According to the result of this study, adding FTP exercises to intervention programs seems viable and warranted. Many authors recommend the inclusion of FTP into intervention methods. This might further involve the consideration of socio-cognitive constructs like substance perception, the inclusion of mothers to help their daughters to develop a FTP as well as the enhancement of self-regulation and consideration of economic status (Fieulainearé & Martinez, 2011). To identify high risk time profiles in students to find the individuals most in need of an intervention might also be beneficial. In clinical practice, patients with

substance-use disorders could benefit from exercises that aim at increasing their FTP or highlighting the importance of a balanced time profile. Conducting further robust research about these recommendations and including these considerations into substance intervention programs can hopefully help to protect young adolescents from substance use making them vulnerable to adverse psychological consequences.

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