

**The Relationship between Time Perspective and Self-Regulation**

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**NOTE ON INCLUSION OF PUBLISHED WORK**

Certain chapters have been published in part during the period of PhD registration. Copyright of these papers resides with the publishers; however, the reproduction of the papers as chapters in this thesis is permitted in the terms of the copyright agreements. These papers are as follows:

**Chapter 2:** Baird, H. M., Webb, T. L., Martin, J., & Sirois, F. M. (2017). The relationship between time perspective and self-regulatory processes, abilities and outcomes: a protocol for a meta-analytical review. *BMJ open*, *7*(6), e017000.

**Chapter 6:** Baird, H. M., Webb, T. L., Martin, J., & Sirois, F. M. (2018). The relationship between a balanced time perspective and self-monitoring of blood glucose among people with type 1 diabetes. *Annals of Behavioral Medicine*.

**ABSTRACT**

Self-regulation is the study of how people direct their thoughts, feelings, and behaviours in order to achieve their goals. Research on self-regulation typically seeks to explore why efforts to self-regulate are sometimes compromised and how self-regulation can be promoted to enable people to achieve their goals. This thesis aimed to explore the relationship between time perspective and self-regulation. Time perspective refers to individual differences in the extent to which people express attitudinal, attentional, and behavioural preferences for the past, present, or future. Chapter 2 presents a meta-analysis of 282 empirical studies that explored the relationship between time perspective and the extent to which people engage in specific self-regulatory processes necessary for goal striving. A future time perspective (i.e., the tendency to consider, anticipate, and plan for the future) was found to be positively associated with self-regulatory processes and goal attainment, with the magnitude of these relationships ranging from small to medium. This review also revealed that little research has explored the relationship between time perspective and monitoring of goal progress – a key self-regulatory process that has been found to promote goal attainment.

Thus, three empirical studies sought to explore the relationship between time perspective and monitoring. To set the stage for these studies, Chapter 3 reviews work on progress monitoring and explains how it might relate to time perspective. Study 1 (reported in Chapter 4) then reports the findings of a correlational study which found that people with a future time perspective were more likely to monitor their goal progress and were more likely to use a wider variety of strategies and information in order to do so. Study 2 (reported in Chapter 5) established the causal nature of these relationships by manipulating time perspective to promote monitoring. Finally, Study 3 (reported in Chapter 6) investigated the mechanisms through which time perspective influences progress monitoring within a specific sample (people with type 1 diabetes) and using an objective measure of monitoring. Feelings associated with monitoring and subsequent attitudes towards monitoring were found to mediate the relationship between time perspective and the frequency with which people with diabetes monitored their blood glucose. Taken together, the findings demonstrate the importance of time perspective for self-regulation, and particularly monitoring goal progress. In Chapter 7, the implications of these findings and avenues for future research are discussed.

**CHAPTER 1**

TIME PERSPECTIVE AND SELF-REGULATION: AN OVERVIEW

**1.1 Introduction**

The challenges that people face during their day-to-day life can often feel like they are competing in a series of battles with their own intentions and desires. For example, someone on a diet may have to battle their urges to indulge in high-calorie foods or snack between meals in order to lose weight, or a student with an upcoming deadline may have to resist going out with friends in order to finish their assignment. But what determines whether people emerge from these battles triumphant or defeated?

Self-regulation is the study of how people direct their thoughts, feelings and behaviours in order to achieve their goals (de Ridder & de Wit, 2006; Vohs & Baumeister, 2004). A number of theoretical models of self-regulation have been proposed in order to identify and explain the cognitive processes that influence people’s behaviour (for a review, see Baumeister & Vohs, 2004). Many of these models (e.g., the Theory of Planned Behaviour, Ajzen, 1991; Social Cognitive Theory, Bandura, 1986; Protection Motivation Theory, Rogers, 1975) recognise that the extent to which people consider the future consequences of their actions is an important determinant of their subsequent behaviour, and propose that behaviour is driven, in part, by weighing up the potential long-term benefits against short-term rewards (Conner & Norman, 2005). Take, for example, the self-regulatory challenges presented above. In each example the individual is required to forgo an immediate pleasure (e.g., eating high-calorie foods or going out with friends) in order to achieve a future benefit (e.g., to lose weight or finish their assignment). While some people may highly value their future, and will take steps to ensure it, others may discount the value of their future in favour of immediate desires.

In light of the above considerations, an extensive body of research has sought to explore whether and how individual differences in people’s time perspectives influences their motivations and behaviours. Time perspective is considered to be a relatively stable individual difference in the extent to which people express attitudinal, attentional, and behavioural preferences for the past, present, or future (Zimbardo & Boyd, 1999). Over time, research has indicated that individuals come to develop a habitual focus on, or orientation towards, one time frame over another – be it reminiscing over the past, living for the moment, or looking towards the future. These preferences have been found to serve as a cognitive bias that can affect people’s judgements, decision-making, and, ultimately, their behaviour (for a review, see Stolarski, Fieulaine, & Beek, 2015). The overarching aim of the research presented in this thesis is to explore the relationship between time perspective and self-regulation. This introductory chapter will begin this endeavour by outlining the fundamental concepts to be explored; namely time perspective and its relationship with self-regulation.

**1.1.1 Conceptualising Time Perspective**

The fundamental premise underlying research on time perspective is that people differ in their perceptions of the past, present, and future (Nuttin, 1985, Shipp, Edwards, & Lambert, 2009). One of the earliest recognised definitions of time perspective was proposed by Kurt Lewin in 1951 as “the totality of the individual’s view of his psychological future and psychological past existing at a given time” (p. 75). However, our current understanding of time perspective has been largely influenced by the ideas presented in a seminal book by Joseph Nuttin and Willy Lens in 1985 entitled, “*Future Time Perspective and Motivation*”. Nuttin and Lens (1985) proposed that people’s ability to foresee, anticipate, and plan for the future, acts as a primary motivational force, and that people’s behaviours are driven by their desires of who or what they want to be in the future. Since these early conceptualisations, research on time perspective has burgeoned and time perspective has been defined and operationalised in a variety of different ways (Lasane & O’Donnell, 2005). This has resulted in a number of different terms that have been used to reflect various constructs relating to time perspective; including, time orientation, time attitudes, temporal focus, and temporal depth.

In this programme of research, the term time perspective is used to describe the overarching view that an individual has towards different time frames. Using this definition, we acknowledge that time perspective is a multidimensional construct that encompasses people’s cognitions, attentions, attitudes, and behaviours. In an attempt to organise the literature on time perspective, the present thesis expands on a framework proposed by Shipp and colleagues (Shipp, Edwards and Lambert, 2009) in order to distinguish between seven key conceptualisations: (i) Time Perspective – referring to the overarching view that an individual holds towards time and encompasses cognition, affect, and behaviour (Zimbardo & Boyd, 1999), (ii) Time Orientation – referring to people’s cognitive engagement in the past, present, and future (Holman & Silver, 1998), (iii) Consideration of Future Consequences – referring to the extent to which people consider the consequences of their actions on future outcomes (Strathman, Gleicher, Boninger, & Edwards, 1994) , (iv) Time Attitude – referring to people’s emotional and evaluative feelings towards the past, present, and future (Nuttin & Lens, 1985), (v) Temporal focus – referring to the extent to which people devote their attention to the past, present, and future (Shipp et al., 2009), (vi) Temporal Depth – referring to the quantitative distance into the past (i.e., how far back into the past) and the future (i.e., how far forward in the future) that is typically considered when thinking about events that have happened or may happen (Bluedorn, 2002), and (vii) Balanced Time Perspective – defined as the ability to draw from multiple timeframes and switch flexibly between them (Boniwell and Zimbardo, 2004).

Although there is no universally accepted definition of time perspective, research on time perspective has been predominantly influenced by the work of Philip Zimbardo and John Boyd. Zimbardo and Boyd (1999) propose that people’s time perspective acts as a cognitive framework where the flow of personal and social experiences are assigned to different time frames in order to give order and meaning to those experiences. According to Zimbardo and Boyd’s (1999) classification there are five main time perspectives; (i) past-negative, reflecting an adverse view of the past and characterised by feelings of bitterness and regret, (ii) past-positive, reflecting a warm and sentimental view of the past and characterised by feelings of nostalgia, (iii) present-hedonistic, reflecting a pleasure-seeking attitude towards life and characterised by risk-taking and the desire for immediate gratification, (iv) present-fatalistic, reflecting the belief that much of life is determined by fate and characterised by feelings of hopelessness, and (v) a future time perspective, reflecting a greater consideration for the effects of current actions on future outcomes and characterised by the ability to impose self-control and delay immediate gratification in order to achieve a future desirable outcome. Although this classification implies that there are five distinct time perspectives, each dimension is typically assessed along a continuum and it is the extent to which each of these time frames are utilised that has been found to influence people’s decisions and behaviours.

**1.1.2 The Relationship between Time Perspective and Self-Regulation**

Over the past 20 years, research on time perspective has grown rapidly and differences in people’s time perspectives have been explored in relation to a number of psychological processes, behaviours, and outcomes, in a range of life domains. For example, a future time perspective (i.e., the tendency to consider the future implications of present decisions and actions) has been associated with a variety of health-protective behaviours (e.g., physical activity and healthy eating; Daugherty & Brase, 2010), greater academic achievement (Horstmanshof & Zimitat, 2007), more responsible financial behaviours (e.g., regular saving; Donnelly, Iyer, & Howell, 2012), and pro-environmental behaviours (e.g., water conservation; Corral-Verdugo, Fraijo-Sing, & Pinheiro, 2006).

In contrast, a present time perspective (i.e., the tendency to make decisions and engage in behaviours that satisfy immediate needs and desires) has been associated with health-risk behaviours (e.g., substance use; Daugherty & Brase, 2010), lower academic achievement (Guthrie, Butler, & Ward, 2009), pathological gambling (Hodgins & Engel, 2002), and risky driving (Zimbardo, Keough, & Boyd, 1997). Although relatively less research has explored the influence of a past time perspective, there is some evidence to suggest that having a positive view of the past is associated with greater health responsibility (Hamilton, Kives, Micevski, & Grace, 2003), and higher levels of education (Shores & Scott, 2007), while having a negative view of the past is associated with binge eating and drinking (Laghi, Ligi, Baumgartner, & Baiocco, 2012), and problematic internet use (Chittaro & Vianello, 2013).

**1.1.3 Why Might Time Perspective be Associated with Self-Regulation?**

Self-regulation encompasses a number of related, but distinct, processes that are necessary for goal striving (Mann, de Ridder, Fujita, 2013). These processes can involve deciding which goals to pursue, engaging in actions to pursue these goals, monitoring progress towards these goals, and warding off temptations or challenges that may derail goal pursuit (Fujita, Carnevale, & Trope, 2011). It is possible that individual differences in time perspective could be associated with one or all of these processes. For example, previous research has indicated that individuals with a future time perspective have stronger intentions to achieve their goals (e.g., Crockett, Weinman, & Hankins, 2009; Fieulaine & Martinez, 2011; Griva, Anagnostopoulos, & Potamianos, 2013), are more likely to engage in actions directed to achieving their goals (e.g., spending more time studying, Horstmanshof & Zimitat, 2007; planning for retirement, Petkoska & Earl, 2009; managing finances, Donnelly, Iyer, & Howell, 2012), and have greater ability to resist temptations that may derail goal pursuit (i.e., greater self-control, Kim, Hong, Lee, & Hyun, 2017). However, although a great deal of research has explored the relationship between time perspective and a number of behaviours and outcomes relevant to self-regulation, little research has sought to explore how and why time perspective is associated with positive outcomes. For example, do people with a future time perspective have better outcomes because they are (i) more motivated, (ii) more likely to keep track of their behaviour and/or (iii) more likely to take action when needed?

The programme of research described in this thesis sought to provide a comprehensive and systematic review of the literature exploring the relationship between time perspective and self-regulation, and relationship between time perspective and a specific self-regulatory process – namely, the frequency and ways in which people monitor their progress towards their goals. To achieve this aim, four empirical studies were conducted. First, research exploring the relationship between time perspective and specific self-regulatory processes and outcomes was reviewed and meta-analysis was used to estimate the size and direction of the respective relationships (Chapter 2). The findings of this review pointed to a lack of empirical research exploring the relationship between time perspective and the extent to which people monitor their goal progress. Given that previous research has highlighted the importance of monitoring for promoting goal attainment (for a review, see Chapter 3), three subsequent studies sought to explore the relationship between time perspective and monitoring of goal progress.

Study 1 was a cross-sectional survey that investigated the relationship between different measures of time perspective and the likelihood and ways in which people monitor their progress towards their goals (Chapter 4). Building on this correlational evidence, Study 2 sought to establish the causal nature of these relationships by manipulating time perspective in order to promote monitoring of goal progress and subsequent goal attainment (Chapter 5). Study 3 then investigated the possible mechanisms through which time perspective influences progress monitoring within a specific sample (namely, people with type 1 diabetes) and using an objective measure of monitoring (data extracted from electronic blood glucose monitors; Chapter 6). Finally, Chapter 7 reviews the evidence collected for this programme of research and discusses these findings in relation to theories of self-regulation. This discussion concludes by highlighting the implications of the research findings and suggesting directions for future research.

**CHAPTER 2**

THE RELATIONSHIP BETWEEN TIME PERSPECTIVE AND SELF-REGULATORY PROCESSES, ABILITIES, AND OUTCOMES:

A META-ANALYSIS

**2.1 Introduction**

A number of independent, empirical studies have explored the associations between time perspective and various processes, behaviours, and outcomes relevant to self-regulation. In response to this growing body of research, meta-analyses have sought to quantify the size of these relations in an attempt to organise and understand the rapidly accumulating research findings. For example, previous meta-analyses have explored the relationship between time perspective and either a specific behaviour, such as procrastination (Sirois, 2014), or a specific group of behaviours, such as pro-environmental behaviours (Milfont, Wilson, & Diniz, 2012), health behaviours (Sweeny & Culcea, 2017; Yarcheski, Mahon, Yarcheski, 2004; Murphy & Dockray, 2018) and occupational well-being (Henry, Zacher, & Desmette, 2017). Additionally, two recent meta-analyses have examined the relationship between time perspective and the specific components of the Theory of Planned Behaviour (i.e., attitudes, perceived behavioural control, and intentions; Andre, van Vianen, Peetsma & Oort, 2018), and the incremental validity of time perspective after controlling for other well-known dispositional antecedents of behaviour (e.g., the “big five” personality traits; Kooij, Kanfer, Betts, & Rudolf, 2018). Taken together, these reviews found small to medium sized relationships between a future time perspective and people’s behaviour and self-regulatory outcomes, and a future time perspective was found to explain additional variance after controlling for individual differences in personality.

However, there are two notable limitations of previous reviews. First, the aforementioned meta-analyses focused primarily on the role of a future time perspective, and typically did not consider the role of other dimensions of time perspective (e.g., a past and a present time perspective). Two exceptions are the reviews conducted by Sirois (2014) and Milfont and colleagues (2012) that explored the relationship between a present time perspective and procrastination (Sirois, 2014) and the relationship between a combined past and present time perspective and pro-environmental behaviour (Milfont et al., 2012). However, both tests of these associations were conducted on a small number of studies (*k* = 8 and *k* = 4 respectively), and, as such, may not provide robust estimates of these relationships. Although a great deal of research has provided evidence for the importance of a future time perspective for goal striving (e.g., Daugherty & Brase, 2010; Donnelly, Iyer, & Howell, 2012; Horstmanshof & Zimitat, 2002), research has also indicated that a present time perspective can have a significant negative influence on goal striving (e.g., Braitman & Henson, 2015; Donnelly et al., 2012; Guthrie, Butler, & Ward, 2009). Thus, it is important that other dimensions of time perspective (e.g., those relating to the past or the present) are not excluded because if meta-analyses find that the negative effect of a present time perspective is stronger than the positive effect of a future time perspective, then it suggests that time perspective-based interventions designed to promote goal attainment may want to focus on reducing a present time perspective rather than promoting a future time perspective. Furthermore, it has recently been suggested that a balanced time perspective is most beneficial, where people are able to draw from multiple timeframes and switch flexibly between them in order to meet situational demands (Boniwell, Osin, Linley and Ivanchenko, 2010; Boniwell and Zimbardo, 2004). However, no review to date has included research pertaining to a balanced time perspective.

Second, while these reviews have pointed to the relationship between time perspective and particular processes, behaviours, and outcomes, they do not indicate which specific self-regulatory processes mediate or explain the relationship between time perspective and self-regulatory outcomes. For example, do people with a future time perspective have a lower body mass index (i.e., the outcome of the goal striving) because they are: (i) more motivated to be active, (ii) more likely to keep track of the amount of physical activity that they do, or (iii) more physically active? Only by answering these questions can we understand why people with different time perspectives are more likely to engage in certain behaviours.

The present chapter reports the findings of a review that used meta-analysis to quantify the size and direction of the relationship(s) between different dimensions of time perspective and specific self-regulatory processes and outcomes. In contrast to previous meta-analyses on time perspective, the present review was not restricted to a specific behaviour or life domain and, instead, deconstructed the processes involved in self-regulation by creating a taxonomy to classify measures used in primary studies according to the self-regulatory process that they were likely to reflect. By doing so, the relationship between different dimensions of time perspective and specific self-regulatory processes could be explored and mediation analyses could be conducted to assess which (if any) of these processes accounted for the relationship between time perspective and goal attainment.

**2.1.1 A Taxonomy for Classifying Measures of Self-regulation**

Self-regulation is the study of how people direct their thoughts, feelings, and behaviours in order to achieve their goals (de Ridder & de Wit, 2006; Vohs & Baumeister, 2004). The term self-regulation is often used more broadly to describe the processes that are involved during goal striving (Mann, de Ridder, Fujita, 2013). These processes can involve deciding which goals to pursue, engaging in actions to pursue these goals, monitoring progress towards these goals, and warding off temptations or challenges that may derail goal pursuit (Fujita, Carnevale, & Trope, 2011). It is possible that individual differences in time perspective could be associated with one or all of these processes. Thus, given that self-regulation likely encompasses a number of processes, it is necessary to identify the core processes involved in self-regulation in order to understand whether and how different dimensions of time perspective relate to each of these specific components independently. An additional challenge is the considerable variation in how self-regulatory processes and relevant behaviours have been operationalised and measured (Vohs & Baumeister, 2004). In an effort to address these challenges, a taxonomy was developed for classifying measures according to the self-regulatory process that they were likely to reflect. This taxonomy can be used to organise and synthesise research on self-regulation, both in relation to time perspective (in the present review), and in subsequent research that explores other antecedents and consequences of self-regulatory processes and outcomes.

**2.1.2 A Framework for Understanding Self-Regulation**

The present review builds on a framework for understanding self-regulation developed by Burnette and colleagues(Burnette, O’Boyle, VanEpps, Pollack, & Finkel, 2013) and distinguishes between three self-regulatory processes as specified by Control Theory(Carver & Scheier, 1981, 1982); namely, goal setting, goal monitoring, and goal operating. Control Theory starts with the assumption that goal striving requires that people establish a specific reference value or a desired outcome; that is, the goal that they would like to achieve. According to Control Theory, once a goal has been formed, a process of monitoring is initiated in which people compare how things are (i.e., their current rate of progress) with how they want or expect them to be (i.e., the desired rate of progress specified by the goal or standard). If a discrepancy is detected, then people can respond either by taking goal-directed action or by revising their initial goal. Control Theory therefore proposes that three processes are essential for effective self-regulation: (i) the setting of goals or standards, (ii) monitoring progress towards these goals, and (iii) acting to reduce discrepancies. Thus, using Carver and Scheier’s (1982) cybernetic model to organise research on self-regulation, the first aim of the present review was to explore how different dimensions of time perspective were associated with each self-regulatory process as specified by Control Theory.

While Control Theory highlights the processes that are likely involved in self-regulation, other research has explored individual differences in people’s *ability* to regulate their behaviour. Self-regulatory ability can be broadly defined as the resources and attributes that an individual has in order to help them with goal attainment (de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012). Examples of self-regulatory ability may include self-control, typically defined as the ability to resist immediate urges, impulses, and temptations that may derail goal pursuit (e.g., Baumeister, Bratslavsky, Muraven, & Tice, 1998; Vohs & Baumeister, 2004), and executive functioning, which refers to a number of cognitive processes (e.g., working memory, behavioural inhibition, and task switching) that enable conscious control over thoughts, feelings, and behaviours (Hofmann, Schmeichel, & Baddeley, 2012). Research has demonstrated that differences in people’s ability to regulate their behaviour are associated with subsequent behaviour and self-regulatory outcomes (e.g., de Ridder et al., 2012). Thus, given the apparent importance of self-regulatory ability for goal striving, the present review also sought to explore how different dimensions of time perspective were associated with people’s ability to regulate their behaviour.

Finally, the present review investigated the relationship between time perspective and self-regulatory outcomes (i.e., goal attainment). However, it is currently unclear which (if any) self-regulatory processes account for the likely effect of time perspective on self-regulatory outcomes. For example, are people with a future time perspective more likely to set goals, monitor their progress in relation to these goals, take action when needed, or do some or all of these things? To answer these questions, the present review conducted a series of mediation models in order to explore whether any of the self-regulatory processes identified above, or people’s ability to regulate their behaviour, mediated or explained the relationship between time perspective and goal attainment.

**2.1.3 Moderators of the Relationship between Time Perspective and Self-Regulation**

Several variables may influence the relationship between time perspective and self-regulation. The impact of these variables needs to be assessed in order to accurately characterise the strength and direction of the relationships between time perspective and self-regulatory processes, abilities, and outcomes, and to understand *when* time perspective is associated with self-regulatory processes, ability, and outcomes and when it is not. It is useful to delineate two classes of moderator variables, namely, methodological moderators and sample characteristics.

**Methodological Moderators**. Three moderators pertaining to the method used to investigate the relationship between time perspective and self-regulation in the primary studies were explored: (i) the nature of the measure of time perspective, (ii) the design of the study, and (iii) the domain being studied.

***Measure of time perspective*.** There is considerable variation in how time perspective has been measured and operationalised. For example, measures of time perspective can differ according to the time frame(s) being studied (i.e., past, present, future) and the dimension of time perspective being assessed (e.g., temporal attitudes, temporal focus, temporal depth). In terms of the time frame(s) being studied, some measures of time perspective assess people’s perspectives with respect to one time frame (e.g., the Future Orientation Scale, Carstensen & Lang, 1996), whereas others assess people’s perspectives with respect to multiple time frames (e.g., the Zimbardo Time Perspective Inventory; Zimbardo & Boyd, 1999). In terms of the dimension of time perspective being assessed, some measures of time perspective assess people’s emotional and evaluative feelings toward the past, present, and future (e.g., the Time Attitude Scale; Nuttin, 1985), whereas others assess the amount of attention that people devote to the past, present, and future (e.g., Temporal Focus Scale; Shipp, Edwards, & Lamber, 2009). This variation in approaches may help to explain apparent inconsistencies and contradictions in the findings of independent empirical studies. For example, Adams and Nettle (2009) found that, while the future subscale of the Consideration for Future Consequences scale (Strathman, Gleicher, Boninger, & Edwards, 1994) was negatively associated with smoking behaviour, the future subscales of other measures of time perspective (e.g., the Zimbardo Time Perspective Inventory; Zimbardo & Boyd, 1999) were not.

Measures of time perspective have also been developed for use in specific samples or in relation to specific goals or behaviours. For example, the Hypertension Temporal Orientation Scale (Brown & Segal, 1996) assesses differences in time perspective in individuals with hypertension. Similarly, Hall and colleagues have devised measures of time perspective that relate specifically to people’s time perspectives toward their diet and exercise (Hall, Fong, & Cheng, 2012). The latter research suggests that the relationships between time perspective and self-regulatory processes and outcomes appear stronger when the measure of time perspective is specific to the domain being studied. Thus, the present review also categorised measures of time perspective according to whether they related specifically to the sample or domain being studied.

***Study Design*.** The present review included both experimental and correlational (i.e., cross-sectional and longitudinal) data and it is possible that the different methodological approaches may lead to different estimates of the size of the relationships of interest. For example, cross-sectional studies may inflate estimated effect sizes due to the simultaneous measurement of study variables (i.e., common method variance; Lindell & Whitney, 2001), which can lead participants to modify their responses in order to appear consistent (Budd, 1987; Fishbein & Ajzen, 2010). It was therefore predicted that the relationships between time perspective and aspects of self-regulation would appear stronger in studies with cross-sectional designs in comparison to studies with prospective and longitudinal designs. The present review also explored whether the magnitude of the relationship observed differed according to correlational and experimental designs.

***Domain being studied*.** Previous research has indicated that time perspective is associated with a number of processes, behaviours, and outcomes across various life domains including, health, finances, education, and work. However, it is currently unknown whether the nature of the relationship between time perspective and self-regulatory processes, abilities, and outcomes is comparable across different life domains. For example, is the strength of the relationship between time perspective and body mass index (a health outcome) similar to the strength of the relationship between time perspective and a student’s grade point average (an educational outcome)? To address these questions, the present review explored whether the life domain being studied moderated the size of the relationships between time perspective and self-regulatory processes, abilities and outcomes.

**Sample Characteristics.** The relationship between time perspective and self-regulation may vary according to the sample being studied. For example, while a future time perspective has been found to be associated with greater physical activity and a healthy diet among a sample of adolescents (e.g., Luszczynska et al., 2004), a future time perspective was not associated with either physical activity or diet in a sample of patients undergoing cardiac rehabilitation (Hamilton et al., 2003). Additionally, given that time perspective is a relatively stable temporal bias that develops over time (Zimbardo & Boyd, 1999), the age of the sample might influence the strength of the relationship, such that the relationship between time perspective and self-regulatory processes and outcomes may appear stronger with increasing age. In light of this discussion, three moderators pertaining to the nature of the sample were explored: (i) the nature of the sample (e.g., university vs. clinical), (ii) the age of the sample, and (iii) the gender of the sample.

**2.1.4 The Present Review**

The present review uses meta-analysis to quantify the size of the relationships between time perspective and self-regulatory processes. Specifically, this review builds on a framework devised by Burnette and colleagues (Burnette et al., 2013) to distinguish between three key self-regulatory processes specified by Control Theory (Carver & Scheier, 1982): (i) goal setting, (ii) goal monitoring, and (iii) goal operating. In addition to these processes, the present review also explores the relationships between time perspective and self-regulatory ability and the outcomes of self-regulation. These associations are examined across a number of different domains (e.g., health, academic, work, financial, environmental) and samples (e.g., community adults, clinical, students, adolescents).

To this end, the present review has four broad aims:

1. To use existing theories and frameworks to develop a taxonomy for classifying measures according to whether they reflect one or more of the self-regulatory processes described above, self-regulatory ability, and/or self-regulatory outcomes;
2. To use meta-analysis to quantify the direction and strength of the relationships between time perspective and self-regulatory processes, ability and outcomes;
3. To explore potential moderators that influence the magnitude of these relationships.
4. To test whether the relationship between time perspective and self-regulatory outcomes is mediated (or explained) by self-regulatory processes and/ or ability;

**2.2 Method**

The review was conducted in accordance with guidelines from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Moher, Liberati, Tetzlaff, & Altman, 2009; see Appendix 1), and with respect to recent recommendations for the meta-analysis of correlational data (e.g., Quintana, 2015). The protocol for the review was published (Baird, Webb, Martin, & Sirois, 2017) and the review was registered with the International Prospective Register of Systematic Reviews (PROSPERO; https://www.crd.york.ac.uk/prospero/; registration number: CRD42017058590).

**2.2.1 Information Sources and Search Strategy**

The sample of studies was generated using four methods. First, a search of the electronic database, Web of Science, was conducted for articles published up to the 11th of January 2016, using search terms relating to time perspective (i.e., *time perspective*, *time orientation*, *time attitude*, *temporal perspective*, *temporal orientation*, *temporal focus*, *temporal depth*, *future consequence*, *past orient\**, *present orient\**, *future orient\**). Articles that contained one or more of these search terms in the title, abstract, or keywords were considered for inclusion in the review. Second, articles referenced in the appendix of a recent book, “Time perspective theory; review, research and application” (Stolarski, Fieulaine, & Beek, 2015) and articles listed on the references page of the Time Perspective Network website (http://www.timeperspective.net/) were reviewed for inclusion. Third, the abstract booklets from the three International Conferences on Time Perspective that have been held to date (in 2012, 2014, and 2016) were screened for published articles and unpublished research/data. Finally, a call for papers and unpublished data was sent to the distribution lists of the European Association of Social Psychology (http://www.easp.eu/), the Society of Experimental Social Psychology (http://www.sesp.org/), and members of the Time Perspective Network (http://www.timeperspective.net/).

**2.2.2 Eligibility Criteria**

The review sought to include all published and unpublished empirical studies that examined the quantitative relationships between measures of time perspective and measures of at least one self-regulatory process, ability, or outcome. Eligibility was not restricted by the study design, and studies using correlational (i.e., cross-sectional or longitudinal) or experimental (i.e., where time perspective was manipulated) designs were both eligible for inclusion. In each case, the effect size *r* was used to represent the strength and direction of the relationship between the measure of time perspective and the measure of the self-regulatory process, ability, and/ or outcome. Thus, studies needed to report, or provide sufficient information in order for us to be able calculate, the bivariate Pearson’s correlation (*r*). No restrictions were placed on the type of sample being studied nor the study setting, and as such, studies of healthy adults, adolescents and children, university students and clinical populations, and studies conducted in community, clinical, and academic settings were all eligible for inclusion. Articles published in a language other than English were also eligible if the relevant information could be identified using automated translation services (e.g., Google Translate; https://translate.google.co.uk/).

**Measures of interest**. To be eligible for inclusion, studies needed to include a measure of time perspective and a measure of a self-regulatory process (i.e., goal setting, goal monitoring or goal operating), ability, or outcome.

***Measures of time perspective****.* Time perspective was conceptualised as a multidimensional construct that encompasses cognition, attention, attitudes, and behaviour. As such, time perspective was broadly defined and included measures of time perspective such as the Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999), and measures of future orientation (e.g., the Consideration of Future Consequences Scale; Strathman, Gleicher, Boninger, & Edwards, 1994), temporal depth (e.g., the Temporal Depth Index; Bluedorn, 2002), temporal focus (e.g., the Temporal Focus Scale; Shipp, Edwards, & Lambert, 2009), and time attitudes (e.g., the Time Attitude Scale; Nuttin, 1985). Measures of time perspective that have been used in specific samples (e.g., the Hypertension Temporal Orientation Scale, Brown & Segal, 1996), and scales in which time perspective is measured as a subscale (e.g., the present-hedonistic subscale of the Barrett Impulsivity Scale; Patton & Stanford, 1995), were also included if it was possible to extract the bivariate correlation between the time perspective subscale and the measure of self-regulatory process, ability and/or outcome.

Many of the measures of time perspective identified above incorporate multiple subscales. For example, the Temporal Depth Index (Bluedorn, 2002), the Temporal Focus Scale (Shipp et al., 2009), and the Time Attitude Scale (Nuttin, 1985) each contain three subscales assessing biases towards the past, present, and future, respectively. Given that different time perspectives are likely to have different associations with aspects of self-regulation, it was necessary to categorise the measures according to the dimensions of time perspective that they were likely to reflect. The present review identified 12 dimensions of time perspective (for a summary of these dimensions, see Table 2.1). The first three dimensions related to general orientations towards the past, present or future (subsequently named: past time perspective, present time perspective, and future time perspective). The next dimensions of time perspective that were identified included scales and subscales that assessed people’s emotional and evaluative feelings towards the past, present, and future. Specifically, there were three dimensions reflecting positive feelings towards the past, present, and future (subsequently named: past-positive, present-positive, and future-positive, respectively) and three dimensions of time perspective reflecting negative feelings towards the past, present, and future (subsequently named: past-negative, present-negative, and future-negative, respectively). Two further dimensions were subscales taken from Zimbardo’s Time Perspective Inventory (Zimbardo & Boyd, 1999). These were a present-hedonistic time perspective, reflecting a pleasure-seeking attitude toward life, and a present-fatalistic time perspective, reflecting the belief that much of life is determined by fate. The final dimension of time perspective identified was labelled a balanced time perspective, defined as the ability to draw from multiple timeframes and switch between them in order to meet current demands (Boniwell and Zimbardo, 2004).

Thus, the relationships between time perspective and self-regulatory processes, abilities, and outcomes were explored for each of these dimensions of time perspective. However, in order to ensure robust estimates of the relationship between time perspective and each self-regulatory process, ability, and outcomes, sample-weighted average effect sizes were only computed when at least three primary studies tested the association. As such, the result tables only include the dimensions of time perspective that had more than three associations with a self-regulatory processes, abilities, or outcomes.

***Measures of self-regulation****.* Studies also needed to include a measure of a self-regulatory process (i.e., goal setting, goal monitoring, or goal operating), ability, or outcome. Given that there is considerable variation in how these processes and behaviours have been operationalised and defined (for a review, see Vohs & Baumeister, 2004), the present review used existing theories (e.g., Control Theory; Carver & Scheier, 1982) and frameworks (e.g., Burnette et al., 2013) to develop a taxonomy for classifying measures according to the self-regulatory process that they were likely to reflect. To achieve this aim, a coding manual was developed (see Appendix 2), which included a definition of each self-regulatory process, self-regulatory ability, and outcomes, an example of how constructs relevant to each component are typically measured, and instructions for coders. Co-authors of this review were asked to consider each measure of self-regulation extracted from eligible studies and indicate whether they thought that the measure reflected a self-regulatory process (i.e., setting, monitoring or operating), ability or outcome. Alternatively, they were asked to indicate if they did not think that the measure was relevant to self-regulation. Below, we outline how these components of self-regulation were conceptualised in the present review.

|  |  |  |
| --- | --- | --- |
| Dimension | Definition | Example Scales and Subscales |
| Past Time Perspective | The extent to which people consider and/ or devote their attention towards their past | Past subscale of the Temporal Focus Scale (Shipp et al., 2009); Past subscale of the Temporal Orientation Scale (Jones et al., 2004) |
| Past-Positive | Positive feelings about the past (e.g., warm and sentimental view of the past) | Past-Positive subscale of the ZTPI (Zimbardo & Boyd, 1999); Past subscale of the Time Attitude Scale (Nuttin, 1985); Past-Positive subscale of the Adolescent Time Attitude Scale (Worrell & Mello, 2007) |
| Past-Negative | Negative feelings about the past (e.g., feelings of regret and past failures) | Past-Negative subscale of the ZTPI(Zimbardo & Boyd, 1999); Past-Negative subscale of the Adolescent Time Attitude Scale (Worrell & Mello, 2007) |
| Present Time Perspective | The extent to which people consider and/ or devote their attention towards their present | Present subscale of the Temporal Focus Scale (Shipp et al., 2009); Present subscale of the Temporal Orientation Scale (Jones et al., 2004) |
| Present-Positive | Positive feelings about the present (e.g., feeling content with life in the present) | Present-Positive subscale of the Adolescent Time Attitude Scale (Worrell & Mello, 2007); Present-Positive subscale of the Time Reference Inventory (Roos & Albers, 1965) |
| Present-Negative | Negative feelings about the present (e.g., feeling unhappy and dissatisfied with life in the present) | Present-Negative subscale of the Adolescent Time Attitude Scale (Worrell & Mello, 2007); Present-Negative subscale of the Time Reference Inventory (Roos & Albers, 1965) |
| Present-Hedonistic | Reflecting a pleasure seeking and risk-taking attitude towards life | Present-Hedonistic subscale of ZTPI (Zimbardo & Boyd, 1999); Present-Hedonistic subscale of the Barrett Impulsivity Scale (Patton & Stanford, 1995) |
| Present- Fatalistic | Reflecting the belief that life is determined by fate | Present-fatalistic subscale of ZTPI (Zimbardo & Boyd, 1999) |
| Future Time Perspective | The extent to which people consider and/ or devote their attention towards their future | Future subscale of ZTPI (Zimbardo & Boyd, 1999); Consideration of Future Consequences Scale (Strathman, et al., 1994); Future subscale of the Temporal Focus Scale (Shipp et al., 2009); Future subscale of the Temporal Orientation Scale (Jones et al., 2004) |
| Future-Positive | Positive feelings about the future (e.g., feeling that the future will be good and full of possibilities) | Future-Positive subscale of the Adolescent Time Attitude Scale (Worrell & Mello, 2007); Future-Positive subscale of the Time Reference Inventory (Roos & Albers, 1965) |
| Future-Negative | Negative feelings about the future (e.g., feeling that the future is bleak and hopeless) | Future-Negative subscale of the Adolescent Time Attitude Scale (Worrell & Mello, 2007); Limited Future subscale of the Future Time Perspective Scale (Carstensen & Lang, 1996) |
| Balanced Time Perspective | The ability to draw from multiple time frames and switch flexibly between them to meet situational demands | Balanced Time Perspective Scale (Webster, 2011); Deviation from a balanced time perspective calculated using scores on the ZTPI (Zimbardo & Boyd) |

**Table 2.1.** *Summary of the different dimensions of time perspective.*

Note. ZTPI = Zimbardo Time Perspective Inventory; CFC = Consideration of Future Consequences

*Goal setting*. Measures of goal setting typically assess the amount of effort or motivation that a person will devote to achieving a goal (Ajzen, 1991). Thus, measures of goal setting may include measures of intentions (e.g., “I intend to achieve X”; Triandis, 1980), commitment or motivation (e.g., “I am strongly committed to achieving X”; Locke, Latham, & Erez, 1988), or readiness to change (e.g., precontemplation, contemplation, preparation, action, and maintenance; Prochaska & DiClemente, 1984).

*Goal monitoring*. Goal monitoring involves evaluating ongoing performance relative to the goal that has been set, or in comparison to others, or past performance (Carver & Scheier, 1982; Webb, Chang, & Benn, 2013). Example measures may include the frequency with which people check their personal finances (e.g., Chang, Webb, & Benn, under review), seek feedback on their performance at work (e.g., from supervisors or colleagues; Anseel, Lievens, & Levy, 2007), record the number of calories consumed (e.g., Boutelle, Kirschenbaum, Baker, & Mitchell, 1999) or use equipment that provides information relating to their goal progress (e.g., smartphone apps, activity wristbands, weighing scales; Hall & Epp, 2013).

*Goal operating.* Goal operating refers to activities and behaviours directed towards goal achievement (Carver & Scheier, 1982). Measures of goal operating may include the number of hours spent preparing for an exam (e.g., Horstmanshof & Zimitat, 2007), planning for retirement (e.g., enquiring about a saving scheme; Hershey, Jacobs-Lawson, McArdle, & Hamagami, 2007), use of learning strategies (e.g., reading the information several times or creating mnemonics; Bowles, 2008), or the amount of effort exerted toward a particular goal (e.g., at work or while studying; Gutierrez-Braojos, 2015).

*Self-regulatory ability*. Self-regulatory ability is conceptualised as the resources and attributes that an individual has in order to help them to achieve their goals (de Ridder et al., 2012). Therefore, measures of self-regulatory ability may include measures of self-control (e.g., the Brief Self-Control Scale; Tangney et al., 2004), delay discounting (e.g., Mischel et al., 1989), impulsivity and sensation seeking (e.g., the Barrett Impulsivity Scale, Patton & Stanford, 1995; the Sensation-Seeking Scale, Zuckerman, Kolin, Price, & Zoon, 1964), executive function (e.g., response inhibition, Logan, Cowan, & Davis, 1984), and problem solving ability (e.g., the Raven Advanced Progressive Matrices, Raven, Court, & Raven, 1998). Measures of emotion regulation may also be relevant, including measures of proactive coping (e.g., Proactive Coping Inventory; Greenglass, Schwarzer, Jakubiec, Fiksenbaum, & Taubert, 1999), suppression of aggression (e.g., the suppression of aggression subscale of the Weinberger Adjustment Inventory, Weinberger, 1997), and emotional stability (e.g., the Emotional Stability Questionnaire; Psycom Services, 1995). We did not include measures that assess people’s perceptions of their self-regulatory ability, for example self-efficacy or perceived behavioural control, as these measures arguably reflect people’s confidence in their ability, rather than their ability itself.

*Self-regulatory outcomes.* Self-regulatory outcomes refer to the outcome(s) of goal pursuit (i.e., what has been achieved). Possible measures of self-regulatory outcomes may include students’ grade point averages (e.g., Shell & Husman, 2001), smokers’ carbon monoxide levels (e.g., Jones, Landes, Yi & Bickel, 2009), the amount of savings or debt that people have accumulated (e.g., Antonides, de Groot & van Raaij, 2011), or a person's body mass index (e.g., Hall & Epp, 2013). Measures of self-regulatory outcomes may also include whether a person engages in health protective behaviours (e.g., physical activity, health screenings, medication adherence, calorie intake; Daugherty & Brase, 2010, Sansbury, Dasgupta, Guthrie, & Ward, 2014) or health risk behaviours (e.g., substance use, alcohol consumption, risky sexual behaviours, consuming fatty foods; Henson, Carey, Carey, & Maisto, 2006), and the extent to which people engage in pro-environmental behaviours, risky driving, or antisocial behaviours (e.g., gambling, violence, or expressions of aggression; Hodgins & Engel, 2002, McKay, Dempster, & Mello, 2015).

However, at times it was not always clear whether the measure of self-regulation reflected a measure of goal operating or a measure of a self-regulatory outcome. For example, whether a person engages in a health protective behaviour (e.g., exercising twice a week) could represent a goal-direct behaviour (e.g., if the goal is to lose weight) rather than a measure of a self-regulatory outcome as suggested above. In light of these instances, four specific rules were formulated to help inform the taxonomy. First, if the study included a measure of goal setting (e.g., intentions to exercise three times a week) and also measured a behaviour directly related to the goal intention (e.g., the number of exercise sessions undertaken each week), then the measure of behaviour was classified as a measure of a self-regulatory outcome. Second, if a study measured a distal goal outcome (e.g., self-rated health), in addition to a more proximal or immediate goal outcome (e.g., smoking behaviour), then the distal goal outcome was classified as a measure of a self-regulatory outcome and the more proximal measure was classified as a measure of goal operating (assuming the distal and proximal goals were related). Third, if a study measured the consequences that may arise as a result of engaging in a specific behaviour (e.g., the Rutgers Alcohol Problems Index assesses a number of detrimental outcomes that may arise from excessive alcohol consumption), then the measure reflecting the consequences of the behaviour was classified as a measure of a self-regulatory outcome and the behaviour itself (e.g., drinking behaviour) was classified as a measure of goal operating. Finally, for studies exploring different groups of people (e.g., alcoholics vs. controls: Klingemann, 2001) on measures of time perspective, group status was classified as a self-regulatory outcome.

**2.2.3 Study Selection**

The process of identifying eligible studies was conducted in two stages. First, the titles and abstracts of articles identified via the search strategies were screened to identify potentially relevant studies. Second, the full texts of articles describing potentially relevant studies were reviewed in detail against the inclusion and exclusion criteria to determine eligibility. The literature search identified 7,093 studies, of which 282 met the inclusion criteria. The flow of studies of studies through each phase of the review are presented in Figure 2.1. Articles included in the review are preceded by an asterisk in the reference list. In total, 90 tests of the association between time perspective and goal setting were eligible for inclusion, 4 tests of the association between time perspective and goal monitoring were eligible for inclusion, and 125 tests of the association between time perspective and goal operating were eligible for inclusion. There were also 251 tests of the association between time perspective and self-regulatory ability, and 398 tests of the association between time perspective and self-regulatory outcomes.

**2.2.4 Data Extraction**

Data from individual studies was extracted using a data extraction form developed for the current review (see Appendix 3). Prior to data extraction, this form was piloted using a sample of eligible studies in order to assess and refine the form as needed. The following data was extracted from studies included in the review: (i) publication details (e.g., authors, year of publication, publication status, and language), (ii) sample characteristics (e.g., mean age, gender composition, and the type of sample being studied), (iii) methodological details, including the time interval (in weeks) between the measure of time perspective and the measure of self-regulatory process, ability, or outcome, the country where the study was conducted, the measure(s) of time perspective and self-regulatory process(es), ability, and / or outcome(s) used in the study, whether each measure of self-regulatory process, ability, or outcome was measured objectively (e.g., a smoker’s carbon monoxide level) or via self-report (e.g., a smoker’s self-reported smoking frequency), scale reliabilities (i.e., Cronbach’s alphas) for self-report measures, and the setting in which the study was conducted (e.g., health, academic, financial, environmental), and (iv) statistical details, including the effect size (e.g., Pearson's *r* statistic), how this effect size was calculated, and the sample size for the effect size extracted. The standard error for each effect size was then calculated using the following formula: SE(*r*) = √1-*r*2/*N*-2.

**2.2.5 Methodological Quality of Individual Studies**

The methodological quality of the individual studies was assessed using a four-point tool devised for the purpose of this review. Specifically, a point was given for each of the following methodological properties achieved. First, if the study used a prospective or experimental design. As previously discussed, cross-sectional designs can inflate the estimated effect sizes due to simultaneous measurement of study variables (i.e., common method variance; Lindell & Whitney, 2001). Second, if the measure of time perspective was internally reliable (i.e., had a Cronbach’s alpha of 0.70 or greater). Third, if an objective measure of a self-regulatory process, ability and/ or outcome was used. Objective measures reduce the influence of social desirability and recall biases (Hassan, 2006; Nederhof, 1985). Finally, a point was given if a sample size greater than 85 was recruited. A sample of 85 would have sufficient power (i.e., approximately 80%) to detect a medium effect size with an alpha of 0.05 (Cohen, 1992). The risk of bias score could therefore range from 0 to 4 (with 0 indicating greater risk of bias) and was explored as a moderator in the analyses.

**Figure 2.1:** *Flow of information through each stage of the review.*

Records identified through database search

(*n* = 6,376)

Additional records from other sources

(*n* = 717)

Records after duplicates removed (*n* = 4,519)

Records screened

(*n* = 4,519)

Records excluded

(*n* = 3,523)

Studies deemed potentially eligible for inclusion

(*n* = 996)

215 Did not include a measure of time perspective

240 Did not include a measure of a self-regulatory process, ability, or outcome

42 Outcomes were not attributable to a change in a self-regulatory process

12 Reported duplicate data that had already been included

8 Could not translate

128 Could not obtain/ extract data

282 studies included in meta-analysis

**IDENTIFICATION**

**SCREENING**

**ELIGIBILITY**

**INCLUDED**

69 Not an empirical study

From: *Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and MetaAnalyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097*

**2.2.6 Computing Effect Sizes**

The effect size metric, Pearson’s *r* was used to represent the strength and direction of the relationship between measures of time perspective and measures of self-regulation. Where Pearson’s *r* was not available, online effect size calculators (Lyons & Morris, 2013 and Psychometrica) were used to convert other effect sizes (e.g., Cohen’s *d*, *Odds Ratios, Eta Squared*) into *r*. If this information was not available from the original report, then the corresponding authors were contacted and asked to provide this information. Authors were not contacted for statistical information if the article was published more than 20 years ago as it was deemed unlikely that this information would be available. For some studies, Spearman’s Rho or point-biserial correlations were used as a proxy for Pearson’s *r.* A positive correlation indicated that the respective dimension of time perspective was positively associated with the respective self-regulatory process, ability, and/or outcome. As such, it was sometimes necessary to reverse score correlations if the measure reflected a lack of the respective self-regulatory process (e.g., number of errors made on a Stroop task would indicate a lack of inhibitory control) or a failure of self-regulation (e.g., in the case of health risk behaviours). In accordance with Cohen’s classification (1992), correlations around 0.10 were considered small, 0.30 were considered medium, and 0.50 were considered large.

In cases where multiple measures of time perspective or self-regulatory process(es), ability, or outcome were completed by the same sample at the same point in time, a single composite effect size was created by meta-analysing the effect sizes for each individual measure prior to inclusion in the main dataset. When multiple samples were reported in the same study, then the effect sizes for each sample were included as separate data points, as long as the procedures for each sample met the inclusion criteria for the review.

**2.2.7 Meta-Analytic Strategy**

Meta-analysis computations were conducted using STATA Version 15 (StataCorp, 2009). A random effects model was applied in all analyses, as it was expected that studies included in the review were likely to be “different from one another in ways too complex to capture by a few simple study characteristics” (Cooper 1986, p. 526). This conservative approach assumes that the effect sizes may vary between studies and will allow the findings to be generalised to populations beyond the specific samples studied (Hedges, 1985). As Pearson’s *r* is not normally distributed, effect sizes were first converted to Fisher’s *z* for analysis and were then converted back to Pearson’s *r* after analysis in order to report the sample-weighted average correlations and the associated 95% confidence intervals (CIs).

The *Q*-statistic (Cochrane, 1954) was used to assess the heterogeneity of the effect sizes from the primary studies. A statistically significant *Q*-statistic indicates that the effect sizes from the primary studies differ more than would be expected by chance alone and therefore, an examination of moderators is justified (Shadish & Haddock, 2009). Heterogeneity was also assessed via the *I2* statistic, which reflects the proportion of variance that is attributable to between-study variability, and not due to sampling error within individual studies. The current meta-analysis used the convention proposed by Higgins and Thompson (2002), with 25, 50, and 75% representing low, medium, and high variance respectively.

When *Q* and *I2* statistics were significant, moderation was tested. For continuous moderators (e.g., the average age of the sample), a random-effects meta-regression model was used to estimate the unstandardised regression coefficient and the significance of the coefficient (using the STATA command *metareg*). For categorical moderators (e.g., the life domain being studied), a separate random-effects model was conducted for each level of the moderator. The sample-weighted average effect sizes were then compared using the *metaf* macro for SPSS (Wilson, 2005). The *metaf* macro performs the analog to One-Way ANOVA in order to determine whether the effect sizes for each level of the moderator significantly differ.

**2.3.8 Assessment of Publication Bias**

Publication status is an important consideration for meta-analyses. Research indicates that studies that report large and statistically significant effects are more likely to be published in comparison to studies with small or non-significant findings (the “file drawer problem”; Rosenthal, 1979). This suggests that effect sizes reported in the published literature might be superficially high and not reflective of the wider empirical evidence. However, it is also possible that unpublished studies utilise less rigorous methods than published studies. In light of these considerations, the present review explored whether difference in effect sizes were observed as a result of publication status. A multimethod approach was used to assess for publication bias. First, an initial inspection of the funnel plots was conducted. Publication bias was then formally assessed using Egger’s regression (Egger, Davey Smith, Schneider, & Minder, 1997). If there was evidence of publication bias, then then Duval and Tweedie’s (2000) trim and fill technique was applied.

**2.3 Results**

The aim of the present review was to quantify the size and direction of the relationships between different dimensions of time perspective and specific self-regulatory processes, self-regulatory ability, and self-regulatory outcomes. Two further aims of this review were to identify moderators that may influence the magnitude of these relationships, and to explore whether self-regulatory processes or self-regulatory ability mediated the relationship between time perspective and self-regulatory outcomes. To address these aims, sample-weighted average effect sizes were computed for the relationship between different dimensions of time perspective and (i) each self-regulatory process (i.e., goal setting, goal monitoring, and goal operating), (ii) self-regulatory ability, and (iii) self-regulatory outcomes. In order to ensure robust estimates of these relationships, sample-weighted average effect sizes were only computed when at least three primary studies tested the association. If there was evidence of significant heterogeneity in effect sizes across the primary studies, then the methodological and sample moderators were explored. Finally, a series of mediation analyses were conducted (using weighted regressions in SPSS) in order to examine whether any of the self-regulatory processes or self-regulatory ability mediated the relationship between time perspective and self-regulatory outcomes.

**2.3.1 The Relationship between Time Perspective and Goal Setting**

Ninety-two tests of the association between time perspective and goal setting were identified (for a summary of studies, please see Appendix 2.4). As can be seen in Table 2.2, the sample-weighted correlations ranged from *r+* = -0.12 (for a present time perspective) to *r+* = 0.22 (for a future time perspective). These findings indicate that there was a small-to-medium sized positive relationship between a future time perspective and goal setting. Given the nature of the measures that were classified as goal setting, this suggests that people with a greater future time perspective have stronger intentions to achieve their goals. There was also a negative relationship between a present time perspective and goal setting, although the size of this relationship was small (*r+*= -0.12) and the confidence interval included zero. The effect sizes observed between the other dimensions of time perspective and goal setting were less than 0.10 and therefore were not considered theoretically significant.

**Table 2.2**. *Sample-weighted average effect sizes for the relationships between dimensions of time perspective and goal setting.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Time Perspective Dimension | *N* | *k* | *r+* | *95% CI* | *Q* | *I2* |
| Past | 4,826 | 5 | 0.04 | -0.10, 0.17 | 46.73\*\*\* | 91.4 |
| Past-Negative | 1,314 | 4 | -0.01 | -0.04, 0.04 | 2.15 | 0 |
| Present | 1,632 | 9 | -0.12 | -0.30, 0.06 | 110.47\*\*\* | 92.8 |
| Present-Hedonistic | 2,123 | 6 | -0.08 | -0.18, 0.03 | 28.41\*\*\* | 82.4 |
| Present-Fatalistic | 624 | 3 | -0.03 | -0.12, 0.05 | 1.93 | 0 |
| Future | 33,405 | 65 | 0.22 | 0.17, 0.27 | 1318.83\*\*\* | 95.1 |

*Note. N* = the number of individuals in the *k* samples; *k* = the number of independent tests of the association included in the analysis; *r+* = sample-weighted average effect size; 95% CI = the 95% confidence intervals. Confidence intervals that do not contain zero are significant at the *p* < .05 level; *Q* = homogeneity statistic (a significant Q statistic indicates moderation); *I* = proportion of total variance that is attributable to between-study variability. Only the dimensions of time perspective that had a least k=3 associations appear in the table. *p*  < .05. \*\* *p*  < .01. \*\*\* *p*  < .001.

**2.3.2 The Relationship between Time Perspective and Monitoring of Goal Progress**

Four studies exploring the relationship between time perspective and monitoring of goal progress were identified for the present review (for a summary of studies, please see Appendix 2.5), and only a future time perspective was assessed in each study. As such, it was only possible to compute the sample-weighted average effect size for the relationship between a future time perspective and goal monitoring. The sample-weighted average effect size was *r+* = 0.13 with a 95% confidence interval from -0.00 to 0.26, based on four studies and a total sample size of 580. This suggests that a future time perspective is positively associated with the extent to which people monitor their progress, although the size of this relationship is small (Cohen, 1992). The effect sizes from primary studies were found to be homogeneous, *Q*(3) = 6.31, *p* = .09, *I* = 52.5%. **2.3.3 The Relationship between Time Perspective and Goal Operating**

One hundred and twenty-five tests of the association between time perspective and goal operating were identified (for a summary of studies, please see Appendix 2.6). As can be seen in Table 2.3, the sample-weighted correlations ranged from *r+* = -0.14 (for a present-fatalistic time perspective) to *r+* = 0.23 (for a future time perspective). These findings indicate that there was a small-to-medium sized positive relationship between a future time perspective and goal operating. This suggests that people with a greater future time perspective are more likely to engage in behaviours and actions directed towards achieving their goal. Negative relationships were observed between a present-hedonistic and present-fatalistic time perspective and goal operating. However, the magnitude of both of these relationships was small (*r+* = -0.12 and -0.14 for present-hedonistic and present-fatalistic dimensions, respectively). These findings suggest that people whose time perspectives are characterised by a pleasure seeking and risk-taking attitude towards life, and those who believe that life is determined by fate, are less likely to engage in behaviours and actions directed toward achieving their goal. The effect sizes observed between other dimensions of time perspective and goal operating were less than 0.10 and therefore are not considered theoretically significant (Cohen, 1992).

**Table 2.3**. *Sample-weighted average effect sizes for the relationship between dimensions of time perspective and goal operating.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Time Perspective Dimension | *N* | *k* | *r+* | *95% CI* | *Q* | *I2* |
| Past | 661 | 3 | 0.06 | -0.04, 0.17 | 3.57 | 44.0 |
| Past-Positive | 4315 | 12 | 0.07 | 0.02, 0.12 | 29.26\*\* | 62.4 |
| Past-Negative | 3352 | 10 | -0.06 | -0.14, 0.01 | 40.20\*\*\* | 77.6 |
| Present | 1466 | 8 | -0.05 | -0.14, 0.04 | 19.69\*\* | 64.5 |
| Present-Hedonistic | 5712 | 16 | -0.12 | -0.19, -0.05 | 99.38\*\*\* | 84.9 |
| Present Fatalistic | 4567 | 14 | -0.14 | -0.20, -0.08 | 56.40\*\*\* | 77.0 |
| Future | 28659 | 62 | 0.23 | 0.20, 0.27 | 556.54\*\*\* | 89.0 |

*Note. N* = the number of individuals in the *k* samples; *k* = the number of independent tests of the association included in the analysis; *r+* = sample-weighted average effect size; 95% CI = the 95% confidence intervals. Confidence intervals that do not contain zero are significant at the *p* < .05 level; *Q* = homogeneity statistic (a significant Q statistic indicates moderation); *I* = proportion of total variance that is attributable to between-study variability. Only the dimensions of time perspective that had a least k=3 associations appear in the table \**p* <.05. \*\**p* <.01. \*\*\**p* <.001.

**2.3.4 The Relationship between Time Perspective and Self-Regulatory Ability**

Two hundred and fifty-one tests of the association between time perspective and self-regulatory ability were identified (for a summary of studies, please see Appendix 2.7). As can be seen in Table 2.4, the sample-weighted correlations ranged from *r+* = -0.22 (for a past-negative time perspective) to *r+* = 0.30 (for a balanced time perspective). These findings indicate that there was a medium-sized positive relationship between a balanced time perspective and self-regulatory ability, suggesting that people who are able to draw from multiple time frames and switch flexibly between them in order to meet situational demands are better able to regulate their behaviour. There was also a positive relationship between a future time perspective and self-regulatory ability (*r+* = 0.26), although the size of this relationship was slightly smaller than the relationship with a balanced time perspective. These analyses also revealed a number of negative relationships between time perspective and self-regulatory ability. The strongest relationship was observed for a past-negative time perspective (*r+* = -0.22), followed by a present-fatalistic time perspective (*r+* = -0.21), a present time perspective (*r+* = -0.20), a present-hedonistic time perspective (*r+* = -0.16), and a negative-future time perspective (*r+* = -0.15). These findings suggest that people with a bias towards these particular time perspectives are less able to regulate their behaviour. The effect size representing the relationship between a past time perspective and self-regulatory ability was less than 0.10 and therefore was not considered theoretically significant (Cohen, 1992).

**Table 2.4**. *Sample-weighted average effect sizes for the relationship between dimensions of time perspective and self-regulatory ability.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Time Perspective Dimension | *N* | *k* | *r+* | *95% CI* | *Q* | *I2* |
| Past | 1,958 | 9 | 0.05 | -0.03,0.14 | 23.58\*\* | 66.1 |
| Past-Positive | 9,169 | 31 | 0.10 | 0.05, 0.15 | 159.87\*\*\* | 81.2 |
| Past-Negative | 8,539 | 31 | -0.22 | -0.28, -0.16 | 187.08\*\*\* | 84.0 |
| Present | 5,504 | 16 | -0.20 | -0.30, -0.20 | 212.21\*\*\* | 92.9 |
| Present-Hedonistic | 8,064 | 34 | -0.16 | -0.23, -0.09 | 348.77\*\*\* | 90.5 |
| Present-Fatalistic | 6,785 | 30 | -0.21 | -0.27, -0.16 | 159.09\*\*\* | 81.8 |
| Future | 29,869 | 92 | 0.26 | 0.22, 0.31 | 1430.77\*\*\* | 98.7 |
| Future-Negative | 1,882 | 5 | -0.15 | -0.27, -0.03 | 10.00\* | 60.0 |
| Balanced Time Perspective | 385 | 3 | 0.30 | 0.14, 0.46 | 5.86 | 65.9 |

*Note. N* = the number of individuals in the *k* samples; *k* = the number of independent tests of the association included in the analysis; *r+* = sample-weighted average effect size; 95% CI = the 95% confidence intervals. Confidence intervals that do not contain zero are significant at the *p* < .05 level; *Q* = homogeneity statistic (a significant Q statistic indicates moderation); *I* = proportion of total variance that is attributable to between-study variability. Only the dimensions of time perspective that had a least k=3 associations appear in the table. \**p* <.05. \*\**p* <.01. \*\*\**p* <.001.

**2.3.5 The Relationship between Time Perspective and Self-Regulatory Outcomes**

Three hundred and ninety-eight tests of the association between time perspective and self-regulatory outcomes were identified (for a summary of studies, please see Appendix 2.8). As can be seen in Table 2.5, the sample-weighted correlations ranged from *r+* = -0.17 (for a present-negative time perspective) to *r+* = 0.19 (for a present-positive time perspective). Although the largest sample-weighted correlation was observed for the relationship between a present-positive time perspective and self-regulatory outcomes, this correlation was only based on four primary studies and the confidence interval included zero. Inspection of the individual effect sizes obtained from these primary studies also confirmed that there was considerable variability between the studies (i.e., Pearson’s *r* ranged from -0.04 to 0.42).

With the exception of a present-positive time perspective, the dimensions of time perspective that reflected a present time perspective (e.g., present-negative, present-hedonistic, and present-fatalistic) were negatively associated with self-regulatory outcomes (*r+* = -0.17 to -0.13). The largest sample-weighted correlation between aspects of present time perspective and self-regulatory outcomes was found between a present-negative time perspective and outcomes (*r+* = -0.17); however, the confidence interval included zero. The sample-weighted correlations between a present-hedonistic and present-fatalistic time perspective were smaller (*r+* = -0.13), but the confidence intervals for these associations did not contain zero and, therefore, may be considered more robust estimates. These findings suggest that people whose time perspectives are characterised by a pleasure seeking and risk-taking attitude towards life, and those who believe that life is determined by fate and they have little control over future events, have worse self-regulatory outcomes. There was a small-to-medium sized positive relationship between a future time perspective and self-regulatory outcomes (*r+* = 0.16), suggesting that people with a future time perspective have better self-regulatory outcomes.

**Table 2.5***. Sample-weighted average effect sizes for the relationship between dimensions of time perspective and self-regulatory outcomes.*

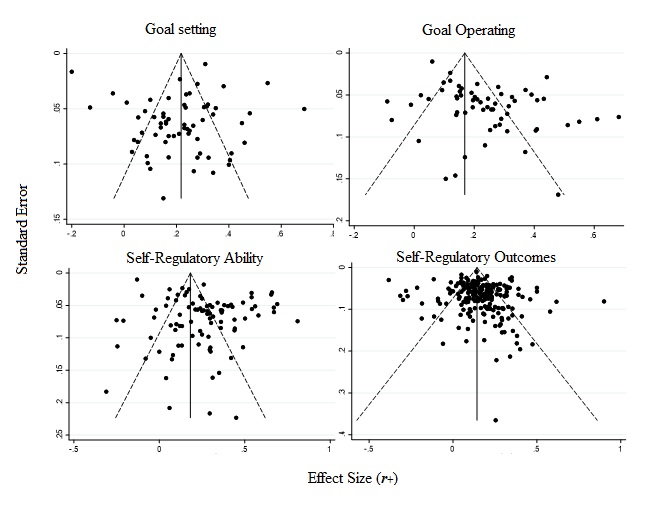
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Time Perspective Dimension | *N* | *k* | *r+* | *95% CI* | *Q* | *I* |
| Past | 2,934.5 | 8 | -0.06 | -0.24, 0.11 | 63.29\*\*\* | 88.9 |
| Past-Positive | 14,796 | 34 | 0.06 | 0.02, 0.10 | 161.97\*\*\* | 79.6 |
| Past-Negative | 11,758 | 33 | -0.13 | -0.19, -0.07 | 352.12\*\*\* | 90.9 |
| Present | 14,802 | 28 | -0.13 | -0.21, -0.06 | 573.43\*\*\* | 95.3 |
| Present-Negative | 495 | 3 | -0.17 | -0.37, 0.02 | 8.14\* | 75.4 |
| Present-Positive | 4,007 | 4 | 0.19 | -0.02, 0.39 | 39.09\*\*\* | 92.3 |
| Present-Hedonistic | 13,718 | 44 | -0.13 | -0.18, -0.08 | 308.82\*\*\* | 86.1 |
| Present Fatalistic | 1,310 | 38 | -0.13 | -0.19, -0.07 | 416.01\*\*\* | 91.1 |
| Future | 79,851 | 197 | 0.16 | 0.14, 0.18 | 1597.65\*\*\* | 87.7 |
| Future Negative | 4,115.5 | 9 | -0.10 | -0.18, -0.02 | 51.61\*\*\* | 84.5 |

*Note. N* = the number of individuals in the *k* samples; *k* = the number of independent tests of the association included in the analysis; *r+* = sample-weighted average effect size; 95% CI = the 95% confidence intervals. Confidence intervals that do not contain zero are significant at the *p* < .05 level; *Q* = homogeneity statistic (a significant Q statistic indicates moderation); *I* = proportion of total variance that is attributable to between-study variability. Only the dimensions of time perspective that had a least k=3 associations appear in the table \**p* <.05. \*\**p* <.01. \*\*\**p* <.001.

**2.3.6 Tests for Publication Bias**

The distributions of the observed effect sizes were examined in order to assess the likelihood that the effect sizes are biased due to missing unpublished studies with small or non-significant findings. Two methods were used to assess for publication bias. First, an initial inspection of the funnel plots was conducted. Publication bias was then formally assessed using Egger’s regression (Egger, Davey Smith, Schneider, & Minder, 1997). However, as these tests are greatly influenced by statistical power, particularly when there is evidence of substantial heterogeneity (Sterne et al., 2002), examinations of publications bias were conducted on the associations between a future time perspective and self-regulatory processes, ability, and outcomes, as these relations consisted of the most primary studies.

The funnel plots (see Figure 2.2) showed some signs of asymmetry, particularly for the relationship between a future time perspective and goal operating, and between a future time perspective and self-regulatory ability. The funnel plots indicate that some studies with small standard errors found larger effect sizes than the sample-weighted estimate. Egger’s regression confirmed that the regression coefficients were significant for the relationship between a future time perspective and goal operating (*B* = 2.82, *SE* = 0.60, *p* < .001) and for the relationship between a future time perspective and self-regulatory ability (*B* = 3.59, *SE* = 0.92, *p* < .001). There was no evidence in bias for the relationship between a future time perspective and goal setting (*p* = .929) or the relationship between a future time perspective and self-regulatory outcomes (*p* = .086).

Therefore, Duval and Tweedie’s (2000) trim and fill technique was used to estimate the adjusted effect sizes for the relationship between a future time perspective and goal operating, and the relationship between a future time perspective and self-regulatory ability. The trim and fill analysis imputed 86 and 128 additional effect sizes and produced adjusted estimates of *r*+ = .12 (95% CI [0.08, 0.16]) and *r*+ = .09 (95% CI [0.03, 0.15]) for goal operating and self-regulatory ability, respectively. Although the trim and fill analysis indicated that a large number of effect sizes needed to be imputed in order to adjust for publication bias, it is important to note that when there is evidence of substantial between-study heterogeneity (as was the case in the present review), the trim and fill technique can over-adjust for publication bias (Terrin, Schmid, Lau & Olkin, 2003). As such, it is likely that the influence of publication bias in the present review may not be as severe as has been suggested by the trim and fill technique. **Figure 2.2** *Funnel plots of effect sizes from included studies exploring the relationship between a future time perspective and self-regulatory processes, ability, and outcomes*

**2.3.7 Moderators of the Relationship between Time Perspective and Self-Regulatory Processes, Ability, and Outcomes.**

The second aim of the present review was to identify moderators that influence the magnitude of the relationships between different dimensions of time perspective and specific self-regulatory processes, self-regulatory ability, and self-regulatory outcomes. As can be seen in Tables 2.2 to 2.5, there was significant heterogeneity in the effect sizes from primary studies examining some of the relationships of interest, suggesting that an exploration of moderators was warranted.

**Continuous Moderators**. The influence of the proposed continuous moderators (i.e., age of the sample, percentage of males in the sample, and year of publication) on the effect sizes from primary studies were examined using meta-regression. A significant beta coefficient indicated moderation. The findings from these analyses are reported in Table 2.6. The average age of the sample was found to moderate the magnitude of the relationship between a present-hedonistic time perspective and goal operating (*β* = 0.007, *p* = .011), such that studies with older participants tended to find a stronger relationship between a present-hedonistic time perspective and the extent to which people engaged in behaviours directed towards achieving their goals.

The year in which the study was published was also found to moderate the magnitude of the relationship between certain dimensions of time perspective and self-regulatory processes, ability, and outcomes. Specifically, the relationship between a future time perspective and goal setting, and the relationship between a present time perspective and self-regulatory outcomes, were found to be stronger in studies that were published more recently (*β* = 0.008, *p* = .025 and *β* = 0.010, *p* = .012, respectively). Moderation analyses also indicated that the relationship between a past time perspective and self-regulatory ability, and the relationship between a negative-future time perspective and self-regulatory outcomes, were weaker in studies that were published more recently (*β* = -0.009, *p* = .008 and *β* = -0.014, *p* = .0101, respectively). However, the moderation analyses that found that the year of publication weakened the relationship between time perspective and self-regulatory processes were based on a smaller number of studies (i.e., *k*’s = 9).

The proportion of male participants in the sample was not found to moderate the magnitude of the effect sizes for any of relationships between time perspective and self-regulatory processes, ability, or outcomes.

**Table 2.6.** *Continuous moderators of the relationship between time perspective and goal setting, goal operating, self-regulatory ability, and self-regulatory outcomes.*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Age of Participants | | | | | Percentage of Male Participants | | | | | Year of Publication | | | | |
|  | Dimension of Time Perspective | *k* | *I2* | *β* | 95% CI | Adj.*R2* | *k* | *I2* | *β* | 95% CI | Adj.*R2* | *k* | *I2* | *β* | 95% CI | Adj.*R2* |
| Setting | Past-Positive | 3 | 0.00 | .00 | -.03, .03 | .00 | 5 | 92.19 | -.00 | -.01, .01 | -29.12 | 5 | 87.02 | -.02 | -.11, .08 | -9.54 |
|  | Present | 6 | 88.15 | .01 | -.00, .03 | 47.73 | 9 | 91.72 | .01 | -.00, .02 | 19.77 | 9 | 93.21 | .00 | -.05, .06 | -14.49 |
|  | Present-Hedonistic | 3 | 84.77 | .00 | -.07, .07 | -65.47 | 4 | 83.89 | -.00 | -.02, .01 | -50.66 | 6 | 85.41 | .00 | -.07, .08 | -29.74 |
|  | Future | 46 | 81.92 | .00 | -.00, .00 | 7.38 | 57 | 94.92 | -.00 | -.00, .00 | 1.39 | 65 | 94.96 | **.01\*** | .00, .02 | 6.56 |
| Operating | Past | 3 | 71.93 | .00 | -.39, .40 | -187.80 | - | - | - | - | - | 3 | 31.98 | .03 | -.25, .30 | 53.86 |
|  | Past-Positive | 8 | 56.66 | .00 | -.00, .01 | 5.80 | 9 | 57.29 | .00 | -.00, .01 | 22.52 | 12 | 60.81 | .00 | -.01, .02 | 2.01 |
|  | Past-Negative | 7 | 76.55 | -.00 | -.01, .00 | 28.14 | 8 | 80.35 | -.00 | -.01, .00 | -15.45 | 10 | 78.80 | -.00 | -.02, .01 | -13.19 |
|  | Present | 6 | 75.32 | -.00 | -.01, .01 | -39.26 | 7 | 70.35 | .00 | -.00, .01 | -29.69 | 8 | 67.32 | -.01 | -.03, .02 | -6.92 |
|  | Present-Hedonistic | 11 | 68.78 | **.01\*** | .00, .01 | 62.17 | 12 | 81.51 | .00 | -.00, .01 | 3.59 | 16 | 85.14 | .01 | -.02, .03 | -6.11 |
|  | Present-Fatalistic | 11 | 75.52 | -.00 | -.01, .00 | -15.38 | 12 | 68.72 | .00 | -.00, .01 | 11.01 | 14 | 76.92 | -.00 | -.02, .01 | -8.49 |
|  | Future | 42 | 80.85 | -.00 | -.01, .00 | 8.15 | 54 | 87.89 | -.00 | -.00, .00 | -0.94 | 62 | 88.31 | .00 | -.01, .01 | -2.13 |
| Ability | Past | 9 | 69.84 | -.00 | -.01, .01 | -33.75 | 9 | 66.65 | .00 | -.00, .01 | -8.54 | 9 | 9.75 | **-.01\*\*** | -.02, -.00 | 87.34 |
|  | Past-Negative | 29 | 82.39 | .00 | -.01, .01 | -4.64 | 30 | 84.85 | -.00 | -.00, .00 | -4.56 | 32 | 83.98 | .00 | -.02, .02 | -4.36 |
|  | Present | 12 | 90.41 | .01 | -.00, .01 | 9.69 | 14 | 94.18 | -.00 | -.01, .01 | -6.75 | 16 | 93.18 | .00 | -.01, .01 | -7.15 |
|  | Present-Hedonistic | 31 | 90.90 | .00 | -.01, .01 | -3.60 | 31 | 89.47 | -.00 | -.01, .00 | 13.23 | 34 | 90.82 | .01 | -.02, .03 | -1.88 |
|  | Present-Fatalistic | 28 | 81.00 | .00 | -.01, .01 | -5.67 | 29 | 81.52 | -.00 | -.00, .00 | -3.33 | 34 | 90.82 | .01 | -.02, .03 | -1.88 |
|  | Future | 77 | 92.26 | -.00 | -.00, .00 | -1.46 | 77 | 92.82 | .00 | -.00, .00 | -1.32 | 92 | 93.71 | .00 | -.00, .01 | -0.27 |
|  | Future-Negative | 4 | 34.88 | -.01 | -.04, .02 | 47.57 | 4 | 4.85 | .01 | -.01, .03 | 100.00 | 5 | 3.97 | .05 | -.01, .11 | 100.00 |
|  | Balanced | - | - | - | - | - | 3 | 78.17 | .00 | -.06, .07 | 63.51 | 3 | 13.54 | -0.21 | -1.53, 1.11 | 91.22 |

**Table 2.6** *(continued)*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Age of Participants | | | | | Percentage of Male Participants | | | | | Year of Publication | | | | |
|  | Dimension of Time Perspective | *k* | *I2* | *β* | 95% CI | Adj.*R2* | *k* | *I2* | *β* | 95% CI | Adj.*R2* | *k* | *I2* | *β* | 95% CI | Adj.*R2* |
| Outcomes | Past | 5 | 93.28 | -.01 | -.05, .03 | -18.56 | 6 | 72.00 | -.00 | -.01, .00 | -18.65 | 8 | 83.31 | .01 | -.01, .03 | 21.71 |
|  | Past-Positive | 24 | 69.97 | .00 | -.00, .00 | -6.22 | 30 | 75.83 | .00 | -.00, .00 | 4.19 | 34 | 79.29 | .00 | -.00, .01 | 3.13 |
|  | Past-Negative | 24 | 82.70 | -.00 | -.01, .00 | -0.37 | 28 | 82.93 | -.00 | -.00, .00 | -4.17 | 33 | 91.12 | -.00 | -.01, .01 | -3.44 |
|  | Present | 8 | 72.70 | .00 | -.01, .01 | -19.15 | 25 | 95.31 | -.00 | -.00, .00 | -3.15 | 28 | 92.98 | .**01\*** | .00, .02 | 23.28 |
|  | Present-Positive | - | - | - | - | - | 4 | 89.82 | .00 | -.02, .02 | -41.81 | 4 | 63.75 | -.01 | -.02, .00 | 88.21 |
|  | Present-Negative | - | - | - | - | - | 3 | 82.22 | .00 | -.04, .04 | 0.45 | 3 | 62.82 | .01 | -.05, .06 | 37.81 |
|  | Present-Hedonistic | 32 | 73.65 | .00 | -.00, .00 | -4.71 | 35 | 86.58 | -.00 | -.00, .00 | -1.67 | 43 | 86.53 | .01 | -.00, .01 | -0.82 |
|  | Present-Fatalistic | 28 | 79.13 | .00 | -.00, .01 | 2.42 | 32 | 84.44 | -.00 | -.00, .00 | 15.19 | 37 | 90.93 | -.00 | -.01, .01 | -3.14 |
|  | Future | 137 | 82.23 | -.00 | -.00, .00 | -1.18 | 170 | 84.11 | -.00 | -.00, .00 | -0.51 | 196 | 87.85 | -.00 | -.00, .00 | 0.01 |
|  | Future-Negative | 6 | 48.55 | -.00 | -.01, .00 | -51.75 | 8 | 86.56 | .00 | -.00, .01 | 3.66 | 9 | 42.15 | **-.01\*** | -.07, -.01 | 96.55 |

*Notes. k* = the number of independent tests of the association included in the analysis; *I2* = proportion of total variance that is attributable to between-study variability, β = standardised beta coefficients, 95% CI = the 95% confidence intervals. Confidence intervals that do not contain zero are significant at the *p* < .05 level. Adj.*R2* = adjusted variance explained by the moderator. Goal monitoring was not included in moderation analyses, as there was no evidence of heterogeneity in primary studies. Dashes indicate where there were insufficient observations to run moderation analyses (i.e., k < 3); beta-coefficients in bold are significant at the *p* < .05 level.

\**p* <.05. \*\**p* <.01. \*\*\**p* <.001.

**Categorical Moderators.** The influence of the proposed categorical moderators (i.e., the nature of the sample, the nature of the measure of time perspective, life domain being studied, and study design) on the observed effect sizes was examined by conducting a separate random-effects model for each level of each moderator. The *metaf* macro for SPSS (Wilson, 2005) was then used to test whether the effect sizes differed significantly. The metaf macro divides the total variability into the variability explained by the moderator (*Q*between statistic) and the residual variability (*Q*within statistic). A significant *Q*between statistic indicates that the difference between the categories are larger than what would be expected by sampling error, therefore indicating moderation (Lipsey & Wilson, 2001).

The findings from these analyses are reported in Table 2.7. None of the categorical factors were found to moderate the relationship between different dimensions of time perspective and self-regulatory processes, self-regulatory ability, or self-regulatory outcomes (*p’s* >.05). The only moderator that approached significance was the influence of the life domain being studied on the relationship between a present time perspective and goal setting, *Q*between (1, 7) = 3.54, *p* = .060. The effect size for this relationship was larger in an environmental domain (*r+* = -.39) than in a health domain (*r+* = -.13); however, the difference in these effect sizes were not statistically significant.

**Table 2.7** *Categorical moderators of the relationship between time perspective and goal setting, goal operating, self-regulatory ability, and self-regulatory outcomes.*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Dimension of Time Perspective** | **Moderator** | ***N*** | ***k*** | ****2** | ***I2*** | **95% CI** | ***r+*** |
|  |  |  | **Nature of the sample** | | | | | |
| **Setting** | Present | University | 647 | 5 | 44.60\*\*\* | 91.0 | -.46, .04 | -.21 |
|  |  | Adults | 985 | 4 | 58.98\*\*\* | 94.9 | -.28, .26 | -.01 |
|  | Future | Adolescents | 9,003 | 13 | 389.95\*\*\* | 96.9 | .01, .26 | .13\* |
|  |  | Adults | 17,558 | 23 | 247.76\*\*\* | 91.1 | .22, .33 | .27\*\*\* |
|  |  | Clinical | 593 | 4 | 2.35 | 0.0 | .21, .36 | .29\*\*\* |
|  |  | University | 5,523 | 23 | 58.62\*\*\* | 62.5 | .15, .24 | .20\*\*\* |
| **Operating** | Past-Positive | Adults | 633 | 3 | 3.29 | 39.2 | -.00, .22 | .11 |
|  |  | University | 2,606 | 6 | 10.97 | 54.4 | -.00, .12 | .06 |
|  | Past-Negative | Adults | 633 | 3 | 2.08 | 3.7 | -.23, -.07 | -.15\*\*\* |
|  |  | University | 2,279 | 5 | 26.86\*\*\* | 85.1 | -.12, .09 | -.01 |
|  | Present - Hedonistic | Adults | 898 | 4 | 14.46\*\* | 79.3 | -.18, .13 | -.03 |
|  |  | University | 3,463 | 8 | 31.67\*\*\* | 77.9 | -.26, -.12 | -.19\*\*\* |
|  | Present-Fatalistic | Adults | 898 | 4 | 10.84\* | 72.3 | -.27, -.01 | -.14\* |
|  |  | University | 2,954 | 7 | 32.67\*\*\* | 81.6 | -.21, -.04 | -.12\*\* |
|  | Future | Adolescents | 4467 | 11 | 112.13\*\*\* | 91.1 | .16, .37 | .27\*\*\* |
|  |  | Adults | 16034 | 19 | 234.80\*\*\* | 91.9 | .13, .26 | .19\*\*\* |
|  |  | University | 6,428 | 24 | 116.46\*\*\* | 80.3 | .21, .32 | .26\*\*\* |
| **Ability** | Past-Negative | University | 3,423 | 14 | 83.09\*\*\* | 84.4 | -.31, -.14 | -.23\*\*\* |
|  |  | Adults | 2,196 | 10 | 19.17\* | 53.0 | -.24, -.11 | -.17\*\*\* |
|  | Present-Orientation | University | 1,267 | 6 | 24.60\*\*\* | 79.7 | -.38, -.13 | -.25\*\*\* |
|  |  | Adults | 2,408 | 3 | 69.53\*\*\* | 97.1 | -.25, .31 | .03 |
|  | Present-Hedonistic | University | 4,169 | 15 | 216.40\*\*\* | 93.5 | -.24, -.01 | -.13\* |
|  |  | Adults | 2,196 | 10 | 98.67\*\*\* | 90.9 | -.30, -.02 | -.16\* |
|  | Present-Fatalistic | University | 3,464 | 13 | 56.51\*\*\* | 78.8 | -.33, -.18 | -.25\*\*\* |
|  |  | Adults | 1,665 | 9 | 12.95 | 38.2 | -.29, -.16 | -.22\*\*\* |
|  | Future | University | 7,219 | 32 | 364.36\*\*\* | 91.5 | .22, .37 | .30\*\*\* |
|  |  | Adults | 19719 | 26 | 987.94\*\*\* | 97.5 | .15, .35 | .25\*\*\* |
|  |  | Adolescents | 8,029 | 13 | 126.18\*\*\* | 90.5 | .11, .26 | .19\*\*\* |
|  |  | Clinical | 166 | 4 | 10.03\* | 70.1 | -.11, .47 | .18 |
|  |  | Mixed | 3,698 | 14 | 247.48\*\*\* | 94.7 | .07, .34 | .21\*\* |
| **Outcome** | Past-Positive | University | 2,299 | 8 | 6.35 | 0.0 | .00, .08 | .04\* |
|  |  | Adults | 1,511 | 7 | 2.96 | 0.0 | .03, .14 | .08\*\* |
|  |  | Adolescents | 8,936 | 8 | 109.40\*\*\* | 93.6 | -.00, .18 | .08 |
|  |  | Mixed | 897 | 7 | 31.53\*\*\* | 81.3 | -.15, .17 | .01 |
|  | Past-Negative | University | 2,299 | 8 | 29.94\*\*\* | 76.6 | -.17, .00 | -.08 |
|  |  | Adults | 2,042 | 8 | 33.94\*\*\* | 79.4 | -.33, -.14 | -.23\*\*\* |
|  |  | Adolescents | 5,420 | 7 | 30.45\*\*\* | 80.3 | -.20, -.07 | -.14\*\*\* |
|  |  | Mixed | 844 | 6 | 31.86\*\*\* | 84.3 | -.39, -.04 | -.21\* |
|  |  |  |  |  |  |  |  |  |
| **Table 2.7** *(continued)* | | |  |  |  |  |  |  |
|  | **Dimension of Time Perspective** | **Moderator** | ***N*** | ***k*** | ****2** | ***I2*** | **95% CI** | ***r+*** |
|  | Present | University | 4,082 | 8 | 35.56\*\*\* | 80.3 | -.33, -.19 | -.26\*\*\* |
|  |  | Adults | 3,186 | 8 | 29.25\*\*\* | 76.1 | -.17, .01 | -.08 |
|  |  | Adolescents | 5,727 | 8 | 339.62\*\*\* | 97.9 | -.26, .14 | -.06 |
|  |  | Mixed | 1,807 | 4 | 22.12\*\*\* | 86.4 | -.30, -.02 | -.16\* |
|  | Present-Hedonistic | University | 4,547 | 16 | 73.89\*\*\* | 79.7 | -.22, -.09 | -.15 |
|  |  | Adults | 2,706 | 11 | 23.47\*\* | 57.4 | -.21, -.09 | -.15 |
|  |  | Clinical | 446 | 3 | 2.25 | 11.2 | -.10, .10 | .00\*\*\* |
|  |  | Adolescents | 4,333 | 6 | 145.08\*\*\* | 96.6 | -.27, .07 | -.10\*\*\* |
|  |  | Mixed | 799 | 6 | 28.30\*\*\* | 82.3 | -.30, .06 | -.12\*\*\* |
|  | Present-Fatalistic | University | 3,555 | 12 | 36.47\*\*\* | 69.8 | -.18, -.06 | -.12\*\*\* |
|  |  | Adults | 2,430 | 10 | 55.73\*\*\* | 83.8 | -.29, -.09 | -.19\*\*\* |
|  |  | Clinical | 446 | 3 | 3.05 | 34.5 | -.03, .21 | .09 |
|  |  | Adolescents | 5,117 | 6 | 70.87\*\*\* | 92.9 | -.31, -.10 | -.21\*\*\* |
|  |  | Mixed | 669 | 5 | 7.93 | 49.6 | -.27, -.03 | -.15\* |
|  | Future | University | 18845 | 60 | 335.98\*\*\* | 82.4 | .16, .24 | .20\*\*\* |
|  |  | Adults | 32717 | 57 | 547.85\*\*\* | 89.8 | .12, .19 | .16\*\*\* |
|  |  | Clinical | 1,176 | 10 | 16.58 | 45.7 | .04, .20 | .12\*\* |
|  |  | Adolescents | 21497 | 43 | 538.96\*\*\* | 92.2 | .07, .17 | .12\*\*\* |
|  |  | Mixed | 4449 | 19 | 135.63\*\*\* | 86.7 | .20, .27 | .18\*\*\* |
|  |  |  | **Domain specific measure of time perspective** | | | | | |
| **Setting** | Future | No | 32070 | 61 | 1279.22\*\*\* | 95.3 | .16, .27 | .22\*\*\* |
|  |  | Yes | 1,335 | 4 | 0.66 | 0.0 | .21, .31 | .26\*\*\* |
| **Operating** | Future | No | 26644 | 53 | 496.90\*\*\* | 89.5 | .18, .27 | .22\*\*\* |
|  |  | Yes | 1,921 | 8 | 5.12 | 0.0 | .19, .27 | .23\*\*\* |
| **Outcome** | Past | No | 2,679 | 5 | 23.91\*\*\* | 83.3 | -.29, .09 | -.10 |
|  |  | Yes | 255 | 3 | 39.37\*\*\* | 94.9 | -.52, .52 | -.00 |
|  | Future | No | 78317 | 188 | 1570.69\*\*\* | 88.1 | .14, .18 | .16\*\*\* |
|  |  | Yes | 1,533 | 9 | 23.02\*\* | 65.2 | .08, .27 | .17\*\*\* |
|  |  |  | **Nature of the measure of future time perspective** | | | | | |
| **Setting** | Future | ZTPI | 4,581 | 17 | 64.94\*\*\* | 75.4 | .16, .28 | .22\*\*\* |
|  |  | CFC | 9,915 | 28 | 225.80\*\*\* | 88.0 | .16, .28 | .22\*\*\* |
|  |  | Other | 18909 | 20 | 987.05\*\*\* | 98.1 | .10, .33 | .21\*\*\* |
| **Operating** | Future | ZTPI | 6,379 | 25 | 122.61\*\*\* | 80.4 | .19, .30 | .24\*\*\* |
|  |  | CFC | 3,866 | 7 | 16.26\* | 63.1 | .08, .20 | .14\*\*\* |
|  |  | Other | 18414 | 30 | 385.78\*\*\* | 92.5 | .19, .31 | .25\*\*\* |
| **Ability** | Future | ZTPI | 9,293 | 40 | 593.28\*\*\* | 93.4 | .24, .39 | .31\*\*\* |
|  |  | CFC | 6,164 | 14 | 144.50\*\*\* | 91.0 | .18, .36 | .27\*\*\* |
|  |  | Other | 24184 | 38 | 956.11\*\*\* | 96.1 | .12, .27 | .20\*\*\* |
| **Outcome** | Future | ZTPI | 27091 | 76 | 397.53\*\*\* | 81.1 | .13, .19 | .16\*\*\* |
|  |  | CFC | 16262 | 33 | 229.76\*\*\* | 86.1 | .09, .18 | .13\*\*\* |
|  |  | Other | 36497 | 88 | 951.17\*\*\* | 90.9 | .13, .21 | .17\*\*\* |
|  |  |  |  |  |  |  |  |  |
| **Table 2.7** *(continued)* | |  |  |  |  |  |  |  |
|  | **Dimension of Time Perspective** | **Moderator** | ***N*** | ***k*** | ****2** | ***I2*** | **95% CI** | ***r+*** |
|  |  |  | **Life domain being studied** | | | | | |
| **Setting** | Present | Health | 1,027 | 5 | 53.34\*\*\* | 92.5 | -.23, .22 | -.01 |
|  |  | Environmental | 475 | 3 | 13.93\*\* | 85.6 | -.63, -.15 | -.39\*\* |
|  | Future | Health | 20415 | 38 | 344.08\*\*\* | 89.2 | .14, .23 | .18\*\*\* |
|  |  | Environmental | 2,666 | 7 | 7.86 | 23.7 | .25, .34 | .29\*\*\* |
|  |  | Finance | 2,921 | 6 | 50.83\*\*\* | 90.2 | .25, .48 | .37\*\*\* |
|  |  | Work | 5,198 | 5 | 229.31\*\*\* | 98.3 | -.12, .39 | .14 |
| **Operating** | Past-Positive | Health | 2,122 | 6 | 13.05\* | 61.7 | -.01, .14 | .06 |
|  |  | Education | 1,625 | 4 | 10.25\* | 70.7 | -.02, .16 | .07 |
|  | Past-Negative | Health | 1,486 | 5 | 20.68\*\*\* | 80.7 | -.23, .03 | -.10 |
|  |  | Education | 1,298 | 3 | 3.40 | 41.2 | -.05, .10 | .03 |
|  | Present-Hedonistic | Health | 3,363 | 9 | 70.44\*\*\* | 88.6 | -.20, .01 | -.09 |
|  |  | Education | 1,573 | 4 | 1.25 | 0.0 | -.21, -.12 | -.17\*\*\* |
|  |  | Finance | 776 | 3 | 24.91\*\*\* | 92.0 | -.38, .12 | -.13 |
|  | Present-Fatalistic | Health | 2,218 | 7 | 19.22\*\* | 68.8 | -.20, -.05 | -.12\*\* |
|  |  | Education | 1,573 | 4 | 16.96\*\* | 82.3 | -.20, .03 | -.08 |
|  |  | Finance | 776 | 3 | 2.51 | 20.2 | -.33, -.17 | -.25\*\*\* |
|  | Future | Health | 17999 | 22 | 87.84\*\*\* | 76.1 | .10, .18 | .14\*\*\* |
|  |  | Education | 4,963 | 20 | 119.55\*\*\* | 84.1 | .25, .39 | .32\*\*\* |
|  |  | Finance | 2,729 | 6 | 43.87\*\*\* | 88.6 | .17, .40 | .29\*\*\* |
|  |  | Emotion Regulation | 742 | 3 | 0.20 | 0.0 | .12, .27 | .20\*\*\* |
|  |  | Work | 1,295 | 6 | 7.08 | 15.3 | .16, .28 | .22\*\*\* |
| **Outcomes** | Past-Positive | Education | 1,868 | 5 | 8.97 | 55.4 | -.08, .06 | -.01 |
|  |  | Health | 6,790 | 18 | 65.56\*\*\* | 74.1 | .01, .11 | .06\* |
|  | Past-Negative | Education | 2,164 | 6 | 8.12 | 38.4 | -.14, -.03 | -.08\*\* |
|  |  | Health | 7,268 | 18 | 269.13\*\* | 93.7 | -.21, -.02 | -.12\* |
|  | Present-Hedonistic | Health | 8,710 | 28 | 256.84\*\*\* | 89.5 | -.18, -.04 | -.11\*\* |
|  |  | Education | 2,745 | 7 | 13.44\* | 55.4 | -.14, -.03 | -.08\*\* |
|  | Present-Fatalistic | Health | 8,478 | 24 | 270.45\*\*\* | 91.5 | -.17, -.02 | -.09\* |
|  |  | Education | 2,432 | 6 | 8.88 | 43.7 | -.17, -.06 | -.12\*\*\* |
|  | Future | Health | 48918 | 123 | 677.57\*\*\* | 82.0 | .13, .17 | .15\*\*\* |
|  |  | Education | 6,719 | 24 | 157.60\*\*\* | 85.4 | .15, .28 | .22\*\*\* |
|  |  | Pro-social | 985 | 7 | 92.82\*\*\* | 93.5 | -.19, .29 | .05 |
|  |  | Financial | 1,830 | 8 | 287.95\*\*\* | 97.6 | -.11, .54 | .22 |
|  |  | Emotion-Regulation | 6,313 | 11 | 106.43\*\*\* | 90.6 | .08, .25 | .17\*\*\* |
|  |  | Environmental | 6,912 | 9 | 74.94\*\*\* | 89.3 | .12, .29 | .21\*\*\* |
|  |  | Work | 4,290 | 5 | 14.63\*\* | 72.7 | .04, .23 | .14\*\* |
|  |  |  |  |  |  |  |  |  |
| **Table 2.7** *(continued)* | |  |  |  |  |  |  |  |
|  | **Dimension of Time Perspective** | **Moderator** | ***N*** | ***k*** | ****2** | ***I2*** | **95% CI** | ***r+*** |
|  |  | **Study design** | | | | | |
| **Setting** | Future | Correlational | 32656 | 60 | 1273.30\*\*\* | 96.1 | .16, .27 | .22\*\*\* |
|  |  | Longitudinal | 582 | 3 | 7.36\* | 72.8 | .19, .03 | .19\* |
| **Operating** | Future | Correlational | 27138 | 52 | 510.14\*\*\* | 90.0 | .19, .28 | .23\*\*\* |
|  |  | Longitudinal | 1,289 | 8 | 32.36\*\*\* | 78.4 | .13, .38 | .26\*\*\* |
| **Outcome** | Future | Correlational | 75382 | 172 | 1550.68\*\*\* | 89.0 | .14, .18 | .16\*\*\* |
|  |  | Longitudinal | 3,408 | 13 | 35.10\*\*\* | 65.8 | .07, .19 | .13\*\*\* |
|  |  | Experimental | 401 | 8 | 0.75 | 0.0 | .18, .37 | .27\*\*\* |

*Notes.* *N* = the number of individuals in the *k* samples; *k* = the number of independent tests of the association included in the analysis; 2 = homogeneity statistic (a significant **2 statistic indicates moderation); *I* = proportion of total variance that is attributable to between-study variability; 95% CI = the 95% confidence intervals. Confidence intervals that do not contain zero are significant at the *p* < .05 level; *r+* = sample-weighted average effect size; Adj.*R2* = adjusted variance explained by the moderator.

*p* < .05. \*\* *p* < .01. \*\*\* *p* < .001.

**2.3.5 Methodological Quality of Individual Studies**

Given that only a future time perspective was found to be significantly associated with each self-regulatory process, self-regulatory ability, and self-regulatory outcomes, risk of bias from individual studies was assessed only for these associations. As can be seen in Table 2.8, risk of bias in individual studies did not moderate the relationship between a future time perspective and any of the self-regulatory processes, self-regulatory ability, or self-regulatory outcomes.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | *k* | *I2* | *β* | 95% CI | Adj.*R2* |
| Setting | 64 | 95.03 | .02 | -.05, .09 | -0.73 |
| Monitoring | 4 | 65.64 | -.01 | -.86, .85 | -.167.69 |
| Operating | 61 | 88.71 | .01 | -.05, .07 | -1.84 |
| Ability | 92 | 96.32 | .03 | -.03, .10 | 0.04 |
| Outcomes | 197 | 87.79 | -.01 | -.04, .02 | -0.43 |

**Table 2.8** *Risk of bias in individual studies exploring the relationship between time perspective and self-regulatory processes, self-regulatory ability, and self-regulatory outcome.*

*Notes. k* = the number of independent tests of the association included in the analysis; *I2* = proportion of total variance that is attributable to between-study variability, β = standardised beta coefficients, 95% CI = the 95% confidence intervals. Confidence intervals that do not contain zero are significant at the *p* < .05 level. Adj.*R2* = adjusted variance explained by the moderator.

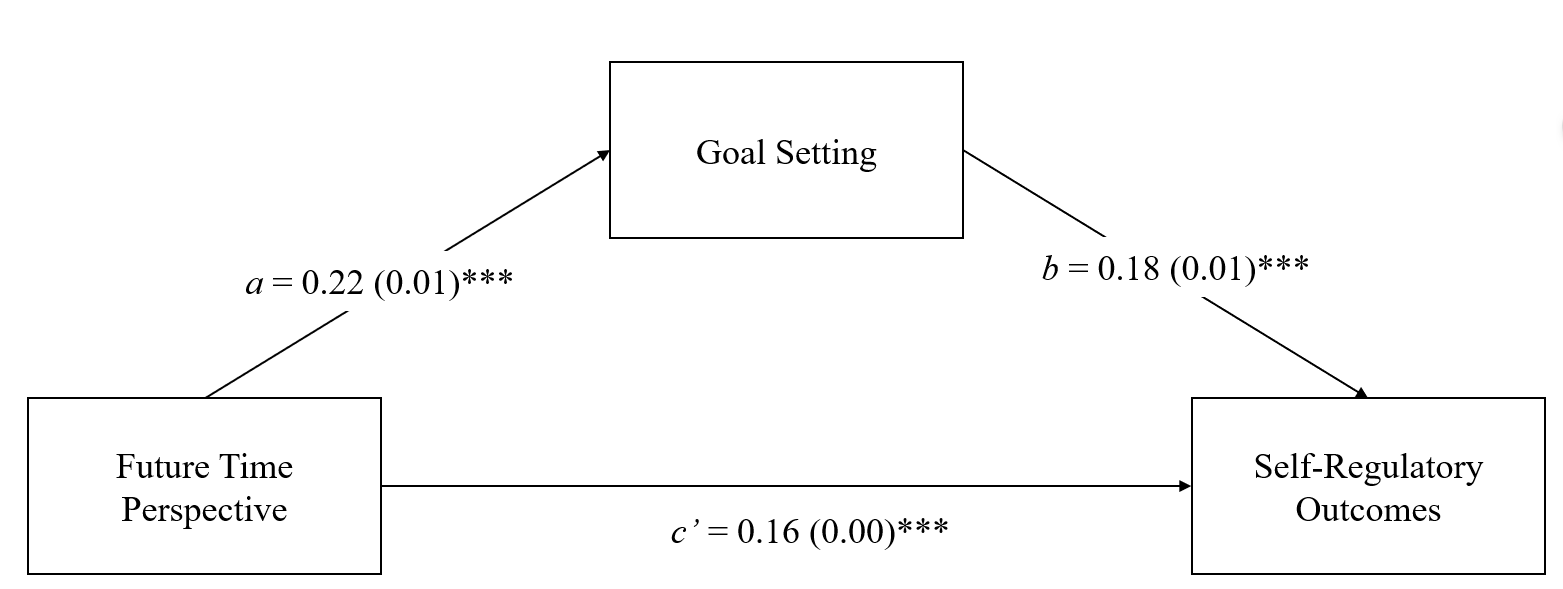
*p* < .05. \*\* *p* < .01. \*\*\* *p* < .001.

**2.3.6 Mediators of the Relationship between Time Perspective and Self-Regulatory Outcomes**

The final aim of the present review was to explore whether the relationship between time perspective and self-regulatory outcomes was mediated (or explained) by self-regulatory processes and / or self-regulatory ability. To test this, a series of mediation analyses were conducted, using weighted regressions in SPSS. Specifically, the sample weighted intercorrelations between time perspective and each self-regulatory process, ability, and outcomes were entered using the matrix input function in SPSS. For each of these mediation models, we used the dimension of time perspective reflecting a future time perspective as it was the only dimension for which we were able estimate the relationship with each self-regulatory process and self-regulatory ability. These analyses tested (i) the relationship between time perspective and each self-regulatory process and self-regulatory ability (i.e., the *a* path), (ii) the relationship between self-regulatory processes and self-regulatory ability on self-regulatory outcomes (i.e., the *b* path), (iii) the relationship between a future time perspective and self-regulatory outcomes (i.e., the *c’* path), and (iv) the indirect relationship between a future time perspective and self-regulatory outcomes, via its relationship with each self-regulatory process and self-regulatory ability (i.e., *a* x *b*; indirect effect).

Data from the present review was used to estimate the size of the relationship between a future time perspective and each self-regulatory process, self-regulatory ability, and self-regulatory outcomes (i.e., the *a* paths and the *c’* path). In order to estimate the relationship between self-regulatory processes and ability and self-regulatory outcomes (i.e., the *b* path), we used data obtained from previous meta-analyses that conducted empirical tests of these relations. First, we used a review conducted by Webb and Sheeran (2006) to estimate the size of the relationship between goal setting and self-regulatory outcomes. Webb and Sheeran (2006) conducted a review of the experimental evidence that explored whether changes in people’s intentions led to significant changes in people’s behaviour. They found that a medium-to-large change in people’s intentions led to a small-to-medium change in their subsequent behaviour (*d*+ = 0.36, *k* = 47, *N* = 8,802). Second, a review conducted by Harkin and colleagues (2016) was used to estimate the size of the relationship between goal monitoring and self-regulatory outcomes. Harkin and colleagues (2016) also reviewed experimental evidence that explored the impact of monitoring based interventions on rates of goal attainment. They found that interventions that promoted people to monitor their goal progress had a small-to-medium impact on their subsequent behaviour *(d*+ = 0.40, *k* = 138, *N* = 13,398). For both of these reviews, the effect size *d* was converted to *r* prior to analysis. Third, a review conducted by Carraro and Gaudreau (2014) was used to estimate the relationship between goal operating and self-regulatory outcomes. Carraro and Gaudreau (2014) explored the relationship of action and coping planning on self-regulatory outcomes. They found that planning had a medium-to-large relationship with self-regulatory outcomes (*r*+ = 0.43, *k* = 19, *N* = 4,330). Finally, a review by de Ridder and colleagues (2012) was to estimate the relationship between self-regulatory ability and self-regulatory outcomes. Specifically, de Ridder and colleagues explored the relationship between dispositional self-control and a range of different behaviours and outcomes (e.g., physical activity and relationship quality). They found that trait self-control had a small-to-medium relationship with self-regulatory outcomes (*r*+ = 0.26, *k* = 20, *N* = 15,455). The significance of each indirect effects was tested using Daniel Soper’s online Sobel test (https://www.danielsoper.com/statcalc/calculator.aspx?id=31). The Sobel test examines whether there is a significant reduction in the effect of the independent variable on the dependent variable after controlling for the effect of the mediator (Sobel, 1982).

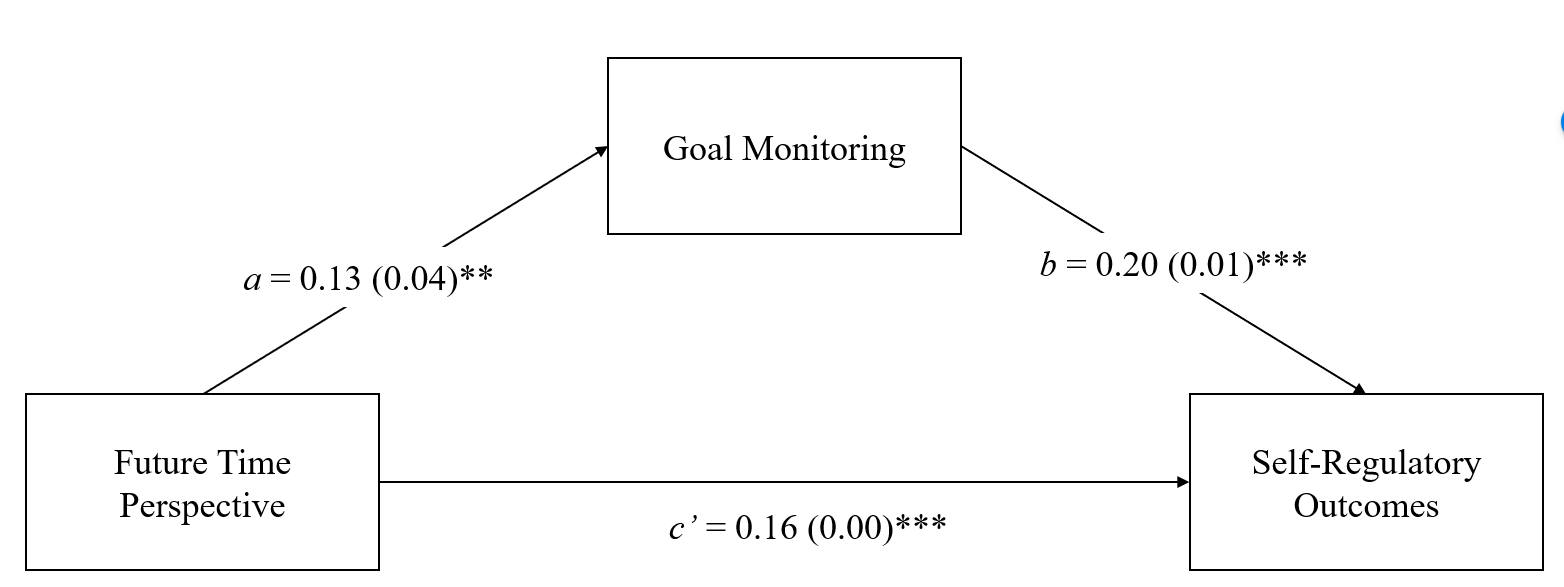
Each of these mediation models are presented in Figures 2.2 to 2.5. As can be seen in Figure 2.2, a future time perspective was positively associated with both goal setting and self-regulatory outcomes, and goal setting was positively associated with self-regulatory outcomes. These findings suggest that people with a future time perspective have stronger intentions to achieve their goals, and that having stronger intentions are associated with improved self-regulatory outcomes. Importantly, the indirect effect was also significant (*z* =13.93, *p* < .001) indicating that the relationship between a future time perspective and self-regulatory outcomes was mediated by goal setting.

**Figure 2.3.** *Mediation model of the relationship between time perspective and self-regulatory outcomes via goal setting.*

*Notes.* Values represent standardized beta coefficients with standard error (*SE*) shown in parentheses

\* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001.

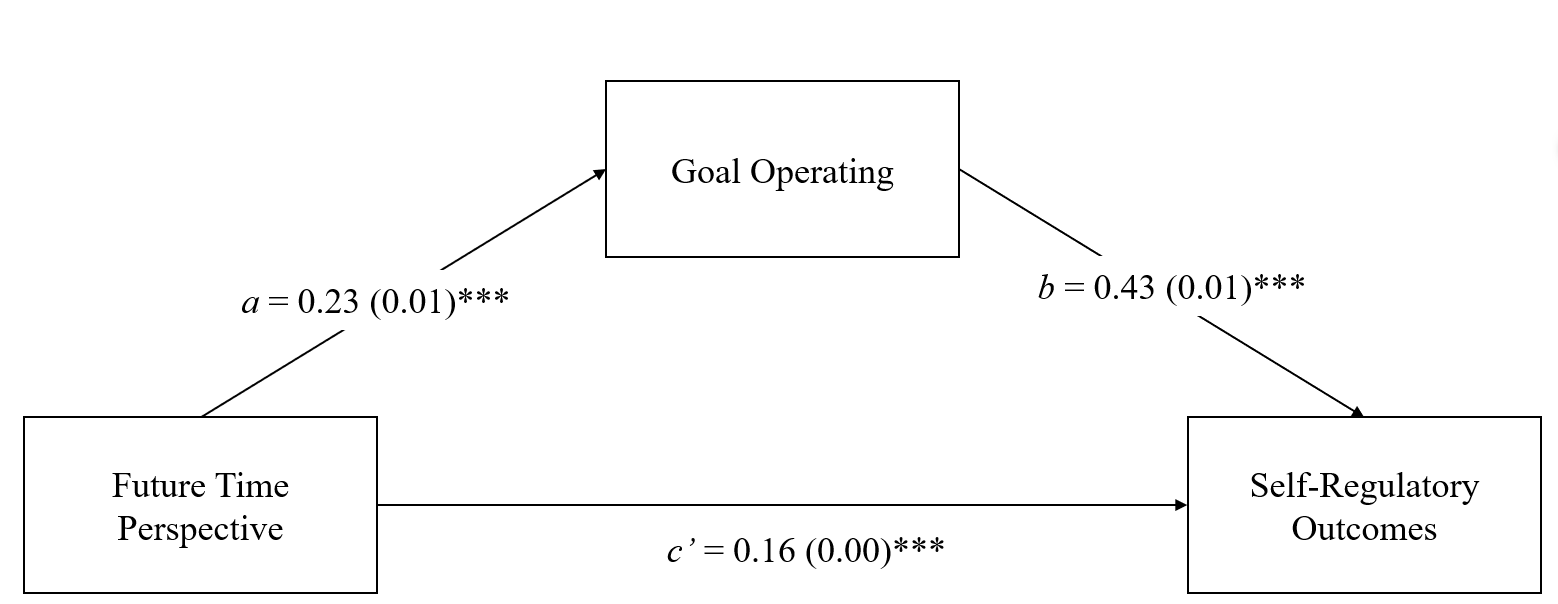
Figure 2.3 shows that a future time perspective was positively associated with both goal monitoring and self-regulatory outcomes, and that goal monitoring was positively associated with self-regulatory outcomes. These findings suggest that people with a future time perspective are more likely to monitor their progress towards their goal, and that more frequent monitoring is associated with better self-regulatory outcomes. Again, the indirect was found to be significant (*z* =3.21, *p* = .002), indicating that the relationship between a future time perspective and self-regulatory outcomes was mediated by goal monitoring.

****Figure 2.4.** *Mediation model of the relationship between time perspective and self-regulatory outcomes via goal monitoring.*

*Notes.* Values represent standardized beta coefficients with standard error (*SE*) shown in parentheses

\* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001.

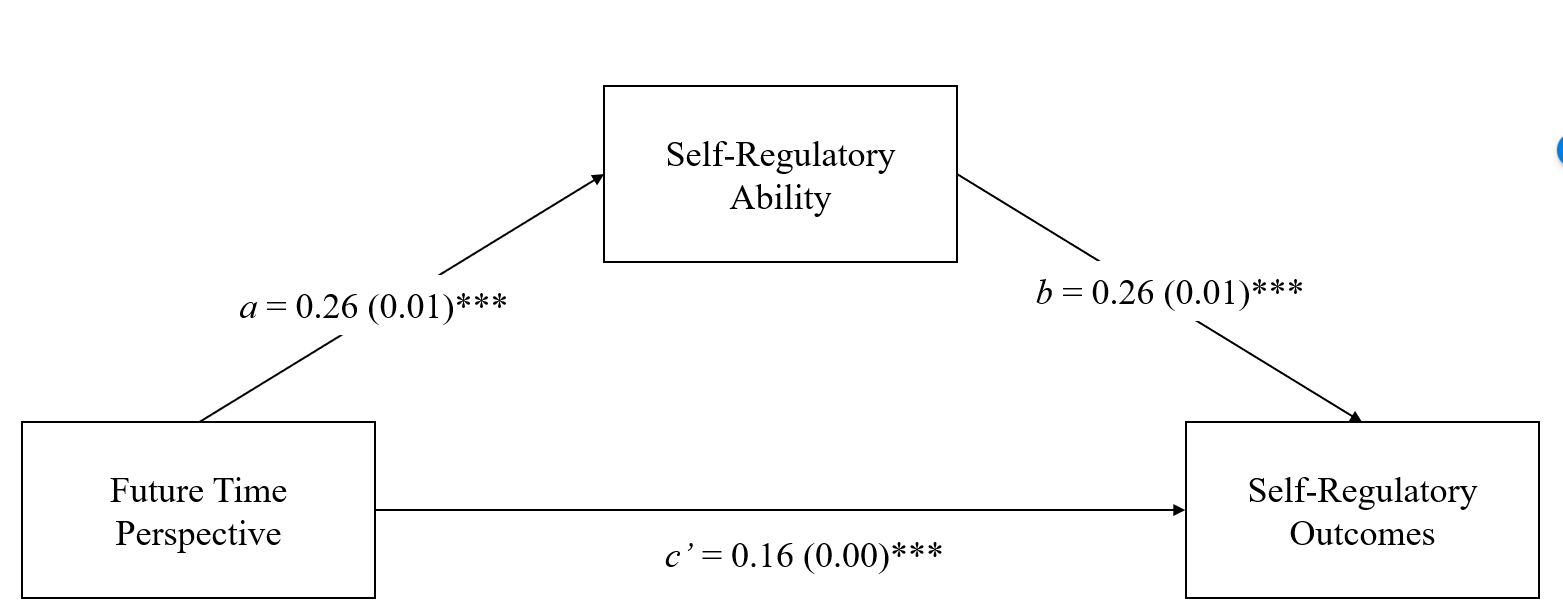
Figure 2.4 shows that a future time perspective was positively associated with both goal operating and self-regulatory outcomes, and that goal operating was positively associated with self-regulatory outcomes. These findings suggest that people with a future time perspective are more likely to engage in actions and behaviours directed towards achieving their goals and that engaging in goal-directed behaviour is associated with better self-regulatory outcomes. Tests of the indirect effect indicated that the relationship between a future time perspective and self-regulatory outcomes was mediated by self-regulatory ability (*z* =20.28, *p* < .001).

****Figure 2.5** *Mediation model of the relationship between time perspective and self-regulatory outcomes via goal operating.*

*Notes.* Values represent standardized beta coefficients with standard error (*SE*) shown in parentheses

\* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001

Finally Figure 2.5 shows that a future time perspective was positively associated with both self-regulatory ability and self-regulatory outcomes, and that self-regulatory ability was positively associated with self-regulatory outcomes. These findings suggest that people with a future time perspective tend to be better able to regulate their behaviour, and that being better able to regulate behaviour is associated with better self-regulatory outcomes. Furthermore, the relationship between a future time perspective and self-regulatory outcomes was mediated by self-regulatory ability (*z* =18.38, *p* < .001).

****Figure 2.6** *Mediation model of the relationship between time perspective and self-regulatory outcomes via self-regulatory ability.*

*Notes.* Values represent standardized beta coefficients with standard error (*SE*) shown in parentheses

\* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001.

**2.4 Discussion**

The present review explored the relationship between different dimensions of time perspective (e.g., a past, present, and future time perspective) and specific self-regulatory processes, self-regulatory ability, and self-regulatory outcomes. To achieve this aim, existing theories (namely, Control Theory; Carver & Scheier, 1981, 1982) and frameworks (e.g., Burnette et al., 2013) were used to develop a taxonomy for classifying measures according to the self-regulatory process, ability, or outcome that they were likely to reflect. A systematic search of the literature then identified 282 empirical studies exploring these relationships.

A future time perspective (i.e., the tendency to consider, anticipate, and plan for the future) was found to be positively associated with all three self-regulatory processes (i.e., goal setting, goal monitoring, and goal operating), with the size of these relationships considered small-to-medium according to Cohen’s criteria (1992). These findings suggest that people with a greater future time perspective have stronger intentions to achieve their goals, are more likely to monitor their progress towards their goals, and are more likely to engage in actions and behaviours directed towards achieving their goals. The present review also found significant, negative relationships between a present-hedonistic and present-fatalistic time perspective and goal operating, suggesting that people whose time perspectives are characterised by a pleasure seeking and a risk-taking attitude towards life, and those who believe that life is determined by fate, are less likely to engage in behaviours directed towards achieving their goals.

In addition to exploring the relationship between time perspective and self-regulatory processes, the present review also explored the relationship between time perspective and people’s ability to regulate their behaviour. Although a future time perspective was found to be positively associated with self-regulatory ability, the strongest relationship was observed between a balanced time perspective and people’s ability to regulate their behaviour. This supports recent suggestions that a balanced time perspective (i.e., where people are able to draw from multiple time frames and switch between them in order to meet situational demands; Boniwell & Zimbardo, 2004) is most beneficial.

Finally, the present review explored the relationship between time perspective and self-regulatory outcomes. A future time perspective was found to be positively associated with self-regulatory outcomes, with the size of this relationship considered small-to-medium according to Cohen’s (1992) guidelines. This finding is consistent with previous meta-analyses that also found that a future time perspective had a small-to-medium sized relationship with people’s behaviour and self-regulatory outcomes (Milfont, Wilson, & Diniz, 2012; Murphy & Dockray, 2018; Sweeny & Culcea, 2017; Yarcheski, Mahon, Yarcheski, 2004). However, a key aim of present review was to expand on existing work by exploring which (if any) of the self-regulatory processes or self-regulatory ability accounted for the relationship between future time perspective on self-regulatory outcomes. Mediation analyses indicated that the relationship between time perspective and self-regulatory was mediated by each self-regulatory process and self-regulatory ability. This suggests that people with a future time perspective are more likely to experience positive outcomes because: (i) they have stronger intentions to achieve their goals, (ii) they more likely to monitor their progress towards their goals, (iii) they are more likely to engage in actions and behaviours directed towards achieving their goals, and (iv) they have greater ability to regulate their behaviour. As such, the present review adds to our current understanding of the role of time perspective in self-regulation by demonstrating that time perspective is associated with goal outcomes via its relationship with key self-regulatory processes and self-regulatory ability. This finding is important as it indicates *why* a future time perspective has been found to lead to positive outcomes. Furthermore, these findings suggest that interventions designed to help people to achieve their goals may also want to target theses specific self-regulatory processes in order to promote goal attainment.

**2.4.1 Contributions of the Present Review**

The present review contributes to our current understanding of time perspective and self-regulation in a number of ways. First, the present review developed a taxonomy for classifying measures according to the self-regulatory process, ability or outcome that they are likely to reflect. As such, the present review was not restricted to a specific behaviour or life domain and, instead, deconstructed the processes involved during self-regulation which were then used to organise and synthesise research on the relationship between different dimensions of time perspective and self-regulation. This taxonomy could enable future research to explore additional antecedents and consequences of self-regulatory processes and outcomes, and to conduct formal tests of self-regulation models. For example, researchers who are interested in health behaviours, or the role of self-regulation in the self-management of certain medical conditions, could explore the influence of other known dispositional antecedents of behaviour on specific self-regulatory processes and abilities, and, in turn, their impact on health outcomes. This may inform strategies and interventions designed to target certain self-regulatory processes (and the factors that influence them) in order to promote health and well-being.

An additional contribution of the present review is the consideration of balanced time perspective. Research to date on time perspective and self-regulation is dominated by research exploring the influence of a future time perspective. However, time perspective is a multi-dimensional construct and a person’s time perspective is not only comprised of their view of the future. Thus, while it is important to identify differences in time perspective that have a positive effect on people’s behaviour and self-regulatory outcomes, it is also important to identify biases that have a negative influence on goal striving. Indeed, it is likely that interventions designed to modify people’s time perspective would be most effective if they promoted time perspectives that had a positive effect and reduced time perspectives that had a negative effect. In support of this idea, it has recently been suggested that a balanced time perspective is most beneficial, where people are able to draw from multiple timeframes and switch flexibly between them in order to meet situational demands (Boniwell, Osin, Linley and Ivanchenko, 2010; Boniwell and Zimbardo, 2004). Providing evidence for the benefits of a balanced time perspective, the present review found that a balanced time perspective had a stronger positive relationship with self-regulatory ability than a future time perspective. However, it was not possible to estimate the size of the relationship between a balanced time perspective and other self-regulatory process and self-regulatory outcomes as there was insufficient evidence to do so. Thus, it would be interesting to see if a balanced time perspective also has a positive association with other self-regulatory process and goal outcomes.

**2.4.2 Limitations and Directions for Future Research**

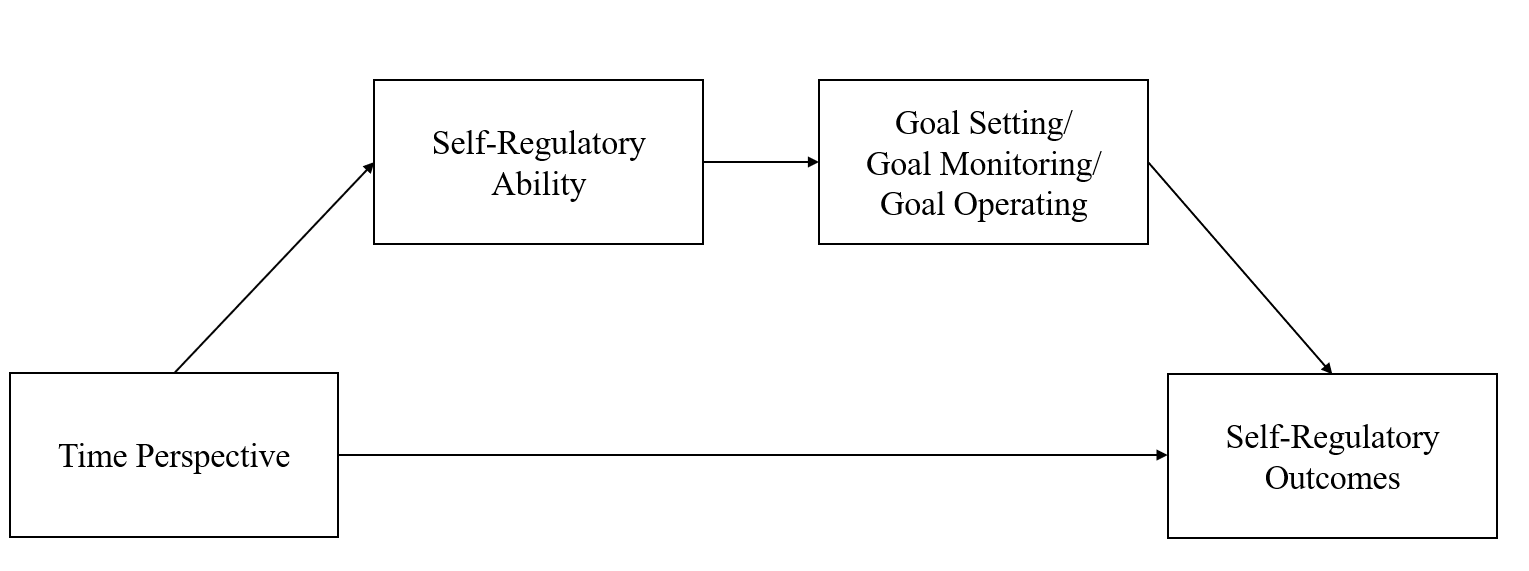
There are a number of limitations of the present review warrant discussion and provide avenues for future research. First, although theoretical models of self-regulation (e.g., Control Theory, Carver & Scheier, 1981, 1982) and empirical evidence (e.g., Harkin et al., 2016) suggest that monitoring of goal progress has an important impact on rates of goal attainment, only four studies identified in the present review examined the relationship between time perspective and goal monitoring. The findings suggested that a future time perspective had a positive relationship with the likelihood with which people monitor their goal progress. However, it was not possible to explore the relationship between other dimensions of time perspective and progress monitoring, and therefore conclusions cannot be drawn with regards to which dimension of time perspective has the strongest relationship the extent to which people monitor their goal progress. Given the importance of monitoring for goal striving, future research should explore the associations of progress monitoring with a range of different time perspectives.

Second, in order to explore whether self-regulatory processes and/or self-regulatory ability mediated the relationship between time perspective and goal outcomes, previous meta-analysis (Carraro & Gaudrea, 2014; de Ridder et al., 2012; Harkin et al., 2016; Webb & Sheeran, 2006) were used to calculate the relationship between each self-regulatory process and ability and self-regulatory outcomes. An alternative approach to these analyses would be to extract the correlations between self-regulatory processes and ability with self-regulatory outcomes from studies included in the review. While this approach would mean that the mediation analyses could be conducted on the same measures of the self-regulatory processes, among the same samples, and in the same contexts, there is also the risk that few studies will report these relations, and thus may weaken the power of such analyses.

Third, the present review revealed a significant amount of heterogeneity among the effect sizes in primary studies. However, for the most part, heterogeneity could not be explained by the proposed moderators. Interestingly, previous meta-analysis on time perspective have differed greatly in terms of the moderators that they have identified. For example, while Sweeny and Culcea (2017) found that gender composition moderated the relationship between a future time perspective and eating behaviour, gender was not found to moderate the relationship between time perspective and a variety of different health behaviours (Murphy & Dockray, 2018). This perhaps suggests that it is important to look at moderators between time perspective and specific behaviours, rather than broad life domains. Using the data collected for the present review, it would be possible to look at moderators for the relationship between time perspective and specific behaviours. For example, studies included in the health domain category could be broken down into those that explored health protective behaviours and health risk behaviours. Furthermore, we could also look at moderators of the relationship between time perspective and very specific behaviours (e.g., physical activity, smoking, attending hospital appointments). Exploring moderators of the relationship between different dimensions of time perspective and specific health behaviours may provide greater insights into the nuances of these relations.

Fourth, research on goal striving often makes inferences about the types of goals that people hold. For example, research exploring the antecedents of smoking cessation may (sometimes incorrectly) assume that all smokers have the goal to quit smoking or reduce the amount that they smoke. In the present review, a number of rules were formulated in order to determine whether the measure represented a valid measure of the outcomes of self-regulation. For example, if the study included a measure of goal setting (e.g., intentions to exercise three times a week) and also measured a behaviour directly related to the goal intention (e.g., the number of exercise sessions undertaken each week), then the measure of behaviour was classified as a measure of a self-regulatory outcome. However, it would be interesting to explore whether the level of inference being made about the extent to which the outcome reflects a specific goal, influences the relationship between time perspective and self-regulatory outcomes. Specifically, measures of self-regulatory outcomes could have been coded according to the level of inference that needs to be made about the degree to which the outcome reflects goal achievement (i.e., how likely it is that people would want to achieve the goal). This could range from little or no inference; for example, when a study recruits participants on the basis that they hold a specific goal (e.g., a study of smokers who have indicated that they want to stop smoking within two weeks; Beenstock, Lindson-Hawley, Aveyard, & Adams, 2014) to high inference (e.g., a study on alcohol consumption in a sample of adults who did not specify whether they wanted to reduce their alcohol consumption; Carey, Henson, Carey, & Maisto, 2007). It is likely that that the relationship between time perspective and self-regulatory outcomes would appear stronger when there was little, or no inference being made with respect to the degree to which the measure of self-regulatory outcomes reflects goal achievement.

Finally, the data that has been collected for this review potentially provides a rich dataset that could be used to explore additional questions. For example, the present-review explored whether the relationship between time perspective and self-regulatory outcomes was mediated by the self-regulatory processes identified by Control Theory (Carver & Scheier, 1981, 1982) and self-regulatory ability. However, it is also likely that people’s ability to regulate their behaviour will be associated with their capacity to set goals, monitor their progress towards these goals, and engage in behaviours directed towards achieving their goals. For example, research has shown that people with greater self-control (reflective of self-regulatory ability) find it easier to restrict their calorie intake (reflective of goal operating) and are more likely to achieve their weight loss goal (reflective of a goal outcome; Crescioni et al., 2011). Thus, in addition to exploring whether self-regulatory ability mediates the relationship between time perspective and self-regulatory outcomes, future research could also explore whether self-regulatory ability mediates the relationship between time perspective and the self-regulatory processes specified by Control Theory (Carver & Scheier, 1981, 1982) in a serial mediation model (see, for example, Figure 2.6). This would provide further insight into the relationship between time perspective and self-regulatory outcomes.

**Figure 2.7.** *Proposed serial mediation model for the relationship between time perspective, self-regulatory ability, self-regulatory processes, and self-regulatory outcomes.*

**2.4.3 Conclusions**

This chapter reports a systematic review of 282 empirical studies that explored the relationship between different dimensions of time perspective and processes, behaviours, and outcomes relevant to self-regulation. Existing theories and frameworks were used to develop a taxonomy for classifying measures according to the component of self-regulation that they are likely to reflect – something that will hopefully be beneficial for subsequent research. A series of meta-analyses found that a future time perspective was positively associated with the extent to which people set goals, monitor their progress towards these goals, and engage in actions to achieve their goals. As suggested by previous reviews, a future time perspective was positively associated with outcomes, but the present review went further to show that self-regulatory processes mediated the relationship between time perspective and outcomes; hence providing one explanation for why previous studies have found beneficial effects of a future time perspective.

**CHAPTER 3**

MONITORING GOAL PROGRESS: A FORGOTTEN SELF-REGULATORY PROCESS?

**3.1 Introduction**

The review presented in Chapter 2 highlighted a lack of empirical research exploring the relationship between time perspective and monitoring of goal progress. The aim of this theoretical chapter is to provide a more extensive discussion of research on progress monitoring and the possible relationship with time perspective. Specifically, this chapter will review evidence that demonstrates the importance of monitoring for promoting goal attainment and will suggest reasons why people may fail to monitor. This chapter will then suggest how individual differences in people’s time perspectives may influence the frequency and ways in which they monitor their progress towards their goals.

**3.1.1 Why Should People Monitor Their Progress Towards Their Goals?**

Suppose that an individual sets a goal to lose 10lbs before an upcoming holiday. In an attempt to achieve this goal, this individual could increase the amount of exercise that they do or reduce the number of calories that they consume. But how would this individual know whether they were on track to achieve their goal or whether they needed to increase their efforts to ensure their goal is met? According to a number of goal striving theories (e.g., Control Theory, Carver & Scheier, 1981, 1982; Feedback Intervention Theory, Kluger & DeNisi, 1998; Test-Operate-Test-Exit Model, Miller, Galanter & Pribram, 1960; Perceptual Control Theory, Powers, 1973), monitoring and obtaining feedback on goal progress is key to identifying the need to regulate one’s behaviour. Monitoring involves periodically noting a current state (e.g., current weight) and comparing this to a desired state or salient reference value (e.g., to lose 10lbs; Carver and Scheier, 1990; Webb, Chang, & Benn, 2013). If a discrepancy between the current state and the desired state is identified (e.g., “My holiday is in two weeks and I have only lost 3lbs”), then actions can be taken in order to reduce this discrepancy or the initial goal can be revised. As such, theoretical models of self-regulation propose that obtaining feedback on goal progress should promote goal attainment because it identifies discrepancies and therefore enables people to determine when action is needed (Fishbach, Touré-Tillery, Carter, & Sheldon, 2012; Myrseth & Fishbach, 2009).

Empirical evidence that monitoring goal progress promotes goal attainment comes from a series of independent studies and systematic reviews. Correlational studies have indicated that the frequency with which people monitor is significantly associated with goal attainment. For example, more frequent monitoring of blood glucose among people with diabetes is associated with better glycaemic control and improved health outcomes (Davidson, Hebblewhite, Bode, Steed, & Steffes, 2004; Evans et al., 1999), and more frequent monitoring of diet (e.g., calorie intake and portion size) and exercise is associated with successful weight loss and weight loss maintenance (Baker & Kirschenbaum, 1993). Research has also indicated that more accurate monitoring, for example by recording the information obtained from monitoring at the time of the event, is associated with improved outcomes (Burke, Swigart, Warziski , Styn, Stone, 2009).

Building on this correlational evidence, a number of experimental studies and meta-analytical reviews have demonstrated that interventions that involve monitoring improve rates of goal attainment across a variety of behaviours, including physical activity (in a sample of community adults; Michie, Abraham, Whittington, McAteer & Gupta, 2009), weight loss (in a sample of adults who are classified as being overweight; Dombrowski, Sniehotta, Avenell, MacLennan & Araujo-Soares, 2012), medication adherence (in a sample of patients with HIV; de Bruin et al., 2012), and the management of medical conditions such as diabetes (in a sample of patients with type 2 diabetes; Farmer et al., 2007) and asthma (in a sample of adults with asthma; van der Meer et al., 2009). More recently, a large meta-analysis conducted across a range of behaviours found that interventions that encouraged participants to monitor their goal progress increased the frequency with which participants monitored (*d+* = 1.98) and promoted goal attainment (*d*+ = 0.40; Harkin et al., 2016). Interestingly, the effect size observed for the impact of progress monitoring on goal attainment (*d*+ = 0.40) was similar to the effect size observed for the impact of goal intentions on goal attainment reported in an earlier meta-analysis (*d*+ = 0.36; Webb & Sheeran, 2006). This is notable as many self-regulatory theories consider the strength of people’s motivations or intentions to perform a behaviour as the key predictor of that behaviour in the future (Fishbein et al., 2001). Thus, the review by Harkin and colleagues (2016) highlighted that successful goal striving not only requires that people are motivated to achieve their goals, but also that people monitor their progress *towards* these goals. Furthermore, Harkin and colleagues (2016) demonstrated that the frequency with which participants monitored their progress mediated the effectiveness of the intervention on goal attainment, providing further evidence that monitoring is a key process through which intentions translate into action.

**3.1.2 Why Might People Avoid Monitoring Their Goal Progress?**

Both theoretical frameworks and empirical evidence suggest that people who monitor their goal progress are better able to achieve their goals than those who do not. However, while highlighting the importance of monitoring in translating good intentions into action, current theoretical frameworks are arguably idealistic. That is, they assume that people will actively monitor and seek feedback on their goal progress if they are given the opportunity to do so. However, a series of studies have revealed instances in which people do not monitor their progress, even when goals are considered important and highly salient. For example, monitoring of blood glucose is essential for people with diabetes to maintain glycaemic control and reduce the risk of future health complications (Davidson et al., 2004; Evans et al., 1999). However, research has indicated that 21% of adults with diabetes never engage in glucose monitoring (American Diabetes Association, 1994) and 60% monitor less frequently than recommended (Karter, Ferrara, Darbinian, Ackerson, & Selby, 2000). Similarly, only 31% of individuals with hypertension report that they monitor their blood pressure (Baral-Grant, Haque, Nouwen, Greenfield, & McManus, 2011) and people who are trying to lose weight often do not weigh themselves on a regular basis (Linde et al, 2005). In other contexts, a UK national survey revealed that only 10% of people who are concerned about their finances check their bank balance regularly (The National Savings and Investment Survey, 2012), and people rarely monitor their electricity consumption despite having the facilities to do so (Webb, Benn and Chang, 2014). Given the importance of monitoring in facilitating goal striving, there is a clear need for subsequent research to explore the factors that influence this process. In other words, what determines whether people monitor their current standing with respect to their goals?

Recent reviews have proposed that, in some circumstances, people are *unable* or *unwilling* to monitor their goal progress (Liberman & Dar, 2009; Webb, Chang, & Benn, 2013). Liberman and Dar (2009) provide an extensive review of the types of situations that make monitoring goal progress objectively difficult, such that people do not know what or how to monitor. These include; having a vague or abstract goal (e.g., “to be happy” or “to be successful”), an unclear contingency between actions and outcome, when progress towards a goal is slow, or when the information obtained through monitoring is confusing. For example, Cowburn and Stockley (2005) found that consumers often do not look at nutritional labels on food packaging to help them monitor their dietary intake as they have difficulty interpreting this information. Similarly, Sweeny, Melnyk, Miller, & Shepperd (2010) suggested that people may not monitor their goal progress if doing so is effortful or inconvenient (e.g., having to go to the doctors for blood tests).

A second review has suggested that there are times when people are motivated to ignore, or avoid, information that would facilitate progress monitoring (Webb et al., 2013). For example, research has shown that employees will avoid seeking feedback on their progress if they believe that the feedback they might obtain will be negative (Tuckey, Brewer, & Williamson, 2002), and people in relationships will ignore threatening information that may be harmful to the well-being of that relationship (e.g., whether a partner has been adulterous; Ickes, Dugosh, Simpson & Wilson, 2003). Given that monitoring is not always pleasant and may bring to light shortcomings or indicate slow progress, Webb and colleagues (2013) propose that people may choose to ‘bury their head in the sand’ to avoid this eventuality – an occurrence which has been termed ‘the ostrich problem’. However, other reviews have suggested that people may avoid monitoring their goal progress, even if progress is perceived to be good, because doing so may lead to complacency and a subsequent decrease in efforts (Amir & Ariely, 2008; Chang, Webb, & Benn, 2017). Indeed, research has indicated that having an ‘illusion of goal progress’ can be detrimental to actual goal progress (Besharat, Carrillat, & Ladik, 2014, study 1). Finally, rather than being motivated to avoid monitoring, it may also be that people do not monitor their goal progress simply because they are not motivated to achieve the goal that has been set or the goal that has been set is of relatively low importance in comparison to other goals. For example, while people tend to view pro-environmental goals as important, health and security goals are usually considered to be more important (Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007). If people are not motivated to achieve their goal, it is unlikely that they will devote time and effort towards monitoring their progress towards their goal (Sweeny et al., 2010).

While these reviews have pointed to the importance of situational and motivational determinants of progress monitoring, a further possibility is that certain types of people are more *able* or *inclined* to monitor their goal progress than others. That is, the presence or absence of certain personality characteristics may influence the likelihood that people monitor. Although relatively less research has explored individual differences associated with progress monitoring, some research has indicated that employees with higher self-esteem are more likely to seek feedback at work while employees with a greater tolerance for ambiguity are less likely to seek feedback at work (Anseel, Beatty, Shen, Lievens, & Sackett, 2015). Given that monitoring goal progress involves engaging in an action in the present in order to identify and resolve discrepancies between present and future states, this programme of research proposed that another factor that may be particularly relevant when considering the extent to which people monitor is time perspective.

**3.1.3 Why Might Time Perspective Be Associated with Monitoring Goal Progress?**

Time perspective has been found to be associated with a variety of processes and behaviours relevant to self-regulation (for a review, see Stolarski, Fieulaine & van Beek, 2015). However, very little research has explored how differences in people’s time perspectives are associated with the *frequency* with which people monitor (e.g., four tests of this association were identified for the review presented in Chapter 2), and no research to date has explored whether differences in people’s time perspectives are associated with the *ways* in which people monitor. Given the importance of monitoring for facilitating goal attainment (Harkin et al., 2016), such research has the potential to inform the development of interventions and strategies deigned to modify time perspective in order to promote monitoring, and thus, help people to achieve their goals. There are several theoretical reasons to think that time perspective may be associated with the likelihood that people monitor. For example, individuals with a present time perspective, who are motivated by immediate gratification, may not regularly monitor their goal progress as they prioritise avoiding short-term costs (e.g., effort and inconvenience). Additionally, individuals with a present time perspective may want to avoid monitoring if they perceive that the information derived from monitoring may be unpleasant. In contrast, individuals with a future time perspective, who give greater consideration to the future consequences of their actions, may invest more time and effort towards actions that can help them achieve their long-term goals, even if doing so may incur short-term costs.

There are also reasons to think that time perspective may be associated with the nature of progress monitoring. For example, monitoring involves comparing information about a current state with a salient reference value. This could be a reference value in the past (e.g., how much progress has been made) or a reference value in the future (e.g., how much progress still needs to be made). Given that monitoring can vary on a temporal dimension, it is likely that differences in people’s time perspective may also be associated with the ways in which people monitor. For example, individuals with a future time perspective may be more likely to use a reference value in the future and individuals with a past time perspective might be more likely to use a reference value in the past. In Chapter 4, we elaborate on these initial hypotheses and propose further hypotheses for how differences in people’s time perspective might be associated with progress monitoring. We then present the findings from a correlational study that aimed to empirically test these hypotheses by exploring the relationship between different measures of time perspective and measures assessing the likelihood and ways in which people monitor their progress towards their goals.

**CHAPTER 4**

THE RELATIONSHIP BETWEEN TIME PERSPECTIVE AND THE LIKELIHOOD AND NATURE OF MONITORING GOAL PROGRESS

**4.1 Introduction**

This chapter presents the findings of a cross-sectional study that sought to explore the relationship between time perspective and the likelihood and nature of progress monitoring. Using an online survey, Study 1 collected information regarding participants’ time perspective, their goals, the properties of these goals, and the likelihood and methods by which participants monitored their goal progress. Given that it was unknown, which (if any) dimensions of time perspective would be associated with monitoring, Study 1 also incorporated a number of different measures of time perspective. This included the development of a new measure that aimed to assess people’s implicit attitudes towards different time frames. Furthermore, given that previous research has indicated that the properties of people’s goals can influence the nature and extent to which people monitor their goal progress (e.g., Liberman and Dar, 2009), Study 1 also explored whether time perspective was associated with the characteristics or properties of peoples’ goals, and if so, whether these factors mediated (or explained) the relationships between time perspective and monitoring of goal progress.

In short, Study 1 sought to answer three broad questions: (i) Is time perspective associated with the characteristics or properties of peoples’ goals? (ii) Is time perspective associated with the likelihood and nature of progress monitoring? (iii) Is the relationship between time perspective and the likelihood and nature of progress monitoring mediated (or explained) by the properties of peoples’ goals? Below, we consider each of these questions in turn and pose some hypotheses that will be tested in the present study.

**4.1.1 How Might Time Perspective Relate to the Nature of People’s Goals?**

The following discussion will first propose how time perspective may be associated with the nature of people’s goals. This is not intended to provide an exhaustive review (for this, see Fuijita & MacGregor, 2012), but will pay particular attention to a number of goal dimensions that have theoretical links with time perspective. Specifically, the present research will distinguish between three goal dimensions: (i) temporal distance (i.e., short-term verses long-term goals), (ii) level of construal (i.e., abstract versus concrete goals), (iii) regulatory focus (i.e., promotion verses prevention goals).

**Temporal Distance.** Goals are cognitive representation of possible states or desired outcomes that an individual seeks to attain (Austin and Vancouver 1996). Goals typically specify or imply a time in which they might be achieved, which can vary from near (e.g., saving money for an upcoming holiday) to far (e.g., saving money for retirement). How far the goal is set from the present is known as ‘temporal distance’ (Peetz, Wilson & Strahan, 2009). Given that time perspective influences how people organise and assign events to temporal categories or time frames (Zimbardo & Boyd, 1999), it is likely that time perspective will influence the temporal distance of goals, such that individuals with a future time perspective will form goals of a more long-term and distant nature than individuals with a past or present time perspective.

**Level of Construal.** Temporal Construal Theory (TCT; Liberman & Trope, 1998; Liberman, Trope & Stephan, 2007; Trope & Liberman, 2003) proposes that temporal distance is directly related to level of abstraction, such that psychologically near goals tend to be low-level and concrete (e.g., going to the library to study), while psychologically distant goals tend to be high-level and abstract (e.g., achieving academic ambitions). In support of these ideas, a recent meta-analysis of 267 empirical studies found a positive association between temporal distance and the level of abstraction at which people construe the world around them (Soderberg, Callahan, Kochersberger, Amit, & Lederwood, 2015). Given that we propose that individuals with a future time perspective will form goals of a more long-term nature, it is also expected that time perspective will also be associated with the level at which goals are construed, such that individuals with a future time perspective will represent goals in a more distant and abstract manner than individuals with a past or present time perspective.

**Regulatory Focus.** Goals also differ in terms of their content or focus. Higgins’ (1997, 1998) Theory of Regulatory Focus distinguishes between two goal orientations – one focused on the promotion or attainment of a positive outcome (e.g., “taking vitamins to maximise health benefits”), the other focused on the prevention or avoidance of a negative outcome (e.g., “taking vitamins to avoid illness”). Although a person’s regulatory focus can vary across different situations, people tend to have a dominant regulatory focus and research has shown that people are especially sensitive to information that corresponds to their dominant focus (Higgins, 2000). According to the Theory of Regulatory Focus, prevention goals, which are motivated by security, safety, and responsibility, tend to elicit the need for more immediate action than promotion goals, which are motivated by aspirations, accomplishments, and future advancements (for empirical demonstrations, see Freitas, Liberman, Salovey & Higgins, 2002; Pennington & Roese, 2003). Interestingly, there are parallels between research on regulatory focus and research on time perspective. For example, while a future time perspective has been found to be positively associated with academic achievement (Brown & Jones, 2004) and health promoting behaviours (e.g., engaging in physical activity; Luszczynska, Gibbons, Piko, & Tekozel, 2004), a present time perspective has been found to be positively associated with situations requiring immediate action, such as obtaining temporary housing when homeless (Epel, Bandura, & Zimbardo, 1999). In light of these observations, it was hypothesised that individual differences in time perspective were likely to be associated with the regulatory focus of people’s goals, such that individuals with a future time perspective will be more likely to form goals with a promotion focus, while individuals with a present time perspective will be more likely to form goals with a prevention focus.

To summarise the above discussion, we have formed three specific hypotheses:

**Hypothesis 1**: Time perspective will be associated with the temporal distance of goals, such that individuals with a future time perspective will form goals of a more long-term and distant nature than individuals with a past or present time perspective.

**Hypothesis 2**: Time perspective will be associated with the construal level of goals, such that individuals with a future time perspective will construe their goals in a more abstract manner than individuals with a past or present time perspective.

**Hypothesis 3**: Time perspective will be associated with the regulatory focus of goals, such that individuals with a future time perspective will be more likely to form goals of a promotion focus than individuals with a past or present time perspective.

**4.1.2 How Might Time Perspective Influence the likelihood and nature of goal progress monitoring?**

The second aim of the present research was to investigate the relationship between time perspective and the likelihood and nature of monitoring goal progress. Monitoring involves periodically noting the qualities being expressed in a goal-related behaviour or its outcomes and comparing these with salient reference values (Carver & Scheier, 1982, 1990). As such, monitoring encompasses a variety of processes from deciding whether and how to seek information, to becoming aware of relevant information, directing attention towards this information, and ultimately, interpreting and utilising the information available (Webb et al., 2013). Individual differences in time perspective could be associated with one or all of these processes.

The present study used a framework devised by Harkin and colleagues (2016) to distinguish between six dimensions of progress monitoring (for an overview, see Table 4.1). Specifically, the present research investigated whether variations in participants’ time perspectives were associated with whether: (i) they compare their current state to a past state, future state, or to other people, (ii) they monitor their rate of goal progress or their distance from their goal, (iii) they monitor their behaviour or the outcomes of their behaviour, (iv) they use abstract or concrete information to assess their goal progress, (v) they passively or actively acquire information regarding their goal progress, and (vi) this information is shared with others or kept private. The following discussion will briefly introduce these dimensions of progress monitoring and will discuss the links with time perspective.

**Reference Value**. Assessing goal progress involves comparing information about a current state with a salient reference value. Reference values can be distinguished on a temporal dimension, for example, by comparing to a past state (e.g., weight last month) or a future state (e.g., to weigh nine stone; Albert, 1977). Progress can also be assessed through a comparison with others (e.g., the weight of celebrities in the media; Festinger, 1954). The adoption of a particular reference value may vary according to a person’s time perspective. Given that time perspective refers to cognitive biases towards the past, present, and future (Zimbardo & Boyd, 1999), we predicted that individuals with a future time perspective would be more likely to compare their current standing to a future state rather than to a previous state or past progress. Consistent with this, we predicted that individuals with a past time perspective would be more likely to compare their current standing to a past state. We also investigated whether individual differences in time perspective were associated with the extent to which people engage in a comparison with others in order to assess their goal progress.

**Monitor Rate of Progress or Distance from the Goal**. A person can also decide whether to monitor their progress in terms of their rate of goal progress (i.e., the speed at which they are progressing towards their goal) or their distance from the goal (i.e., how far they are away from a goal or starting point; Bonezzi, Brendl & De Angelis, 2011). Consider, for example, a student who is required to read a 500-page book for an assignment. In order to monitor their progress, this student could assess how quickly they are able to read a chapter (i.e., their rate of goal progress), or they can count the number of pages they have read so far (i.e., what they have already achieved), or the number of pages remaining (e.g., what they still need to achieve). Given that individuals with a future and past time perspective may differ in terms of the reference values against which they compare their goal progress, we expected that individuals with a future time perspective would be more inclined to evaluate their progress in terms of what they still need to achieve in order to reach their goal, whereas individuals with a past time perspective would be more inclined to assess their progress in terms of what they have achieved so far. Additionally, we expected that individuals with a present time perspective, who have a greater focus on the here-and-now, would be more likely to assess the speed at which they are making progress rather than considering their distance to or from their goal or starting point.

**Table 4.1.** *Dimensions of Progress Monitoring*

|  |  |  |
| --- | --- | --- |
| Dimension | Definition | Example |
|  | **Reference value** | |
| Past | Goal progress is compared with a past state or previous rate of goal progress | A person compares their current weight with their past weight |
| Future | Goal progress is compared with a future state or goal | A person compares their current weight with how much they would like to weigh |
| Others | Goal progress is compared with others progress or states | A person compares their current weight with how much others around them weigh |
|  | **Monitor rate of progress or distance from the goal** | |
| Rate of progress | The person monitors the rate of progress towards a specified goal | A person notes that they weigh 2lbs less each week |
| Distance from goal | The person monitors how far they are away from a goal or starting point | A person notes that they weigh 10lbs more than desired |
|  | **Focus of monitoring** | |
| Monitor behaviour | The person monitors their behaviour(s) | A person uses a pedometer to monitor the number of steps that they take |
| Monitor outcomes | The person monitors the outcome(s) of their behaviour | A person weighs themselves to monitor their weight |
|  | **Level of abstraction** | |
| Abstract | The person uses abstract information to assess whether they are making progress | A person notices that their clothes feel looser than before |
| Concrete | The person uses concrete information to assess whether they are making progress | A person sees that they have lost weight on the weighing scales |
|  | **Passive and active monitoring** | |
| Passive monitoring | The person attends to information about their goal progress that can be obtained without deliberate effort | Another person comments on a person’s weight loss without being prompted |
| Active monitoring | The person makes deliberate efforts to seek out information about their goal progress | A person asks another person whether they think they have lost weight |
|  | **Public and private monitoring** | |
| Public monitoring | The information obtained from monitoring is shared with others | A person uploads information about their weight loss on social media |
| Private monitoring | The information obtained from monitoring is kept private | A person does not share or tell others about their weight loss |

*Note.* Table adapted from Harkin et al., (2016).

**Focus of Progress Monitoring**. When assessing goal progress, a person can monitor the behaviour itself (e.g., the number of calories consumed) or the outcomes of this behaviour (e.g., the amount of weight lost; Abraham & Michie, 2008; Michie et al., 2013). A future time perspective has been found to direct people to the long-term consequences of their actions and is associated with a greater awareness of the effects of current actions on future outcomes (Rothspan & Read, 1996). Therefore, it is hypothesised that individuals with a future time perspective will be more likely to focus on the outcomes of their behaviour to assess their progress than individuals with a past or present time perspective. In contrast, individuals with a present time perspective, who are motivated more by immediate gains, may be more likely to assess their progress by monitoring their current behaviour than individuals with a past or future time perspective.

**Level of Abstraction**. The information acquired through monitoring can also vary in terms of level of abstraction. Consider, for example, the goal of losing weight. A person could choose to assess the fit of their clothes (i.e., a relatively abstract construal of progress) or use weighing scales (i.e., a more concrete construal of progress). Given that individuals with a future time perspective may set goals that are more distant and abstract, it is also expected that they will use more abstract information to monitor their progress.

**Passive and Active Monitoring**. Research has also distinguished between passive and active ways of monitoring goal progress (e.g., Ansell, Beatty, Shen, Lievens & Scakett, 2013; Berger, 2002; Chang, Webb & Benn, 2014). Passive monitoring involves attending to information that is readily available in the environment (e.g., noticing an improvement in physical fitness or receiving feedback from others), and thus the information is obtained without deliberate effort. In contrast, active monitoring involves seeking out information which will inform goal progress (e.g., recording the amount of exercise performed), and thus a deliberate effort is made to seek information on goal-related behaviour and its outcomes (Chang et al., 2014). Given that we might expect individuals with a future time perspective to invest more time and effort towards actions that can help them achieve their long-term goals, we hypothesised that individuals with a future time perspective would be more likely to actively seek out information relevant to their goal progress than individuals with a past or present time perspective.

**Public and Private Monitoring**. Once a person has assessed whether they are making progress towards their goal, they can then decide whether this information is shared with others or kept private. The former is referred to as public monitoring and occurs when the information derived from monitoring is reported to at least one other person (e.g., through telling other people or sharing on social media sites). On the other hand, private monitoring occurs when the information derived from monitoring is kept from other people. Research on time perspective has shown that individuals with a future time perspective have greater self-efficacy; that is, a person’s belief in their ability to achieve their goal (Zebardast, Besharat & Hghighatgoo, 2011). As such, we predict that individuals with a future time perspective, perhaps given their confidence in achieving their goals, will be more likely to engage in public monitoring than individuals with a past or present time perspective.

To summarise, we have formed five specific hypotheses about how time perspective might influence the likelihood and nature of progress monitoring:

**Hypothesis 4**: Time perspective will be associated with the reference value that is used during monitoring, such that individuals with a future time perspective will be more likely to compare their current standing to their desired state, while individuals with a past time perspective will be more likely to compare their current standing with respect to a previous state.

**Hypothesis 5:** Time perspective will be associated with how people assess whether they are making progress on their goal, such that individuals with a future time perspective will be more likely to evaluate their progress in terms of what they still need to achieve, whereas individuals with a past time perspective will be more likely to assess their progress in terms of what they have achieved so far.

**Hypothesis 6:** Time perspective will be associated with the way that people assess whether they are making progress toward their goal, such that individuals with a future time perspective will be more likely to focus on the outcomes of their behaviour, whereas individuals with a present time perspective will be more likely to focus on their current behaviour.

**Hypothesis 7:** Individuals with a future time perspective will use more abstract information to monitor their progress than individuals with a past or present time perspective.

**Hypothesis 8:** Time perspective will be associated with whether people actively seek out information regarding their goal progress, such that individuals with a future time perspective will be more likely to actively monitor their goal progress than individuals with a past or present time perspective.

**Hypothesis 9:** Time perspective will be associated with whether the information derived from monitoring is shared with others or kept private, such that individuals with a future time perspective will be more likely to engage in public monitoring, than individuals with a past or present time perspective.

**4.1.3 Do the Properties of People’s Goals Mediate the Relationship between Time Perspective and Monitoring of Goal Progress?**

A third aim of the present study was to explore whether the properties of people’s goals mediated the relationship between time perspective and the likelihood and nature of progress monitoring. To this end, we considered a number of additional goal properties that might explain the relationship between time perspective and monitoring of goal progress.

**Goal Deadline and Measurability**. Liberman and Dar (2009) identified a number of instances in which monitoring goal progress can be objectively difficult, such that people do not know what or how to monitor. These instances include having goals with vague end-states and goals where progress was difficult to measure. As such, the present study explored whether time perspective was associated with the extent to which people’s goals have a specific deadline, and the extent to which progress towards participants goals can be easily measured. In light of the review by Liberman and Dar (2009), we might expect that if time perspective is associated with specificity of the goal deadline and the measurability of the goal then this will subsequently increase the extent to which people monitor their goal progress.

**Goal Commitment.** Previous research (e.g., Crockett et al., 2009; Griva et al., 2013) and the review presented in Chapter 2 has indicated that a future time perspective was positively associated with people’s goal intentions. The strength of people’s goal intentions, or people’s commitment towards their goal, will also likely influence the extent to which people monitoring. That is, if people are not motivated to achieve their goal, then it is unlikely that they will devote time and effort towards monitoring their progress towards their goal (Sweeny et al., 2010). Thus, it is likely that goal commitment will mediate the relationship between time perspective and monitoring of goal progress, such that a future time perspective will be associated with greater commitment toward achieving the goal, and greater commitment will be associated with more extensive monitoring of goal progress.

**Success Expectation.** Webb and colleagues (2013) proposed that there are instances in which people are motivated to avoid or ignore information regarding their goal progress. They proposed that people may avoid monitoring their goal progress if they do not believe that they are on track to achieve their goal. Given that research has indicated that individuals with a future time perspective have greater self-efficacy (Zebardast et al, 2011), we might expect that the relationship between time perspective and monitoring of goal progress will be mediated by people’s expectations with regards to whether or not they will achieve their goal.

**4****.1.4 Measuring Time Perspective**

Time perspective is considered a multidimensional construct that encompasses cognition, attention, attitude, and behaviour (Gjesme, 1979; Kastenbaum, 1961). As a result, there has been considerable variation in how time perspective has been operationalised and defined (Boniwell, Evgeny, Linley & Ivanchenko, 2010). Additionally, few measures have considered time perspective in all its complexity. For example, while some measures of time perspective assess people’s attitudes toward the past, present, and future (e.g., the Time Attitude Scale; Nuttin, 1985), other assess the amount of attention people devote to different time frames (e.g., Temporal Focus Scale; Shipp et al., 2009). This diversity in approaches has led to inconsistencies and contradictions in empirical findings. For example, Adams and Nettle (2009) found that, while the future subscale of the Consideration for Future Consequences scale (Strathman, Gleicher, Boninger, & Edwards, 1994) was negatively associated with smoking behaviour, the future subscales of other measures of time perspective (e.g., the Zimbardo Time Perspective Inventory; Zimbardo & Boyd, 1999) were not. As such, it has been recommended that multiple measures should be utilised when studying time perspective (Boniwell et al., 2010; Ward, Butler & Guthrie, 2009).

Given that was unknown, which if any, dimensions of time perspective would be associated with progress monitoring; the present study utilised a number of different measures of time perspective. Specifically, a framework devised by Shipp and Colleagues (Shipp, Edwards and Lambert, 2009) was used to distinguish between seven different conceptualisations: (i) Time Perspective – the overarching view that an individual holds towards time and encompasses cognition, affect, and behaviour, (ii) Time Orientation – cognitive engagement in the past, present, and future, (iii) Consideration of Future Consequences – the extent to which people consider the consequences of their actions on future outcomes, (iv) Time Attitude – emotional and evaluative feeling towards the past, present, and future, (v) Temporal focus – the extent to which people devote their attention to the past, present, and future, (vi) Temporal Depth – quantitative distance into the past (i.e., how far back into the past) and the future (i.e., how far forward in the future) that is typically considered when thinking about events that have happened or may happen, and (vii) Balanced Time Perspective – ability to draw from multiple timeframes and switch flexibly between them. Thus, the present study incorporated a number of previous validated self-report measures in order to reflect each concept.

Although previous research on time perspective has relied heavily on self-report measures, time perspective is often defined as an unconscious trait in the literature (e.g., Zimbardo & Boyd, 1999). Self-report measures may be susceptible to self-presentation biases as it is likely that thinking further ahead (i.e., a greater future time perspective) is perceived as more socially desirable. Additionally, research has indicated that both explicit and implicit cognitions are important, independent predictors of people’s behaviour (e.g., Prestwich, Hurling, & Baker, 2011). Thus, implicit measures of time perspective may provide useful insights into the relationship between time perspective and monitoring of goal progress that may not be captured by self-report measures. However, to our knowledge, only one published study to date has used an implicit measure of time perspective. Demeyer and De Raedt (2014) devised an implicit measure of time perspective based on a scrambled sentence test (Wenzlaff, 1993). The scrambled sentence test is a technique used to measure the availability of specific cognitions by presenting participants with scrambled sentences that can be unscrambled in different ways. Research has indicated that people tend to unscramble the sentences in line with their cognitive mindset and most activated cognitions (e.g., Wenzlaff, 1993; Rude, Wenzlaff, Gibbs, Vane, & Whitney, 2002). In the version created by Demeyer and De Raedt (2014), sentences could be constructed to reflect either a short-term or long-term future time perspective. They found that the number of sentences that participants unscrambled in-line with a long-term future time perspective has a significant and positive correlation with a self-report measure of future time perspective (i.e., Future Time Perspective Scale; Carstensen & Lang, 1996). However, this implicit measure of time perspective only assesses the extent to which people have a future time perspective. Thus, in the present study, we devised a new implicit measure of time perspective that assessed participants’ implicit attitudes towards different time frames. Specifically, we used series of Single Category Implicit Association Tests (SC-IAT, Karpinski & Steinman, 2006), to assess the extent to which participants had positive or negative attitudes towards their past, present, and future.

**4.1.5 The Present Research**

Numerous studies have demonstrated that time perspective plays a fundamental role in various aspects of human functioning. Given the importance of monitoring in facilitating goal attainment, the present research sought to combine these lines of research in order to explore the relationship between time perspective and the likelihood and nature with which participants monitored their goal progress. Study 1 involved a large, online survey designed to collect information on participants’ time perspective, their goals, the properties of these goals, and the frequency and methods by which participants monitor their goal progress. As well as exploring our hypotheses, Study 1 will also incorporate a number of measures of time perspective in order to assess the correlations between them. Additionally, given that time perspective is often described as an unconscious trait, Study 1 will also provide an initial test of an implicit measure of time attitudes.

**4.2 Method**

**4.2.1 Participants and Recruitment**

Participants were staff and students at the University of Sheffield and members of the wider online community. Five recruitment strategies were employed: (i) email advertisements were sent to staff and students who subscribed to the University of Sheffield mailing list, (ii) Level 1 Undergraduate Psychology students were recruited through an Online Research Participation System, (iii) adverts were placed on social networking sites, including Facebook (www.facebook.com) and Twitter (www.twitter.com), (iv) adverts were placed on internet forums and websites that promote psychological research (e.g., the Social Psychology Network, http://www.socialpsychology.org/expts.htm), and (v) an advert was placed on Prolific Academic (www.prolificacademic.co.uk), a crowdsourcing website for scientific research.

The study was presented to participants as an investigation into people’s goals (Appendix 4.1). To be eligible to participate, participants had to be over the age of 18 and informed consent was obtained from all respondents at the start of the survey (Appendix 4.2). Level 1 Psychology students were provided with three course credits for their participation and participants recruited through Prolific Academic were paid £3.75 for their completion of the survey (this payment is in line with Prolific Academic’s requirements of £1.25 per 15 minutes of time). Other participants were given the option of being entered into a prize draw to win a £50 Amazon voucher. Level 1 Psychology students and participants who took part through Prolific Academic were not eligible for the prize draw. The methods and procedures reported in the present study were approved by the University of Sheffield, Department of Psychology Research Ethics Committee (7th November 2014).

**4.2.2. Measures and Procedure**

An online, cross-sectional survey administered via Qualtrics (https://www.qualtrics.com/) was used to collect information on participant’s time perspective, their goals, the properties of these goals, and the frequency and methods by which participants monitored their progress towards these goals. The survey incorporated a battery of questionnaires, an adaptation of the scrambled sentence test (Srull & Wyer, 1979), and a set of Single-Category Implicit Association Tests (SC-IATs; Karpinski & Steinman, 2006). The survey took approximately 45 minutes to complete. An initial demographic survey collected information regarding participants’ age, gender, ethnicity, country of origin and residence, years of education, and employment status. Participants then completed self-report measures of time perspective, followed by measures assessing the properties of participants’ goals, and the likelihood and ways in which they monitored their progress towards their goals. Finally, participants were asked to complete two implicit measures of time perspective. These measures are described in detail below.

**Self-report measures of time perspective**. The present study used a framework devised by Shipp and Colleagues (Shipp, Edwards and Lambert, 2009) to distinguish between seven different conceptualisations of Time Perspective: (i) Time Perspective, (ii) Time Orientation, (iii) Consideration of Future Consequences, (iv) Time Attitudes, (v) Temporal Focus, (vi) Temporal Depth, and (vii) Balanced Time Perspective. Previously validated, self-report measures were used to reflect each construct and their order of presentation in the questionnaire was randomised.

*Time perspective* was measured using the Zimbardo Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999). The Zimbardo Time Perspective Inventory is a 56-item scale which assess five dimensions of time perspective: Past-Positive (9 items; e.g., “It gives me pleasure to think about my past”), Past-Negative (10 items; e.g., “I often think of what I should have done differently in my life”), Present-Fatalistic (9 items; e.g., “It doesn’t make sense to worry about the future, since there is nothing I can do about it anyway”), Present-Hedonistic (15 items; e.g., “I find myself getting swept up in the excitement of the moment”), and Future (13 items; e.g., “I am able to resist temptations when I know there is work to be done”). Items were rated on a 5-point Likert scale ranging from “very untrue of me” to “very true of me”. After reverse scoring appropriate items, an average score was computed for each subscale, such that higher scores indicated a stronger bias towards that particular time frame. Cronbach’s alpha indicated that each subscale was internally reliable in the present sample: Past-positive α = .82; past-negative α = .84, present-fatalistic α = .71, present-hedonistic α = .82, and future α = .79.

*Time orientation* was measured using the Temporal Orientation Scale (TOS; Jones, Banicky, Pomare & Lasane, 1996). This is a 15-item measure designed to assess the emphasis that participants place on each time frame. It consisted of three subscales, with 5 items assessing an orientation towards the past (e.g., “I often think about all the things I wish I had done differently in my past”), the present (e.g., “I try to live one day at a time”), and the future (e.g., “When I want to get something done, I make step-by-step plans and think about how to complete each step respectively”). Items were rated on a 5-point Likert scale ranging from “not true of me” to “very true of me”. An average score was computed for each subscale with higher scores indicate a greater orientation towards that time frame. Cronbach’s alpha indicated that each subscale was internally reliable in the present sample: Past α = .82, present α = .73, and future α = .78.

*Consideration of Future Consequences* was measured using the 14-item Consideration of Future Consequences scale (CFC; Joireman, Shaffer, Balliet, & Strathman, 2012). This measure assesses the extent to which immediate versus distant consequences of behaviour are considered. It contains two subscales, assessing concern for future consequences (7 items, e.g., “I consider how things might be in the future and try to influence those things with my day-to-day behaviour”) and concerns for immediate consequences (7 items, e.g., “I only act to satisfy immediate concerns, figuring the future will take care of itself”). Participants were asked to indicate how true each statement is for them on a 5-point Likert-type scale from ‘very untrue of me’ to ‘very true of me’. Cronbach’s alpha indicated that each subscale was internally reliable in the present sample: CFC-Future α = .76 and CFC-Immediate α = .80.

*Time attitude* was measured using the Time Attitude Scale (TAS; Nuttin, 1985), which assessed how positively or negatively participants felt about each temporal frame, using 9 bipolar adjectives (e.g., Pleasant-Unpleasant; Important-Unimportant; Success-Failure). For each bipolar pair, participants were asked to indicate how they feel towards their past, present and future on a 7-point scale anchored by the positive and negative adjective. After reverse scoring appropriate items, higher scores indicated a more positive attitude towards that temporal frame. Cronbach’s alpha indicated that each subscale was internally reliable in the present sample: Past α = .95, present α = .94, and future α = .95.

*Temporal focus* was measured using the 12-item Temporal Focus Scale (TFS; Shipp, Edwards & Lambert, 2009). It consists of three subscales, with 4-items for the past (e.g., “I think about things from my past”), the present (e.g., “I think about where I am today”), and the future (“I think about what my future has in store”). Participants were asked to indicate the extent to which they think about the time frame specified in the item on a 4-point Likert scale, ranging from “never” to “constantly”. An average score was computed for each subscale such that a higher score indicated greater attention towards that particular time frame. Cronbach’s alpha indicated that each subscale was internally reliable in the present sample: Past α = 0.89, present α = 0.75, and future α = 0.86.

*Temporal depth* was measured using the Temporal Depth Index (TDI; Bluedorn, 2002). Participants were presented with six phrases; (1) a long time ago, (2) a middling time ago, (3) recently, (4) a short-term future, (5) a mid-term future, and (6) a long-term future, and were asked to specify how much time they refer to when thinking about each of these phrases. Three of these phrases referred to past temporal depth and three referred to future temporal depth. Each phrase was scored using a Likert scale that includes 15 options of time spans, ranging from “one day” to “more than twenty-five years”. Cronbach’s alpha indicated that each subscale was internally reliable in the present sample: Future temporal depth α = 0.83 and past temporal depth α = 0.75

*Balanced time perspective* was measured using the Balanced Time Perspective Scale (BTPS; Webster, 2011). This is a 28-item measure that contains a past-subscale (14 items; e.g., “Reminiscing about my past gives me a sense of purpose in life”) and a future-subscale (14 items; e.g., “I get excited when I think about the future”). Each item connects the respective time zone, be it the past or the future, to the present (e.g., “Achieving future dreams is something that motivates me now”. Responses were provided on a 6-point Likert scale, anchored by labels of “strongly disagree” to “strongly agree”. Cronbach’s alpha indicated that each subscale was internally reliable in the present sample: Past α = 0.92 and future α = 0.94.

**Implicit measures of time perspective**. Participants were asked to complete two implicit measures of time perspective: (i) a scrambled sentence test and (ii) a series of single category implicit association tests. These tasks were presented to participants as tasks assessing their literacy skills.

*Scrambled Sentence Test.* The scrambled sentence test used in the present study was modelled after Demeyer and Raedt (2014). Participants were presented with twenty sets of six words (e.g., “as / limited / time / I / unlimited / experience”). Participants were asked to rearrange five of the words in each set to create a grammatically correct sentence. Unbeknownst to participants, the sentences could be constructed to reflect either a short-term or long-term time perspective. For example, the words “always / I / rarely / make / ahead / plans” could be interpreted as either “I rarely make plans ahead” (short-term) or “I always make plans ahead” (long-term). Participants were told that they should try to complete as many sentences as they could as quickly as possible. The ratio of sentences indicating a future time perspective over the total number of completed sentences indicated how far participants looked ahead, with higher scores reflecting a more dominant future time perspective.

*Implicit Association Tests.* Participants’ implicit attitudes towards each time frame (i.e., past, present, and future) was measured using three Single Category Implicit Association Tests (SC-IAT, Karpinski & Steinman, 2006), one for each time frame. The SC-IATs were imbedded into the Qualtrics survey using JavaScript. In each time-attitude SC-IAT, participants were asked to categorise words as either ‘good’ (e.g., pleasant, cheerful, delightful) or ‘bad’ (e.g., unpleasant, terrible, painful), along with words related to each time dimension (e.g., ‘yesterday’ and ‘before’ for the past SC-IAT; ‘today’ and ‘now’ for the present SC-IAT; ‘tomorrow’ and ‘later’ for the future SC-IAT). These words were presented in the centre of the computer screen and in lower case letters. On the left and right sides of the screen, the category labels of ‘positive’ and ‘negative’ were permanently displayed. On one half of the trials, the time frame category and the positive category shared a response key and on the other half of the trials, the time frame category and the negative category will share a response key.

Each SC-IAT consisted of two blocks. Each block consisted of 24 practice trials immediately followed by 72 test trials. In the first block, good words and words related to the timeframe were categorised on the ‘a’ key, and bad words were categorised on the ‘l’ key. In the second block, good words were categories on the ‘a’ key, and bad words and words related to the timeframe were categories on the ‘l’ key. There were 21 words used for each evaluative dimension and five words represented the target words for each timeframe (Appendix 4.3). Each stage was preceded by a set of instructions concerning the categorisations and the appropriate key responses.

SC-IAT scores were computed using the *D*-score algorithm proposed by Greenwald, Nosek, & Banaji (2003). First, nonresponses and responses less than 350 milliseconds were removed. Incorrect responses were replaced with each participants’ block mean plus an error penalty of 400 milliseconds. The average response time from the block in which good words and words related to the timeframe were categorised on the same key (e.g., Past + Good) were subtracted from the average response time from the block in which bad words and words related to the timeframe were categorised on the same key (e.g., Past + Bad). This score was then divided by the standard deviation. A higher *D*-score indicated more positive attitudes towards the past, present, or future,

**Goal Properties and Methods of Monitoring Goal Progress**

A new set of measures, devised for this study, were used to assess the properties of participants’ goals, and the methods by which participants assess whether they are making progress towards their goals. Two subscales were also taken from the Goal Perceptions Questionnaire (GPQ; Ingledew, Wray, Markland & Hardy, 2005), namely, the goal commitment and success expectation subscales. These measures are outlined in Table 4.2 (see Appendix 4.4 for the full list of measures). All items were measured on a 5-point Likert scale, anchored by labels of “strongly disagree” to “strongly agree”. Some items were reverse coded so that higher scores indicated higher levels on each of the variable of interest.

**Likelihood of monitoring goal progress***.* A 40-item measure devised by Webb, Benn, & Chang (in prep; Appendix 4.5), was used to assess the extent to which participants monitor their progress across a variety of domains, such as work performance, alcohol consumption, household energy and nutritional information. Example items include, “I seek feedback on how I am performing at work”, “I think about how many units of alcohol I drink”, “I look carefully at my gas and electricity bills”, and “I monitor how many calories I eat”. Items were rated on a 5-point Likert scale ranging from “strongly disagree” to “strongly agree”. Each subscale contains four items, and after recoding appropriate items, scores are averaged to provide a measure of monitoring in each domain.

**Table 4.2.** *Summary of measures used to assess goal properties and methods of monitoring*

|  |  |  |  |
| --- | --- | --- | --- |
| Construct | No. items | Example scales item | α |
| **Goal Properties** | | | |
| Promotion Focus | 2 | “My goal specifies something that I would like to achieve” | .68 |
| Temporal Distance | 6 | “The outcome that I hope to achieve is in the distant future” | .79 |
| Level of abstraction | 6 | “My goal is vague” | .85 |
| Specific deadline | 8 | “My goal has a specific deadline” | .89 |
| Measurability | 11 | “It is hard to know what stage I am at with this goal” | .90 |
| Goal commitment | 4 | “I am really committed to achieving this goal” | .86 |
| Success expectation | 4 | “There is a good chance that I will achieve this goal” | .85 |
| **Methods of Monitoring** | | | |
| **Reference Value** |  |  |  |
| Past | 5 | “I refer to the past to help me to evaluate my progress toward my goal” | .81 |
| Present | 4 | “I evaluate my progress in terms of the here and now” | .53 |
| Future | 4 | “I compare my current progress towards my goal with how I would like it to be in the future” | .75 |
| Others | 4 | “I compare my progress with that of others who hold the same or a similar goal” | .90 |
| **Monitor rate of progress and distance from goal** | | |  |
| Monitor rate of progress | 5 | “I assess how quickly I am making progress towards my goal” | .80 |
| Monitor distance from goal | 6 | “I assess my progress by evaluating how close I am to achieving my goal” | .78 |
| **Focus of Monitoring** | |  |  |
| Monitor behaviour | 6 | “I keep track of how often I perform behaviours related to my goal” | .83 |
| Monitor outcomes | 6 | “I look at the consequences of my behaviours in order to assess my progress towards my goal” | .78 |
| **Level of Abstraction** | |  |  |
| Abstract | 8 | “I assess my progress towards my goal in terms of a feeling, rather than a number” | .76 |
| Concrete | 7 | “I use numbers or specific values to measure my progress towards my goal” | .89 |
| **Passive and active monitoring** | | |  |
| Passive Monitoring | 5 | “I get information about my progress towards my goal without looking for it” | .58 |
| Active Monitoring | 8 | “I always seek information about how well I am doing on my goal” | .81 |
| Feedback | 4 | “Other people tell me how I am doing on my goal” | .91 |
| **Public and private monitoring** | | |  |
| Public Monitoring | 6 | “I tell other people about my progress towards my goal” | .85 |

However, in the present study, an average was taken across subscales to provide a global measure of the extent to which participants monitor their goal progress toward a variety of different goals. Cronbach’s alpha indicated that the full scale was internally reliable in the present sample (α = .85).

**4.3. Results**

**4.3.1 Analytical Strategy**

The aim of the present study was to explore the relationship between time perspective and the likelihood and ways in which participants monitored their progress towards their goals. There were three overarching questions: (i) Is time perspective associated with the characteristics or properties of peoples’ goals? (ii) Is time perspective associated with the likelihood and nature of progress monitoring? (iii) Is the relationship between time perspective and the likelihood and nature of progress monitoring mediated (or explained) by the properties of peoples’ goals? To address these questions, the data was analysed in four stages. First, the demographic and behavioural characteristics of the final sample are described. Second, the discriminant and convergent validity of the measures of time perspective were explored by examining the bivariate correlations between them. Third, using the measures of time perspective that demonstrated discriminant validity in step 2, a series of multiple linear regression analyses were conducted to determine the relationship between measures of time perspective and the nature of elicited goals and the likelihood and ways in which participants monitored their goal progress. These analyses were conducted using SPSS version 23 (IBM Corp, Armonk, New York). Finally, a series of mediation models were conducted using PROCESS (Hayes, 2013) to explored whether the relationship between time perspective and the likelihood and nature of progress monitoring was mediated (or explained) by the properties of peoples’ goals.

**4.3.2 Demographics and Behavioural Characteristics of the Sample**

Five hundred seventy-eight people expressed an initial interest in the study (i.e., clicked on the hyperlink included in the advert). Of these, 524 then completed the online consent form. Given the length of this study (i.e., approximately 45 minutes), a number of participants dropped out at various stages of the survey. The number of participants in each stage of the study is presented in Figure 4.1. A total of 250 people completed the survey. Participants were aged between 18 and 75 (*Mage* = 27.63, *SDage* = 10.62) and were predominantly female (62.4%). Participants were mainly of British origin (58.0%) and were native-English speakers (80.8%). Approximately half of the sample were students (53.2%) and 22% were in full-time employment.

**4.3.3 Convergent and Discriminant Validity of the Time Perspective Constructs**

Before assessing the predictive validity of time perspective and testing the proposed hypotheses, the convergent and discriminant validity of the different time perspective constructs (i.e., time perspective, time orientation, consideration of future consequences, time attitudes, temporal depth, temporal focus, and balanced time perspective) were explored. Specifically, the bivariate correlations among the measures of time perspective were examined in order to identify constructs that were highly correlated. Carlson and Herdman (2012) suggest that correlations greater than *r* = .50 provides evidence for convergence. The intention here was to remove redundant variables from subsequent analyses; that is, variables with high correlations indicating that the variables are measuring the same underlying construct and as such would explain the same-shared variance in subsequent analyses (i.e., multicollinearity). The inter-correlations for the measures of time perspective are displayed in Table 4.3.

**Figure 4.1.** *Flow of participants through the study.*

**Expressed interest in the study**

(i.e., clicked on the survey web link included in the advert)

*N* = 578

**Provided consent**

*N* = 524

**Demographics**

*N* = 415

**Measures of Time Perspective**

Zimbardo Time Perspective Inventory, *N* = 328

Consideration for Future Consequences, *N* = 328

Temporal Orientation Scale, *N* = 330

Time Attitude Scale, *N* = 338

Balanced Time Perspective Scale, *N* = 331

Temporal Focus Scale, *N* = 330

Temporal Depth Index, *N* = 334

**Measures of Goal Properties and Methods of Monitoring**

Goal Properties, *N*s = 296 to 294

Methods of Monitoring, *N*s = 283 to 288

Likelihood of Monitoring, *N* =279

**Implicit Measures of Time Perspective**

Scrambled Sentence Task, N = 259

SC-IATS, N = 185

**Completed** *N* = 250

*Notes.* *N* is lower for SC-IATs due to missing blocks for some participants (perhaps due to issues with JavaScript).

An examination of the correlation matrix revealed a considerable degree of inter-scale correlation. As expected, there were significant correlations between the past-negative and the past-positive sub-scale of ZTPI and the past subscales of the Time Orientation Scale, Temporal Focus Scale, Time Attitude Scale and the Balanced Time Perspective Scale (*rs* > .52, *p* < .01). Similarly, the future subscale of ZTPI correlated significantly with both the Consideration for Future Consequences Scale (*r* = .58, *p* < .001) and the future subscale of the Time Orientation Scale (*r* = .72, *p* < .001). The future subscale of the Balance Time Perspective Scale correlated highly with the remaining future-subscales, that is, the Time Attitude future subscale (*r* = .63, *p* < .001), and the Temporal Focus future subscale (*r* = .58, *p* < .001).

Contrary to our expectations, there was a lack of significant correlations between the present time perspective sub-scales. One exception was a significant positive correlation between the present and future subscales of Time Attitude Scale (*r* = .67, *p* < .001), suggesting that people who have a positive view about their future also have a positive view about their life in the present. Additionally, the Temporal Depth Index failed to correlate above .50 with any other measure. In light of these correlations, the decision was made to retain each subscale from the ZTPI and the future subscale of the BTPS due to their high correlations with both the past and future sub-scales of other time perspective measures and due to their prominence in the literature. Additionally, the TDI was retained as it failed to correlate significant with any other measure suggesting is has unique variance and is measuring a distinct construct. The Time Orientation Scale, Temporal Focus Scale, Time Attitude Scale and Consideration for Future Consequences Scale were therefore eliminated from subsequent analyses.

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**Table 4.3.** *Pearson’s bivariate correlations among the measures of time perspective.*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ZTPI | | | | | CFC | TOS | | | TFS | | | TA | | | TDI | | BTPS | | SC-IAT | | |
|  | PN | PP | PH | PF | F | Tot | Past | Pres | F | Past | Pres | F | Past | Pres | F | Past | F | Past | F | Past | Pres | F |
| ZTPI-PP | -.32\*\* | - |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ZTPI-PH | -.01 | .12\* | - |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ZTPI-PF | .25\*\* | -.04 | .27\*\* | - |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ZTPI-F | .03 | .10 | -.30\*\* | -.37\*\* | - |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CFC | .00 | .07 | -.32\*\* | -.44\*\* | **.58\*\*** | - |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| TOS-Past | **.70\*\*** | .00 | -.02 | .26\*\* | .02 | -.04 | - |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| TOS-Present | -.11 | .04 | .36\*\* | .27\*\* | -.29\*\* | -.43\*\* | -.01 | - |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| TOS-Future | -.03 | .08 | -.19\*\* | -.25\*\* | **.72\*\*** | **.51\*\*** | .02 | -.09 | - |  |  |  |  |  |  |  |  |  |  |  |  |  |
| TFS-Past | **.53** | .09 | -.07 | .13\* | .08 | .09 | **.61\*\*** | -.10 | .02 | - |  |  |  |  |  |  |  |  |  |  |  |  |
| TFS-Present | -.10 | .07 | .30\*\* | .08 | -.05 | -.14\* | -.07 | .44\*\* | .00 | .05 | - |  |  |  |  |  |  |  |  |  |  |  |
| TFS-Future | .05 | .07 | .10 | -.26\*\* | .30\*\* | .39\*\* | .03 | -.26\*\* | .24\*\* | .18\*\* | .16\*\* | - |  |  |  |  |  |  |  |  |  |  |
| TA-Past | **-.52\*\*** | **.70\*\*** | .06 | -.15\*\* | .04 | .07 | -.22\*\* | -.02 | .02 | -.11\* | .07 | .06 | - |  |  |  |  |  |  |  |  |  |
| TA-Present | -.47\*\* | .30\*\* | .26\*\* | -.24\*\* | .00 | .09 | -.38\*\* | .18\*\* | .07 | -.29\*\* | .24\*\* | .13\* | .37\*\* | - |  |  |  |  |  |  |  |  |
| TA-Future | -.37\*\* | .24\*\* | .18\*\* | -.30\*\* | .15\*\* | .22\*\* | -.37\*\* | .01 | .16\*\* | -.27\*\* | .13\* | .30\*\* | .28\*\* | **.67\*\*** | - |  |  |  |  |  |  |  |
| TDI-Past | .04 | .05 | -.09 | -.07 | .04 | .15\*\* | .01 | -.11 | .05 | .10 | -.01 | .01 | .05 | -.01 | -.02 | - |  |  |  |  |  |  |
| TDI-Future | -.03 | .06 | -.14\* | -.12\* | .20\*\* | .24\*\* | .01 | -.16\*\* | .16\*\* | -.03 | -.07 | .11 | .08 | .03 | .09 | .31\*\* | - |  |  |  |  |  |
| BTPS-Past | -.11\* | **.60\*\*** | .10 | -.06 | .25\*\* | .30\*\* | .09 | .04 | .31\*\* | .19\*\* | .11 | .21\*\* | .49\*\* | .28\*\* | .28\*\* | .08 | .07 | - |  |  |  |  |
| BTPS-Future | -.12\* | .19\*\* | .16\*\* | -.36\*\* | .35\*\* | .42\*\* | -.16\*\* | -.15\*\* | .29\*\* | -.06 | .15\*\* | **.58\*\*** | .19\*\* | .40\*\* | **.63\*\*** | .04 | .09 | .42\*\* | - |  |  |  |
| SC-IAT Past | -.20\*\* | .12 | .17\* | -.04 | -.14 | -.17\* | -.11 | .06 | -.21\*\* | -.07 | .09 | .02 | .18\* | .10 | .03 | .02 | -.01 | .03 | .00 | - |  |  |
| SC-IAT Pres | -.02 | -.23\*\* | -.13 | .01 | -.22\*\* | -.14 | -.02 | .13 | -.18\* | -.04 | .06 | -.11 | -.13 | -.07 | -.12 | .06 | -.01 | -.16\* | -.07 | .16\* | - |  |
| SC-IAT Future | -.01 | -.14 | .11 | -.07 | -.04 | .00 | -.06 | -.09 | -.07 | -.10 | .10 | .10 | .01 | .06 | .13 | .01 | .01 | -.06 | .11 | .05 | .03 | - |
| SST | -.35\*\* | .26\*\* | .09 | -.33\*\* | . 24\*\* | .22\*\* | -.26\*\* | .03 | .24\*\* | -.17\*\* | .08 | .31\*\* | .23\*\* | .50\***\*** | .**58\*\*** | .00 | .11 | .25\*\* | **.56\*\*** | .02 | -.04 | .06 |

Note. *N*’s vary from 185 to 338. ZTPI = Zimbardo Time Perspective Inventory; CFC = Consideration of Future Consequences; TOS= Temporal Orientation Scale; TFS = Temporal Focus Scale; TA = Time Attitude; TDI = Temporal Depth Index; BTPS = Balanced Time Perspective Scale; SC-IAT = Single Category Implicit Association Test; SST = Scrambled Sentence Test. PN = Past-Negative; PP = Past-Positive; PH = Present-Hedonistic; PF = Present-Fatalistic; F = Future; Pres = Present

Correlations that provide evidence for convergent validity are in **bold type**.

\*\*p < .01. \* p < .05.

In order to explore the validity of the implicit measures of time attitudes that were devised for this study, the correlations between each SC-IAT and the explicit measures of time perspective were explored. A meta-analysis of the relationship between implicit and explicit attitudes across a range of different domains found a modest relationship between implicit and explicit measures (e.g., *r* = .24; Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005). This suggests that we would expect positive correlations between each SC-IAT (i.e., past, present, and future) and the corresponding dimensions of time perspective on the explicit measures, with the size of these relationships approximately small to medium according to Cohen’s criteria (1992).

As would be expected, the past SC-IAT was positively correlated with the past subscale of the Time Attitude Scale (*r* = 0.18, *p* < .05) and negatively correlated with the past-negative subscale of the ZTPI (*r* = -0.20, *p* < .001), providing initial evidence for the validity of the past SC-IAT. However, no significant correlations were observed between the present and future SC-IATs and the present and future subscales of the explicit measures of time perspective. However, the scrambled sentence test was found to correlated with both the future subscale of the Time Attitudes Scale (*r* = 0.58, *p* < .01) and the future subscale of the BTPS (*r* = 0.56, *p* < .01). Given that there is only limited evidence for the validity of these implicit measures, and in order to avoid reducing the sample size for our main analyses due to missing data on the implicit measures of time perspective, analyses exploring the relationship between time perspective and nature of progress monitoring were conducted using the pre-established self-report measures. However, both implicit and explicit measures of time perspective were used to explore the relationship between time perspective and the likelihood with which participants monitor their goal progress towards a variety of different goals, so that comparisons between implicit and explicit measures could be made, and further tests for the validity of the implicit measures of time perspective could be provided

**4.3.4 Properties of Elicited Goals**

The majority of participants’ goals related to education (e.g., “to get a first in my degree”; 34.6%) or work (e.g., “to find a job”; 16.4%), followed by goals related to health or physical fitness (e.g., “to lose weight”; 14.4%), goals that related to learning, or improving upon, a skill (e.g., “become faster a solving the Rubix’s cube” or “learn a new language”; 9.2%), and goals that related to finances or saving money (e.g., “be financially independent from my parents”; 6.8%). Other goals related to romantic relationships (e.g., “to fall in love”; 5.5%), travel (e.g., “go travelling in America over summer; 4.1%), relationships with friends and family (e.g., “keep in contact with a circle of friends”; 3.1%), emotions and feelings (e.g., “to be happy”; 2.1%), housing/ accommodation (e.g., “find a house to live in next year with my flatmates”; 1.4%), pro-social behaviours (e.g., “get a charity up and running”; 1.4%), and religion (e.g., “reading the Bible daily”; 1.0%).

**4.3.5 Does Time Perspective Predict the Nature of people’s goals?**

A series of multiple linear regressions were conducted to examine whether time perspective predicted the nature of people’s goals in terms of: (i) temporal distance, (ii) level of construal, (iii) regulatory focus, (iv) specificity of the deadline, (v) measurability, (vi) commitment, and (vii) success expectations. For each of these analyses, the measures of time perspective that demonstrated discriminant validity (i.e., the five subscales from the Zimbardo Time Perspective Inventory, the two subscales from the Temporal Depth Index, and the future subscale of the Balanced Time Perspective Scale) were entered as the independent variables. Preliminary tests for each of these regression analyses indicated that the data met the assumption of independent errors and normality, and that multicollinearity was not a concern. The results from these regression analyses are presented in Table 4.4.

**Temporal Distance**. Contrary to our hypothesis, time perspective was not found to explain a significant amount of variance in the temporal distance of participants’ goals, *R2* = .018; *F*(8, 285) = 0.67, *p* = .720, and none of the dimensions of time perspective emerged as significant predictors. This suggests that time perspective is not associated with how far in the future participants’ goals are set.

**Level of Construal.** Time perspective was found to explain a significant amount of variance in the level of construal of participants’ goals, *R*2 = .060; *F*(8, 286) = 2.29, *p* = .021. However, contrary to our hypothesis, the beta weights indicated that the future subscale of the Balanced Time Perspective Scale was negatively associated with goal construal (*β* = -0.15, *p* = .027); indicating that participants with a greater future time perspective were more likely to form goals of a concrete, rather than an abstract, nature.

**Promotion Focus.** Time perspective was found to explain a significant amount of variance in the regulatory focus of participants’ goals, *R*2 = .103; *F*(8, 285) = 4.08, *p* < .001. In line with our hypothesis, participants with a present time perspective (specifically a present-fatalistic time perspective) were less likely to form goals that related to the attainment of a positive outcome (*β* = -0.22, *p* = .002). The findings also indicated that having a greater past temporal depth was positively associated with having goals with a promotion focus (*β* = 0.14, *p* = .022). This suggests that the further back into the past that participants typically consider when thinking about events that have happened is associated with forming goals that seek to attain a positive outcome.

**Table 4.4.** *Summary of multiple regression analyses exploring the relationship between different dimensions of time perspective and the properties of participants’ goals.*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Temporal Distance  (*N* = 294) | | | Level of Construal  (*N* = 295) | | | Promotion Focus  (*N* = 294) | | | Specific Deadline  (*N* = 294) | | | Measurability  (*N* = 293) | | | Commitment  (*N* = 293) | | | Success Expectation (*N*=293) | | |
|  | *β* | *t* | *P* | *β* | *t* | *p* | *β* | *t* | *p* | *β* | *t* | *p* | *β* | *t* | *p* | *β* | *t* | *p* | *β* | *t* | *p* |
| ZTPI-PN | .03 | 0.40 | .687 | .02 | 0.32 | .747 | -.05 | -0.80 | .426 | .00 | 0.01 | .989 | -.09 | -1.40 | .162 | .05 | 0.82 | .413 | -.09 | -1.51 | .131 |
| ZTPI-PP | .03 | 0.45 | .652 | .00 | 0.03 | .980 | .02 | 0.24 | .812 | -.02 | -0.28 | .782 | -.05 | -0.71 | .477 | -.02 | -0.38 | .704 | -.05 | -0.78 | .434 |
| ZTPI-PH | -.02 | -0.33 | .743 | -.05 | -0.82 | .415 | -.04 | -0.60 | .552 | .12 | 1.75 | .082 | .07 | 0.99 | .322 | .07 | 1.22 | .225 | .12 | 1.90 | .058 |
| ZTPI-PF | -.07 | -0.94 | .348 | -.01 | -0.20 | .845 | -.22 | -3.18 | .002 | -.05 | -0.64 | .522 | -.03 | -0.35 | .724 | -.25 | -3.91 | .000 | -.11 | -1.66 | .098 |
| ZTPI-F | -.02 | -0.29 | .776 | -.13 | -1.86 | .064 | .00 | 0.03 | .979 | .17 | 2.49 | .013 | .12 | 1.73 | .084 | .08 | 1.28 | .203 | .01 | 0.21 | .833 |
| TDI-Past | -.01 | -0.23 | .820 | -.01 | -0.14 | .889 | .14 | 2.30 | .022 | -.03 | -0.54 | .589 | .04 | 0.66 | .512 | -.07 | -1.30 | .195 | -.08 | -1.40 | .162 |
| TDI-Future | -.06 | -0.94 | .348 | -.06 | -1.00 | .320 | -.05 | -0.81 | .418 | .06 | 1.03 | .304 | .04 | 0.69 | .488 | .17 | 3.00 | .003 | .20 | 3.29 | .001 |
| BTPS- Future | .09 | 1.29 | .198 | -.15 | -2.23 | .027 | .08 | 1.23 | .221 | .09 | 1.25 | .211 | .12 | 1.73 | .085 | .26 | 4.21 | .000 | .19 | 2.86 | .005 |
| Model | *R2* = .018;  *F*(8, 285) = 0.67,  *p* = .720 | | | *R2* = .060;  *F*(8, 286) = 2.29,  *p* = .021 | | | *R2* = .103;  *F*(8, 285) = 4.08,  *p* < .001 | | | *R2* = .065;  *F*(8, 285) = 2.49,  *p* =.013 | | | *R2* = .058;  *F*(8, 284) = 2.19,  *p* = .028 | | | *R2* = .293;  *F*(8, 284) = 11.17,  *p* < .001 | | | *R2* = .131;  *F*(8, 284) = 5.37,  *p* < .001 | | |

*Notes.* ZTPI = Zimbardo Time Perspective Inventory; PN = Past-Negative; PP = Past-Positive; PH = Present-Hedonistic; PF = Present-Fatalistic; F = Future; TDI = Temporal Depth Index; *β* = standardised beta coefficients; *t* = *t*-test value; *p* = significance.

**Specific Deadline.** Time perspective was found to explain a significant amount of variance in the extent to which participants’ goals specified a specific deadline, *R*2 = .065; *F*(8, 285) = 2.49, *p* = .013. An inspection of the beta weights indicated that a future time perspective (measured using the ZTPI) was positively associated with having goals that have a specific deadline (*β* = 0.17, *p* = .013).

**Measurability.** Time perspective was found to explain a significant amount of variance in the measurability of participants’ goals, *R*2 = .058; *F*(8, 284) = 2.19, *p* = .028. However, an inspection of the individual beta weights revealed that none of the dimensions of time perspective independently predicted goal measurability.

**Goal Commitment.** Time perspective was found to explain a significant amount of variance in the level of commitment that participants had towards their goals, *R*2 = .293; *F*(8, 284) = 11.17, *p* < .001. As predicted, the findings indicated that a future time perspective (measured using the TDI, and the BTPS) was a significant, positive predictor of goal commitment (*β* = 0.17, *p* = .003 and *β* = 0.26, *p* < .001, respectively). This suggests that participants with a greater future time perspective had stronger commitments towards achieving their goals. Furthermore, a present-fatalistic time perspective was negatively associated with goal commitment *(β* = -0.25, *p* < .001), suggesting that participants who believe that life is determined by fate, and that they have little control over future events, are less committed to achieving their goal.

**Success Expectations.** Time perspective was found to explain a significant amount of variance in participants’ expectations for achieving their goal, *R*2 = .131; *F*(8, 284) = 5.37, *p* < .001. The findings indicated that a future time perspective (measured using the TDI and the BTPS) was a significant, positive predictor of participants’ success expectations (*β* = 0.20, *p* = .001 and *β* = 0.19, *p* = .005, respectively). This suggests that participants with a greater future time perspective have stronger beliefs that they will achieve their goals.

**4.3.6 Does Time Perspective Predict the Nature of Progress Monitoring?**

A series of multiple linear regressions were conducted in order to examine whether time perspective predicted the ways in which participants monitored their goal progress in terms of whether: (i) they compare their current state to a past state, future state, or to other people, (ii) they monitor their rate of goal progress or their distance from their goal, (iii) they monitor their behaviour or the outcomes of their behaviour, (iv) they use abstract or concrete information to assess their goal progress, (v) they passively or actively acquire information regarding their goal progress, and (vi) information obtained from monitoring is shared with others or kept private. Again, the measures of time perspective that demonstrated discriminant validity (i.e., the five subscales from the Zimbardo Time Perspective Inventory, the two subscales from the Temporal Depth Index, and the future subscale of the Balanced Time Perspective Scale) were entered as the independent predictors. Preliminary tests for each of these regression analyses indicated that the data met the assumption of independent errors and normality, and that multicollinearity was not a concern.

**Reference Value Used to Monitor.** Time perspective was found to explain a significant amount of variance in whether participants used a reference value in the past, *R*2 = .109; *F*(8, 275) = 4.19, *p* < .001. Inspection of the beta weights (see Table 4.5) demonstrated that a past time perspective, both past-negative and past-positive, was the strongest positive predictor of using a reference value in the past (*β* = 0.23, *p* < .001 and *β* = 0.21, *p* = .002, respectively). Interestingly, a future time perspective (measured using the BTPS) was also found to be a significant predictor of using a reference value in the past (*β* = 0.15, *p* = .030).

Time perspective was also found to explain a significant amount of variance in whether participants used a reference value in the present, *R*2 = .077; *F*(8, 275) = 2.87, *p* = .004. In line with our predictions, a present-time perspective (specifically a present-hedonistic time perspective) was a significant, positive predictor for using a reference value in the present (*β* = 0.19, *p* = .004; see Table 4.5). Additionally, past-negative time perspective, and the future subscale of the temporal depth index were both negative predictors of using a reference value in the present (*β’s* = -0.13, *p’s* < .05).

**Table 4.5.** *Summary of multiple regression analyses exploring the relationship between different dimensions of time perspective and the reference value used during monitoring.*

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Reference Value Used to Monitor | | | | | | | | | | | |
|  | Past  (*N* = 284) | | | Present  (*N* = 284) | | | Future  (*N* = 284) | | | Other  (*N* = 284) | | |
| Predictor | *β* | *t* | *p* | *β* | *t* | *p* | *β* | *t* | *p* | *β* | *t* | *p* |
| ZTPI-PN | .23 | 3.61 | .000 | -.13 | -2.03 | .043 | .17 | 2.74 | .007 | .25 | 3.85 | .000 |
| ZTPI-PP | .20 | 3.11 | .002 | -.12 | -1.85 | .065 | .05 | 0.78 | .437 | .09 | 1.34 | .183 |
| ZTPI-PH | -.05 | -0.74 | .462 | .19 | 2.87 | .004 | .06 | 0.91 | .363 | -.08 | -1.18 | .239 |
| ZTPI-PF | .01 | 0.21 | .837 | .12 | 1.74 | .082 | -.29 | -4.38 | .000 | -.09 | -1.32 | .188 |
| ZTPI-F | .09 | 1.31 | .191 | .11 | 1.52 | .129 | .13 | 1.92 | .056 | .02 | 0.30 | .762 |
| TDI-Past | .01 | 0.09 | .926 | .04 | 0.56 | .577 | -.01 | -0.21 | .838 | -.17 | -2.68 | .008 |
| TDI-Future | -.05 | -0.77 | .440 | -.13 | -2.13 | .034 | .03 | 0.49 | .622 | .04 | 0.62 | .539 |
| BTPI- Future | .15 | 2.18 | .030 | -.04 | -0.54 | .589 | .15 | 2.26 | .025 | .08 | 1.11 | .267 |
| Model | *R2* = .109, *F*(8, 275) = 4.19, *p* < .001 | | | *R2* = .077, *F*(8, 275) = 2.87, *p* = .004 | | | *R2* = .191, *F*(8, 275) = 8.13, *p* < .001 | | | *R2* = .088, *F*(8, 275) = 3.32, *p* = .001 | | |

*Notes.* ZTPI = Zimbardo Time Perspective Inventory; PN = Past-Negative; PP = Past-Positive; PH = Present-Hedonistic; PF = Present-Fatalistic; F = Future; TDI = Temporal Depth Index; *β* = standardised beta coefficients; *t* = *t*-test value; *p* = significance.

Time perspective explained a significant amount of variance in whether participants used a reference value in the future, *R*2 = .191; *F*(8, 275) = 8.13, *p* < .001. Consistent with our hypothesis, a future time perspective (measured using the BTPS) was found to be the strongest, positive predictor of using a reference value in the future (*β* = 0.15, *p* = .025; see Table 4.5). However, there was also a significant, negative relationship between a present-fatalistic time perspective and using a reference value in the future (*β* = -0.29, *p* < .001). This suggests that people who have a greater belief that life is determined by fate, and that they have little control over the future, are less likely to monitor their goal progress in terms of what they still need to achieve.

Finally, time perspective was found to explain a significant amount of variance for whether participants compared their goal progress to the goal progress of others, *R*2 = .088; *F*(8, 275) = 3.32, *p* = .001. Although no specific hypotheses were formed for the nature of this relationship, the findings indicated that there was a significant, positive relationship between a past-negative time perspective and comparing goal progress with others (*β* = 0.25, *p* < .001), and a significant, negative relationship between a past temporal depth and comparing goal progress with others (*β* = -0.17, *p* = .008).

**Monitor Rate of Goal Progress and Distance from the Goal.** Time perspective was found to explain a significant amount of variance in terms of whether participants monitor their rate of goal progress and their distance from the goal, *R2* = .091; *F*(8, 277) = 3.48, *p* = .001 and *R2* = .134; *F*(8, 277) = 5.34, *p* < .001, respectively (see Table 4.6).

**Table 4.6.** *Summary of multiple regression analyses exploring the relationship between different dimensions of time perspective and whether participants monitor their goal progress in terms their rate of progress or distance from the goal.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Rate of Progress  (*N* = 286) | | | Distance from the Goal  (*N* = 286) | | |
| Predictor | *β* | *t* | *p* | *β* | *t* | *p* |
| ZTPI-PN | .22 | 3.45 | .001 | .17 | 2.76 | .006 |
| ZTPI-PP | .04 | 0.65 | .518 | .06 | 0.95 | .345 |
| ZTPI-PH | .01 | 0.10 | .924 | .00 | 0.00 | 1.00 |
| ZTPI-PF | -.09 | -1.31 | .191 | -.13 | -1.86 | .064 |
| ZTPI-F | .12 | 1.72 | .087 | .04 | 0.61 | .542 |
| TDI-Past | .00 | -0.04 | .972 | -.07 | -1.18 | .239 |
| TDI-Future | .05 | 0.80 | .425 | -.01 | -0.22 | .826 |
| BTPS-Future | .09 | 1.38 | .169 | .26 | 3.91 | .000 |
| Model | *R2* = .091;  *F*(8, 277) = 3.48, *p* = .001 | | | *R2* = .134;  *F*(8, 277) = 5.34, *p* < .001 | | |

*Notes.* ZTPI = Zimbardo Time Perspective Inventory; PN = Past-Negative; PP = Past-Positive; PH = Present-Hedonistic; PF = Present-Fatalistic; F = Future; TDI = Temporal Depth Index; *β* = standardised beta coefficients; *t* = *t*-test value; *p* = significance.

As hypothesised, a future time perspective was the strongest, positive predictor of the extent to which participants monitor their goal progress in terms of what they still need to achieve (*β* = 0.26, *p* < .001). Contrary to our hypothesis, a present time perspective was not associated with the extent to which participants monitor their rate of goal progress. Instead, the findings indicated that a past-negative time perspective was a significant, positive predictor of assessing goal progress in terms of the rate of progress (*β* = 0.22, *p* = .001).

**Focus of Progress Monitoring.** Time perspective was found to explain a significant amount of variance in terms of whether participants’ monitor their behaviour(s) and outcome(s) of their behaviour, *R2 =* .112*; F*(8, 277) = 4.35, *p < .*001 and *R2 =* .132*; F*(8, 277) = 5.27, *p < .*001, respectively (see Table 4.7). A future time perspective (measured using the ZTPI and BTPS) was the only significant and positive predictor of the extent to which participants monitored their behaviour(s) and the outcome(s) of their behaviour (*β*’s *=* 0.15 to 0.25, *p*’s < .03).

**Table 4.7.** *Summary of multiple regression analyses exploring the relationship between different dimensions of time perspective and whether participants monitor their behaviour or the outcomes of their behaviour.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Monitor Behaviour  (*N* = 286) | | | Monitor Outcomes  (*N* = 286) | | |
| Predictor | *β* | *t* | *p* | *β* | *t* | *p* |
| ZTPI-PN | .05 | 0.73 | .469 | .13 | 1.97 | .050 |
| ZTPI-PP | .04 | 0.67 | .505 | -.07 | -1.04 | .298 |
| ZTPI-PH | -.06 | -0.87 | .384 | -.04 | -0.59 | .557 |
| ZTPI-PF | .12 | 1.80 | .074 | -.13 | -1.89 | .060 |
| ZTPI-F | .25 | 3.59 | .000 | .16 | 2.42 | .016 |
| TDI-Past | -.10 | -1.64 | .102 | -.06 | -1.07 | .285 |
| TDI-Future | .02 | 0.24 | .811 | .06 | 0.95 | .344 |
| BTPS-Future | .16 | 2.33 | .021 | .15 | 2.24 | .026 |
| Model | *R2* = .112;  *F*(8, 277) = 4.35, *p* < .001 | | | *R2* = .132;  *F*(8, 277) = 5.27, *p* < .001 | | |

*Notes.* ZTPI = Zimbardo Time Perspective Inventory; PN = Past-Negative; PP = Past-Positive; PH = Present-Hedonistic; PF = Present-Fatalistic; F = Future; TDI = Temporal Depth Index; *β* = standardised beta coefficients; *t* = *t*-test value; *p* = significance.

**Concrete and Abstract Monitoring.** Time perspective did not explain a significant amount of variance in whether participants use abstract methods to monitor their goal progress, *R*2 = .045; *F*(8, 273) = 1.60, *p* = .125. However, time perspective did explain a significant amount of variance in the extent to which participants use concrete methods to monitor their goal progress, *R*2 = .083; *F*(8, 273) = 3.10, *p* = .002. The beta weight indicated that a future time perspective (measuring using both the ZTPI and the BTPS) was positively associated with using more concrete methods of monitoring (*β* = 0.14, *p* = .042 and *β* = 0.16, *p* = .025, respectively; Table 4.8).

**Table 4.8.** *Summary of multiple regression analyse exploring the relationship between different dimensions of time perspective and whether participants use concrete or abstract information to assess their progress.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Concrete Monitoring  (*N* = 282) | | | Abstract Monitoring  (*N* = 282) | | |
| Predictor | *β* | *t* | *p* | *β* | *t* | *p* |
| ZTPI-PN | -.08 | -1.21 | .228 | .11 | 1.71 | .088 |
| ZTPI-PP | -.05 | -0.78 | .438 | .08 | 1.18 | .239 |
| ZTPI-PH | .16 | 2.44 | .016 | -.09 | -1.32 | .188 |
| ZTPI-PF | .01 | 0.09 | .928 | .11 | 1.46 | .144 |
| ZTPI-F | .14 | 2.05 | .042 | -.06 | -0.84 | .405 |
| TDI-Past | .03 | 0.50 | .615 | -.08 | -1.23 | .220 |
| TDI-Future | .04 | 0.57 | .572 | -.05 | -0.73 | .465 |
| BTPS-Future | .16 | 2.26 | .025 | .00 | 0.03 | .979 |
| Model | *R2* = .083;  *F*(8, 273) = 3.10, *p* = .002 | | | *R2* = .045;  *F*(8, 273) = 1.60, *p* = .125 | | |

*Notes.* ZTPI = Zimbardo Time Perspective Inventory; PN = Past-Negative; PP = Past-Positive; PH = Present-Hedonistic; PF = Present-Fatalistic; F = Future; TDI = Temporal Depth Index; *β* = standardised beta coefficients; *t* = *t*-test value; *p* = significance.

**Passive and Active Monitoring.** Time perspective did not explain a significant amount of variance in whether participants engage in passive monitoring, *R*2 = .041; *F*(8, 278) = 1.48, *p* = .164. However, time perspective did explain a significant amount of variance in the extent to which participants engage in active monitoring, *R*2 = .198; *F*(8, 278) = 8.60, *p* < .001. Inspection of the beta weights (see Table 4.9) indicated that a future time perspective (measuring using the ZTPI and the BTPS) was positively associated with more active monitoring. Time perspective was also found to explain a significant amount of variance in whether participants monitor their goal progress by obtaining feedback from others, *R*2 = .064; *F*(8, 278) = 2.39, *p* = .017. The beta weights indicated that a present-hedonistic time perspective was a significant and positive predictor of whether participants assessed their goal progress by obtaining feedback from others (*β* = 0.14, *p* = .043).

**Table 4.9.** *Summary of multiple regression analyses exploring the relationship between different dimensions of time perspective and whether participants engage in passive monitoring, active monitoring, or through obtaining feedback from others.*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Passive Monitoring  (*N* = 287) | | | Active Monitoring  (*N* = 287) | | | Feedback  (*N* = 287) | | |
| Predictor | *β* | *t* | *p* | *β* | *t* | *p* | *β* | *t* | *p* |
| ZTPI-PN | .07 | 1.07 | .284 | .18 | 3.00 | .003 | .08 | 1.27 | .206 |
| ZTPI-PP | .09 | 1.32 | .189 | .03 | 0.43 | .667 | .10 | 1.51 | .132 |
| ZTPI-PH | .11 | 1.68 | .093 | .08 | 1.30 | .196 | .14 | 2.03 | .043 |
| ZTPI-PF | -.03 | -0.35 | .723 | -.03 | -0.44 | .658 | -.01 | -0.18 | .861 |
| ZTPI-F | -.09 | -1.29 | .197 | .28 | 4.26 | .000 | .11 | 1.60 | .112 |
| TDI-Past | .01 | 0.16 | .870 | -.01 | -0.19 | .849 | -.09 | -1.45 | .150 |
| TDI-Future | -.03 | -0.52 | .601 | .04 | 0.73 | .468 | .07 | 1.18 | .241 |
| BTPS-Future | .07 | 0.97 | .331 | .21 | 3.23 | .001 | .07 | 0.98 | .328 |
| Model | R2 = .041;  F(8, 278) = 1.48, p = .164 | | | R2 = .198;  F(8, 278) = 8.60, p < .001 | | | R2 = .064;  F(8, 278) = 2.39, p = .017 | | |

*Notes.* ZTPI = Zimbardo Time Perspective Inventory; PN = Past-Negative; PP = Past-Positive; PH = Present-Hedonistic; PF = Present-Fatalistic; F = Future; TDI = Temporal Depth Index; *β* = standardised beta coefficients; *t* = *t*-test value; *p* = significance.

**Public and Private Monitoring.** Time perspective did not explain a significant amount of variance in whether participants engage in public monitoring, *R2* = .040; *F*(8, 278) = 1.45, *p* = .176 (see Table 4.10). However, time perspective did explain a significant amount of variance in the extent to which participants engage in private monitoring, *R2* = .089; *F*(8, 278) = 3.38, *p* = .001. Inspection of the beta-weights (see Table 4.10) indicated that a present-fatalistic time perspective was the only significant, positive predictor of private monitoring (*β* = 0.25, *p* =.001). This finding suggests that people who believe that life is determined by fate, and that they have little control over their future, are less likely to share information about their goal progress. The regression analyses also indicated that a past-positive time perspective was negatively associated with private monitoring (*β* = -0.16, *p* =.010). This suggests that people who have a positive view of their past, are less likely to keep information about their goal progress private.

**Table 4.10.** *Summary of multiple regression analyses exploring the relationship between different dimensions of time perspective and whether participants monitored their progress in terms their rate of progress or distance from the goal.*

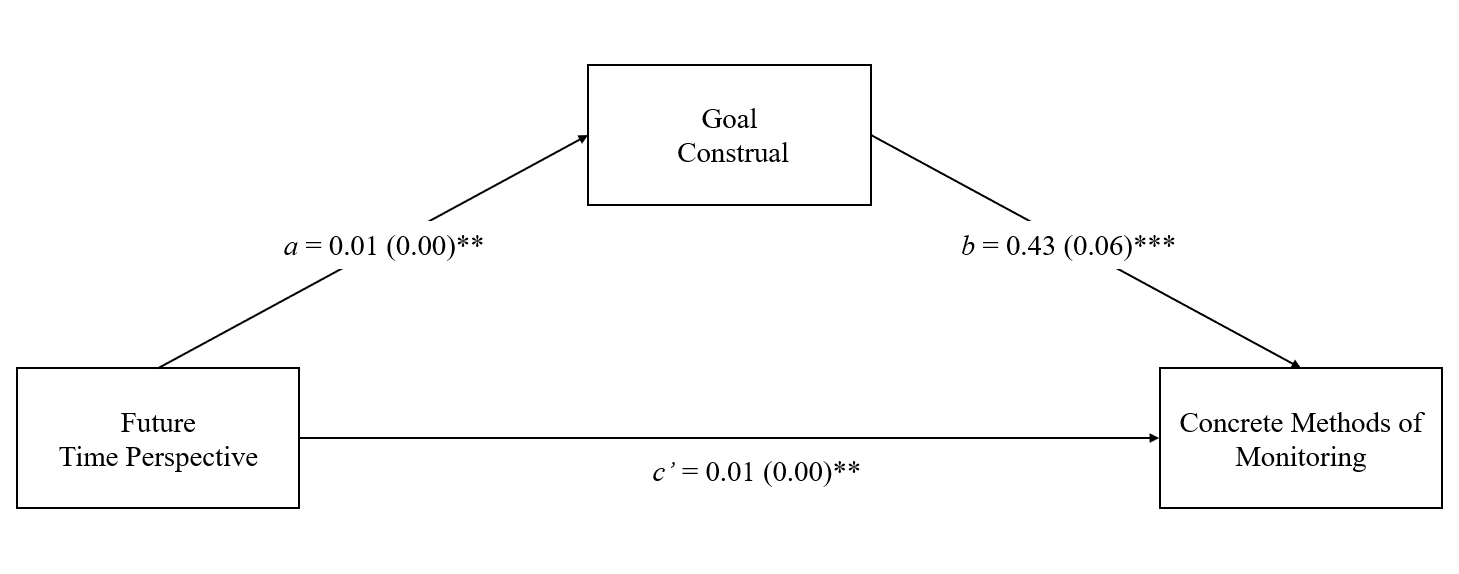
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Private Monitoring  (*N* = 287) | | | Public Monitoring  (*N* = 287) | | |
| Predictor | *β* | *t* | *p* | *β* | *t* | *p* |
| ZTPI-PN | -.02 | -0.35 | .725 | -.01 | -0.11 | .914 |
| ZTPI-PP | -.16 | -2.59 | .010 | .08 | 1.17 | .244 |
| ZTPI-PH | -.03 | -0.48 | .632 | .10 | 1.48 | .141 |
| ZTPI-PF | .25 | 3.49 | .001 | .10 | 1.40 | .164 |
| ZTPI-F | .02 | 0.33 | .744 | .02 | 0.34 | .738 |
| TDI-Past | -.03 | -0.55 | .584 | -.03 | -0.42 | .675 |
| TDI-Future | -.06 | -0.97 | .334 | .05 | 0.78 | .434 |
| BTPS-Future | .02 | 0.26 | .797 | .09 | 1.35 | .179 |
| Model | *R2* = .089;  *F*(8, 278) = 3.38, *p* = .001 | | | *R2* = .040;  *F*(8, 278) = 1.45, *p* = .176 | | |

*Notes.* ZTPI = Zimbardo Time Perspective Inventory; PN = Past-Negative; PP = Past-Positive; PH = Present-Hedonistic; PF = Present-Fatalistic; F = Future; TDI = Temporal Depth Index; *β* = standardised beta coefficients; *t* = *t*-test value; *p* = significance.

**4.3.7 Do the Properties of People’s Goals Mediate the Relationship between Time Perspective and Monitoring of Goal Progress?**

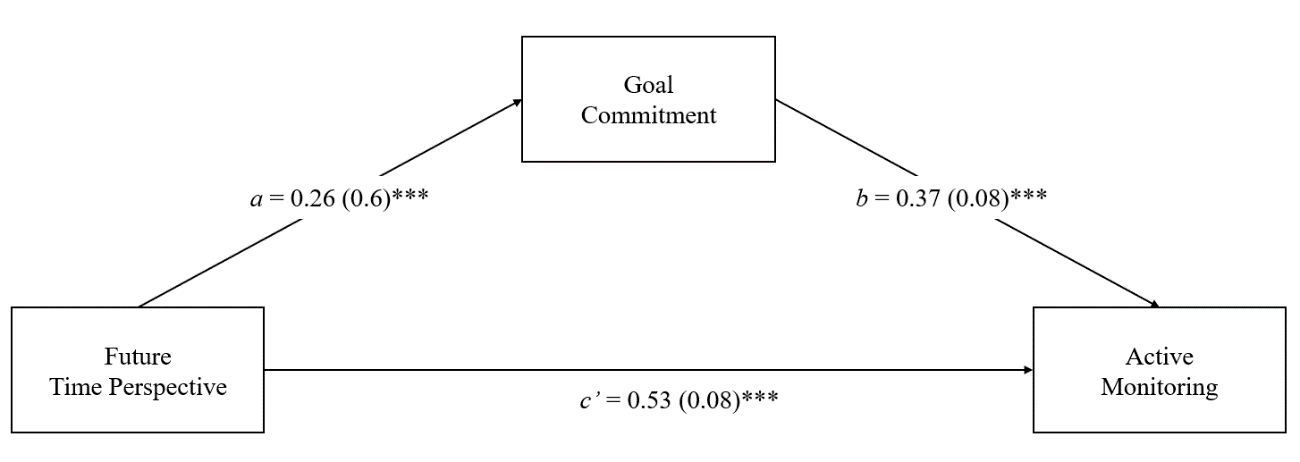
In light of the above regression analyses, a number a mediation models were tested in order to explore whether the properties of participants’ goals mediated the relationship between time perspective and monitoring of goal progress.

First, the regression analyses indicated that participants with a future time perspective were more likely to form goals of a concrete nature and they were more likely to use more concrete methods to monitor their goal progress. Thus, it is possible that a future time perspective is associated with using more concrete methods of monitoring, via the construal level of participants’ goals. As can be seen in Figure 4.2, a future time perspective was associated with goals of a more concrete nature (*a* = 0.01, *p* = .001), and more concrete goals were associated with using concrete methods to monitor goal progress (*b* = 0.43, *p* < .001). There was also a significant indirect effect of a future time perspective on concrete methods of monitoring, via the construal level of participants’ goals (indirect effect = 0.01, *95% CI*: [0.00, 0.01]), demonstrating that participants with a future time perspective are more likely to use concrete methods to monitor their goal progress because they form goals of a more concrete nature.

**Figure 4.2.** *Mediation model of the relationship between a future time perspective and concrete methods of monitoring, via goal construal (N = 282).*

*Notes.* Values represent unstandardized beta coefficients with the standard error (*SE*) shown in parentheses. \* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001.

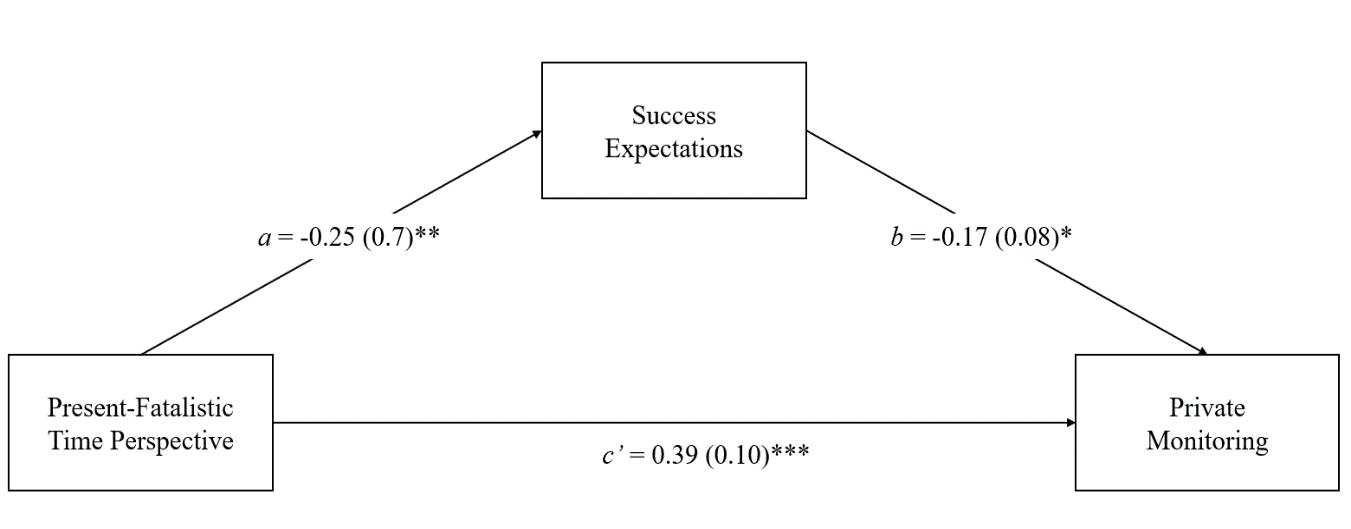
Second, the regression analyses indicated that a future time perspective was positively associated with more active monitoring. A possible reason for this is that people with a greater future time perspective have stronger commitment towards achieving their goal, and as such, are more likely to actively seek out information on how well they are doing. In order to test this hypothesis, a mediation analysis was conducted to explore whether there was an indirect relationship between a future time perspective and active monitoring, via goal commitment. As can be seen in Figure 4.3, a future time perspective was associated with greater goal commitment (*a* = 0.26, *p* < .001), and greater goal commitment was associated with more active monitoring (*b* = 0.37, *p* < .001). There was also a significant indirect effect of a future time perspective on active monitoring, via participants’ commitment to their goal (indirect effect = 0.10, *95% CI*: [0.05, 0.17). Taken together, these findings demonstrate that people with a future time perspective are more likely to seek out information about their goal progress because they have stronger commitments towards achieving their goals.

**Figure 4.3.** *Mediation model of the relationship between a future time perspective and active monitoring, via goal commitment (N = 286).*

*Notes.* Values represent unstandardized beta coefficients with the standard error (*SE*) shown in parentheses. \* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001.

Finally, the regression analyses indicated that a present-fatalistic time perspective was associated with the extent to which participants kept information about their goal progress private. A possible reason for this is because people with a present-fatalistic time perspective are less likely to believe that they will achieve their goal and therefore, do not want to share information about their progress. In order to test this hypothesis, a mediation analysis was conducted to explore whether there was an indirect relationship between a present-fatalistic time perspective and private monitoring, via success expectations.

As can be seen in Figure 4.4, a present-fatalistic time perspective was negatively associated with participants success expectations (*a* = -0.25, *p* = .001), and success expectations were negatively associated with the extent to which participants monitor their goal progress privately (*b* = -0.17, *p* = .023).There was also a significant indirect effect of a present-fatalistic time perspective on private monitoring (indirect effect = 0.04, *95% CI*: [0.01, 0.11). Taken together, these findings support the hypothesis that people with a present-fatalistic time perspective are less likely to share information regarding their goal progress because they are less likely to believe that they will achieve their goal.

****Figure 4.4**. *Mediation model of the relationship between a present-fatalistic time perspective and private monitoring via participants’ success expectations (N = 287)*

*Notes.* Values represent unstandardized beta coefficients with the standard error (*SE*) shown in parentheses. \* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001.

The regression analyses also indicated that a past-positive time perspective was negatively associated with private monitoring (*β* = -0.16, *p* =.010). This suggests that people who have a positive view of their past, are less likely to keep information about their goal progress private. It is possible, that people who have a positive view of their past are less likely to monitor their goal progress in private because they have greater success expectations. Thus, a second mediation analysis (*N* =287) was conducted to explore whether there was an indirect relationship between a past-positive time perspective and private monitoring, via success expectations. However, this analysis revealed that there was not an indirect effect of a past-positive time perspective on private monitoring, via participants success expectations, indirect effect = -0.01, *95% CI*: [-0.05, 0.02].

**4.3.8 Does Time Perspective Predict the Likelihood of Monitoring Goal Progress?**

The final set of analyses explored whether time perspective was associated with the extent to which participants monitor their goal progress towards a variety of different goals. This analysis was first conducted using the explicit measures of time perspective (i.e., the five subscales from the Zimbardo Time Perspective Inventory, the two subscales from the Temporal Depth Index, and the future subscale of the Balanced Time Perspective Scale), followed by the implicit measures of time perspective (i.e., the SC-IATs and scrambled sentence test). The dependent variable was the 40-item measure, devised by Webb, Benn, & Chang (in prep; Appendix 4.5), that assessed the extent to which participants monitor their progress across a variety of domains, such as work performance, alcohol consumption, household energy and nutritional information.

**Explicit measures of time perspective.** Time perspective was found to explain a significant amount of variance in the likelihood with which participants monitor their goal progress towards a variety of different goals, *R*2 = .303, *F*(8, 269) = 14.65, *p* < .001. Inspection of the beta-weights (See Table 4.11) indicated that a future time perspective (measured using the ZTPI) was the strongest, positive predictor of the likelihood with which participants monitor their goal progress towards a variety of different goals (*β* = 0.41, *p* < .001). However, a past-negative time perspective, a past-positive time perspective, and a present-hedonistic time perspective also emerged as significant, positive predictors (see Table 4.11).

|  |  |  |  |
| --- | --- | --- | --- |
|  | Likelihood of Progress Monitoring  (*N* = 278) | | |
| Predictor | *β* | *t* | *p* |
| ZTPI-PN | .17 | 2.93 | .004 |
| ZTPI-PP | .11 | 1.97 | .050 |
| ZTPI-PH | .13 | 2.22 | .027 |
| ZTPI-PF | -.06 | -0.98 | .327 |
| ZTPI-F | .41 | 6.70 | .000 |
| TDI-Past | .01 | 0.25 | .803 |
| TDI-Future | .03 | 0.58 | .565 |
| BTPS-Future | .15 | 2.47 | .014 |
| Model | *R2* = .303;  *F*(8, 269) = 14.65, *p* < .001 | | |

**Table 4.11.** *Summary of multiple regression analysis exploring the relationship between different dimensions of time perspective and the likelihood of monitoring goal progress.*

*Notes.* ZTPI = Zimbardo Time Perspective Inventory; PN = Past-Negative; PP = Past-Positive; PH = Present-Hedonistic; PF = Present-Fatalistic; F = Future; TDI = Temporal Depth Index; *β* = standardised beta coefficients; *t* = *t*-test value; *p* = significance.

**Implicit measures of time perspective.** Implicit measures of time perspective were also found to explain a significant amount of variance in the likelihood with which participants monitor their goal progress towards a variety of different goals, *R*2 = .102, *F*(8, 138) = 3.93, *p* = .005. Inspection of the beta weights indicated that a greater implicit future time perspective is associated with the likelihood with which participants monitor their goal progress towards a variety of different goals (*β* = 0.27, *p* = .001). None of the SC-IATs were found to predict the likelihood with which participants monitor (see Table 4.12).

**Table 4.12.** *Summary of multiple regression analysis exploring the relationship between implicit measures time perspective and the likelihood of monitoring goal progress.*

|  |  |  |  |
| --- | --- | --- | --- |
|  | Likelihood of Progress Monitoring  (*N* = 143) | | |
| Predictor | *β* | *t* | *p* |
| Past SC-IAT | .00 | 0.01 | .995 |
| Present SC-IAT | -.16 | -1.91 | .059 |
| Future SC-IAT | -.05 | -0.58 | .563 |
| Scrambled sentence test | .27 | 3.33 | .001 |
| Model | *R2* = .102;  *F*(8, 138) = 3.93, *p* = .005 | | |

*Notes.* ZTPI = Zimbardo Time Perspective Inventory; PN = Past-Negative; PP = Past-Positive; PH = Present-Hedonistic; PF = Present-Fatalistic; F = Future; TDI = Temporal Depth Index; *β* = standardised beta coefficients; *t* = *t*-test value; *p* = significance.

**4.4 Discussion**

The present study aimed to address three broad questions: (i) Is time perspective associated with the characteristics or properties of peoples’ goals? (ii) Is time perspective associated with the likelihood and nature of progress monitoring? (iii) Is the relationship between time perspective and the likelihood and nature of progress monitoring mediated (or explained) by the properties of peoples’ goals?

First, the present study explored whether time perspective was associated with the properties of participants’ goals. Time perspective was not found to be associated with the temporal distance of participants’ goals nor the extent to which participants’ goals could be easily measured. However, time perspective was found to be associated with the construal level of participants’ goals, the regulatory focus of participants’ goals, the extent to which participants’ goals had a specific deadline, and participants’ goal commitment and success expectations. Specifically, participants’ with a future time perspective were more likely to form goals of a more concrete nature and goals that had a specific deadline. These findings were in contrast to our initial hypotheses which proposed that participants with a future time perspective would be more likely to set goals further into the future, and therefore, would be more abstract in nature (in line with Temporal Construal Theory; Liberman & Trope, 1998). Given that Liberman and Dar (2009) proposed that abstract goals and goals with vague end-states can be difficult to monitor, these findings suggest that having a future time perspective may benefit goal striving as it encourages people to set goals that are more concrete and specific.

A future time perspective was also found to be associated with participants’ commitment to their goal and their success expectations. Specifically, participants with a future time perspective had greater commitment towards achieving their goals and had a greater belief that they would achieve their goals. These findings are consistent with previous research that has found that a future time perspective is associated with stronger goal intentions (e.g., Crockett et al., 2009) and greater self-efficacy (e.g., Zebardat et al, 2011).

Second, the present study explored whether time perspective was associated with the nature of progress monitoring. In line with our initial hypotheses, we found that participants with a past time perspective were more likely to use a reference value in the past, and participants with a future time perspective were more likely to use a reference value in the future. However, interestingly, a future time perspective was also found to be associated with using a reference value in the past. This suggest that people with a future time perspective use a wider variety of information to assess whether they are making progress towards their goals. In support of this conclusion, the present study also found that a future time perspective was the only significant predictor of whether participants monitored both their behaviours and the outcomes of their behaviours. Taken together, these findings suggest that people with a future time perspective are more likely to monitor their goal progress and use various methods in order to do so.

A future time perspective was also found to be associated with the extent to which participants actively sought out information on how well they were progressing towards their goal. A mediation analysis indicated that this was because participants with a future time perspective were more committed towards achieving their goal, and as such, were more likely to seek out information regarding their goal progress. Mediation analyses also indicated that participants with a future time perspective were more likely to use more concrete methods to monitor their goal progress, and this was because they formed goals of a more concrete nature. It is likely that using more concrete methods to monitor goal progress (e.g., using weighing scales to assess weight loss) is more accurate than using more abstract method (e.g., noticing whether clothes feel looser).

In terms of whether participants share information about their goal progress with others, or keep information about their goal progress private, a present-fatalistic time perspective was found to be associated with more private monitoring. Mediation analyses indicated that this was because people with a greater present-fatalistic time perspective, who believe that life is determined by fate and that they have little control over future events, are less likely to believe that they will achieve their goals.

Finally, the present study explored whether differences in people’s time perspective were associated with the likelihood with which participants monitored their goal progress across various life domains (e.g., work performance, alcohol consumption, household energy. and nutritional information). The findings demonstrated that participants with a future time perspective were more likely to engage in monitoring their goal progress towards a variety of different goals. Similarly, an implicit future time perspective was also found to be positively associated with the likelihood with which people monitor. Taken together, these findings largely support the benefits of a future time perspective for monitoring of goal progress. The present study found that participants with a future time perspective were more likely to set goals that were more specific in nature, and participants with a future time perspective were more likely to actively seek information on their goal progress, using a variety of strategies and information in order to do so.

**4.4.1 Strengths and Limitations**

The present research offers new insights into whether and how differences in people’s time perspectives are associated with the likelihood and ways in which they monitor their progress towards their personal goals. Our findings suggest that people with a future time perspective are more likely to monitor their goal progress, and that they are more likely to use a wider variety of strategies and information in order to do so. By allowing participants to nominate their own goal, we were also able to explore how the relationship between time perspective and monitoring of goal progress was mediated by the types of goals that people hold. This was a key advantage of the present study as recruiting participants with a specific goal (e.g., to lose weight), may have hindered variations in the ways in which people could monitor their goal progress. That is, the ways of monitoring goal progress for weight-loss are likely to be different to the ways of monitoring goal progress to other types of goals (e.g., “to be happy”).

In order to test the proposed hypotheses, the present study developed a number of self-report measures for the properties of people’s goals and the nature of progress monitoring. Although, further research is needed on the validity of these measures, our hope is that the present research has provided a set of tools that may enable future research to explore other antecedents and determinants of progress monitoring. Similarly, a number of implicit measures of time perspective were created based on an implicit association test paradigm (Greenwald, Nosek, & Banaji, 2003). Initial evidence was provided for the validity of an implicit measure of people’s attitudes towards their past (i.e., the size of the correlation with explicit measures were similar to those observed in previous research). Unfortunately, no evidence was found for the validity of the implicit measures of people’s attitudes towards their present or their future. However, in light of the success of the implicit measure for past time attitudes, the present study suggests that an implicit measure of time perspective based on an implicit association tests paradigm can be successful. If implicit measures of time perspective can be validated, it may encourage future research on time perspective to also consider the role of people’s implicit time perspectives for goal striving.

However, there are a number of limitations to the present study that warrant discussion. First, the conclusions from this study are based on research that is correlational and cross-sectional. As such, it is unclear whether time perspective influences monitoring of goal progress or vice versa. For example, it is possible that frequently comparing one’s current state to a desired future state may actually promote a future time perspective. Although the present study is not able to speak to this issue, it suggests that future research may want to consider these relationships using longitudinal or experimental designs. A second limitation is that the measures of progress monitoring were based on self-reports. Self-report measures can be influenced by self-presentation and recall biases (Baumeister, 1982), which may lead people to indicate that they monitor more often than they actually do. Thus, future research should explore the influence of time perspective on more objective measures of monitoring goal progress.

**4.1.2 Conclusions**

The present research provides the first empirical test of the relationship between time perspective and monitoring of goal progress. Specifically, the findings demonstrated that individuals with a future time perspective are more likely to monitor their goal progress, and that they are more likely to use a wider variety of strategies and information in order to do so. Given the importance of progress monitoring for promoting goal attainment (Harkin et al., 2016), it is important that research explores factors that influence the extent to which people monitor. The present study has indicated that time perspective can influence both the extent of progress monitoring and the nature of progress monitoring. If time perspective can be manipulated to promote monitoring, it could inform strategies and interventions designed to increase the frequency with which people monitor, and therefore help people to achieve their goals.

**CHAPTER 5**

MANIPULATING TIME PERSPECTIVE TO PROMOTE MONITORING OF GOAL PROGRESS AND GOAL ATTAINMENT

**5.1 Introduction**

Chapter 4 provided evidence for a relationship between time perspective and monitoring of goal progress. Specifically, people with a future time perspective were more likely to monitor their goal progress, and they were more likely to use a wider variety of strategies and information in order to do so. However, a limitation of the evidence presented in Chapter 4 was that it was based on research that was correlational and cross-sectional, leaving open the possibility that monitoring influenced time perspective, rather than vice versa. For example, frequently comparing one’s current standing with respect to future goals may promote a future time perspective. Chapter 5 therefore sought to build on this correlational evidence by manipulating time perspective and examining the effects of doing so on monitoring of goal progress. A further limitation of the research presented in Chapter 4 was the self-report nature of the measures of progress monitoring. Self-report measures can be influenced by self-presentation and recall biases (Baumeister, 1982), which may lead people to indicate that they monitor more often than they actually do. Thus, a second aim of the present research was to obtain a more objective measure of the extent to which people monitored their goal progress. To this end, the present study recruited participants who were currently working towards a health goal, specifically concerning their diet or exercise. The extent to which participants monitored their diet and exercise was objectively assessed by obtaining data on the amount of time that participants spent using the smartphone application, “My Fitness Pal” (https://www.myfitnesspal.com/).

**5.1.1 Techniques for Manipulating Time Perspective**

Although the majority of research on time perspective has been cross-sectional, a number of different techniques have been used to manipulate time perspective. These techniques include lab-based manipulations that aim to temporarily shift people’s time perspective (e.g., Demeyer & De Raedt, 2014; Mogilner, Aaker & Kamvar, 2012; Van Gelder, Hershfield, & Nordgren, 2013), and longitudinal interventions that aim to promote more sustained and long-term changes in people’s time perspective (e.g., Hall & Fong, 2003). Lab-based manipulations have ranged from subtle priming paradigms (e.g., asking participants to unscramble sentences containing either present- or future-related words; Mogilner, Aaker & Kamvar, 2011) to more explicit manipulations (e.g., presenting participants with age-advanced avatars of their own faces; Van Gelder, Hershfield, & Nordgren, 2013). However, perhaps due to convenience, most studies have used mental imagery to manipulate time perspective (e.g., Arnocky, Milfont, & Nicol, 2014; Demeyer & De Raedt, 2014; Rabinovich, Morton & Postmes, 2010). Mental imagery tasks typically involve asking participants to imagine what their circumstances might be like in the future (to promote a future time perspective) or to reflect on their current circumstances (to promote a present time perspective).

Research has shown that time perspective manipulations can produce significant and intended changes on both self-report measures of time perspective (e.g., Hall & Fong, 2003) and implicit measures of time perspective (e.g., Demeyer & De Raedt, 2014). Furthermore, research has indicated that inducing a future time perspective can increase people’s motivations towards pro-environmental behaviours (Arnocky et al., 2014) and decrease the propensity of delinquent behaviour (e.g., cheating on a test; Van Gelder et al., 2013). However, few studies have explored whether it is possible to manipulate time perspective in order to promote health behaviours. This is surprising as a great deal of correlational research on time perspective is conducted within a health domain (Andre, van Vianen, Peetsma, & Oort, 2018), and a series of studies have found evidence that time perspective is significantly associated with a variety of different health behaviours (e.g., Adams & Nettle, 2009; Crockett, Weinman, Hankins, & Marteau, 2009). An important exception is a study conducted by Hall and Fong (2003). Hall and Fong (2003) recruited a sample of university students who had signed up for a fitness class and tested the effectiveness of a brief (three half-hour weekly sessions) time perspective intervention, designed to enhance participants long-term thinking about physical activity (e.g., by asking participants to list the long-term benefits of regularly engaging in physical activity). Before and after the intervention, participants were asked to estimate the number of hours that they had engaged in vigorous and moderate intensity physical activity over the past 30 days. They found that the time perspective intervention significantly increased self-reported physical activity at both a 10-week and 6-month follow-up.

Given the importance of monitoring for promoting goal attainment (Harkin et al., 2016), the present study sought to explore whether it was possible to manipulate time perspective in order to promote the extent to which participants monitored their goal progress. If time perspective can be manipulated to promote monitoring, it could form the basis of interventions designed to promote positive and lasting changes in people’s behaviour. The current study also aimed to expand on previous research by manipulating a past time perspective. To our knowledge, no study to date has included a past time perspective manipulation condition. This is important as a past time perspective has been found to be associated with health protective behaviours (e.g., taking greater responsibility for one’s health; Hamilton et al., 2003) and behaviours that indicate monitoring (e.g., wearing a wristwatch; Zimbardo & Boyd, 1999).

**5.1.2 Using Smartphone Applications to Monitor Goal Progress**

To examine the effects of a time perspective manipulation on monitoring goal progress, data was obtained for the amount of time that participants spent using the smartphone application, “My Fitness Pal” – an application that enables users to monitor their diet (e.g., calorie intake) and exercise levels (e.g., the number of steps walked each day). Smartphone applications (or “apps”) provide a convenient and cost-effective tool to enable people to monitor their goal progress. In 2017, it was estimated that 85% of UK adults owned a smartphone (Global Mobile Consumer Survey, 2017) and there are currently over 3.8 million different smartphone applications (Statista, 2018). Health-related smartphone apps have seen considerable growth over the past few years, with statistics indicating that there are over 105,000 health apps available on Google Play (for Android devices) and over 126,000 health apps available on Apple’s App Store (for iOS devices; Research2Guidance, 2016). These apps typically serve two functions; first, they enable people to collect and record health-related data that can also be shared with healthcare providers, and second, they provide access to health information, such as the nutritional value of certain foods. Several inbuilt features of smartphones support the efficacy of these apps. For example, apps such as “My Fitness Pal” and “Runkeeper” use the phone’s Global Positioning System (GPS) and pedometer to track and record physical activity, and “My Fitness Pal” enables users to take photos of the barcodes on food packaging to easily and quickly upload nutritional information.

A number of empirical studies have provided evidence for the efficacy of smartphone applications for promoting monitoring and subsequent goal attainment (e.g., Carter, Burley, Nykjaer & Cade, 2013; Turner-McGrievy et al., 2013). For example, Carter and colleagues (2013) recruited volunteers who were overweight to investigate the effectiveness of a weight loss intervention that was delivered by either a smartphone app, a website, or a paper diary. The findings indicated that participants in the smartphone app group monitored their diet and physical activity more frequently and lost more weight over a 6-month period than participants in the website and diary groups. These findings were supported by a similar study by Turner-McGrievy and colleagues (2013) who found that participants who were overweight or obese and were provided with a smartphone app that enabled them to monitor their physical activity, had a significantly lower BMI after 6-months than participants who were not provided with a smartphone app. In both of these studies, participants’ weight was objectively measured by calculating their BMI (i.e., weight (kg)/ height (m)2) before and after the intervention period. Taken together, these findings demonstrate the potential benefits of using smartphone apps to promote progress monitoring and goal attainment.

iPhones automatically record the amount of time that people spend using different apps. This information, found under the iPhone’s battery settings, reports in hours and minutes how long different apps have been used for in the past 24 hours and over the past seven days. Thus, the present study sought to capitalise upon this information by exploring whether manipulating time perspective influenced the duration for which participants used a smartphone app designed to monitor their diet and exercise. By doing so, the present study aimed to address some of the limitations identified in Study 1 that arose as a result of using self-report measures of progress monitoring (e.g., self-presentation and recall biases).

**5.1.3 The Present Study**

To investigate whether time perspective has a causal impact on the extent to which people monitor their goal progress, Study 2 adopted an experimental design in which participants’ time perspective was manipulated to promote thinking about their past, present, or future. The study recruited participants who were currently working towards a health goal, specifically concerning their diet or exercise. Over a period of five days, participants received an email each day asking them to imagine and briefly describe events that have occurred (for the past and present manipulation conditions) or may occur (for the future manipulation condition). The extent to which participants monitored their diet and exercise levels was measured using participants’ use of the smartphone application, My Fitness Pal (https://www.myfitnesspal.com/). Data was also obtained for the number of calories that participants consumed each day and the number of steps that they walked each day as an indication of actual goal progress. Specifically, the following hypotheses were tested:

**Hypothesis 1:** Participants in the future time perspective condition will spend more time using the app, My Fitness Pal (indicating more frequent monitoring), than participants in the past and present time perspective conditions.

**Hypothesis 2:** The influence of a future time perspective on calorie intake and steps taken (i.e., goal outcomes) will be mediated by the amount of time that participants used the app, My Fitness Pal.

**5.2 Method**

**5.2.1 Participants and Recruitment**

Participants were students at the University of Sheffield and members of the wider online community. Level 1 Undergraduate Psychology students at the University of Sheffield were recruited through an Online Research Participation System and were provided with three course credits for taking part. Other participants were recruited through social media sites (e.g., Facebook and Twitter) and did not receive any incentives for their participation. To be eligible to take part, individuals needed to be aged 16 or over and have an iPhone. We also asked that participants only took part in the study if they were currently working towards a health goal, specifically with regards to their diet or exercise. A power analysis, conducted using G\*Power (Faul, Erdfelder, Lang, & Buchner, 2007), indicated that 84 participants would be required to detect a medium-sized effect (*f* = 0.35), with power set at 80% and an alpha of .05. This would result in 28 participants in each time perspective manipulation group.

The baseline questionnaire was completed by 135 participants, and of these, 96 participants also completed the follow-up questionnaire (a dropout rate of 28.89%). In order to match participants’ data from the baseline and follow-up questionnaires, while maintaining anonymity, participants were asked to create a unique identification code. Seven participants were excluded as it was not possible to accurately match their baseline and follow-up data (i.e., their unique identification codes did not match). Thus, the final sample comprised 86 participants. Participants were aged between 16 and 48 (*Ma*ge = 22.47; *SD*age = 6.45), 66% were female, and 62% were students. Most participants (72.1%) indicated that they had heard of the app, My Fitness Pal, and 31.4% already had the app installed on their iPhone.

**5.2.2 Design and Procedure**

The study adopted a three (time perspective manipulation: *past* vs. *present* vs. *future*) between-subjects design. Participants were randomly allocated to one of the time perspective conditions using the ‘RAND’ function in Microsoft Excel. The dependent variables were: (i) how much time participants spent monitoring their goal progress using the smartphone app, MyFitnessPal, (ii) the number of calories that they consumed each day, and (iii) the number of steps that they walked each day. The methods and procedures reported in the present study were approved by the University of Sheffield, Department of Psychology Research Ethics Committee (15th November 2017). The data was collected by two students as part of a Level 3 student project that I supervised.

**5.2.3 Measures and Procedure**

Participants were invited by online adverts to participate in a study about their experience of the app, My Fitness Pal. The adverts outlined the inclusion criteria for the study and included a link to a baseline questionnaire administered via Qualtrics (https://www.qualtrics.com/). After reading the information sheet (Appendix 5.1) and completing the online consent form (Appendix 5.2), participants were asked to provide their email address. Participants’ email addresses were required to deliver the time perspective manipulation, but this information was deleted as soon as data collection was complete. Participants then created their own unique identification code. Following this, the study comprised three parts: (i) a baseline questionnaire, (ii) the time perspective manipulation, and (iii) a follow-up questionnaire.

**Baseline Questionnaire**. The baseline questionnaire collected information regarding participants’ age, gender, and employment status. Following this, participants completed measures regarding their health goals and their prior use of the app, My Fitness Pal. Specifically, participants were asked to confirm whether they were currently working towards a health goal, whether they had heard of the app, My Fitness Pal, and if so, whether they currently had the app downloaded on their iPhone (dichotomous responses: yes or no). If participants had the app downloaded on their iPhone, then they were asked to report how often they currently use the app, on a 7-point scale ranging from more than once a day to less than once a month. Alternatively, they could indicate that they do not currently use the app. Participants were then asked to indicate which function of My Fitness Pal they were most interested in using (e.g., recording their calorie intake, exercise levels, or both).

***Manipulation check***. To determine whether the time perspective manipulation successfully promoted thinking about the past, present, or future, participants were asked to complete the Temporal Focus Scale (Shipp, Edwards & Lambert, 2009) at baseline and again at follow-up. The Temporal Focus Scale assesses the extent to which participants devote their attention towards the past, present, and future. It consists of three subscales, with 4-items for the past (e.g., “I think about things from my past”), the present (e.g., “I think about where I am today”), and the future (“I think about what my future has in store”). Participants were asked to indicate the extent to which they think about the time frame specified in the item on a 4-point Likert scale, ranging from “Never” to “Constantly”. An average score was computed for each subscale such that a higher score indicated greater attention towards that particular time frame. The Temporal Focus Scale has demonstrated good internal consistency and has been found to correlate with other existing measures of time perspective in previous studies (e.g., Shipp et al., 2009). In the present sample, Cronbach’s alpha indicated that each subscale was internally reliable at both time points (Past α = 0.75 and 0.81; Present α = 0.68 and 0.78; Future α = 0.79 and 0.86). Finally, participants were provided with instructions on how to download the My Fitness Pal app.

**Time Perspective Manipulation**. Upon completion of the baseline questionnaire, participants were randomly assigned to a time perspective manipulation condition, using the ‘RAND’ function in Excel. Given that mental imagery techniques have proved successful in manipulating time perspective in previous studies (e.g., Arnocky et al, 2014; Demeyer & De Raedt, 2014; Rabinovich et al, 2010), the time perspective manipulation used in the present study was modelled after a mental imagery manipulation developed by Van Gelder and colleagues (2015). Participants received an email each day for five days with a link to a brief Qualtrics survey. Each survey asked participants for their unique identification code followed by a single question asking them to imagine and briefly describe events that have occurred (for the past and present manipulation conditions) or may occur (for the future manipulation condition).

***Future time perspective manipulation***. In the future time perspective condition, the questions were designed to encourage participants to think about their future. For example, “Imagine and briefly describe what you would be doing on a day like today in exactly *one year* from now”. The questions for each of the five days were identical, except the time frame in each question varied such that the quantitative distance into the future increased with each question. That is, the first question referred to one year from now, the second question referred to three years from now, followed by five years from now, ten years from now, and fifteen years from now. Participants were asked to provide a brief description in an open response box.

***Present time perspective manipulation.*** Participants in the present time perspective condition were asked to imagine and briefly describe what they did yesterday (i.e., ““Imagine and briefly describe what you did yesterday”). The questions for each of the five days remained the same throughout the five days (i.e., the time frame always referred to yesterday). Participants were asked to provide a brief description in an open response box.

***Past time perspective manipulation.*** In the past time perspective manipulation condition, the questions were designed to encourage participants to think about their past. For example, “Imagine and briefly describe what you were doing on a day like today exactly *one year* ago”. As with the future time perspective manipulation condition, the questions for each of the five days were identical, except here the time frame in each question varied such that the quantitative distance into the past increased with each question. That is, the first question referred to one year ago, the second question referred to three years ago, followed by five years ago, ten years ago, and fifteen years ago. Participants were asked to provide a brief description in an open response box.

The time perspective manipulations were conducted during the week (i.e., Monday to Friday), as it was thought that participants would be more likely to check their emails during a week day. On the following Monday, participants were emailed a link to the follow-up questionnaire.

**Follow-up Questionnaire**. After providing their unique identification code, participants were asked to access their My Fitness Pal app. First, participants were shown how to access their calorie information (Appendix 5.3). Participants were then asked to input the number of calories that they had recorded consuming over the past seven days, starting with the day of the first time perspective manipulation message (i.e., Monday to Sunday). This data was obtained for seven days to correspond with the data obtained for app usage (which is also reported for seven days). If no information regarding calorie intake was recorded, then participants were asked to leave the field(s) blank. Next, participants were shown how to access their daily steps information (Appendix 5.4). Again, participants were asked to input the number of steps walked for the past seven days. Given that My Fitness Pal automatically records how many steps people take on a daily basis, there should be no missing data. Finally, participants were shown how to find information on the amount of time that they spent using different apps (Appendix 5.5). iPhones provide information regarding app usage for both on-screen activity (i.e., the amount of time that the app is displayed on the screen to the user) and background activity (i.e., the amount of time that the app is running in the background but is not displayed to the user). Participants were asked to locate the My Fitness Pal app and report the amount of on-screen activity for the app. If My Fitness Pal was not listed, participants were asked to tick a box indicating that the app did not feature in their list of used apps. The My Fitness Pal app may not be listed if it had not been used at all over the past seven days, or if it had only been used for a very short amount of time (i.e., < two minutes). Finally, participants completed the Temporal Focus Scale (Shipp et al., 2009) for a second time.

**5.3 Results**

**5.3.1 Analytic Strategy**

The present study aimed to investigate whether time perspective could be manipulated to promote monitoring of goal progress and goal attainment. To address these questions, the data were analysed in four stages. First, attrition analyses were conducted to compare participants who completed the study to those participants who withdrew from the study on key study variables. Second, randomisation and manipulation checks were conducted to ensure that randomisation of participants to the time perspective manipulation conditions was successful, and to determine whether the time perspective manipulations significantly promoted thinking towards the past, present, or future. Third, a series of one-way ANOVAs were conducted to explore the influence of the time perspective manipulation on each of the dependent variables. Although the study specified that participants should currently be working towards a health goal, when asked, only 64 participants (74%) indicated that this was the case. As such, these analyses were conducted on the full sample and for the sub-sample of participants who indicated that they were currently working towards a health goal. The above analyses were conducted using SPSS version 23 (IBM Corp, Armonk, New York). Finally, two mediation models were conducted, using PROCESS (Hayes, 2013), to explore whether the influence of the time perspective manipulation on calorie intake and steps taken was mediated by the extent to which participants monitored their goal progress.

**5.3.2 Attrition Analyses**

Participants who withdrew from the study (i.e., did not complete the follow-up questionnaire) were compared to participants who completed the study on demographics and information regarding their health goals and their prior use of the app, My Fitness Pal. These analyses indicated that there were no differences in age, *t*(127) = -0.21, *p* = .837, *d* = .04, gender, **2(1) = 2.76, *p* = 0.970, Cramer’s V = .15, nor student status, **2(1) = 0.15, *p* = 0.699, Cramer’s V = .03. Similarly, there was no difference between participants who completed the follow-up questionnaire and those who did not in terms of whether they had heard of the app, My Fitness Pal,**2(1) = 2.54, *p* = 0.111, Cramer’s V = .14, whether they currently had the app installed on their iPhone, **2(1) = 0.98, *p* = 0.322, Cramer’s V = .11, nor whether they wanted to use the app to monitor their calorie intake,**2(1) = 0.00, *p* = 1.00, Cramer’s V < .01, or exercise levels,**2(1) = 0.39, *p* = 0.531, Cramer’s V = .05. Similarly, for those participants who already had the My Fitness Pal app installed on their iPhone, there was no difference between completers and non-completers in terms of how often they currently used the app, *t*(39) = -0.02, *p* = .988, *d* < .01. Taken together, these findings suggest that participants who completed the study did not differ significantly from those participants who did not complete the study.

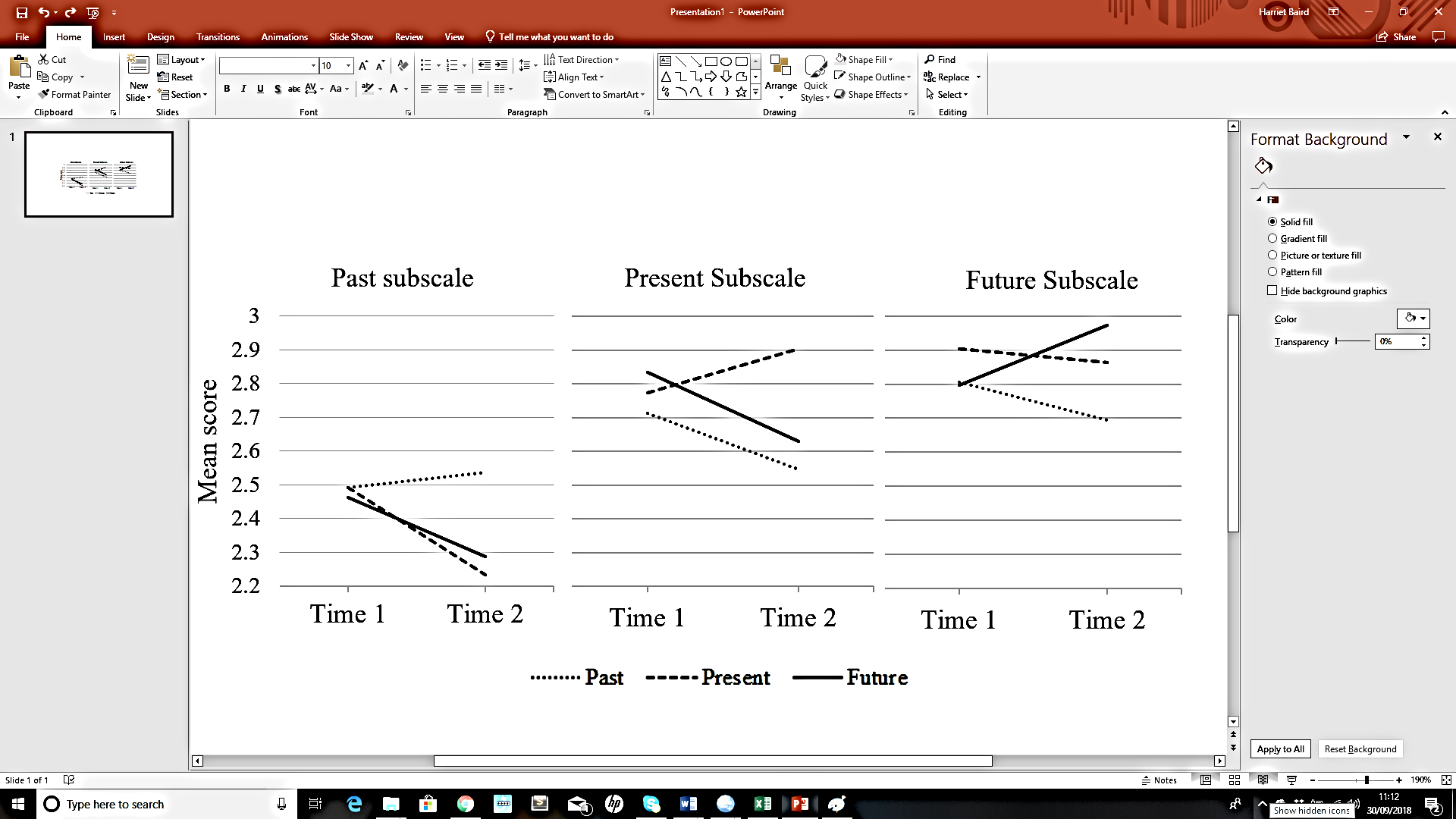
**5.3.3 Randomisation Check**

To ensure that randomisation of participants to the manipulation conditions was successful, a one-way ANOVA (time perspective manipulation: *past vs. present vs. future*) was conducted on the demographic variables and the baseline scores for each subscale of the Temporal Focus Scale. These findings indicated that there were no differences between time perspective manipulation groups on any of the demographics or variables regarding participants’ health goals (*p*’s > .05). Similarly, manipulation groups did not differ in their baseline scores on the past, *F*(2, 85) = 0.02, *p* = .976, η² < .001, present, *F*(2, 85) = 0.41, *p* = .662, η² = .01, or future, *F*(2, 85) = 0.33, *p* = .719, η² = .01, subscales of the Temporal Focus Scale. Thus, randomisation was considered successful.

**5.3.4 Manipulation Check**

To determine whether the time perspective manipulation was successful in promoting thinking towards the past, present, or future, a 3-between (time perspective manipulation: *past* vs*. present* vs*. future*) by 2-within (time point: *pre-manipulation* vs*. post-manipulation*) by 3-within (temporal focus: *past* vs. *present* vs. *future*) mixed ANOVA was conducted. The main effects of time perspective manipulation, *F*(2, 83) = 0.38, *p* = .683, ηp2 = .01 , and time point, *F*(1, 83) = 3.51, *p* = .065, ηp2 = .04, were not significant. There was; however, a significant main effect of temporal focus, *F*(2, 166) = 18.61, *p* < .001, ηp2 = .18, and a significant 3-way interaction between time perspective manipulation, time-point, and temporal focus, *F*(4, 166) = 0.66, *p* = .004, ηp2 = .09. As can be seen in Figure 5.1, participants in the past, present, and future time perspective manipulation groups gave higher scores on the corresponding subscale of the Temporal Focus Scale after the time perspective manipulation.

In order to formally assess whether the manipulation significantly increased thinking towards the past, present, or future, a number of planned contrasts were conducted. These contrasts compared each time perspective manipulation group to the other manipulation groups on the corresponding subscale of the Temporal Focus Scale. For example, the past time perspective manipulation group was compared to the present and future time perspective manipulation groups on the past subscale of the Temporal Focus Scale after the manipulation (weights: past = 2, present = -1, future = -1).

**Figure 5.1.** *Mean scores on each subscale of the Temporal Focus Scale, before and after the time perspective manipulation, according to the time perspective manipulation group*

*Note.* Time 1 = before the time perspective manipulation; Time 2 = after the time perspective manipulation. The mean scores on the time perspective subscales (i.e., the y-axis) could range from 1.0 to 5.0; however, to ease visual impressions of the data, the y-axis in the graph ranges from 2.2 to 3.0. Thus, the size of the different between these means must be interpreted with caution.

For the past and present time perspective manipulation conditions, these contrasts were significant, *t*(83) = 2.19, *p* = .031 and *t*(83) = 2.66 = .009, respectively. These findings indicate that participants in the past manipulation group had significantly higher scores on the past subscale of the Temporal Focus Scale (*M* = 2.56; *SD* = 0.68) after the manipulation in comparison to participants in the present (*M* = 2.23; *SD* = 0.59) and future (*M* = 2.29; *SD* = 0.52) manipulation groups. Similarly, participants in the present manipulation group had significantly higher scores on the present subscale of the Temporal Focus Scale (*M* = 2.90; *SD* = 0.55) after the manipulation in comparison to participants in the past (*M* = 2.54; *SD* = 0.53) and future (*M* = 2.63; *SD* = 0.52) manipulation groups. However, the planned contrast was not significant for the future time perspective manipulation group, *t*(83) = 1.35, *p* = .179, indicating that participants in the future time perspective manipulation group did not have significantly higher scores on the future subscale of the Temporal Focus Scale after the manipulation in comparison to participants in the past and present manipulation groups.

**5.3.5 Did Manipulating Time Perspective Promote Monitoring of Goal Progress?**

To examine whether the time perspective manipulation influenced the amount of time that participants monitored their goal progress, a one-way ANOVA (time perspective manipulation: *past vs. present vs. future*) was conducted with the amount of time that participants spent using the My Fitness Pal app as the dependent variable. However, preliminary analyses indicated that the distribution of the data for app usage demonstrated substantial positive skew (Shapiro-Wilk statistic = 0.69, *p* < .001). An inspection of the histogram indicated that this was because 45 participants could not locate My Fitness Pal on their list of used apps, and, therefore, were assigned a value of zero. Due to the amount of skew, attempts to transform this variable were unsuccessful. As a result, and to prevent floor effects from inducing attenuation in mean estimates, the analysis exploring the influence of time perspective on app usage was only conducted on those participants who had data regarding their use of My Fitness Pal (*N* = 41). This variable also demonstrated positive skew, but the data was successfully transformed using the LOG10 function in SPSS (Shapiro-Wilk statistic = 0.967, *p* = .058). Means and standard deviations for the amount of time (in minutes) that participants used the My Fitness Pal app are reported using the non-transformed data in Table 5.1.

When this analysis was conducted on all participants who had data regarding their use of My Fitness Pal (*N* = 41), there was no effect of the time perspective manipulation on the amount of time that participants used the app, *F*(2, 40) = 0.87, *p* = .426, , η² = .04. However, when the same analysis was conducted on participants who indicated that they were currently working towards a health goal (*N* = 34), the time perspective manipulation had a significant effect on the amount of time that participants used My Fitness Pal, *F*(2, 33) = 4.05, *p* = .027, , η² = .21. Post hoc analyses indicated that participants in the future time perspective manipulation group spent significantly more time using My Fitness Pal (*M* = 131.20; *SD* = 72.98) than participants in the past manipulation group (*M* = 64.00; *SD* = 77.74; *p* =.024). There was no difference in app usage between the present time perspective manipulation group (*M* = 74.31; *SD* = 54.10) and the other manipulation groups (*p* > .05).

**Table 5.1.** *Means and standard deviations for each of the dependent variables according to the time perspective manipulation group*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Time Perspective Manipulation Group | | | | | |
|  |  | Past | | Present | | Future | |
|  | *N* | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| App Usage |  |  |  |  |  |  |  |
| Full sample | 41 | 76.67 | 86.14 | 72.31 | 51.88 | 116.69 | 73.97 |
| Health goal sample | 34 | 64.00 | 77.74 | 74.31 | 54.10 | 131.20 | 72.98 |
| Calorie Intake |  |  |  |  |  |  |  |
| Full sample | 64 | 1,842.25 | 483.23 | 1860.76 | 497.30 | 1987.28 | 473.74 |
| Health Goal sample | 49 | 1,853.33 | 487.04 | 1798.89 | 523.77 | 1863.72 | 484.70 |
| Calorie intake sample | 36 | 1,706.35 | 465.54 | 1814.62 | 439.58 | 2007.05 | 524.46 |
| Step Counts |  |  |  |  |  |  |  |
| Full sample | 70 | 6,157.43 | 2706.66 | 6234.92 | 3596.92 | 7051.59 | 5038.79 |
| Health goal sample | 50 | 5,750.94 | 2479.96 | 6292.13 | 3614.51 | 7155.35 | 4518.40 |
| Step count sample | 39 | 6,356.96 | 2666.14 | 6583.38 | 3323.45 | 7136.07 | 5645.98 |

*Note*. *N* = number of participants; *M* = mean; *SD* = standard deviation; App usage is reported in minutes using the non-transformed means.

**5.3.6 Did Manipulating Time Perspective Influence Calorie Intake?**

To examine whether the time perspective manipulation influenced participants calorie intake, a one-way ANOVA (time perspective manipulation: *past vs. present vs. future*) was conducted using participants’ average calorie intake over the seven days as the dependent variable. These analyses were conducted for three samples: (i) the full sample for which calorie intake data was available (*N* = 64), (ii) the sub-sample who indicated that they were currently working towards a health goal (*N* = 48), and (iii) the sub-sample who indicated that they were interested in monitoring their calorie intake (*N* = 36). Means and standard deviations for calorie intake according to the time perspective manipulation group are reported in Table 5.1. There was no effect of time perspective on calorie intake in any of these analyses: full sample = *F*(2, 61) = 0.55, *p* = 0.580, , η² = .02; sub-sample that reported working towards a health goal = *F*(2, 46) = 0.08, *p* = 0.925, , η² < .01; sub-sample who indicated that they were interested in monitoring their calorie intake = *F*(2, 33) = 1.22, *p* = 0.308, , η² = .07.[[1]](#footnote-1)

**5.3.7 Did Manipulating Time Perspective Influence Step Counts?**

To examine whether the time perspective manipulation influenced participants step counts, a one-way ANOVA (time perspective manipulation: *past vs. present vs. future*) was conducted using participants’ average step count over the seven days as the dependent variable. An analysis of standardised residuals indicated that one participant had an outlying value (i.e., a z-score greater than +/- 3.29 standard deviations from the mean) on the number of steps walked each day. As such, this participant was removed from the analysis. Again, these analyses were conducted for three samples: (i) the full sample for which step count data was available (*N* = 70), (ii) the sub-sample who indicated that they were currently working towards a health goal (*N* = 50), and (iii) the sub-sample who indicated that they were interested in monitoring their step count (*N* = 39). Means and standard deviations for the number of steps taken according to the time perspective manipulation group are reported in Table 5.1.There was no effect of time perspective on step count in any of these analyses: full sample = *F*(2, 67) = 0.38, *p* = 0.684, , η² = .01; sub-sample working towards a health goal = *F*(2, 47) = 0.658, *p* = 0.523, , η² = .03; sub-sample who indicated that they were interest in monitoring their step count= *F*(2, 36) = .12, *p* = 0.885, , η² = .01[[2]](#footnote-2).

**5.3.8 Did Monitoring Goal Progress Mediate the Influence of Time Perspective on Goal Outcomes?**

To examine whether the extent to which participants monitored their goal progress mediated the influence of time perspective on calorie intake and the number of steps taken, two mediation models were conducted using Hayes’ PROCESS (2013). To conduct these mediation models, the time perspective manipulation groups were dummy coded prior to analysis so that participants in the future time perspective manipulation group could be compared to those who were not (i.e., the past and present manipulation groups were combined.) These analyses were conducted using the full sample, so as to not reduce the sample size further due to missing data. The indirect effects were tested using a bootstrap estimation approach with 10,000 resamples. These results indicated that the indirect effect was not significant for calorie intake (*N* =34), indirect effect = -18.20, *95% CI*: [-214.63, 51.88], nor steps taken (*N* = 36), indirect effect = 277.24, *95% CI*: [-220.35, 1897.25]. These findings suggest that monitoring goal progress does not mediate the relationship between a future time perspective and goal outcomes.

**5.4 Discussion**

The present study investigated whether it was possible to manipulate time perspective in order to promote monitoring of goal progress. In support of our hypotheses, we found that increasing a future time perspective increased the amount of time that participants used the app, My Fitness Pal. However, this was only the case for participants who specified that they were currently working towards a health goal, suggesting that a future time perspective influences monitoring, but only if the goal to which people are monitoring is related to their goal intentions. These findings are consistent with previous research that points to the importance of a future time perspective for promoting self-regulation (e.g., Andre et al., 2018; Kooij et al., 2018) and the evidence presented in Chapter 4 (Study 1) that found that a future time perspective was positively associated with the likelihood with which people monitor.

The present study also extends previous investigations. To our knowledge, this study provides the first experimental test of the relationship between time perspective and monitoring of goal progress. Such findings are significant as they point towards the causal nature of these relations. Furthermore, given that previous research has demonstrated the importance of monitoring for promoting goal attainment (Harkin et al., 2016), these findings demonstrate that time perspective can be manipulated to promote monitoring and, as such, could inform strategies and interventions designed to help people to achieve their goals. These findings also suggest that when exploring possible determinants and antecedents of progress monitoring, it is important that the extent to which people monitor is assessed for goals that are salient (Sweeny et al., 2010).

A second aim of the present research was to explore if manipulating time perspective could promote goal attainment, and if monitoring of goal progress mediated this effect. Contrary to our hypotheses, manipulating time perspective was not found to influence the number of calories that participants consumed, nor the number of steps that participants walked, over the course of the study. Furthermore, the amount of time that participants used the app, My Fitness Pal was not found to mediate the influence of a future time perspective on goal attainment. This is perhaps surprising as previous experimental research has found that manipulating a future time perspective has a significant impact on people’s behaviour. For example, Hall and Fong (2003) found that a brief time perspective manipulation, designed to enhance participants long-term thinking about physical activity, found that it significantly increased self-reported physical activity at both a 10-week and 6-month follow-up.

One explanation for why we did not find that manipulating time perspective influenced calorie intake or step count could be because these behaviours were not related to people’s goals. That is, although we recruited participants who were currently working towards a health goal, specifically concerning their diet or exercise, we did not specify that their goals should relate to reducing their calorie intake or increasing their number of daily steps. Furthermore, assessing calorie intake as a goal outcome can be particularly problematic because the number of calories that people consume can be influenced by a range of factors, including people’s goals with respect to eating. For example, while one individual may want to reduce their calorie intake in order to lose weight, another individual may want to increase their calorie intake in order to gain muscle. As such, these differences in the nature of participants’ goals may explain why monitoring of goal progress was not found to be associated with calorie intake or the number of steps taken.

Finally, the present study provides additional support for the effectiveness of mental imagery techniques for manipulating time perspective (Arnocky, Milfont, & Nicol, 2014; Demeyer & De Raedt, 2014; Rabinovich, Morton & Postmes, 2010). However, it is important to note, that while the future time perspective manipulation did increase the extent to which participants focused on the future, it was not significantly different to the other time perspective manipulation conditions. One possibility for this could be because some of the time frames used in the mental imagery task were too far in the future. That is, on the final day of the manipulation, participants in the future time perspective condition were asked to imagine and briefly describe what they would be doing on a day like today 15 years from now. Cheng et al. (2012) found that individuals typically produce future events approximately 3.6 years from the present day (e.g., Addis, Wong, & Schacter, 2007). Thus, one possibility for why there was not a significant increase in scores on the Temporal Focus Scale (Shipp et al., 2009) after the time perspective manipulation, could be because the time frames used in the mental imagery task were too far in the future, thus leading participants to construe their future in abstract terms (e.g., Temporal Construal Theory; Liberman & Trope, 1998; Liberman, Trope & Stephan, 2007; Trope & Liberman, 2003). This may have hindered the effectiveness of the future time perspective manipulation as participants thoughts concerning their future may not have been as vivid.

**5.4.1 Strengths and Limitations**

The present study capitalised upon novel iPhone software that enabled us to objectively explore the amount of time that participants used an app that allowed them to monitor their goal progress. Although this method of measuring progress monitoring had a number of benefits over the self-report measures used in Study 1 (e.g., reducing errors in recall biases) was not without its limitations.

First, the intended aim of this iPhone software is to allow users to look at how different apps influence their phone’s battery life. As such, the accuracy of this data for research purposes is currently unknown. Second, although the amount of time for which participants used the app, My Fitness Pal was objectively recorded, participants then self-reported this information in the follow-up survey. Thus, participants’ responses may still have been influenced by self-presentation biases, which may have led participants to indicate that they used the app more often than they actually did. The same issue applies to participants’ data regarding their calorie intake and daily step count. For example, previous research has indicated that self-reported dietary intake is subject to underreporting and imprecisions, particularly among individuals who are overweight (e.g., Heitmann, 1995; Wehling & Lusher, 2000). To overcome these issues, future research could ask participants to upload “screen-shots” (i.e., an image of what would be visible on their screens) showing this information. Finally, it is likely that app usage is only a proxy measure of progress monitoring. That is, the present study assumed that the longer duration for which participants used the app, My Fitness Pal, indicated more frequent monitoring. However, the amount of time that participants used an app that *allowed* them to monitor their goal progress, does not necessarily indicate that they *were* monitoring their goal progress. For example, participants may have spent time exploring the functions of My Fitness Pal, rather than looking at data regarding their goal progress. Furthermore, there are a number of different ways in which people can monitor their progress towards their diet and exercise goals (e.g., looking at food packaging, or stepping on weighing scales). As such, failing to use the smartphone app did not necessarily mean that participants were not monitoring their goal progress. Taken together, this discussion suggests that future studies should use a range of measures to more accurately reflect people’s monitoring behaviour.

A final limitation of the present study arose as a result of missing data. A power analysis indicated that 84 participants would be required to detect a medium-sized effect. Although 86 participants completed the follow-up, only 61 of these participants indicated that they were currently working towards a health goal, and only 41 participants had usable data regarding their app usage. Thus, it is possible that our analyses failed to detect some potentially significant associations (i.e., there was an increased chance of making a type 11 error).

**5.4.2 Conclusions**

The present research found that increasing the extent to which people think about the future, increased the extent to which they used an app that enabled them to monitor their goal progress towards their diet and exercise goals. However, it is important to note, that while the future time perspective manipulation did increase the extent to which participants focused on the future, it was not significantly different to the other time perspective manipulation conditions. Thus, while this study is one of the experimental tests of the relationship between time perspective and monitoring of goal progress, the findings should be interpreted with caution and replications with larger samples are required to strengthen these findings.

**CHAPTER 6**

TIME PERSPECTIVE AND SELF-MONITORING OF BLOOD GLUCOSE AMONG ADULTS WITH TYPE 1 DIABETES

**6.1 Introduction**

The research presented in this thesis so far has provided evidence for the benefits of a future time perspective for goal striving and monitoring of goal progress. For example, the meta-analytical review presented in Chapter 2 demonstrated that a future time perspective was positively associated with a number of self-regulatory processes and positive goal outcomes, and two empirical studies found that people with a future time perspective were more likely to monitor their goal progress (Study 1), and increasing a future time perspective increased the frequency with which people monitored (Study 2). Taken together, these findings would suggest that interventions designed to promote goal striving and monitoring of goal progress should focus on encouraging a future time perspective.

However, researchers have also argued that focusing on one time perspective, while excluding others, can be detrimental (Boniwell & Zimbardo, 2004). For example, although a future time perspective has been found to be associated with a number of health protective behaviours (e.g., physical activity and healthy eating; Daugherty & Brase, 2010), academic achievement (e.g., Horstmanshof & Zimitat, 2007), and more responsible financial behaviours (Donnelly, Iyer & Howell, 2012), research has also indicated that in situations that require immediate action (e.g., obtaining temporary housing when homeless) a present time perspective is most beneficial (Epel, Bandura, & Zimbardo, 1999). Furthermore, it has been suggested that focusing primarily on the future may hinder a person’s ability to enjoy life in the present (Sobol-Kwapinska, 2009; Sobol-Kwapinska & Jankowski, 2016).

As such, it has been suggested that having a balanced time perspective is most beneficial, where people are able to draw from multiple timeframes and switch flexibly between them in order to meet situational demands (Boniwell & Zimbardo, 2004; Boyd & Zimardo, 2005). Interestingly, however, although differences in a balanced time perspective have been explored frequently in relation to psychological well-being (e.g., happiness and life satisfaction, Zhang, Howell, & Stolarski, 2013; self-esteem and optimism, Sobol-Kwapinska and Jankowski, 2016), little research has explored the relationship between balanced time perspective and specific behaviours. To our knowledge, only two studies have explored the relationship between a balanced time perspective and people’s behaviour. These studies demonstrated that a balanced time perspective was associated with retirement planning in a sample of older adults (i.e., aged 45 to 91 years; Mooney, Earl, Mooney, & Bateman, 2017) and less problematic alcohol use in a sample of adolescents and university students, and in a sample of outpatients being treated primarily for alcohol use (Loose et al., 2018). Furthermore, the review presented in Chapter 2 indicated that a balanced time perspective had a stronger relationship with people’s ability to regulate their behaviour than a future time perspective.

In light of these findings, exploring the relationship between a balanced time perspective and monitoring of goal progress seems a promising line of research. The present study therefore sought to explore the relationship between a balanced time perspective and monitoring of goal progress in a specific sample (namely, people with type 1 diabetes) who share a common goal (to maintain glycaemic control). By doing so, we hoped to address some of the limitations identified in earlier studies.

First, key limitations of both Study 1 and Study 2 were due to the measures that were used to assess progress monitoring. For example, Study 1 used self-report measures which may have been susceptible to self-presentation and recall biases (Baumeister, 1982). Study 2 aimed to improve on Study 1 by using a more objective measure of monitoring, namely, the extent to which participants used the smartphone app, My Fitness Pal. However, it is likely that app usage is only a proxy measure of progress monitoring. That is, it was assumed that the longer duration for which participants used the app indicated more frequent monitoring. However, the amount of time that participants used an app that *allowed* them to monitor their goal progress, does not necessarily indicate that they *were* monitoring their goal progress. Furthermore, although the amount of time that participants used the app was objectively recorded, participants then self-reported this information in the follow-up survey. As such, their responses may still have been influenced by self-presentation biases. In order to address these limitations, the extent to which people with type 1 diabetes monitored their blood glucose was assessed by extracting data from participants’ electronic blood glucose meters.

Second, although Study 2 recruited participants who were working towards a health goal specifically concerning their diet or exercise, the exact nature of participants’ goals was unknown. For example, while one individual may want to reduce their calorie intake in order to lose weight, another individual may want to increase their calorie intake in order to gain muscle. These differences in the nature of participants’ focal goal may explain why monitoring of goal progress was not found to be associated with calorie intake or the number of steps taken. People with type 1 diabetes are required to monitor their blood glucose levels in order to maintain glycaemic control. Maintaining healthy blood glucose levels in people with type 1 diabetes is key to preventing potentially serious and life-threatening complications. Thus, it is likely that people with diabetes will have the goal to maintain glycaemic control. Furthermore, by exploring the relationship between a balanced time perspective and monitoring in a clinical sample, we hope to demonstrate the wider implications of both research on time perspective, and research on monitoring of goal progress. For example, if a balanced time perspective is found to be associated with self-monitoring of blood glucose, it might inform strategies designed to promote self-monitoring of blood glucose and reduce the risk of future health complications.

In light of these limitations, the present study aimed to build on the evidence presented in Chapter 4 and Chapter 5 by exploring the relationship between time perspective and monitoring goal progress in a specific sample (i.e., people with type 1 diabetes) who share a common goal (i.e., to maintain glycaemic control). The present study will also address the limitations associated with using smart-phone applications as a proxy measure for monitoring of goal progress by extracting data from participants’ electronic blood glucose meters, thus providing an objective measure for how often participants monitor. Furthermore, while Study 1 and Study 2 focused on the role of a future time perspective for monitoring goal progress, and in light of previous research suggesting that a balanced time perspective is optimal (e.g., Mooney et el., 2017; Loose et al., 2018), the present study will explore the relationship between a balanced time perspective and the extent to which people monitor their goal progress. Finally, while the research presented in Chapter 4 and Chapter 5 demonstrated the relationship between time perspective and monitoring of goal progress, these studies did not indicate *why* time perspective may be associated with progress monitoring. Thus, a final aim of the present study was to explore possible mediators of the relationship between time perspective and monitoring of goal progress.

**6.1.1 Type 1 Diabetes and Glycaemic Control**

Diabetes Mellitus is a group of metabolic disorders that are characterised by an excess of glucose circulating in the blood stream, known as hyperglycaemia. Type 1 diabetes accounts for approximately 5 to 10% of cases of diabetes (Forouhi et al., 2006) and occurs due to the destruction of insulin-producing cells that impairs the body’s ability to metabolise glucose. Once diagnosed, patients must remain on insulin replacement therapy, most commonly delivered through insulin injections, in order regulate blood glucose levels (American Diabetes Association, 2010). In the short term, poor control of type 1 diabetes can lead to the development of acute complications such as hypoglycaemia (excessively low blood glucose levels caused by taking too much insulin) and diabetic ketoacidosis (high levels of ketones in the blood caused by high blood glucose levels). In the long term, it can lead to microvascular complications (e.g., damage to the eyes, kidneys and nervous system) and macrovascular complications (e.g., heart attack, heart failure and strokes), which can result in serious and life-debilitating consequences such as limb amputation, loss of vision and premature death (Daneman, 2006).

Research has indicated that maintaining glycaemic control can reduce the incidence and progression of these life-debilitating complications (e.g., Reichard, Nilsson, & Rosenqvist, 1993; Wang, Lau, & Chalmers, 1993). Most notably, the Diabetes Control and Complications Trial (DCCT; 1993) found that a 2% reduction in glycated haemoglobin (HbA1c; a measure a long-term glycaemic control) halved the risk of diabetic-related complications. However, maintaining glycaemic control is difficult to achieve through insulin therapy alone. Insulin regimes vary between individuals and must be continuously adjusted according to current lifestyle (e.g., levels of stress, exercise, carbohydrate consumption). Additionally, the effects of insulin injections are notoriously erratic. For example, clinically significant differences in blood glucose can be seen after the same insulin dose due to variations in the absorption rate of insulin into the bloodstream and the metabolic effects induced by the administered insulin (Heinemann, 2008; Richardson & Kerr, 2003).

**6.1.2 Self-Monitoring of Blood Glucose**

Self-monitoring of blood glucose has been identified as a key strategy in maintaining glycaemic control (National Institute for Health and Care Excellence, 2014). Obtaining reliable information about glycaemic variations enables the individual and their healthcare providers to make informed adjustments to their therapeutic regime (e.g., diet, exercise, insulin dosage; Benjamin, 2002). Indeed, numerous studies have shown that frequent monitoring of blood glucose (i.e., three to four times daily) is associated with reductions in glycated haemoglobin (HbA1c; a measure of long-term glycaemic control) and improved health outcomes (e.g., Davidson, Hebblewhite, Bode, Steed, & Steffes, 2004; Evans et al., 1999; Nyomba, Berard, & Murphy, 2003). However, despite clear recommendations and the potential benefits, adherence to blood glucose monitoring is often suboptimal, with studies suggesting that 21% of adults never engage in glucose monitoring (American Diabetes Association, 1994) and 60% monitor less frequently than recommended (Karter, Ferrara, Darbinian, Ackerson, & Selby, 2000). As such, identifying factors that are associated with adherence to glucose monitoring has become a focal point of research (Vincze, Barner, & Lopez, 2003).

Previous research has demonstrated that demographic factors (e.g., older age, male gender, ethnic minority, low socioeconomic status, and lower levels of education) and biomedical factors (e.g., longer time since diabetes diagnosis and less intensive treatment regimens) are associated with less frequent monitoring of blood glucose (Karter et al., 2000; Vincze et al, 2003). However, researchers have recently highlighted the importance of identifying psychological factors (e.g., locus of control and compensatory beliefs; Martinez et al., 2016) that can help to understand self-management behaviours in diabetes, especially as such research could inform health education and interventions designed to promote adherence (Hunter, 2016).

**6.1.3 Importance of a Balanced Time Perspective**

As with many health-protective behaviours, self-monitoring of blood glucose involves a temporal dilemma. That is, the possible benefits of regularly monitoring blood glucose (e.g., lower likelihood of kidney failure, stroke, and heart attack) may not come to fruition for many years, while at the same time monitoring blood glucose may involve short-term costs (e.g., inconvenience, discomfort, difficulty, or fear of a “bad” monitoring result). Thus, it seems likely that time perspective will be associated with the extent to which people monitor their blood glucose. Previous research has focused on the role of a future time perspective for promoting health behaviours, including the health behaviours of people with diabetes. For example, studies have shown that a future time perspective is associated with more adaptive behaviours, such as medication adherence (Sansbury, Dasgupta, Guthrie, & Ward, 2014), weight management behaviours (e.g., eating less fatty foods and engaging in more physical activity; Hall, Fong, & Cheng, 2012), and stronger intentions to attend a diabetes screening appointment (Orbell & Hagger, 2006). However, while having a future time perspective may encourage people to set goals for the future (e.g., to achieve long-term glycaemic control), it would be difficult for an individual to form plans in order to achieve these goals without using information from the past (e.g., past knowledge of how certain foods influence their blood glucose levels) or the present (e.g., information obtained from monitoring their blood glucose). Thus, the present research sought to explore whether individual differences in a balanced time perspective were associated with the frequency with which participants monitored their blood glucose, and thus, achieved long-term glycaemic control.

**6.1.4 Why might a Balanced Time Perspective be associated with Blood Glucose Monitoring?**

There are several reasons to think that differences in the extent to which people have a balanced time perspective may be associated with the frequency with which they monitor their blood glucose levels. First, empirical research has indicated that having a more balanced time perspective is associated with higher levels of positive affect (e.g., the extent to which people tend to feel excited and determined) and lower levels of negative affect (e.g., the extent to which people tend to feel scared and ashamed; Zhang et al., 2013). Therefore, individuals with a more balanced time perspective may associate more positive feelings with monitoring (e.g., monitoring their blood glucose makes them feel relaxed and reassured) and so monitor more frequently as a result. Second, having a more balanced time perspective may be associated with people’s attitudes toward monitoring their blood glucose. Specifically, individuals with a more balanced time perspective may consider monitoring to be more beneficial and worthwhile for their future health (i.e., they have more positive attitudes toward monitoring) and so monitor more frequently as a result. Additionally, given that past research has highlighted that people’s feelings toward a particular behaviour (or the emotions that they associate with performing the behaviour) can influence their subsequent attitudes toward that behaviour (for a review, see Schwarz, 2000), it also seems likely that feelings and attitudes are related, such that positive feelings toward monitoring promote positive attitudes toward monitoring (i.e., these mediators may occur sequentially).

Finally, previous research has demonstrated that having a more balanced time perspective is associated with greater self-control ability (Stolarski, Bitner, & Zimbardo, 2011). Furthermore, greater self-control ability has been found to be associated with better glycaemic control in adolescents with type 1 diabetes (Lansing, Berg, Butner, & Wiebe, 2016). Therefore, there may be an indirect relationship between balanced time perspective and blood glucose monitoring via self-control ability. In light of these considerations, the present research will explore three possible mediators of the relationship between a balanced time perspective and the frequency of blood glucose monitoring: (i) The feelings that people associate with monitoring, (ii) people’s attitudes toward monitoring, and (iii) self-control ability.

**6.1.5 The Present Research**

People with type 1 diabetes need to self-monitor their blood glucose in order to maintain glycaemic control and reduce the risk of future health complications. The present research proposes that differences in people’s time perspective and, specifically, differences in the extent to which people hold a balanced time perspective, may be associated with the frequency with which people with type 1 diabetes monitor their blood glucose, and thus, achieve long-term glycaemic control. A second aim of the present research was to explore potential reasons why balanced time perspective may be associated with self-monitoring. Specifically, the following hypotheses were tested:

**Hypothesis 1:** A more balanced time perspective will be associated with more frequent self-monitoring of blood glucose and, as a consequence, lower HbA1c levels, indicating better long-term glycaemic control.

**Hypothesis 2:** The feelings that people associate with monitoring, their attitudes toward monitoring, and their self-control ability, will mediate the relationship between the extent to which people hold a balanced time perspective and the frequency with which people self-monitor their blood glucose levels.

**6.2 Method**

**6.2.1 Study Setting and Recruitment**

The study was conducted in collaboration with the Adult Diabetes Outpatient Clinics at Sheffield Teaching Hospitals NHS Foundation Trust in the UK. This Trust has two diabetes centres, based at the Royal Hallamshire Hospital and the Northern General Hospital. Potential participants were identified by nurse specialists, clinicians, and research coordinators at these diabetes centres. To be eligible to participate, individuals needed to be aged 18 or over, have had a diagnosis of type 1 diabetes for at least 12 months (as assessed by the date on which they were clinically diagnosed), and have access to an electronic glucose meter to monitor their blood glucose.

Eligible participants were provided with a recruitment pack that contained a letter of invite (Appendix 6.1), an information sheet (Appendix 6.2), a consent form (Appendix 6.3), a questionnaire, and a stamped addressed envelope. This information was either sent to eligible participants via post, or it was given to them when they attended an appointment at the clinic. Participants were able to decide whether they would like to complete a paper copy of the consent form and questionnaire, or whether they would prefer to provide this information online via the survey software, Qualtrics (https://www.qualtrics.com/). Participants who chose to complete a paper copy of the questionnaire were asked to return this, along with their consent form, using the envelope provided. Participants did not receive any incentives for taking part in this research.

Between April 2016 and January 2017, 779 postal questionnaires were distributed. Of those contacted, 165 (21%) agreed to participate. A further 74 participants were approached at the diabetes outpatient clinics and 22 (30%) agreed to take part. Four participants (2%) were removed from the analyses because they did not meet the inclusion criteria (i.e., they did not have a diagnosis of type 1 diabetes), resulting in a final sample of 183 participants.

**6.2.2 Participant Characteristics**

Table 6.1 displays the demographic and biomedical characteristics of the sample. Participants were aged between 18 and 88 years (*M* = 49.95; *SD* = 17.18). Approximately one half of the sample were female (49%) and the majority were White British (97%). An Index of Multiple Deprivation (IMD; Department for Communities and Local Government, 2015) score was calculated using postcode data (http://dclgapps.communities.gov.uk/imd/idmap.html). The English IMD ranks every postcode area in England from the most deprived area (ranked 1) to the least deprived area (ranked 32,844). Due to this wide range, ranks were divided by 1,000 for ease of comprehension. The mean IMD for the present sample was 18.01 (*SD* = 98.00) which is slightly higher than the overall mean rank for England (16.42), suggesting that the sample was, on average, marginally more deprived than the population of England as a whole. Participants were, on average, 21 years post diagnosis at the time that they completed the study (*SD* = 15.99; range: 1 to 73 years). The mean HbA1c level for the sample was 63 mmol/mol (*SD* = 14.71), which is higher than the recommended value (≤ 48 mmol/mol; NICE, 2017), indicating that the sample tended to have difficulties controlling their blood glucose levels. The mean HbA1c level for the current sample was also compared to the mean HbA1c level for other patients with Type 1 diabetes under the care of Sheffield Teaching Hospitals. Research co-ordinators at these diabetes centres identified 1,437 patients who matched our inclusion criteria (i.e., had Type 1 diabetes for longer than 12 months and were aged 18 or over). The average HbA1c level for this patient group was 68.4 mmol/mol, which is slightly higher (*d* = 0.37) than the average HbA1c level for our sample (i.e., 62.99 mmol/mol). Although this suggests that our sample tended to have difficulties controlling their blood glucose, they had slightly better glycaemic control than the average patient under the care of Sheffield Teaching Hospitals.

**Table 6.1.** *Demographic and biomedical characteristics of the sample.*

|  |  |  |  |
| --- | --- | --- | --- |
| Characteristic | *n (missing)* | *%* | *Mean (SD)* |
| Sex | 177 (6) |  |  |
| Male | 87 | 47.5 |  |
| Female | 90 | 49.2 |  |
| Age (years) | 177 (6) |  | 49.95 (17.17) |
| Ethnicity | 182 (1) |  |  |
| White British | 178 | 97.3 |  |
| Non-white | 4 | 2.2 |  |
| Country of birth | 170 (13) |  |  |
| UK | 166 | 90.7 |  |
| Other | 4 | 2.2 |  |
| Education Level | 180 (3) |  |  |
| No formal education | 3 | 1.6 |  |
| Primary education | 7 | 3.8 |  |
| Secondary education | 45 | 24.6 |  |
| College/ sixth form | 48 | 26.2 |  |
| Undergraduate degree | 46 | 25.1 |  |
| Postgraduate degree | 22 | 12.0 |  |
| PhD/ Doctorate | 9 | 4.9 |  |
| Employment Status | 182 (1) |  |  |
| Full-time | 84 | 45.9 |  |
| Part-time | 24 | 13.1 |  |
| Unemployed | 8 | 4.4 |  |
| Student | 8 | 4.4 |  |
| Retired | 43 | 23.5 |  |
| Unable to work | 12 | 6.6 |  |
| Other | 3 | 1.6 |  |
| Index of Multiple Deprivation score | 177 (6) |  | 18.01 (98.00) |
| Attended a DAFNE course | 181 (2) |  |  |
| Yes | 125 | 68.3 |  |
| No | 56 | 30.6 |  |
| Time since diabetes diagnosis (years) | 172 (11) |  | 21.34 (15.99) |
| HbA1c value | 147 (36) |  | 62.99 (14.71) |

**6.2.3 Design and Procedure**

The study employed a cross-sectional design in which participants were asked to complete measures of time perspective, the feelings that they associate with monitoring their blood glucose levels, their attitudes toward monitoring their blood glucose, and their ability to exert self-control. Permission was also obtained for the research team to access participants’ Diasend database and medical records in order to extract information regarding the frequency with which they monitored their blood glucose levels and their long-term glycaemic control (i.e., their HbA1c level). The study was presented to participants as an investigation into the factors that influence blood glucose monitoring and glycaemic control; however, no details were provided on the specific factors of interest or how they might relate to these outcomes.

**6.2.4 Measures**

**Demographics**.The following demographic information was collected from participants: Date of birth, gender, ethnicity, country of birth, postcode, occupation, employment status, and level of education. Participants were also asked to indicate whether they had participated in the Dose Adjustment for Normal Eating (DAFNE) training course. This course is offered to adults with type 1 diabetes across the UK and provides formal training on how to adjust insulin doses according to diet (e.g., carbohydrate intake) and lifestyle (e.g., amount of exercise). The course trains attendees to monitor their blood glucose levels before each meal in order to guide the calculation of their insulin dose.

**Time perspective**. Time perspective was measured using Zimbardo and Boyd’s Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999). This measure contains 56-items that assess five dimensions of time perspective; (i) past-positive (e.g., “It gives me pleasure to think about my past”), (ii) past-negative (e.g., “I often think of what I should have done differently in my life”), (iii) present-fatalistic (e.g., “It doesn’t make sense to worry about the future, since there is nothing I can do about it anyway”), (iv) present-hedonistic (e.g., “I find myself getting swept up in the excitement of the moment”), and (v) future (e.g., “I am able to resist temptations when I know there is work to be done”). Participants are asked to respond to each of the items on a 5-point Likert scale, anchored by ‘very untrue of me’ to ‘very true of me’. Cronbach’s alpha suggested that each subscale was internally reliable: Past-positive (α = .75); past-negative (α = .86), present-fatalistic (α = .72), present-hedonistic (α = .80), and future (α = .80).

In order to measure a balanced time perspective, we first computed the Deviation from a Balanced Time Perspective (DBTP) score (Stolarski, Bitner, & Zimbardo, 2011). The DBTP score is based on the assumption that there is an “optimal” score for each of the ZTPI subscales. How close a participant’s scores are to the optimal scores determines their level of balance. The equation used to calculate a DBTP score is as follows:

Where “*o*” refers to the optimal (or ideal) score for each time perspective subscale, and “*e*” refers to each participant’s empirical score for each time perspective subscale. Optimal scores were derived from Zimbardo & Boyd’s online cross-cultural database (http://www.thetimeparadox.com/surveys/)[[3]](#footnote-3). According to this database, the optimal scores are as follows: Past-negative = 2.10; Past-positive = 3.67; Present-fatalistic = 1.67; Present-hedonistic = 4.33; Future = 3.69. In order to computer a DBTP score, each participants’ empirical score (‘*e’)* is first subtracted from the optimal score (‘*o’)*. These scores are then squared to eliminate negative values and the square root of the sum of squares is applied in order to maximize the possibility of obtaining a normal distribution (Ferguson and Takane, 1989). Typically higher scores indicate greater deviation from a balanced time perspective; however, to ease interpretations of the research findings in the present study, this measure was reverse-scored so that higher scores indicated a more balanced time perspective.

**Affect associated with self-monitoring blood glucose**. How participants typically feel when they self-monitor their blood glucose was measured using the stem “Monitoring my blood glucose makes me feel…”, followed by 8 items: Guilty, bad about myself, good about myself, relaxed, disappointed, at ease, anxious, and reassured. These items were devised for the purpose of this study and were informed by the literature and attendance at a DAFNE training course. Items were rated on a 5-point Likert scale ranging from ‘strongly disagree’ to ‘strongly agree’. Negative items were reverse coded so that higher scores indicated that participants associated monitoring with more positive affect (α = .86).

**Attitudes toward self-monitoring blood glucose***.* Participants’ attitudes toward monitoring were measured with the stem “I think that monitoring my blood glucose every time that I am supposed to is…” followed by six bipolar adjectives rated on a 5-point scale: ‘Important – unimportant’, ‘easy – difficult’, ‘harmful – beneficial’, ‘worthwhile – pointless’, ‘unpleasant – pleasant’, and ‘wise – foolish’. After reverse coding negative items, the items were averaged such that higher scores indicated that participants held more positive attitudes toward self-monitoring their blood glucose levels (α = .77).

**Self-control***.* Trait self-control was assessed using the 13-item Brief Self-Control Scale (BSCS; Tangney, Baumeister, & Boone, 2004). Previous studies have demonstrated that the BSCS is a valid measure of self-control (Tangney et al., 2004) and it has been found to be associated with glycaemic control in individuals with type 1 diabetes (Lansing et al., 2016). Example items include: “I am good at resisting temptation” and “I often act without thinking through all the alternatives”. Items were rated on a 5-point Likert scale, anchored by ‘not at all’ to ‘very much’. After reverse scoring negative items, items were averaged such that higher scores reflected greater levels of trait self-control (α = .77).

Clinical Outcomes

**Biomedical information**.The following information was collected from participants’ medical records:Time since diabetes diagnosis, name of consultant in charge of care, and current insulin regime (e.g., frequency of injections, insulin types, and doses).

**Frequency of blood glucose monitoring***.* The frequency with which participants monitored their blood glucose was measured using Diasend® software (https://diasend.com//en). Diasend is a system for recording information from electronic blood glucose meters, including the value, date, and time of each measurement. This information is uploaded by patients or their healthcare providers to a secure online database. To account for any effects of participation in the research on the frequency with which participants monitored their blood glucose, this data was extracted for three separate weeks: (i) the week prior to when participants completed the questionnaire (or nearest available date), (ii) the week when participants completed the questionnaire, and (iii) the week after the questionnaire was completed (or nearest available date). A one-way repeated measures ANOVA was conducted to test whether there were differences in the frequency with which participants monitored their blood glucose between these weeks. Mauchly’s test of sphericity indicated that the assumption of sphericity had been violated (*χ2* (2) = 9.31, *p* = .010), and therefore the degrees of freedom were corrected using the Huynh-Feldt estimate of sphericity (ε = .90). There were no differences in the frequency with which participants monitored their blood glucose according to the week that the data was extracted, *F*(1.81, 117.44) = 1.68, *p* = .193; Time 1: *M* = 28.55, *SD* = 12.99; Time 2: *M* = 29.71, *SD* = 13.70; Time 3: *M* = 28.35, *SD* = 13.55. This confirms that participating in the study did not influence the frequency with which participants monitored their blood glucose. If no data was available within a year of the date required, then the data was recorded as missing. The number of times that participants monitored their blood glucose in each of these weeks (where available) was averaged to provide an objective measure of the frequency with which participants self-monitored their blood glucose during the study period.

Participants also reported how often they monitored their blood glucose each week using a single item: “On average, how many times a week do you monitor your blood glucose?” If participants provided a range (e.g., 25 to 30), then the median value was recorded. There was a high correlation between the data extracted from the Diasend software and the self-reported frequency with which participants monitored their blood glucose (*r* = .75; see Table 3). As such, to reduce missing data in these variables (*Nmissing* = 45 and 5 for the objective and self-report measures, respectively) and to ensure sufficient power for subsequent analyses, a composite measure was created. That is, when data was available for both of these measures, an average was taken, otherwise scores were based on either the objective or self-reported data depending on which was available.

**Long-term glycaemic control***.* Medical records were reviewed to extract participants’ most recent HbA1c level. HbA1c is a measure of glycosylated haemoglobin that reflects overall blood glucose levels over the previous 6 to 8 weeks (Kilpatrick, 2000). Previous research has demonstrated a strong relationship between high levels of HbA1c and complications (DCCT, 1993) and, as such, HbA1c is considered to be the ‘gold standard’ measure of long-term glycaemic control (American Diabetes Association, 2010). HbA1c levels are measured in mmol/mol, with levels exceeding 48 mmol/mol reflecting difficulties controlling blood glucose levels (NICE, 2017). The HbA1c reading that most closely corresponded to the date that the participant completed the questionnaire was extracted from participants’ medical records. If a participants’ HbA1c level had not been tested within a year of the date that the questionnaire was completed, then it was recorded as missing.

**6.3 Results**

**6.3.1 Analytic Strategy**

The aim of the present research was to investigate whether individual differences in a balanced time perspective are associated with the frequency with which people with type 1 diabetes monitor their blood glucose levels and, as a result, maintain glycaemic control. To address these questions, the data was analysed in three stages. First, the relationships between the demographic factors (e.g., age, gender, ethnicity) and biomedical factors (e.g., time since diagnosis) and the outcome variables (i.e., frequency of self-monitoring of blood glucose and HbA1c levels) were explored using correlations, *t*-tests, and ANOVAs as appropriate. When significant relationships between these factors and the outcome variables were found, the relevant factors were controlled for in subsequent analyses. Second, hierarchical regression analyses were conducted, with balanced time perspective as the independent variable (entered in Step 2) and the frequency of blood glucose monitoring or HbA1c level as the dependent variables, controlling for any covariates identified in the first step of the analyses (entered in Step 1). These analyses were conducted using SPSS version 23 (IBM Corp, Armonk, New York). Finally, a series of mediation models were conducted using PROCESS (Hayes, 2013). These models explored (i) whether the relationship between balanced time perspective and long-term glycaemic control was mediated by the frequency with which participants monitored their blood glucose and (ii) whether the relationship between balanced time perspective and self-monitoring of blood glucose was mediated by the feelings that participants’ associated with monitoring, their attitudes towards monitoring, and/or their self-control ability. In all of the mediation models, the indirect effect was tested using a bootstrap estimation approach with 10,000 resamples. Confidence intervals excluding zero were considered statistically significant at the *p* < 0.05 level. All of the analyses used the composite measure of the frequency with which participants monitored their blood glucose to reduce missing data and increase the statistical power of these analyses. Additional analyses were also conducted to explore the relationship between the individual dimensions of time perspective and the outcome variables (i.e., frequency of self-monitoring of blood glucose and HbA1c levels), to permit comparison with earlier studies presented in this thesis and previous studies that have focused on these variables (Appendix 6.4).

**6.3.2 Preliminary analyses**

Preliminary analyses were conducted to establish whether the data met the statistical assumptions for the analyses outlined above. These analyses revealed the presence of outliers. Specifically, an analysis of standardised residuals indicated that four participants had outlying values (i.e., z-scores greater than +/- 3.29 standard deviations from the mean) on the measure of the frequency of self-monitoring of blood glucose and one participant had an outlying HbA1c value. As such, these participants were removed from subsequent analyses involving these variables. The means, standard deviations, and range for the key study variables (excluding the outliers identified above) are presented in Table 6.2.

**Table 6.2**. *Means, standard deviations, and range for key study variables.*

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Sample Size *(N)* | Mean *(SD)* | Range |
| Balanced time perspective | 164 | 2.80 (0.66) | 3.98 |
| Affect associated with monitoring | 175 | 3.55 (0.82) | 4.00 |
| Attitudes towards monitoring | 174 | 4.22 (0.59) | 3.67 |
| Self-control | 178 | 3.23 (0.60) | 3.15 |
| Self-reported SMBG frequency | 173 | 30.01 (13.91) | 74.00 |
| Objective SMBG frequency | 136 | 27.85 (13.53) | 72.00 |
| Combined SMBG frequency | 177 | 28.61 (13.00) | 73.00 |
| HbA1c level | 142 | 62.94 (13.62) | 82.00 |

*Notes.* SMBG = Self-monitoring of blood glucose, HbA1c = glycated haemoglobin. Outliers have been excluded.

**6.3.3 Identification of covariates**

We measured a number of demographic and biomedical factors that have previously been found to be associated with the frequency with which people monitor their blood glucose levels. However, to avoid reducing the statistical power of our main analyses, our decision as to which of the covariates to include in our analyses was determined by identifying the demographic and biomedical factors that have significant relationships with the outcome variables in the current sample*.* The correlations between the study variables are presented in Table 6.3. Neither age, time since diabetes diagnosis, nor index of multiple deprivation scores were significantly associated with the frequency with which participants self-monitored their blood glucose or HbA1c levels (*p*s > .05). Thus, these factors were not controlled for in later analyses. Independent t-tests indicated that gender was not significantly associated with either the frequency of blood glucose monitoring or HbA1c values (*p’s* > .05). However, there was a significant difference in the frequency of monitoring blood glucose between participants who had attended a DAFNE course and those who had not, *t*(174) = -3.49, *p* = .001. As might be expected, participants who had attended a DAFNE course tended to monitor their blood glucose levels more frequently (*M* = 30.91; *SD* = 12.70) than those who had not attended (*M* = 23.75; *SD* = 12.21). Thus, whether participants had attended a DAFNE course was controlled for in analyses exploring the relationship between time perspective and the frequency with which participants monitored their blood glucose levels. There was no difference in HbA1c levels as a function of DAFNE attendance, *t*(46.24) = -0.10, *p* = .925, and so DAFNE attendance was not controlled in the analyses focusing on HbA1c levels.

Two one-way ANOVAs were conducted to examine whether participants’ level of education or employment status influenced the outcome variables. Given that some levels of these variables contained just a small number of participants (e.g., only 3 participants reported having no formal education, see Table 1), some of the groups were combined in order to reduce unequal group sizes and to ensure that post hoc tests could be conducted if required. Specifically, for level of education, the lowest two levels (i.e., ‘no formal education’ and ‘primary education’) were combined, as were the upper two levels (i.e., ‘postgraduate degree’ and ‘PhD/ doctorate’). For employment status, the groups ‘unemployed’ and ‘unable to work’ were combined, and the group ‘other’, which only contained three observations, was excluded. The analyses indicated that there were no differences in HbA1c levels according to level of education or employment status (*p’s* > .05). Similarly, there was no difference in the frequency with which participants self-monitored their blood glucose levels according to employment status, *F*(4,151) = 1.78, *p* = .136. There was, however, a significant difference in the frequency with which participants monitored their blood glucose according to their level of education, *F*(4, 151) = 3.42, *p* = .010. Post hoc tests revealed that participants who had completed secondary education (i.e., up to GCSE level) monitored their blood glucose more frequently (*M* = 33.15, *SE* = 2.19) than those who had completed college/ sixth form (i.e., up to A-level; *M* = 24.37, *SE* = 2.16, *p* = .038). Thus, level of education was controlled for in analyses exploring the relationship between balanced time perspective and the frequency with which participants monitored their blood glucose. As the sample in this study were predominantly White British (97.3%) and from the UK (90.7%), differences in ethnicity and country of birth could not be explored. Finally, given that our sample was recruited using two different methods (i.e., via postal questionnaires or approached in clinic) independent t-tests and chi-squared tests were conducted to explore whether the demographics, biomedical factors, or the outcome measures varied according to how participants were recruited. These analyses revealed that none of the variables differed according to how the sample was recruited (*p*s > .05), and therefore, the method of recruitment was not considered further.

**6.3.4 Is a balanced time perspective associated with (i) the frequency of blood glucose monitoring and (ii) long-term glycaemic control?**

The correlation between balanced time perspective and the frequency of blood glucose monitoring was small and not statistically significant (*r* = 0.14; *p* = .066); as was the correlation between balanced time perspective and HbA1c levels (*r* = -0.08; *p* = .365; see Table 3). However, given that our earlier analyses indicated that whether participants had attended a DAFNE course and their level of education were significantly associated with the frequency with which they monitored their blood glucose, further tests of these relationships were conducted as planned, using hierarchical regression and mediation analyses. These analyses provide a better estimate of the relationship between balanced time perspective and the frequency with which people with Type 1 diabetes monitor their blood glucose and HbA1c levels as they enable us to control for these confounding factors.

**Table 6.3.** *Descriptive statistics and Pearson’s bivariate correlations between study variables.*

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables |  | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. |
| 1. Age | | .07 | .44\*\* | -.02 | .29\*\* | .28\*\* | .35\*\* | .06 | -.05 | .05 | -.13 |
| *N* | | 172 | 167 | 159 | 169 | 169 | 172 | 167 | 136 | 171 | 142 |
| 2. Index of multiple deprivation | | | .04 | .12 | -.02 | .06 | .09 | .03 | -.00 | .04 | -.14 |
| *N* | | | 167 | 159 | 169 | 169 | 172 | 167 | 136 | 171 | 142 |
| 3. Time since diagnosis (in years) | | |  | -.08 | .18\* | .07 | .04 | .13 | .14 | .13 | .01 |
| *N* | | |  | 157 | 165 | 164 | 167 | 162 | 134 | 166 | 142 |
| 4. Balanced Time Perspective | | | |  | .26\*\* | .18\* | .13 | .15 | .19\* | .14 | -.08 |
| *N* | | | |  | 162 | 162 | 164 | 160 | 126 | 164 | 132 |
| 5. Affect associated with monitoring | | |  |  |  | .53\*\* | .34\*\* | .25\*\* | .20\* | .24\*\* | -.37\*\* |
| *N* | | |  |  |  | 171 | 175 | 170 | 134 | 174 | 141 |
| 6. Attitudes towards monitoring | | |  |  |  |  | .29\*\* | .35\*\* | .16 | .31\*\* | -.20\* |
| *N* | | |  |  |  |  | 174 | 170 | 134 | 174 | 139 |
| 7. Self-control ability | | |  |  |  |  |  | .08\*\* | .01 | .07 | -.31\*\* |
| *N* | | |  |  |  |  |  | 173 | 136 | 177 | 142 |
| 8. Self-reported SMBG frequency | | |  |  |  |  |  |  | .75\*\* | .95\*\* | -.18\* |
| *N* | | |  |  |  |  |  |  | 132 | 173 | 137 |
| 9. Objective SMBG frequency | | |  |  |  |  |  |  |  | .93\*\* | -.15 |
| *N* | | |  |  |  |  |  |  |  | 136 | 122 |
| 10. Combined SMBG frequency | | |  |  |  |  |  |  |  |  | -.20\* |
| *N* | | |  |  |  |  |  |  |  |  | 141 |
| 11. HbA1c value | | |  |  |  |  |  |  |  |  | - |

*Notes.* ZTPI = Zimbardo Time Perspective Inventory, SMBG = Self-monitoring of blood glucose, HbA1c = glycated haemoglobin.

*N* = sample size for each correlation.

\* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001

**Frequency of self-monitoring blood glucose levels.** Participants’ level of education and whether they had attended a DAFNE course were entered into Step 1 of a hierarchical regression and explained 8% of the variance in the frequency with which participants monitored their blood glucose levels (*R2* = .08, adj.*R2* = .07, *F*(2, 159) = 6.66, *p* = .002). Inspection of the beta weights revealed that, while attendance on a DAFNE course was a significant predictor (*β* = 0.28, *p* < .001), level of education was not (*β* = -0.07, *p* = .391). The addition of the variable representing a balanced time perspective in Step 2 led to a significant increase in the variance explained in the frequency with which participants self-monitored their blood glucose levels (*R*2change = .03, *F*change(1, 158) = 4.97, *p* = .027). The beta weight indicated that balanced time perspective was positively associated with monitoring (*β* = 0.18, *p* = .027). This suggests that the more balanced a participant’s time perspective, the more frequently they monitored their blood glucose levels. In the final model, the variables explained 11% of the variance in the frequency with which participants self-monitored their blood glucose levels, *F*(3, 158) = 6.21, *p* = .001, with DAFNE course attendance and a balanced time perspective both emerging as significant, independent predictors.

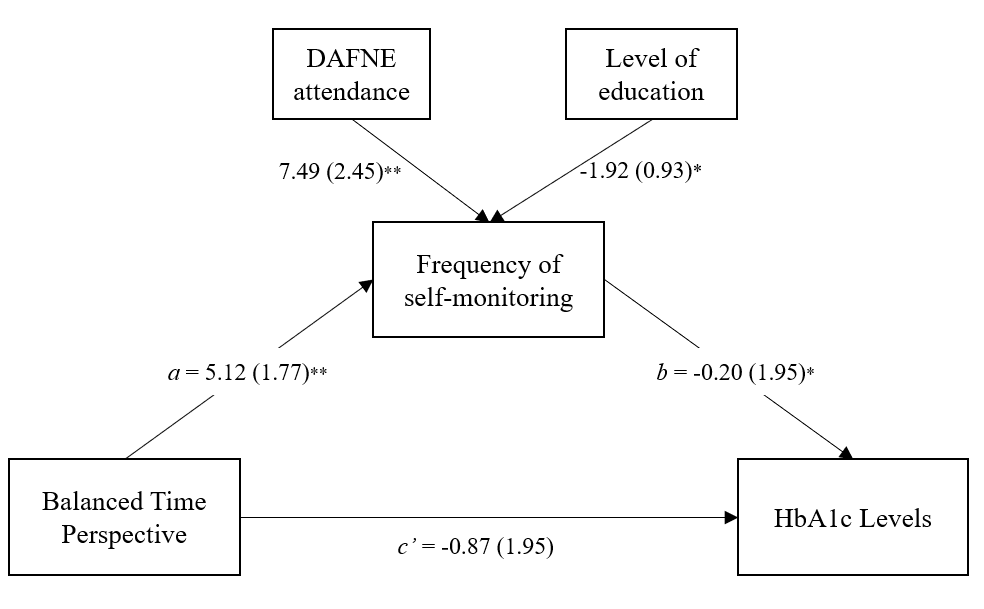
**Long-term glycaemic control**. In order to explore whether a balanced time perspective predicted long-term glycaemic control, a second regression analysis was conducted with participants’ HbA1c levels as the dependent variable and balanced time perspective as the independent variable. We did not control for DAFNE course attendance or level of education, as our initial analyses suggested that these factors were not associated with HbA1c levels. This regression analysis indicated that a balanced time perspective was not a significant, direct predictor of participants’ long-term glycaemic control, *F*(1, 134) = 1.01, *p* = .317, *β* = -0.09, *p* = .317.

**6.3.5 Does self-monitoring of blood glucose mediate the relationship between balanced time perspective and long-term glycaemic control?**

A mediation analysis was conducted to explore whether there was an indirect relationship between balanced time perspective and HbA1c levels, via the frequency with which participants monitored their blood glucose. As before, we controlled for whether participants had attended a DAFNE course and their level of education. As can be seen in Figure 6.1, a balanced time perspective was positively associated with the frequency with which participants monitored their blood glucose (*a* = 5.119, *p* = .004), and more frequent monitoring was negatively associated with HbA1c levels (*b* = -0.204, *p* = .034), indicating that more frequent monitoring led to better glycaemic control. There was also a significant indirect effect of balanced time perspective on HbA1c levels via the frequency of blood glucose monitoring (indirect effect = -1.045, *95% CI*: [-2.696, -0.018]). Taken together, these findings suggest that participants with a more balanced time perspective monitored their blood glucose more frequently, which resulted in lower (and therefore healthier) HbA1c levels. In support of the regression analysis, there was not a direct relationship between balanced time perspective and HbA1c levels (*c’* = -0.870, *p* = .657).

**6.3.6 Which factors mediate the relationship between a balanced time perspective and the frequency of blood glucose monitoring?**

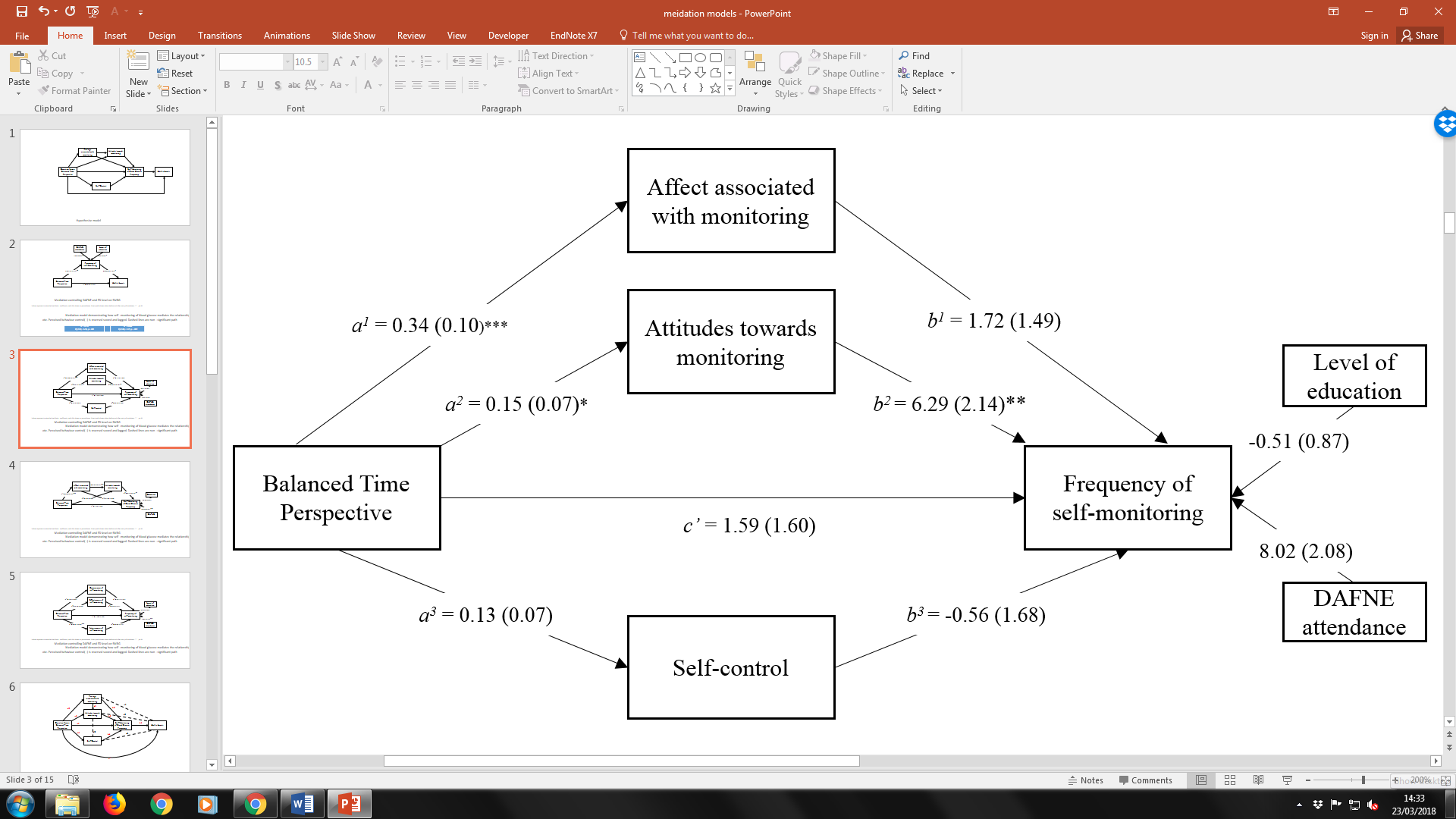
The final set of analyses explored whether the relationship between a balanced time perspective and the frequency with which participants monitored their blood glucose was explained by the feelings that they associate with monitoring, their attitudes towards monitoring, and / or their self-control ability. Two different predictions can be made regarding the ordering of these variables.

****Figure 6.1.** *Mediation model of the relationship between a balanced time perspective and long-term glycaemic control (i.e., HbA1c levels) via the frequency with which participants self-monitor their blood glucose levels (N = 129).*

*Notes.* As recommended by Hayes (2013), values represent unstandardized beta coefficients with the standard error (*SE*) shown in parentheses. \* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001.

On the one hand, it is possible that these variables mediate the relationship independently (i.e., parallel mediation). On the other hand, it is possible that the feelings that participants associate with monitoring are related to their attitudes towards monitoring that, in turn, influence the frequency with which they monitor their blood glucose (i.e., serial mediation). In order to test these predictions, two mediation models were tested: (i) A parallel mediation model (containing all of the potential mediators), and (ii) a serial mediation model (containing feelings and attitudes associated with monitoring in series).

The findings from the parallel mediation model are presented in Figure 6.2. Balanced time perspective was significantly related to the feelings that participants associated with monitoring their blood glucose levels (*a1* = 0.343, *p* < .001) and their attitudes towards monitoring (*a2* = 0.152, *p* = .021), but not participants’ self-control ability (*a3* = 0.133, *p* = 0.067). The only significant predictor of the frequency with which participants monitored their blood glucose levels was their attitudes towards monitoring (*b2* = 6.293, *p* = .004). However, tests of the indirect effects indicated that none of these factors independently mediated the relationship between balanced time perspective and the frequency with which participants monitored their blood glucose levels (see Table 6.4). The direct effect was also not significant (*c’* = 1.594, *p* = .321).

**Figure 6.2.** *Parallel mediation model of the relationship between a balanced time perspective and the frequency of blood glucose monitoring via the feelings that participants associate with monitoring, their attitudes towards monitoring, and self-control ability (N = 158).*

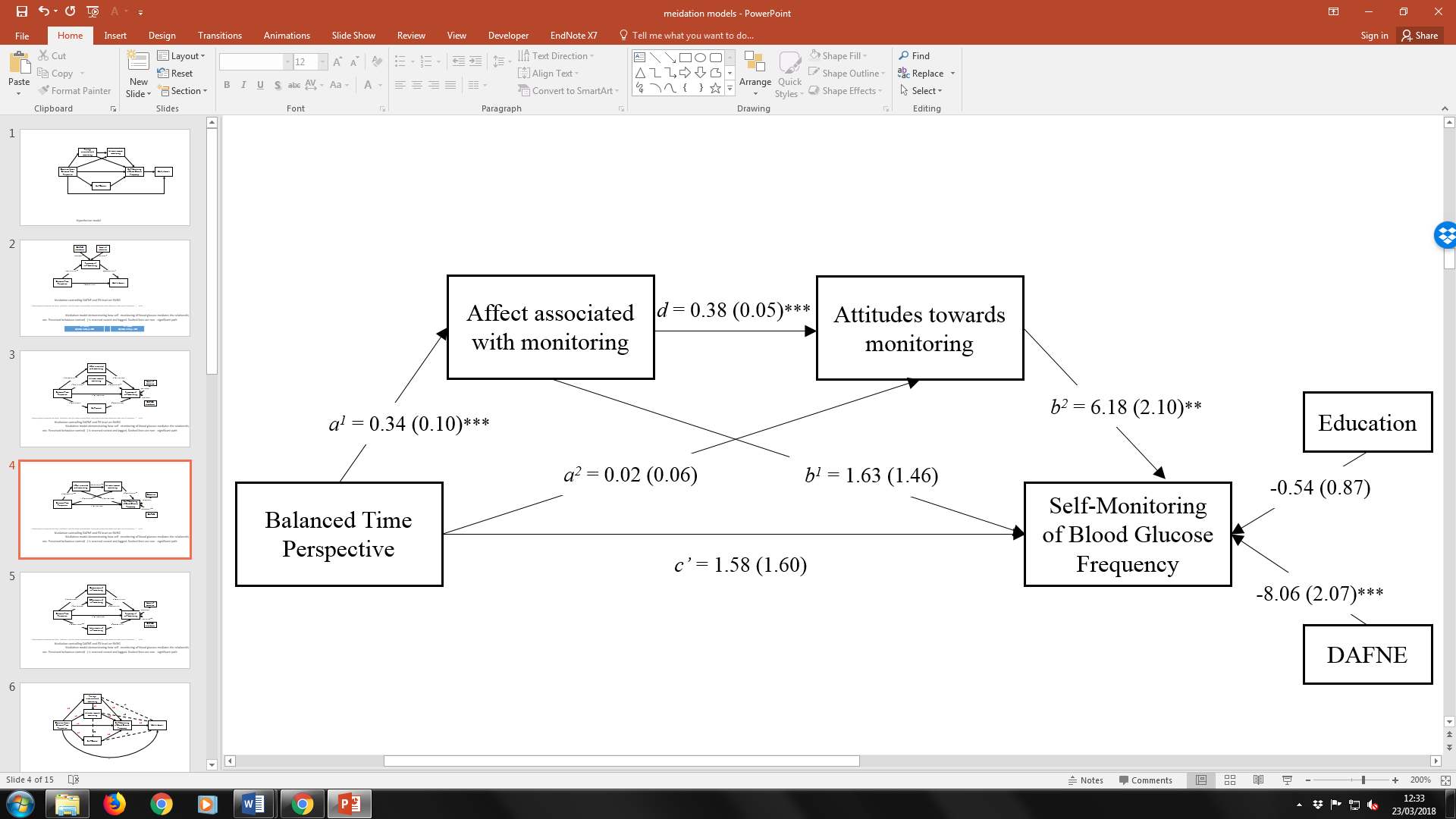
*Notes.* As recommended by Hayes (2013), values represent unstandardized beta coefficients with standard error (*SE*) shown in parentheses. \* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001

**Table 6.4.** *Summary of indirect effects (N = 158) for the parallel mediation model depicted in Figure 6.3.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Indirect effect** | | | |
| **Variable** | Effect | *SE* | Lower  *95% CI* | Upper  *95% CI* |
| Affect associated with SMBG | 0.591 | 0.503 | -0.221 | 1.809 |
| Attitudes towards SMBG | 0.955 | 0.632 | -0.027 | 2.570 |
| Self-control ability | -0.075 | 0.230 | -0.677 | 0.304 |
| Total indirect effect | 1.471 | 0.815 | 0.001 | 3.215 |

*Notes.* Effect = Unstandardized indirect effect, *SE* = Standard error, *CI* = Confidence interval, SMBG = Self-monitoring of blood glucose. Confidence intervals for indirect effects are based on 10,000 bootstrapped samples. Confidence intervals excluding zero are considered statistically significant at the *p* < 0.05 level.

The findings from the serial mediation model are presented in Figure 6.3. When feelings associated with monitoring and attitudes towards monitoring were placed in series, balanced time perspective significantly related to feelings associated with monitoring (*a1* = 0.343, *p* < .001), but not attitudes towards monitoring (*a2* = 0.022, *p* = .694). In turn, the feelings that participants’ associated with monitoring did not significantly predict the frequency with which they monitored their blood glucose levels (*b1* = 1.635, *p* = .265), but attitudes towards monitoring did (*b2* = 6.183, *p* = .004). Clarifying these findings, there was a significant indirect effect of balanced time perspective on the frequency with which participants monitored their blood glucose levels through the feelings that they associated with monitoring and then their attitudes towards monitoring (indirect effect = 0.800, *95% CI:* [0.25, 1.86]). Furthermore, after controlling for the feelings that participants associated with monitoring and their attitudes towards monitoring, the direct effect was not significant (*c’* = 1.579, *p* = .324). This provides support for a serial mediation model in which a balanced time perspective influences the feelings that participants associate with monitoring that, in turn, influences their attitudes toward monitoring and so the frequency with which they do so.

**Figure 6.3.** *Sequential mediation model of the relationship between a balanced time perspective and the frequency of blood glucose monitoring via the feelings that participants associate with monitoring and their subsequent attitudes towards monitoring (N = 158).*

*Notes.* As recommended by Hayes (2013), values represent unstandardized beta coefficients with standard error (*SE*) shown in parentheses. \* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001

**6.4 Discussion**

The aim of the present research was to explore whether time perspective was associated with the frequency with which people with type 1 diabetes monitored their blood glucose levels, and as a result, achieved long-term glycaemic control. Consistent with our initial hypotheses, we found that, after controlling for participants’ level of education and whether they had attended a DAFNE course, a more balanced time perspective was associated with more frequent self-monitoring of blood glucose. Furthermore, the findings indicated that, although there was not a direct relationship between the extent to which participants had a balanced time perspective and long-term glycaemic control, there was a significant indirect effect, suggesting that a more balanced time perspective is associated with better long-term glycaemic control via its relationship with the frequency of blood glucose monitoring.

A second aim of the present research was to identify factors that explain why the extent to which participants had a balanced time perspective was associated with self-monitoring of blood glucose. Our findings suggested that the feelings that participants associated with monitoring their blood glucose (e.g., the extent to which doing so made them feel reassured) and participants’ subsequent attitudes towards monitoring (e.g., the extent to which they believed that monitoring their blood glucose is worthwhile) mediated the relationship between a balanced time perspective and the frequency with which participants monitored their blood glucose levels. Specifically, participants with a more balanced time perspective tended to associate more positive affect with monitoring their blood glucose levels. This, in turn, was associated with more positive attitudes toward monitoring, which were associated with more frequent monitoring.

These findings are important from both a theoretical and practical perspective. From a theoretical perspective, the findings are consistent with theories and past research that points to the importance of time perspective for understanding health behaviour (e.g., Hall, Fong, & Sansone, 2015), including the self-management behaviours of people with diabetes (e.g., Hall, Fong, & Cheng, 2012; Sansbury et al., 2014), and research that has demonstrated the importance of self-monitoring of blood-glucose for maintaining glycaemic control (e.g., Davidson et al., 2004, Evans et al., 1999). Furthermore, and in light of the findings from our serial mediation analysis, the present research also indicates that how people typically feel when they monitor their blood glucose is related to their attitudes toward monitoring. This is important because, although attitudes are commonly featured in models of health behaviour (e.g., the Theory of Planned behaviour; Ajzen, 1991), a common criticism of these models is that they assume that behaviour is rational and, as such, they fail to acknowledge the role of other non-cognitive determinants, such as emotions (Conner & Sparks, 2005). Thus, our findings provide empirical support for these criticisms and for past research that has highlighted the role of (anticipated and experienced) emotions in shaping people’s attitudes toward various behaviours (Schwarz, 2000)

The present findings also extend previous investigations in two ways. First, while previous research has highlighted the benefits of a future time perspective, the present research demonstrates the efficacy of having a balanced time perspective in promoting the performance of health-protective behaviours. This is significant as it suggests that the optimal time perspective is more nuanced than simply a focus on the future and that other dimensions of time perspective should not be ignored. Second, while previous research has explored the relationship between balanced time perspective and psychological well-being (e.g., Zhang et al., 2013), the present research is one of the first few studies that has explored the relationship between having a more balanced time perspective and a specific health behaviour – namely, the extent to which people with type 1 diabetes monitor their blood glucose levels.

In contrast to previous research, the present research did not find a relationship between a balanced time perspective and self-control ability (Stolarski et al., 2011). Similarly, we did not find a relationship between participants’ self-control ability and the extent to which they self-monitored their blood glucose levels. This is perhaps surprising as previous research has found that self-control is associated with a wide range of behaviours (de Ridder et al., 2012), including better glycaemic control in adolescents with type 1 diabetes (Lansing et al., 2016). One possible explanation for the lack of relationship in the present research is that a core component of self-control is the ability to resist immediate temptation (i.e., an inhibitory response; Vohs et al., 2016), whereas self-monitoring of blood glucose is considered an active and deliberate behaviour that does not necessarily require the person to overcome or resist an alternative course of action. As such, the self-regulatory challenges involved in blood glucose monitoring are likely motivational (e.g., is this something that I want to do?) rather than volitional (e.g., I want to do this, but struggle to do so). Self-control may be more strongly associated with self-management behaviours that involve inhibiting impulses (e.g., resisting fatty foods), rather than self-management behaviours that involve deciding whether to take proactive steps to benefit future health (e.g., checking blood glucose levels). Nonetheless, the present research further highlights the need to explore psychological factors for understanding self-management behaviours in diabetes (Hunter, 2016)

The present findings also have a number of practical implications; not least for interventions designed to promote self-monitoring of blood glucose levels. Specifically, future research could explore whether it is possible to facilitate a balanced time perspective in order to promote self-monitoring of blood glucose. For example, previous research with individuals with Post Traumatic Stress Disorder has developed a therapy that involves identifying and modifying time perspective (Sword et al., 2014). During this therapy, deviations from a balanced time perspective are identified (e.g., a high score on the past-negative subscale) and efforts are made to enhance neglected dimensions of time perspective in order to promote balance (e.g., by asking the individual to think about all the positive things in their past that they have previously ignored). It would be interesting to investigate if a similar intervention could also increase the frequency with which participants with type 1 diabetes monitor their blood glucose levels. Such studies would not only be practically important but would also represent the first experimental tests of the relation between balanced time perspective and health outcomes.

**6.4.1 Strengths and limitations**

Although the present research provides support for the significance of time perspective for understanding how frequently people with type 1 diabetes self-monitor their blood glucose levels, we acknowledge that the size of the effects found were relatively small. That is, after controlling for whether participants had attended a DAFNE course and their level of education (which together explained 8% of the variance in the frequency with which participants monitored their blood glucose), differences in time perspective only explained an additional 3% of the variance. These effects are, however, comparable to other studies exploring psychological correlates of health behaviour (e.g., Norman & Conner, 1996), and variables explaining a similar percentage of variance are often included in models of health behaviour (e.g., Conner, Armitage, 1998). Furthermore, even small effects can have substantive implications for public health (Onwezen, Van’t Riet, Dagevos, Sijtsema, & Snoek, 2016; West, 2007). However, in order to provide stronger support for interventions designed to modify time perspective, future research could consider context-specific measures of time perspective. For example, previous studies have demonstrated that using a measure of time perspective that is specific to the health condition being studied (e.g., using the Hypertension Temporal Orientation Scale; Brown & Segal, 1996), to assess differences in time perspective in individual with hypertension), can explain a larger amount of the variance in subsequent behaviour (e.g., Alberts & Dunton, 2008). This suggests that a diabetes-specific measure of time perspective may increase the size of the effects found, therefore providing greater support for the development of interventions designed to modify time perspective. It may also be easier to modify time perspective with respect to a specific issue, than more general perspectives.

A strength of the present research was the use of an objective measure of glycaemic control and the frequency with which participants self-monitored their blood glucose levels. Although this is not the first study to use HbA1c levels to measure glycaemic control, it is one of the first studies to use Diasend software for research purposes. The promising findings reported here suggest that the software may be a useful way to investigate other research questions (e.g., exploring habits associated with blood glucose monitoring). The present research found a high correlation between participants’ self-reported frequency of monitoring and the objective data extracted from participants’ electronic blood glucose meters, and so these measures were combined to reduce missing data and to ensure that the analyses were sufficiently powered. While this suggests that people are fairly accurate in reporting their blood glucose monitoring practices, future studies that use data provided by Diasend software may want to recruit larger samples in order to compensate for data that may not have been uploaded onto the system.

There are, however, some further limitations to the present research that warrant discussion. One limitation is the cross-sectional nature of this research which means that any inferences about the causal nature of these relationships are based on theoretical considerations that cannot be empirically verified using the present data. Although it seems reasonable to assume that time perspective (being a relatively stable individual difference) is a precursor to the frequency with which people monitor their blood glucose and, in turn, outcomes such as glycaemic control, future studies could and should utilise a longitudinal design – or better still, an experimental design as suggested above – in order to provide empirical support for these ideas.

A second limitation of the present research was the relatively low response rate (22% of those invited to take part agreed to do so). Low response rates can introduce self-selection bias and, as a result, our sample may not be representative of individuals with type 1 diabetes. For example, given that we told participants that we were interested in blood glucose monitoring and glycaemic control, it is possible that individuals who monitored their blood glucose more frequently and had better glycaemic control were more likely to take part. That said, the average HbA1c level for the current sample was only slightly lower than the average HbA1c level for the 1,437 patients at Sheffield Teaching Hospitals who matched our inclusion criteria (63 mmol/mol compared to 68 mmol/mol), and the size of this effect was estimated to be small (*d* = 0.37). This suggests that, although the current sample had slightly better glycaemic control, there was not a substantial difference between those participants who took part in this study and the larger population pool. Our sample did, however, lack ethnic diversity as 97% of the sample was White British. Given that previous research has indicated that ethnic minority groups are less likely to monitor their blood glucose (Karter et al., 2000), future studies with more ethnically diverse samples are important in order to ensure that the findings can be generalised.

Finally, given the limited population from which participants could be recruited (i.e., adults with type 1 diabetes attending the outpatient clinics at Sheffield Teaching Hospitals) and due to missing data, the size of the sample obtained to test our hypotheses was smaller than anticipated. Therefore, it is possible that our analyses failed to detect some potentially significant associations (i.e., there was an increased chance of making a type II error). Although our sample size is comparable to similar studies conducted within this population (e.g., Lansing et al., 2016), the findings should be interpreted with caution.

**6.4.2 Conclusion**

The present research found that a more balanced time perspective was associated with more frequent self-monitoring of blood glucose among adults with type 1 diabetes and, as a consequence, better long-term glycaemic control. The present research also sheds light on why a balanced time perspective is associated with blood glucose monitoring. Specifically, the findings suggest that people with a more balanced time perspective monitor their blood glucose more frequently because they associate more positive feelings with monitoring and thus have more positive attitudes towards monitoring. From a theoretical standpoint, these findings suggest that future research should consider whether and how balanced time perspective influences the performance of other health behaviours. From a practical standpoint, the research suggests that a promising intervention for people with type 1 diabetes might be to try to promote a balanced time perspective in order to increase the frequency with which people monitor their blood glucose and thus improve glycaemic control.

**CHAPTER 7**

GENERAL DISCUSSION

**7.1 Introduction**

The programme of research described in this thesis had two primary aims. First, to provide a comprehensive and systematic review of the literature exploring the relationship between time perspective and self-regulation, and second, to explore the relationship between time perspective and a specific self-regulatory process – namely, the frequency and ways in which people monitor their progress towards their goals.

To achieve these aims, four empirical studies were conducted. First a meta-analysis of 283 independent empirical studies was conducted in order to explore the relationship between time perspective and specific self-regulatory processes and outcomes. Three subsequent studies then sought to explore the relationship between time perspective and the likelihood and ways in which people monitor their progress towards their goals. This concluding chapter reviews the findings from these studies and discusses them in relation to theories of self-regulation. The potential implications and practical applications of the findings for both academic research and the wider community will be considered, and discussed in light of the strengths and limitations upon which the conclusions were drawn. Finally, potential avenues for future research will be suggested.

**7.2 Overview of Main Findings**

An extensive body of empirical research has explored the relationship between time perspective and processes, behaviours, and outcomes relevant to self-regulation (Stolarski, Fieulaine, & Beek, 2015). In an attempt to synthesise this research, a number of reviews have sought to quantify the size of these relationships using meta-analysis (e.g., Andre et al., 2018; Kooij, et al., 2018; Milfont et al., 2012; Murphy & Dockray, 2018; Sirois, 2014). However, the present thesis identified two notable limitations of previous reviews. First, they focused primarily on the role of a future time perspective and rarely considered the role of other dimensions of time perspective. Second, although they pointed to the relationship between time perspective and specific behaviours and outcomes, they did not indicate *why* time perspective might be associated with people’s behaviour and self-regulatory outcomes.

To address these limitations, *Chapter 2* presented the findings of a large meta-analytical review that aimed to quantify the size and direction of the relationships between different dimensions of time perspective and specific self-regulatory processes, self-regulatory ability, and self-regulatory outcomes. In support of earlier meta-analyses, a future time perspective (i.e., the tendency to consider, anticipate, and plan for the future) was positively associated with all three self-regulatory processes (i.e., goal setting, goal monitoring, and goal operating), self-regulatory ability, and self-regulatory outcomes. However, building on past reviews, the present review also found that the relationship between time perspective and self-regulatory outcomes was mediated by each self-regulatory process and by self-regulatory ability. This suggests that people with a future time perspective are more likely to experience positive outcomes because: (i) they have stronger intentions to achieve their goals, (ii) they are more likely to monitor their progress towards their goals, (iii) they are more likely to engage in actions and behaviours directed towards achieving their goals, and (iv) they have greater ability to regulate their behaviour. As such, this review advanced our current understanding of the relationship between time perspective and self-regulation by demonstrating that time perspective is associated with positive outcomes via its relationship with key self-regulatory processes and self-regulatory ability.

*Chapter 2* also highlighted that very little empirical research has explored the relationship between time perspective and the extent to which people monitor their goal progress. This was surprising as both theoretical frameworks and empirical evidence indicate that people who monitor their goal progress are better able to achieve their goals than those who do not (Harkin et al., 2016). Given the importance of monitoring for promoting goal attainment, this highlighted an important gap in current research, and thus, provided the focus for the three empirical studies that followed. *Chapter 3* provided a basis for the empirical work by reviewing research on monitoring of goal progress and proposing how individual differences in people’s time perspectives may shape the nature and extent to which people monitor their progress towards their goals.

*Chapter 4* then presented the findings of a large, online, cross-sectional survey (Study 1) that empirically examined the relationship between different measures of time perspective and the likelihood and nature of progress monitoring. This study demonstrated that people with a future time perspective are more likely to monitor their goal progress towards a variety of different goals and that a future time perspective was associated with using a wider variety of strategies and information in order to do so. For example, a future time perspective was associated with using both a reference value in the future and a reference value in the past to compare current progress, and people with a future time perspective were more likely to actively seek out information regarding their goal progress. Furthermore, participants with a future time perspective monitored their goal progress both by monitoring both their behaviours and the outcomes of their behaviours.

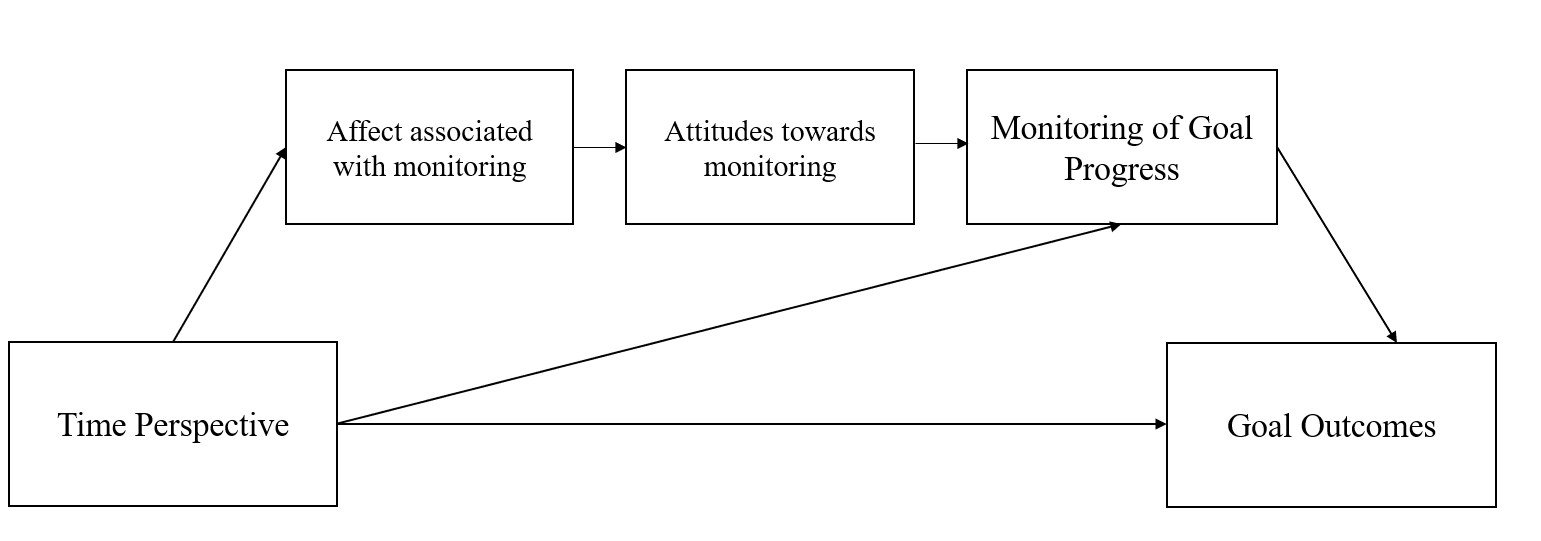
Study 1 also demonstrated that the properties of people’s goals were found to mediate the relationship between time perspective and the ways in which people monitor. For example, people with a present-fatalistic time perspective, who have greater belief that life is determined by fate and that they have little control over future events, were less likely to share information about their goal progress with others because they had less self-efficacy with regards to achieving their goal. Furthermore, mediation analyses indicated that people with a future time perspective were more likely to take steps to actively seek out information on their goal progress because they were more committed towards achieving their goal. The findings of Study 1 support the findings from the meta-analytical presented in Chapter 2 which also found that a future time perspective was positively associated with monitoring of goal progress.

Given that the evidence presented in Study 1 was correlational in nature, it left open the possibility that that monitoring influenced time perspective, rather than vice versa. For example, frequently comparing one’s current standing with respect to future goals may actually promote a future time perspective. Thus, *Chapter 5* sought to explore whether it was possible to manipulate time perspective in order to promote monitoring, and thus establish the causal nature of the relationship between time perspective and progress monitoring. Specifically, Study 2 capitalised on advancements in mobile technology to explore whether manipulating time perspective influenced the amount of time that participants used a smartphone app designed to help them monitor their progress towards their health goals. Consistent with the idea, Study 2 found that promoting a future time perspective increased the amount of time that participants used My Fitness Pal to monitor their goal progress. However, this was only the case for participants who specified that they were currently working towards a health goal, suggesting that a future time perspective can influence monitoring, but only if the goal to which they are monitoring is related to their intentions. This suggests that people’s goal intentions have an important influence on whether or not people monitor their progress towards their goals and suggests that self-regulatory processes may work together, in a cumulative manner, in order to promote goal striving. Taken together, the evidence presented in *Chapter 4* (Study 1) and *Chapter 5* (Study 2) suggested that having a future time perspective was most beneficial for monitoring of goal progress. As such, this research suggests that interventions designed to promote behaviour change by encouraging people to monitor their goal progress might want to focus on encouraging a future time perspective.

However, researchers have also argued that focusing on one time perspective, while excluding others, can be detrimental (Boniwell & Zimbardo, 2004). As such, it has been suggested that having a balanced time perspective is optimal, where people are able to draw from multiple timeframes and switch flexibly between them in order to meet situational demands (Boniwell & Zimbardo, 2004; Boyd & Zimbardo, 2005). Interestingly, however, although differences in a balanced time perspective have been explored in relation to psychological well-being (e.g., happiness and life satisfaction, Zhang, Howell, & Stolarski, 2013), very little research has explored the relationship between balanced time perspective and specific behaviours.

Thus, *Chapter 6* (Study 3) sought to explore whether a balanced time perspective was associated with monitoring of goal progress and subsequent goal attainment. These relations were explored in a specific sample (namely, people with type 1 diabetes) who share a common goal (to maintain glycaemic control). The extent to which participants with type 1 diabetes monitored their blood glucose was objectively assessed by extracting data from participants’ electronic blood glucose meter which time and date stamps every time a reading is taken. Study 3 also aimed to explore three possible mediators of the relationship between time perspective and monitoring of goal progress; namely, affect associated with monitoring, attitudes towards monitoring, and trait self-control.

Study 3 found that a balanced time perspective was associated with more frequent self-monitoring of blood glucose, and as a result, better long-term glycaemic control. Not only did this study provide evidence for the relationship between a balanced time perspective and progress monitoring, it also indicated that a balanced time perspective is associated with self-regulatory outcomes via its relationship with progress monitoring. These findings further support the findings from the meta-analytical review, presented in Chapter 2 that also found that self-regulatory processes mediate the relationship between time perspective and goal attainment. However, Study 3 went further than the meta-analysis presented in Chapter 2 by identifying factors that explain why (a balanced) time perspective is associated with progress monitoring. Specifically, the findings suggested that the feelings that participants associated with monitoring (e.g., the extent to which doing so made them feel reassured) and participants’ subsequent attitudes towards monitoring (e.g., the extent to which they believed that monitoring was worthwhile) mediated the relationship between a balanced time perspective and the frequency with which participants monitored their blood glucose levels. A graphical diagram outlining the relationships examined in the present thesis is presented in Figure 7.1.

**Figure 7.1** *The relationship between time perspective and goal attainment, via the affect that people associate with monitoring, their subsequent attitudes towards monitoring, and likelihood of monitoring goal progress.*

**7.3 Theoretical and Practical Implications**

The findings collected for this programme of research are important from both a theoretical and a practical perspective. From a theoretical perspective, the findings presented in this thesis are consistent with theories and past research that point to the importance of time perspective for self-regulation. However, the research presented in this thesis also extends on previous investigations in a number of ways. First, although an extensive body of research has explored the relationship between time perspective and various behaviours and outcomes, the present research shows *why* time perspective is associated with better goal striving (i.e., because it is associated with self-regulatory processes and ability). To achieve this aim, existing theories (namely, Control Theory; Carver & Scheier, 1981, 1982) and frameworks (e.g., Burnette et al., 2013) were used to develop a taxonomy for classifying measures according to the self-regulatory process, ability, or outcome that they were likely to reflect. This taxonomy was then used to organise and synthesise research on self-regulation in relation to time perspective. Furthermore, the taxonomy created in order to synthesise research on self-regulation could also be used in subsequent research that explores other antecedents and consequences of self-regulatory processes and outcomes.

The present research then explored the relationship between time perspective and monitoring of goal progress – a key self-regulatory process that until recently had been largely over looked – finding that individual differences in time perspective shape the nature and extent of progress monitoring. The present study also indicated why time perspective is associated with monitoring. That is, people with a future time perspective were found to monitor their goal progress more frequently because that associated more positive feelings with monitoring, and subsequently had more positive attitudes towards monitoring. Future research could consider whether affect and attitudes also mediate the relationship between other antecedents of monitoring and the extent to which people monitor.

The present findings also have a number of practical implications; not least for interventions designed to promote monitoring of goal progress. Specifically, and in light of the findings from Study 3, future research could explore whether it is possible to facilitate a balanced time perspective in order to promote monitoring of blood glucose. For example, previous research with individuals with Post Traumatic Stress Disorder has developed a therapy that involves identifying and modifying time perspective (Sword et al., 2014). During this therapy, deviations from a balanced time perspective are identified (e.g., a high score on the past-negative subscale) and efforts are made to enhance neglected dimensions of time perspective in order to promote balance (e.g., by asking the individual to think about all the positive things in their past that they have previously ignored). It would be interesting to investigate if a similar intervention could also increase the frequency with which people monitor their goal progress. Such studies would not only be practically important but would also represent the first experimental tests of the relation between balanced time perspective and goal outcomes.

**7.3 Limitations and suggestions for future research**

Although the research presented in this thesis contributes to our understanding of the relationship between time perspective and self-regulation, there are a number of limitations that should be acknowledged. First, measuring the extent to which people monitor their goal progress posed a considerable challenge. The ideal or optimal frequency of monitoring may vary greatly depending on the nature of the goal, and the type of information that individuals can, and do, use to monitor can also differ between goals and individuals. For example, when assessing progress toward the goal of losing weight, one person may prefer to measure their calorie intake, while another person may look at their exercise level or how their clothes fit. Most measure of monitoring to date have relied on self-reports (e.g., asking participants to rate the extent to which they look at their electricity meter to monitor their electricity consumption; Webb et al., 2014) perhaps because measuring progress monitoring objectively and without interference is difficult (Benn, 2014). For example, asking participants to use or download a smartphone application that facilitates monitoring progress toward a particular goal (e.g., My Fitness Pal is designed to help people to keep track of their calorie intake), may prompt them to monitor more often than they would normally do so. A lab-based measure of monitoring that can be objectively observed would therefore represent a significant methodological advancement that could benefit subsequent research. One way of doing this, might be to explore how often people looked at the time during a mock exam.

**7.4 Conclusions**

The research presented in this thesis has found that time perspective is a significant determinant of self-regulatory processes, self-regulatory ability, and self-regulatory outcomes. The research also sheds light on why time perspective is associated with self-regulatory outcomes (i.e., via the relationship between self-regulatory processes, and self-regulatory ability), and why time perspective is associated with monitoring of goal progress (i.e., via the relationship between the affect that people associate with monitoring and subsequent attitudes towards monitoring). The present thesis also provides initial evidence that time perspective can be manipulated to promote monitoring. From a practical standpoint, this suggests that time perspective might provide a promising intervention that promotes the frequency with which people monitor their goal progress, and therefore help people achieve a variety of different goals.

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**Appendix 2.1**: *PRISMA (Preferred Reporting Items for Systematic review and Meta-Analysis) 2009 checklist:*

|  |  |  |  |
| --- | --- | --- | --- |
| Section/topic | # | Checklist item | Reported on page # |
| TITLE | | |  |
| Title | 1 | Identify the report as a systematic review, meta-analysis, or both. |  |
| ABSTRACT | | |  |
| Structured summary | 2 | Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number. |  |
| INTRODUCTION | | |  |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known. |  |
| Objectives | 4 | Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS). |  |
| METHODS | | |  |
| Protocol and registration | 5 | Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number. |  |
| Eligibility criteria | 6 | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale. |  |
| Information sources | 7 | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched. |  |
| Search | 8 | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated. |  |
| Study selection | 9 | State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis). |  |
| Data collection process | 10 | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators. |  |
| Data items | 11 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made. |  |
| Risk of bias in individual studies | 12 | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis. |  |
| Summary measures | 13 | State the principal summary measures (e.g., risk ratio, difference in means). |  |
| Synthesis of results | 14 | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I2) for each meta-analysis. |  |
| Risk of bias across studies | 15 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies). |  |
| Additional analyses | 16 | Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified. |  |
| RESULTS | | |  |
| Study selection | 17 | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram. |  |
| Study characteristics | 18 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations. |  |
| Risk of bias within studies | 19 | Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12). |  |
| Results of individual studies | 20 | For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot. |  |
| Synthesis of results | 21 | Present results of each meta-analysis done, including confidence intervals and measures of consistency. |  |
| Risk of bias across studies | 22 | Present results of any assessment of risk of bias across studies (see Item 15). |  |
| Additional analysis | 23 | Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]). |  |
| DISCUSSION | | |  |
| Summary of evidence | 24 | Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers). |  |
| Limitations | 25 | Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias). |  |
| Conclusions | 26 | Provide a general interpretation of the results in the context of other evidence, and implications for future research. |  |

*From:*  Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

**Appendix 2.2**: *Manual for classifying measures of self-regulation*

**The relationship between time perspective and self-regulatory processes, abilities, and outcomes: A meta-analytic review**

Phase 1: Developing a taxonomy for classifying measures of self-regulatory processes, abilities, and outcomes

**INFORMATION FOR CODERS**

The proposed review aims to quantify the size of the relationships between time perspective and different self-regulatory processes, abilities, and outcomes, across various domains (e.g., health, academic, wellbeing). Specifically, this review will build on a framework developed by Burnette and colleagues (Burnette, O’Boyle, VanEpps, Pollack, & Finkel, 2013) and distinguish between three self-regulatory processes as specified by Control Theory (Carver & Scheier, 1982); namely, goal setting, goal monitoring, and goal operating. In addition, we will distinguish these processes from measures of self-regulatory ability and the outcomes of self-regulation.

**Creating a taxonomy for classifying measures of self-regulation:**

There is considerable variation in how processes relevant to self-regulation have been labelled, defined, and measured. The purpose of this exercise is to develop a taxonomy for classifying the different measures that have been used in research to date. Below is a definition of each self-regulatory process, as well as what we mean by self-regulatory ability and outcomes, and an example of how constructs relevant to the respective process (or ability or outcome) are typically measured:

**Goal setting**: Goal setting involves establishing specific reference points or desired outcomes; that is, identifying something that an individual would like to achieve (Austin & Vancouver, 1996). This process is reflected by constructs such as the importance of the respective goal, how committed the person is to that goal and so on. Measures of these constructs should therefore be coded as pertaining to the process of setting goals. For example, a measure of goal intentions would be considered a measure of goal setting (e.g., participants are asked to indicate the extent to which they agree with the statement: “I intend to lose weight”).

**Goal monitoring:** Goal monitoring involves evaluating ongoing performance relative to the goal that has been set (Carver & Scheier, 1982; Webb, Chang, & Benn, 2013). Goal monitoring alerts the individual to the nature and extent of any discrepancy between the current state (e.g., weighing ten stone) and the desired state (e.g., to weigh nine stone), or the discrepancy between the current rate of progress toward the goal and the desired rate of goal progress. An example of a measure reflecting the process of goal monitoring would be the number of times that participants record the calories that they have eaten using an app on their smart phone.

**Goal operating**: Goal operating involves activities and behaviours directed toward goal achievement (Carver & Scheier, 1998). An example would be engaging in physical activity in order to improve physical fitness. Therefore, a measure of physical activity would constitute a measure of the process of goal operating, assuming that engaging in physical activity was relevant to the focal goal (e.g., that the goal was to get fit, to lose weight, to do more exercise etc.).

**Self-regulatory ability**: Self-regulatory ability refers to the resources and attributes that an individual has in order to assist with goal attainment. Therefore, measures of the ability to delay gratification (Mischel et al., 2011) or levels of trait self-control (i.e., the ability to control thoughts, feelings, and behaviours; de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012) would be examples of measures of self-regulatory ability.

**Self-regulatory outcomes**: Self-regulatory outcomes refer to the outcome(s) of the goal striving (i.e., what has been achieved). An example of a measure of self-regulatory outcomes could be a student’s grade point average (GPA), assuming that this outcome reflected the extent to which the respective goal was achieved (e.g., that the person had the goal to succeed academically).

**Instructions for coding:** On the following pages are a list of measures that may reflect a particular self-regulatory process, ability, or outcome. We would like you to indicate whether you think that each measure reflects the process of goal setting, goal operating, goal monitoring, and / or is a measure of self-regulatory ability or outcomes. Alternatively, if you feel that the measure does not reflect any of these things, then please select the option ‘Not relevant to self-regulation’. Please use the notes column to explain your decision if needed and / or to record any comments that you have.

Following this is a table detailing measures that are **NOT** currently included in the review because they do not seem to measure a self-regulatory process, ability, or outcome. However, we would like you to consider whether you think that it would be worth including any of these (i.e., whether you think that they are relevant to self-regulation).

**Appendix 2.3**: *Data Extraction Form*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data Item |  | | Coding | |
| PUBLICATION DETAILS | | | |
| Authors |  | | Text entry | |
| Publication date |  | | Numerical entry | |
| Publication status  Publication language |  | | 0 = unpublished; 1 = published  Text entry (to be coded once compiled) | |
| SAMPLE CHARACTERISTICS | | | |
| Mean age | |  | Numerical entry | |
| Gender composition (% male) | |  | Numerical entry | |
| Type of sample | |  | 0 = university sample; 1 = community adults; 2 = clinical population; 3 = adolescents/ children | |
| METHODOLOGICAL DETAILS | | | |
| Time interval (in weeks) between measures of time perspective and measures of self-regulation | |  | 0 = cross-sectional study; 1 = one week; 2 = two weeks; 3 = three weeks (and so on) | |
| Country where the study was conducted | |  | Text entry (to be coded once compiled) | |
| Measure of time perspective | |  | Text entry (to be coded once compiled) | |
| Domain specific measure of TP | |  | 0 = no; 1 = yes  A domain specific measure of time perspective refers to whether the measure of time perspective is specific to the goal or sample being studied. For example, the 'Hypertension Temporal Orientation Scale' (a measure of time perspective for people with hypertension) or Hall's 'Time Perspective Questionnaire - Exercise Version', which measures the extent to which people are present or future orientated in their thinking about physical activity. | |
| Measure of self-regulation | |  | Text entry (to be coded once compiled) | |
| Self-report or objective measure of self-regulation | |  | 0 = objective; 1 = self-report | |
| Scale reliabilities (i.e., Cronbach’s alphas) for self-report measures | |  | Numerical entry | |
| Domain being studied | |  | 1 = health; 2 = academic; 3 = work; 4 = financial; 5 = environmental 6 = Other | |
| STATISTICAL DETAILS | |  |  | |
| Effect size *(r*) | |  | Numerical entry | |
| How the effect size was calculated |  | | 0 = reported; 1 = author provided on contact; 3 = converted from other data provided | |
| Sample size |  | | Numerical entry | |
| Standard error of effect size |  | | Calculated via sample size and effect size | |
| CODING |  | |  | |
| Self-regulatory process/ ability/ outcome |  | | 1 = goal setting; 2 = goal monitoring; 3 = goal operating; 4 = goal outcome; 5 = self-regulatory ability | |
| Inference coding for self-regulatory outcome |  | | 0 = goal specified; 1 = low inference; 2 = medium inference; 3 = high inference  NB Use “Level of inference coding for measures of outcome” document for guidance. | |

**Appendix 2.4.** Overview and characteristics of the studies exploring the relationship between time perspective and goal setting.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Authors (year)** | **Dimension of Time Perspective** | **Measure of Goal Setting** | **Type of Sample** | **Age (*mean*)** | **Gender (% males)** | **Country** | **Study design** | ***N*** | **Effect Size (*r*)** |
| Adams & Nettle (2009) | Future | Time period considered for financial planning | Community | 34.70 | 18.20 | USA | Cross-sectional | 396.5 | .24\* |
| Agnew & Loving (1999; sample 1) | Future | Intentions to use condoms | University | - | 0 | USA | Cross-sectional | 59 | 0.15 |
| Agnew & Loving (1999; sample 2) | Future | Intentions to use condoms | University | - | 100 | USA | Cross-sectional | 176 | 0.17 |
| Arnocky, Milfont & Nicol (2013; Study 1) | Future | Pro-environmental motivation | University | 21.40 | 17.95 | New Zealand | Cross-sectional | 78 | .34 |
|  | Present | Pro-environmental motivation | University | 21.40 | 17.95 | New Zealand | Cross-sectional | 78 | -.57 |
| Arnocky, Milfont & Nicol (2013; Study 2) | Future | Pro-environmental motivation | University | 21.00 | 30.77 | New Zealand | Cross-sectional | 104 | .41 |
|  | Present | Pro-environmental motivation | University | 21.00 | 30.77 | New Zealand | Cross-sectional | 104 | -.44 |
| Balliet & Ferris (2013; Study 1) | Future | Intentions to help | University | 21.6 | 35 | Singapore | Cross-sectional | 184 | .12 |
| Bode, de Ridder, Kuijer & Bensing (2007) | Future | Realistic goal setting | Community | 61.46 | - | Netherlands | Cross-sectional | 158 | .05 |
| Carey, Henson, Carey & Maisto (2007) | Present-Hedonistic | Readiness-to-change (alcohol consumption) | University | - | - | USA | Cross-sectional | 509 | .01 |
|  | Future | Readiness-to-change (alcohol consumption) | University | - | - | USA | Cross-sectional | 509 | .01 |
| Carmi (2012) | Future | Willingness to sacrifice for the environment & Health importance | University | 24.2 | 27 | Israel | Cross-sectional | 331 | .15\* |
| Carmi & Arnon (2014) | Future | Willingness to sacrifice for the environment | Community | 46.1 | 46.2 | Israel | Cross-sectional | 1216 | .28 |
| Carmi & Bartal (2014) | Future | Willingness to sacrifice for the environment | University/ Community | 32.2 | 30.5 | Israel | Cross-sectional | 361 | .35 |
| Crockett, Weinman, Hankins & Marteau (2009; Study 2) | Future | Intentions to attend a diabetes screening | Community | - | 49 | UK | Cross-sectional | 300 | .12\* |
|  | Present-Hedonistic | Intentions to attend a diabetes screening | Community | - | 49 | UK | Cross-sectional | 300 | -.27 |
| Demir & Kumkale (2013) | Future | Intentions to become a registered organ donor | University/ Community | 23.06 | 46 | Turkey | Cross-sectional | 367 | .08 |
| Epstein, Jankowiak, Lin, Paluch, Koffarnus & Bickel (2014) | Future | Time period considered for financial planning | Community | 34.2 | 51.1 | USA | Cross-sectional | 975 | .38 |
| Eren (2012) | Future | Planned effort and persistence in teaching | University | 20.53 | 69.44 | Turkey | Cross-sectional | 396 | .32\* |
| Eren & Tezel (2010) | Future | Planned effort and persistence in teaching | University | 19.86 | 18.68 | Turkey | Cross-sectional | 421 | .32\* |
| Fieulaine & Martinez (2011) | Past-Positive | Intention to use cannabis | High School | 16.7 | 46 | France | Cross-sectional | 690 | .10r |
|  | Past-Negative | Intention to use cannabis | High School | 16.7 | 46 | France | Cross-sectional | 690 | -.04r |
|  | Present-Hedonistic | Intention to use cannabis | High School | 16.7 | 46 | France | Cross-sectional | 690 | -.19r |
|  | Future | Intention to use cannabis | High School | 16.7 | 46 | France | Cross-sectional | 690 | .24r |
| Gellert, Ziegelmann, Lippke & Schwarzer (2012; Study 1) | Future | Intentions to consume fruit and vegetables | Community | 37.81 | 18.92 | Germany | Cross-sectional | 909 | .18 |
| Gellert, Ziegelmann, Lippke & Schwarzer (2012; Study 2) | Future | Intentions to exercise | Community | 66.6 | 51.9 | Germany | Cross-sectional | 289 | .14 |
| Griva, Anagnostopoulous & Potamianos (2013) | Past-Positive | Intention to participate in mammography screening | Clinical (Outpatients) | 50.9 | 0 | Greece | Cross-sectional | 194 | .12 |
|  | Past-Negative | Intention to participate in mammography screening | Clinical (Outpatients) | 50.9 | 0 | Greece | Cross-sectional | 194 | .02 |
|  | Present-Hedonistic | Intention to participate in mammography screening | Clinical (Outpatients) | 50.9 | 0 | Greece | Cross-sectional | 194 | -.04 |
|  | Present-Fatalistic | Intention to participate in mammography screening | Clinical (Outpatients) | 50.9 | 0 | Greece | Cross-sectional | 194 | -.05 |
|  | Future | Intention to participate in mammography screening | Clinical (Outpatients) | 50.9 | 0 | Greece | Cross-sectional | 194 | .25 |
| Gulley (2013) | Past-Positive | Intention to participate in physical activity | High School | - | 48.10 | USA | Cross-sectional | 183 | .05 |
|  | Past-Negative | Intention to participate in physical activity | High School | - | 48.10 | USA | Cross-sectional | 183 | -.04 |
|  | Present-Hedonistic | Intention to participate in physical activity | High School | - | 48.10 | USA | Cross-sectional | 183 | .04 |
|  | Present-Fatalistic | Intention to participate in physical activity | High School | - | 48.10 | USA | Cross-sectional | 183 | -.09 |
|  | Future | Intention to participate in physical activity | High School | - | 48.10 | USA | Cross-sectional | 183 | .21 |
| Hall Fong & Meng (2014) | Future | Intentions to quit smoking | Community (smokers) | - | 43.30 | Australia/ Canada/ USA/ UK | Cross-sectional | 9772 | .31 |
| Hall, Fong & Cheng (2012) | Future | Intentions to participate in physical activity/ intentions to eat fatty foods (reverse scored) | Clinical (Type 2 Diabetes) | 57 | 40.8 | Canada | Cross-sectional | 204 | .24\* |
| Halvari (1991; Study 1) | Future | Perceived instrumentality of physical activity | High School | - | 100 | Norway | Cross-sectional | 128 | .03 |
| Halvari (1991; Study 2) | Future | Amount of planned time devoted to school work | High School | - | 100 | Norway | Cross-sectional | 112 | .17 |
| Halvari (1996) | Future | Perceived instrumentality of studying | High School | - | 57.2 | Norway | Cross-sectional | 257 | .16 |
| Heckman, Wilson & Ingersoll (2009) | Future | Motivation to be healthy | University | - | 25 | USA | Cross-sectional | 387 | .31\* |
| Hershey & Mowen (2000) | Future | Planning and consideration for retirement | Community | 62.6 | - | USA | Cross-sectional | 230 | .23 |
| Hershey, Henkens, Van Dalen (2010) | Future | Clarity of retirement goal | Community | - | - | USA/ Netherland | Cross-sectional | 975 | .55 |
| Hershey, Jacobs-Lawson, McArdle & Hamagami (2007) | Future | Clarity of retirement goal | Community | 36.3 | 43.4 | USA | Cross-sectional | 265 | .48 |
| Howlett, Kees & Kemp (2008) | Future | Likelihood of participating in a retirement plan | University | 21.00 | - | USA | Cross-sectional | 84 | .27 |
| Joireman & Liu (2014) | Future | Willingness to take action to mitigate global warming | Community | - | 52 | USA | Cross-sectional | 293 | .34 |
|  | Present | Willingness to take action to mitigate global warming | Community | - | 52 | USA | Cross-sectional | 293 | -.19 |
| Joireman, Shaffer, Balliet & Strathman (2012; Study 1) | Future | Intentions to exercise | University | - | 59.66 | USA | Cross-sectional | 114 | .29 |
|  | Present | Intentions to exercise | University | - | 59.66 | USA | Cross-sectional | 114 | -.16 |
| Joireman, Shaffer, Balliet & Strathman (2012; Study 2) | Future | Intentions to eat healthy foods | University | - | 50.86 | USA | Cross-sectional | 221 | .14 |
|  | Present | Intentions to eat healthy foods | University | - | 50.86 | USA | Cross-sectional | 221 | -.02 |
| Joireman, Van Lange & Van Vugt (2004) | Future | Intentions to use public transport | Community | 37.75 | 43.39 | USA | Cross-sectional | 175 | .19 |
| Jung & McCormick (2010) | Future | Intentions to apply for jobs | High School | 16.59 | 43.46 | Australia | Cross-sectional | 566 | .10 |
| Kees (2011; Study 1) | Future | Intentions to eat healthy foods | University | 23 | 40 | USA | Cross-sectional | 117 | .09 |
| Kees (2011; Study 2) | Future | Intentions to eat healthy foods and participate in physical activity | University | 21 | 43 | USA | Cross-sectional | 278 | .17 |
| Kellar, Mann, Kinmonth, Prevost, Sutton & Marteau (2011) | Future | Intentions to change lifestyle if diagnosed with diabetes | Community | - | - | UK | Cross-sectional | 103 | .32 |
|  | Future | Intentions to change lifestyle if diagnosed with diabetes | Community | - | - | UK | Cross-sectional | 92 | .40 |
| Kelly (2003) | Present | Setting and prioritising goals | University | 25.6 | 34.62 | USA | Cross-sectional | 130 | .14 |
| Kooij, Bal & Kanfer (2014) | Future | Intentionx to continue working | Community | 45.2 | 47 | Netherlands | Longitudinal | 301 | .15 |
| Koposko & Hershey (2014) | Future | Clarity of retirement goal | University | 19.51 | 36 | USA | Cross-sectional | 722 | .25 |
| Kovac & Rise (2007) | Future | Intentions to quit smoking | University (Smokers) | 22.8 | 37.6 | Norway | Cross-sectional | 93 | .10\* |
| Kovac, Lansing, Cameron & Hoigaard (2016) | Future | Intentions to get a certain grade in exams | University | 25 | 14 | Norway | Cross-sectional | 106 | .28 |
| Martin, Hernandez, Frias-Armenta & Hess (2014) | Future | Likelihood of engaging in illegal anti-ecological behaviours | University | 22.4 | 23.01 | Spain | Cross-sectional | 439 | .23r |
| Milfont, Andrade, Belo & Pesso (2008) | Past-Positive | Concern regarding one’s health | University | 22.47 | 40.49 | Brazil | Cross-sectional | 247 | .06 |
|  | Past-Negative | Concern regarding one’s health | University | 22.47 | 40.49 | Brazil | Cross-sectional | 247 | .06 |
|  | Present-Hedonistic | Concern regarding one’s health | University | 22.47 | 40.49 | Brazil | Cross-sectional | 247 | .02 |
|  | Present-Fatalistic | Concern regarding one’s health | University | 22.47 | 40.49 | Brazil | Cross-sectional | 247 | .04 |
|  | Future | Concern regarding one’s health | University | 22.47 | 40.49 | Brazil | Cross-sectional | 247 | .14 |
| Morison, Cozzolino & Orbell (2010) | Future | Intentions to vaccinate daughter against HPV | Community | 43.5 | 21.63 | UK | Cross-sectional | 245 | .16 |
| Mullan, Allom, Brogan, Kothe & Todd (2014) | Future | Intentions to consume fruit and vegetables | University | 20.3 | 26 | Austrailia | Cross-sectional | 154 | .16\* |
| Orbell (unpublished data) | Future | Intentions to avoid binge drinking | University | 20.09 | 44.4 | UK | Longitudinal | 196 | .07 |
| Orbell & Hagger (2006) | Future | Intentions to take part in diabetes screening | Community | 53.59 | 35.24 | UK | Cross-sectional | 210 | .23 |
| Orbell, Hagger & Hamilton (unpublished) | Future | Intentions not to drink and swim | Community | - | 100 | Australia | Cross-sectional | 181 | .25 |
|  | Present | Intentions not to drink and swim | Community | - | 100 | Australia | Cross-sectional | 181 | .09 |
| Orbell, Perugini & Rakow (2004) | Future | Intentions to take part in bowl cancer screening | Community | 57.96 | 37.73 | UK | Cross-sectional | 220 | .26 |
| Ouwehand, de Ridder & Bensing (2006) | Future | Extent to which individuals set goals | Community | 61.8 | 51.22 | Netherlands | Cross-sectional | 123 | .46 |
| Park, Hyun, Kim and Lee (2014) | Future | Focus on achieving goals | High School | - | 0 | Korea | Cross-sectional | 203 | .45 |
| Park, Lee, Yun & Cui (2014) | Future | Intentions to smoke | Adolescents | - | 100 | China | Cross-sectional | 768 | -.04r |
| Rappange, Brouwer & van Exel (2009) | Future | Willingness to invest in future health | Adolescents | 13.2 | 46.96 | Netherlands | Cross-sectional | 1761 | .21\* |
| Rew, Fouladi & Yockey (2002) | Future | Intentions to use condoms | Homeless young adults | 18.5 | 58.9 | USA | Cross-sectional | 414 | -.13 |
| Rise, Kovac, Kraft & Moan (2008) | Future | Intentions to quit smoking | University (Smokers) | 24.6 | 76 | Norway | Cross-sectional | 103 | .09 |
| Schuz & Eid (2013; Study 1) | Future | Intentions to avoid overexposure to the sun | High School | 15.73 | 44.9 | Germany | Cross-sectional | 156 | 0.28 |
| Schuz & Eid (2013; Study 2) | Future | Intentions to avoid overexposure to the sun | High School | 14.32 | 49.1 | Germany | Cross-sectional | 253 | 0.3 |
| Shirai, Shimomura, Kawasaki, Adachi & Wakamatsu (2013) | Past-Positive | Intentions to find a job | Community | - | 28.05 | Japan | Cross-sectional | 3512 | -.13 |
|  | Future | Intentions to find a job | Community | - | 28.05 | Japan | Cross-sectional | 3512 | -.2 |
|  | Present-Positive | Intentions to find a job | Community | - | 28.05 | Japan | Cross-sectional | 3512 | -.21 |
| Vinkers, Adriaanse & de Ridder (2013) | Future | Commitment to weight loss goal | Community | 55.86 | 46.11 | Netherlands | Cross-sectional | 167 | .17 |
| Zacher & de Lange (2011) | Future | Focus on achieving goals | Community | 43.41 | 62.4 | Netherlands | Longitudinal | 85 | .40 |
| Zacher & de Lange (2011) | Future-Negative | Focus on achieving goals | Community | 43.41 | 62.4 | Netherlands | Longitudinal | 85 | .14 |
|  | Future | Intentions to attend bowl cancer screening | Community | 53.66 | 49.7 | UK | Cross-sectional | 165 | .04 |
| Zahid, Orbell & Geeraert (unpublished) | Future | Intentions to attend bowl cancer screening | Community | 65.89 | 54.2 | UK | Cross-sectional | 211 | .69 |
|  | Present | Intentions to attend bowl cancer screening | Community | 65.89 | 54.2 | UK | Cross-sectional | 211 | .33 |

Note. *An asterisks (\*) indicates instance where effect sizes have been combined prior to inclusion in the main analyses. A superscript “r” indicates instances where an effect size has been reverse scored.*

**Appendix 2.5**. Overview and characteristics of the studies exploring the relationship between time perspective and goal monitoring.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Authors (year)** | **Dimension of Time Perspective** | **Measure of Goal Monitoring** | **Type of Sample** | **Age (mean)** | **Gender (% males)** | **Country** | **Study design** | ***N*** | **Effect Size (*r*)** |
| Milfont, Andrade, Belo & Pesso (2008) | Past-Positive | Use of wristwatch to keep track of the time | University | 22.47 | 40.49 | Brazil | Cross-sectional | 247 | .16 |
|  | Past-Negative | Use of wristwatch to keep track of the time | University | 22.47 | 40.49 | Brazil | Cross-sectional | 247 | .05 |
|  | Present-Hedonistic | Use of wristwatch to keep track of the time | University | 22.47 | 40.49 | Brazil | Cross-sectional | 247 | -.07 |
|  | Present-Fatalistic | Use of wristwatch to keep track of the time | University | 22.47 | 40.49 | Brazil | Cross-sectional | 247 | .01 |
|  | Future | Use of wristwatch to keep track of the time | University | 22.47 | 40.49 | Brazil | Cross-sectional | 247 | .12 |
| Qian, Lin, Han, Tian, Chen & Wang (2015a) | Future | Seeking feedback from supervisors | Community | - | - | China | Cross-sectional | 56 | .13 |
| Qian, Lin, Han, Tian, Chen & Wang (2015b) | Future | Seeking feedback from supervisors | Community | 30.14 | 62.7 | China | Cross-sectional | 228 | .25 |
| Tucker, Blum, Xie, Roth & Simpson (2012) | Present-Hedonistic | Interactive voice response self-monitoring to assess HIV risk behaviours | Clinical (patients with aids) | 38.4 | 65 | USA | Longitudinal | 49 | .23\* |
| Tucker, Blum, Xie, Roth & Simpson (2012) | Future | Interactive voice response self-monitoring to assess HIV risk behaviours | Clinical (patients with aids) | 38.4 | 65 | USA | Longitudinal | 49 | -.13\* |

Note. *An asterisks (\*) indicates instance where effect sizes have been combined prior to inclusion in the main analyses. A superscript “r” indicates instances where an effect size has been reverse scored.*

**Appendix 2.6.** Overview and characteristics of the studies exploring the relationship between time perspective and goal operating.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Authors (year)** | **Dimension of Time Perspective** | **Measure of Goal Operating** | **Type of Sample** | **Age (mean)** | **Gender (% males)** | **Country** | **Study design** | ***N*** | **Effect Size (*r*)** |
| Adams & White (2009) | Future | Smoking behaviour | Community | 50.5 | 41.42 | UK | Cross-sectional | 804 | .10r |
| Bode, de Ridder, Kuijer & Bensing (2007) | Future | Use of resources (e.g., asking for help) | Community | 61.46 | - | Netherlands | Cross-sectional | 158 | -.08 |
| Bowles (2008) | Future | Strategies for learning | High school | 16.45 | 49.56 | Australia | Cross-sectional | 228 | .24\* |
|  | Past | Strategies for learning | High school | 16.45 | 49.56 | Australia | Cross-sectional | 228 | -.04\* |
| Braitman & Henson (2015) | Past-Positive | Alcohol consumption | University | 20.41 | 34.9 | USA | Cross-sectional | 431 | .06r\* |
|  | Past-Negative | Alcohol consumption | University | 20.41 | 34.9 | USA | Cross-sectional | 431 | .06r\* |
|  | Present-Hedonistic | Alcohol consumption | University | 20.41 | 34.9 | USA | Cross-sectional | 431 | -.26r\* |
|  | Present-Fatalistic | Alcohol consumption | University | 20.41 | 34.9 | USA | Cross-sectional | 431 | -.13r\* |
|  | Future | Alcohol consumption | University | 20.41 | 34.9 | USA | Cross-sectional | 431 | .19r\* |
| Carey, Henson, Carey & Maisto (2007) | Present-Hedonistic | Alcohol consumption | University | - | - | USA | Cross-sectional | 509 | -.35r\* |
|  | Future | Alcohol consumption | University | - | - | USA | Cross-sectional | 509 | .09r\* |
| Carvalho & Novo (2015a) | Future | Adaptation to transitions at school | Adolescents | 16 | 0 | Portugal | Cross-sectional | 351 | .23 |
| Carvalho & Novo (2015b) | Future | Adaptation to transitions at school | Adolescents | 16 | 100 | Portugal | Cross-sectional | 351 | .17 |
| Dassen, Houben & Jansen (2015) | Future | Healthy Eating | Community/ University | 31.5 | 22.37 | Netherlands | Cross-sectional | 151 | .29\* |
|  | Present | Healthy Eating | Community/ University | 31.5 | 22.37 | Netherlands | Cross-sectional | 151 | -.24\* |
| Daugherty & Brase (2010) | Present-Hedonistic | Various Health behaviours (e.g., exercising. Eating breakfast, wearing a seatbelt) | University | 18.99 | 37.26 | USA | Cross-sectional | 467 | -.09\* |
|  | Present-Fatalistic | Various Health behaviours (e.g., exercising. Eating breakfast, wearing a seatbelt) | University | 18.99 | 37.26 | USA | Cross-sectional | 467 | -.11\* |
|  | Future | Various Health behaviours (e.g., exercising. Eating breakfast, wearing a seatbelt) | University | 18.99 | 37.26 | USA | Cross-sectional | 467 | .15\* |
| De Bilde, Vansteenkiste & Lens (2011) | Present-Hedonistic | Strategies for learning and studying | High School/ University | 17 | 32.73 | Belgium | Cross-sectional | 275 | -.19\* |
|  | Present-Fatalistic | Strategies for learning and studying | High School/ University | 17 | 32.73 | Belgium | Cross-sectional | 275 | -.26\* |
|  | Future | Strategies for learning and studying | High School/ University | 17 | 32.73 | Belgium | Cross-sectional | 275 | .43\* |
| Donnelly, Iyer & Howell (2012; Study 4) | Past-Positive | Financial management | Community | 34.93 | 34.2 | USA | Cross-sectional | 201 | .02\* |
|  | Past-Negative | Financial management | Community | 34.93 | 34.2 | USA | Cross-sectional | 201 | -.08\* |
|  | Present-Hedonistic | Financial management | Community | 34.93 | 34.2 | USA | Cross-sectional | 201 | -.23\* |
|  | Present-Fatalistic | Financial management | Community | 34.93 | 34.2 | USA | Cross-sectional | 201 | -.24\* |
| Earl, Bednall & Muratore (2015) | Past-Positive | Retirement planning and adjustment | Community | - | 54 | Australia | Cross-sectional | 367 | .17\* |
|  | Past-Negative | Retirement planning and adjustment | Community | - | 54 | Australia | Cross-sectional | 367 | -.18\* |
|  | Present-Hedonistic | Retirement planning and adjustment | Community | - | 54 | Australia | Cross-sectional | 367 | .10\* |
|  | Present-Fatalistic | Retirement planning and adjustment | Community | - | 54 | Australia | Cross-sectional | 367 | -.20\* |
|  | Future | Retirement planning and adjustment | Community | - | 54 | Australia | Longitudinal | 367 | .11 |
| Ekendahl (2007) | Future | Engagement in treatment for substance abuse | Community (substance users) | 32 | 90 | Sweden | Cross-sectional | 29 | .48 |
| Elias, Mustafa, Roslan, & Noah (2010) | Future | Engagement in studying | High School | - | 40.42 | Malaysia | Cross-sectional | 94 | .68 |
| Epel, Bandura & Zimbardo (1999) | Present | Time spent searching for a job and house | Community (Homeless adults) | - | 36.59 | USA | Longitudinal | 48 | -.10\* |
|  | Future | Time spent searching for a job and house | Community (Homeless adults) | - | 36.59 | UA | Longitudinal | 48 | .14\* |
| Foo, Uy & Baron (2009) | Future | Venture effort | University | - | 67.39 | Philippines | Longitudinal | 46 | .11\* |
| Gamboa, Ros, Imaginario & Ortuno (2011) | Past-Positive | Problematic internet use | University | 21.77 | 34.9 | Portuguese | Cross-sectional | 550 | .26r\* |
|  | Past-Negative | Problematic internet use | University | 21.77 | 34.9 | Portuguese | Cross-sectional | 550 | -.20r\* |
|  | Present-Hedonistic | Problematic internet use | University | 21.77 | 34.9 | Portuguese | Cross-sectional | 550 | -.09r\* |
|  | Present-Fatalistic | Problematic internet use | University | 21.77 | 34.9 | Portuguese | Cross-sectional | 550 | -.22r\* |
|  | Future | Problematic internet use | University | 21.77 | 34.9 | Portuguese | Cross-sectional | 550 | .16r\* |
| Gellert, Ziegelmann, Lippke & Schwarzer (2012; Study 1) | Future | Detailed plans to maintain fruit and vegetable intaking | Community | 37.81 | 18.92 | Germany | Cross-sectional | 909 | .12\* |
| Gellert, Ziegelmann, Lippke & Schwarzer (2012; Study 2) | Future | Detailed plans to maintain exercise | Community | 66.6 | 51.9 | Germany | Cross-sectional | 289 | .12\* |
| Guthrie, Lessl, Ochi & Ward (2013) | Present-Hedonistic | Exercise and current smoking behaviour | Community | 44.3 | 52.4 | USA | Cross-sectional | 265 | .01\* |
|  | Present-Fatalistic | Exercise and current smoking behaviour | Community | 44.3 | 52.4 | USA | Cross-sectional | 265 | .03\* |
|  | Future | Exercise and current smoking behaviour | Community | 44.3 | 52.4 | USA | Cross-sectional | 265 | -.01\* |
| Gutierrez-Braojos (2015) | Future | Strategies for learning | University | 22.02 | 16 | Spain | Cross-sectional | 100 | .41\* |
| Halbert, Wrenn, Weathers, Delmoor, Have & Coyne (2010) | Future | Attempts to avoid cancer related thoughts and feelings | Clinical (cancer patients) | 63.6 | 100 | USA | Cross-sectional | 194 | .17 |
|  | Present | Attempts to avoid cancer related thoughts and feelings | Clinical (cancer patients) | 63.6 | 100 | USA | Cross-sectional | 194 | -.02 |
| Hall & Epp (2013) | Future | Engagement in physical activity | Community | 45.21 | 24.80 | USA | Longitudinal | 208 | .26 |
| Hall Fong & Meng (2014) | Future | Smoking behaviour | Community (smokers) | - | 43.30 | Australia/ Canada/ USA/ UK | Cross-sectional | 9772 | .06r |
| Halvari (1991a) | Future | Motivation to succeed and avoid failure | Adolescents | - | 51.63 | Norway | Cross-sectional | 306 | .20\* |
| Halvari (1991b) | Future | Motivation to succeed and avoid failure | High School | - | 100 | Norway | Cross-sectional | 128 | .29\* |
| Halvari (1996) | Future | Motivation to succeed and avoid failure | High School | - | 57.2 | Norway | Cross-sectional | 257 | .27\* |
| Harber, Zimbardo & Boyd (2003; Study 1) | Future | Collecting study credits for degree | University | - | 50.9 | USA | Longitudinal | 80 | .24\* |
| Harber, Zimbardo & Boyd (2003; Study 2) | Future | Number of diary submissions for a diary study | University | - | - | USA | Longitudinal | 102 | .51 |
| Hershey, Henkens & Van Dalen (2010) | Future | Planning and saving for retirement | Community | - | - | USA/ Netherlands | Cross-sectional | 975 | .44\* |
| Hershey, Jacobs-Lawson, McArdle & Hamagami (2007) | Future | Planning for retirement | Community | 36.3 | 43.4 | USA | Cross-sectional | 265 | .41 |
| Horstmanshof & Zimitat (2007) | Past-Positive | Hours spent studying/ Academic application | University | - | 33 | Australia | Cross-sectional | 345 | -.01\* |
|  | Past-Negative | Hours spent studying/ Academic application | University | - | 33 | Australia | Cross-sectional | 345 | -.06\* |
|  | Present-Hedonistic | Hours spent studying/ Academic application | University | - | 33 | Australia | Cross-sectional | 345 | -.21\* |
|  | Present-Fatalistic | Hours spent studying/ Academic application | University | - | 33 | Australia | Cross-sectional | 345 | -.12\* |
|  | Future | Hours spent studying/ Academic application | University | - | 33 | Australia | Cross-sectional | 345 | .39\* |
| Incollingo Belsky, Epel & Tomiyama (2014) | Past-Positive | Calorie intake | Community | 54.95 | 78.5 | USA | Longitudinal | 65 | .12r |
|  | Past-Negative | Calorie intake | Community | 54.95 | 78.5 | USA | Longitudinal | 65 | -.25r |
|  | Present-Hedonistic | Calorie intake | Community | 54.95 | 78.5 | USA | Longitudinal | 65 | .02r |
|  | Present-Fatalistic | Calorie intake | Community | 54.95 | 78.5 | USA | Longitudinal | 65 | -.15r |
|  | Future | Calorie intake | Community | 54.95 | 78.5 | USA | Longitudinal | 65 | .17r |
| Janeiro (2010) | Future | Career planning | High School | 17.9 | 37 | Portugal | Cross-sectional | 320 | .34 |
|  |  | Career planning | Adolescents | 14.3 | 52 | Portugal | Cross-sectional | 300 | .15 |
|  | Present | Career planning | High School | 17.9 | 37 | Portugal | Cross-sectional | 320 | .15 |
|  |  | Career planning | Adolescents | 14.3 | 52 | Portugal | Cross-sectional | 300 | .07 |
|  | Past | Career planning | High School | 17.9 | 37 | Portugal | Cross-sectional | 320 | -.16 |
|  |  | Career planning | Adolescents | 14.3 | 52 | Portugal | Cross-sectional | 300 | -.07 |
| Joireman, Kees & Sprott (2010) | Future | Compulsive buying | University | 21 | 45 | USA | Cross-sectional | 209 | .23r |
| Kairys (2010; Study 1) | Past-positive | Smoking and Alcohol Use | - | - | - | Lithuania | Cross-sectional | 634 | .02r |
|  | Present-Hedonistic | Smoking and Alcohol Use | - | - | - | Lithuania | Cross-sectional | 634 | -.20r |
|  | Future | Smoking and Alcohol Use | - | - | - | Lithuania | Cross-sectional | 634 | .15r |
| Kashio (201) | Past-Positive | Fulfilling achievement motivation | University | 22.06 | 20.8 | Japan | Cross-sectional | 327 | .10 |
|  | Present-Positive | Fulfilling achievement motivation | University | 22.06 | 20.8 | Japan | Cross-sectional | 327 | .31 |
|  | Future | Fulfilling achievement motivation | University | 22.06 | 20.8 | Japan | Cross-sectional | 327 | .33\* |
| Kelly (2003) | Present | Time management | University | 25.6 | 34.62 | USA | Cross-sectional | 130 | .11 |
| King & Gaerlan (2015) | Past-Positive | Use of learning strategies | University | 17.66 | 54.8 | Philippines | Cross-sectional | 385 | .19\* |
|  | Past-Negative | Use of learning strategies | University | 17.66 | 54.8 | Philippines | Cross-sectional | 385 | .06\* |
|  | Present-Hedonistic | Use of learning strategies | University | 17.66 | 54.8 | Philippines | Cross-sectional | 385 | -.13\* |
|  | Present-Fatalistic | Use of learning strategies | University | 17.66 | 54.8 | Philippines | Cross-sectional | 385 | -.00\* |
|  | Future | Use of learning strategies | University | 17.66 | 54.8 | Philippines | Cross-sectional | 385 | .29\* |
| Kooij, de Lange, Jansen, Dikkers (2013; Study 1) | Future | Work engagement | Community (health employees) | 45.7 | 11 | Netherlands | Cross-sectional | 385 | .21 |
|  |  | Work engagement | Community (university employees) | 45.7 | 11 | Netherlands | Cross-sectional | 1169 | .12 |
|  | Present | Work engagement | Community (health employees) | 45.7 | 11 | Netherlands | Cross-sectional | 385 | -0.1 |
|  |  | Work engagement | Community (university employees) | 45.7 | 11 | Netherlands | Cross-sectional | 1169 | -.16 |
| Kovac & Rise (2007) | Future | Action planning to stop smoking | University (smokers) | 22.8 | 37.6 | Norway | Cross-sectional | 93 | .02 |
| Kovac, Lansing, Cameron & Hoigaard (2016) | Future | Action planning to get good grades | University | 25 | 14 | Norway | Cross-sectional | 104 | .55 |
| Lee & Song (2011) | Present-Hedonistic | Compulsive buying | University | 22 | 45 | Korea | Cross-sectional | 208 | -.28r\* |
|  | Present-Fatalistic | Compulsive buying | University | 22 | 45 | Korea | Cross-sectional | 208 | -.33r\* |
|  | Future | Compulsive buying | University | 22 | 45 | Korea | Cross-sectional | 208 | .26r\* |
| Livneh & Martz (2007) | Past-Positive | Adjustment to diabetes diagnosis | Clinical (Diabetes) | 48.9 | 34 | USA | Cross-sectional | 106 | .34 |
|  | Past-Negative | Adjustment to diabetes diagnosis | Clinical (Diabetes) | 48.9 | 34 | USA | Cross-sectional | 106 | -.18 |
|  | Present-Hedonistic | Adjustment to diabetes diagnosis | Clinical (Diabetes) | 48.9 | 34 | USA | Cross-sectional | 106 | .30 |
|  | Present-Fatalistic | Adjustment to diabetes diagnosis | Clinical (Diabetes) | 48.9 | 34 | USA | Cross-sectional | 106 | -.32 |
|  | Future | Adjustment to diabetes diagnosis | Clinical (Diabetes) | 48.9 | 34 | USA | Cross-sectional | 106 | .31 |
| Moore & Dahlen (2008) | Future | Adaptive Expression (e.g., thinking through situation before acting) | University | - | 35 | USA | Cross-sectional | 316 | .21 |
| Noone, O'Loughlin & Kendig (2012) | Future | Financial planning for retirement | Community | - | - |  | Cross-sectional | 705 | .21 |
| Oyanadel & Buela-Casal (2014) | Past-Positive | Various health behaviours | Clinical / Community | - | - | Chile | Longitudinal | 334 | -.03\* |
|  | Past-Negative | Various health behaviours | Clinical / Community | - | - | Chile | Longitudinal | 334 | -.01\* |
|  | Present-Hedonistic | Various health behaviours | Clinical / Community | - | - | Chile | Longitudinal | 334 | -.03\* |
|  | Present-Fatalistic | Various health behaviours | Clinical / Community | - | - | Chile | Longitudinal | 334 | -.03\* |
|  | Future | Various health behaviours | Clinical / Community | - | - | Chile | Longitudinal | 334 | .05\* |
| Pearson, Kite & Henson (2013) | Future | Engaging in protective behavioural strategies | University | - | 31.7 | USA | Cross-sectional | 278 | .22\* |
|  | Present | Engaging in protective behavioural strategies | University | - | 31.7 | USA | Cross-sectional | 278 | -.16\* |
| Phan (2009) | Future | Use of deep and surface learning strategies | University | 22 | 39.27 | Fiji | Cross-sectional | 275 | .34\* |
| Rappange, Brouwer & van Exel (2009) | Future | Engaging in health behaviours | Adolescents | 13.2 | 46.96 | Netherlands | Cross-sectional | 1761 | .12\* |
| Rise, Kovac, Kraft & Moan (2008) | Future | Action planning to stop smoking | University (smokers) | 24.6 | 76 | Norway | Cross-sectional | 103 | .41\* |
| Robbins & Bryan (2004) | Future | Frequency of alcohol consumption | Adolescents | 15.3 | 73 | USA | Cross-sectional | 300 | -.09r |
| Schmitt, Gielnik, Zacher & Klemann (2013) | Future | Engagement at work | Community | 52.7 | - | Germany | Longitudinal | 124 | .27 |
| Schmitt, Zacher & de Lange (2013; Study 1) | Future | Engagement at work | Community | 36.77 | 97.1 | Germany | Cross-sectional | 174 | .31 |
| Schmitt, Zacher & de Lange (2013; Study 1) | Future | Engagement at work | Community | 41.9 | 42 | Germany | Cross-sectional | 64 | .37 |
| Schultheiss & Stead (2004; Study 2) | Future | Planning for future career and information seeking | Adolescents | 10.51 | 52 | USA | Cross-sectional | 447 | .37\* |
| Shell & Husman (2008a) | Future | Time spent studying and study effort | University | - | 37.78 | USA | Cross-sectional | 397 | .02\* |
| Shell & Husman (2008b) | Future | Time spent studying and study effort | University | - | 30.3 | USA | Cross-sectional | 198 | .14\* |
| Tatsumi (2014) | Future | Rehabilitation effort, participation, and competition | Community (athletes) | 20.22 | - | Japan | Cross-sectional | 113 | .25\* |
|  | Present | Rehabilitation effort, participation, and competition | Community (athletes) | 20.22 | - | Japan | Cross-sectional | 113 | .09\* |
|  | Past | Rehabilitation effort, participation, and competition | Community (athletes) | 20.22 | - | Japan | Cross-sectional | 113 | .13\* |
| van der Sluis, Vinkhuyzen, Boomsma & Posthuma (2010a) | Future | Persistence and dedication to school | Community | - | 100 | Netherlands | Cross-sectional | 338 | .16\* |
| van der Sluis, Vinkhuyzen, Boomsma & Posthuma (2010b) | Future | Persistence and dedication to school | Community | - | 0 | Netherlands | Cross-sectional | 497 | .14\* |
| Vinkers, Adriaanse & de Ridder (2013) | Future | Healthy diet and engaging in exercise | Community (weight management group) | 55.86 | 46.11 | Netherlands | Cross-sectional | 167 | .09\* |
| Yoo (2015) | Future | College adjustment | University | 26.98 | 42.7 | North Korea | Cross-sectional | 103 | .61\* |
| Zacher (2013) | Future | Job search intensity | Community | 57.66 | 44.5 | Australia | Cross-sectional | 182 | .14\* |
| Zambianchi & Bitti (2014) | Future | Regulation of negative emotions | University | 22 | 25 | Italy | Cross-sectional | 232 | .20\* |
|  | Present | Regulation of negative emotions | University | 22 | 25 | Italy | Cross-sectional | 232 | .08\* |
| Zimbardo & Boyd 1999 | Past-Positive | Hours spent studying per week | University | - | - | USA | Cross-sectional | 566 | .01 |
|  | Past-Negative | Hours spent studying per week | University | - | - | USA | Cross-sectional | 566 | .06 |
|  | Present-Hedonistic | Hours spent studying per week | University | - | - | USA | Cross-sectional | 566 | -.15 |
|  | Present-Fatalistic | Hours spent studying per week | University | - | - | USA | Cross-sectional | 566 | .02 |
|  | Future | Hours spent studying per week | University | - | - | USA | Cross-sectional | 566 | .28 |

Note. *An asterisks (\*) indicates instance where effect sizes have been combined prior to inclusion in the main analyses. A superscript “r” indicates instances where an effect size has been reverse scored.*

**Appendix 2.7.** Overview and characteristics of the studies exploring the relationship between time perspective and self-regulatory ability

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Authors (year) | Dimension of Time Perspective | Measure of Self-Regulatory Ability | Type of Sample | Age (mean) | Gender (% males) | Country | Study design | *N* | Effect Size (*r*) |
| Alexander, Allen, Brooks, Cole & Campbell (2004; Study 1) | Present | Impulsivity | University | 20.3 | 48.52 | UK | Cross-sectional | 169 | -.43 |
| Alexander, Allen, Brooks, Cole & Campbell (2004; Study 2) | Present | Impulsivity | Community |  | 51.52 | UK | Cross-sectional | 132 | -.60 |
| Anagnostopoulos & Griva (2012) | Past-Negative | Proactive Coping | University | 28.82 | 40.8 | Greece | Cross-sectional | 120 | -.44 |
|  | Past-Positive | Proactive Coping | University | 28.82 | 40.8 | Greece | Cross-sectional | 120 | .11 |
|  | Present-Fatalistic | Proactive Coping | University | 28.82 | 40.8 | Greece | Cross-sectional | 120 | -.36 |
|  | Present-Hedonistic | Proactive Coping | University | 28.82 | 40.8 | Greece | Cross-sectional | 120 | .06 |
| Baumann & Odum (2012) | Past-Negative | Impulsivity | University | 19.88 | 41 | USA | Cross-sectional | 143 | -.08 |
|  | Past-Positive | Impulsivity | University | 19.88 | 41 | USA | Cross-sectional | 143 | .10 |
|  | Present-Fatalistic | Impulsivity | University | 19.88 | 41 | USA | Cross-sectional | 143 | -.13 |
|  | Present-Hedonistic | Impulsivity | University | 19.88 | 41 | USA | Cross-sectional | 143 | -.09 |
| Boniwell, Osin, Linley & Ivanchenko (2010; Study 1) | Past-Negative | Time Competence | University | 24 | 18.44 | UK | Cross-sectional | 179 | -.58 |
|  | Past-Positive | Time Competence | University | 24 - medium | 18.44 | UK | Cross-sectional | 179 | .34 |
|  | Present-Fatalistic | Time Competence | University | 24 | 18.44 | UK | Cross-sectional | 179 | -.09 |
|  | Present-Hedonistic | Time Competence | University | 24 | 18.44 | UK | Cross-sectional | 179 | .31 |
| Carelli & Wilberg (2012) | Future Negative | Inhibition | Clinical (adults with ADHD) | 30.8 | 43.33 | Sweden | Cross-sectional | 29 | .01 |
|  | Future-Negative | Inhibition | Community | 29.89 | 49.18 | Sweden | Cross-sectional | 59 | -.18 |
|  | Past-Negative | Inhibition | Clinical (adults with ADHD) | 30.8 | 43.33 | Sweden | Cross-sectional | 29 | .01 |
|  | Past-Negative | Inhibition | Community | 29.89 | 49.18 | Sweden | Cross-sectional | 59 | -.01 |
|  | Past-Positive | Inhibition | Clinical (adults with ADHD) | 30.8 | 43.33 | Sweden | Cross-sectional | 29 | -.29 |
|  | Past-Positive | Inhibition | Community | 29.89 | 49.18 | Sweden | Cross-sectional | 59 | .24 |
|  | Present-Fatalistic | Inhibition | Clinical (adults with ADHD) | 30.8 | 43.33 | Sweden | Cross-sectional | 29 | .20 |
|  | Present-Fatalistic | Inhibition | Community | 29.89 | 49.18 | Sweden | Cross-sectional | 59 | .02 |
|  | Present-Hedonistic | Inhibition | Clinical (adults with ADHD) | 30.8 | 43.33 | Sweden | Cross-sectional | 29 | .23 |
|  | Present-Hedonistic | Inhibition | Community | 29.89 | 49.18 | Sweden | Cross-sectional | 59 | .01 |
| Carelli, Wiberg & Wiberg | Future Negative | Decision making Style: Avoidant Style | Community | 33.58 | 36.5 | Sweden | Cross-sectional | 40 | -.40 |
|  | Past-Negative | Decision making Style: Avoidant Style | Community | 33.58 | 36.5 | Sweden | Cross-sectional | 40 | -.28 |
|  | Past-Positive | Decision making Style: Avoidant Style | Community | 33.58 | 36.5 | Sweden | Cross-sectional | 40 | .19 |
|  | Present-Fatalistic | Decision making Style: Avoidant Style | Community | 33.58 | 36.5 | Sweden | Cross-sectional | 40 | -.17 |
|  | Present-Hedonistic | Impulsivity | Community | 33.58 | 36.5 | Sweden | Cross-sectional | 40 | -.82 |
| Carey, Henson, Carey & Maisto | Present-Hedonistic | Regulatory-ability | University | - | - | USA | Cross-sectional | 509 | -.23 |
| Carvalho & Novo | Future |  | Adolescents | 16 | 0 | Portugal | Cross-sectional | 351 | -.17 |
| Chavarria, Allan, Moltisanti & Taylor | Past-Negative | Measure of behavioural restraint and inhibition | Community | 33.36 | - | USA | Cross-sectional | 531 | -.19 |
|  | Present hedonistic | Measure of behavioural restraint and inhibition | Community | 33.36 | - | USA | Cross-sectional | 531 | -.41 |
| Dassen, Houben & Jansen | Present | Delay Discounting | Community / University | 31.5 | 22.37 | Netherlands | Cross-sectional | 151 | .10 |
| Daugherty & Brase | Present-Fatalistic | Delay Discounting | University | 18.99 | 37.26 | USA | Cross-sectional | 467 | -.25 |
|  | Present-Hedonistic | Delay Discounting | University | 18.99 | 37.26 | USA | Cross-sectional | 467 | -.18 |
| Diaz-Morales, Ferrari & Cohen | Past-Negative | Decisional Procrastination Scale | Community | 49.78 | 0 | Spain | Cross-sectional | 254 | -.21 |
| Diaz-Morales, Ferrari & Cohen | Past-Negative | Decisional Procrastination Scale | Community | 49.78 | 100 | Spain | Cross-sectional | 255 | -.30 |
|  | Past-Positive | Decisional Procrastination Scale | Community | 49.78 | 0 | Spain | Cross-sectional | 254 | -.09 |
|  | Present-Fatalistic | Decisional Procrastination Scale | Community | 49.78 | 0 | Spain | Cross-sectional | 254 | -.22 |
|  | Present-Fatalistic | Decisional Procrastination Scale | Community | 49.78 | 100 | Spain | Cross-sectional | 255 | -.31 |
|  | Present-Hedonistic | Decisional Procrastination Scale | Community | 49.78 | 0 | Spain | Cross-sectional | 254 | -.03 |
|  | Present-Hedonistic | Decisional Procrastination Scale | Community | 49.78 | 100 | Spain | Cross-sectional | 255 | -.14 |
| Donnelly, Iyer & Howell - Study 4 | Past-Negative | Conscientiousness | Community | 34.93 | 34.2 | USA | Cross-sectional | 205 | -.17 |
|  | Past-Positive | Conscientiousness | Community | 34.93 | 34.2 | USA | Cross-sectional | 205 | .17 |
|  | ZTPI-PF | Conscientiousness | Community | 34.93 | 34.2 | USA | Cross-sectional | 205 | -.129 |
|  | ZTPI-PH | Conscientiousness | Community | 34.93 | 34.2 | USA | Cross-sectional | 205 | -0.012 |
| Duangpatra, Bradley & Glendon | ZTPI- Present | Sensation seeking | Community / University |  | 52.6 | Australia | Cross-sectional | 607 | -0.36 |
| Dunkel & Weber | ZTPI-Past-negative | Conscientiousness | University | 19.76 | 40.82 | USA | Cross-sectional | 196 | -0.19 |
|  | ZTPI-Past-positive | Conscientiousness | University | 19.76 | 40.82 | USA | Cross-sectional | 196 | 0.02 |
|  | ZTPI-Fatalistic | Conscientiousness | University | 19.76 | 40.82 | USA | Cross-sectional | 196 | -0.33 |
|  | ZTPI-Hedonistic | Conscientiousness | University | 19.76 | 40.82 | USA | Cross-sectional | 196 | -0.15 |
| Echeverria, Esteves, Gomes & Ortuno | Present | Sensation Seeking | Mixed | 24.8 |  | Portugal | Cross-sectional | 214 | -0.25 |
| Ein-Gar & Sagiv - study 3 | Past Negative | Self-control | Community / University | 24.56 | 42 | Israel | Cross-sectional | 134 | -0.43 |
|  | Past Positive | Self-control | Community / University | 24.56 | 42 | Israel | Cross-sectional | 134 | -0.095 |
|  | Present Fatalistic | Self-control | Community / University | 24.56 | 42 | Israel | Cross-sectional | 134 | -0.292 |
|  | Present Hedonistic | Self-control | Community / University | 24.56 | 42 | Israel | Cross-sectional | 134 | -0.519 |
| Ely & Mercurio | Past Negative | Conscientiousness | University | 19.1 | 48.7 | USA | Cross-sectional | 230 | -0.27 |
|  | Past Positive | Conscientiousness | University | 19.1 | 48.7 | USA | Cross-sectional | 230 | 0.22 |
| Enzler | Present | Conscientiousness | Community | 54 | 44 | Switzerland | Cross-sectional | 1598 | -0.18 |
| Ferrari & Diaz-Morales | Past-Negative | Avoidant Procrastination | Community | 49.4 | 49.09 | Spain | Cross-sectional | 275 | -0.08 |
|  | Past-Positive | Avoidant Procrastination | Community | 49.4 | 49.09 | Spain | Cross-sectional | 275 | 0.04 |
|  | Present-Fatalistic | Avoidant Procrastination | Community | 49.4 | 49.09 | Spain | Cross-sectional | 275 | -0.295 |
|  | Present- Hedonistic | Avoidant Procrastination | Community | 49.4 | 49.09 | Spain | Cross-sectional | 275 | -0.17 |
| Gamboa, Ros, Imaginario & Ortuno | Past-Negative | Poor self-regulation | University | 21.77 | 34.9 | Portugal | Cross-sectional | 550 | -0.229 |
|  | Past-Positive | Poor self-regulation | University | 21.77 | 34.9 | Portugal | Cross-sectional | 550 | 0.052 |
|  | Past-Positive | Poor self-regulation | University | 21.77 | 34.9 | Portugal | Cross-sectional | 550 | 0.077 |
|  | Present-Fatalistic | Poor self-regulation | University | 21.77 | 34.9 | Portugal | Cross-sectional | 550 | -0.222 |
|  | Present- Hedonistic | Poor self-regulation | University | 21.77 | 34.9 | Portugal | Cross-sectional | 550 | -0.077 |
| Getsinger & Leon | Future | Ego-delay | Neuropsychiatric patients | 33 | 93.75 | USA | Cross-sectional | 80 | 0.23 |
|  | Present | Ego-delay | Neuropsychiatric patients | 33 | 93.75 | USA | Cross-sectional | 80 | -0.04 |
|  | Past | Ego-delay | Neuropsychiatric patients | 33 | 93.75 | USA | Cross-sectional | 80 | 0.32 |
| Gupta, Hershey & Gaur | ZTPI-Future | Procrastination | Community | 28.14 | 59.75 | India | Cross-sectional | 236 | -0.365 |
|  | ZTPI-PN | Procrastination | Community | 28.14 | 59.75 | India | Cross-sectional | 236 | -0.171 |
|  | ZTPI-PP | Procrastination | Community | 28.14 | 59.75 | India | Cross-sectional | 236 | -0.25 |
|  | ZTPI-PF | Procrastination | Community | 28.14 | 59.75 | India | Cross-sectional | 236 | -0.288 |
|  | ZTPI-PH | Procrastination | Community | 28.14 | 59.75 | India | Cross-sectional | 236 | 0.087 |
| Hall Fong & Meng | Future | Sensation seeking | Current smokers | - | 43.3 | Australia/ Canada/ USA/ UK | Cross-sectional | 9772 | 0.13 |
| Heerey, Matveeva & Gold | Future | Delay discounting | Community adults | 47 | 68 | UK | Cross-sectional | 25 | 0.06 |
|  | Future | Delay discounting | Schizophrenia patients | 45.16 | 79.49 | UK | Cross-sectional | 39 | -0.35 |
| Hershey & Mowen | Future | Emotional instability | Community adults | 62.6 | - | USA | Cross-sectional | 230 | -0.24 |
| Hershfield, Goldstein, Sharpe, Fox, Yetkelis, Carstensen, Bailsenson - study 2 | Future | Temporal discoutning | Not clear just refers to participants | 20.08 | 28.57 | USA | Experimental | 21 | 0.3302 |
| Incollingo Belsky, Epel & Tomiyama | ZTPI-Future | Restrained Eating | Community | 54.95 | 78.5 | USA | - | 65 | 0.343 |
|  | ZTPI-PN | Restrained Eating | Community | 54.95 | 78.5 | USA | - | 65 | -0.373 |
|  | ZTPI-PP | Restrained Eating | Community | 54.95 | 78.5 | USA | - | 65 | 0.176 |
|  | ZTPI-PF | Restrained Eating | Community | 54.95 | 78.5 | USA | - | 65 | -0.361 |
|  | ZTPI-PH | Restrained Eating | Community | 54.95 | 78.5 | USA | - | 65 | -0.281 |
| Kairys - study 1 | ZTPI-PN | Conscientiousness | Not reported |  |  | Lithuania | Cross-sectional | 636 | -0.162 |
|  | ZTPI-PP | Conscientiousness | Not reported | Not reported | Not reported | Lithuania | Cross-sectional | 636 | 0.195 |
|  | ZTPI-PF | Conscientiousness | Not reported |  |  | Lithuania | Cross-sectional | 636 | -0.137 |
|  | ZTPI-PH | Conscientiousness | Not reported |  |  | Lithuania | Cross-sectional | 636 | -0.192 |
| Kairys - study 2 | ZTPI-PN | Conscientiousness | Not reported | 28.1 | 21 | Lithuania | Cross-sectional | 153 | -0.288 |
|  | ZTPI-PP | Conscientiousness | Not reported | 28.1 | 21 | Lithuania | Cross-sectional | 153 | -0.03 |
|  | ZTPI-PF | Conscientiousness | Not reported | 28.1 | 21 | Lithuania | Cross-sectional | 153 | -0.466 |
|  | ZTPI-PH | Conscientiousness | Not reported | 28.1 | 21 | Lithuania | Cross-sectional | 153 | -0.261 |
| Kairys | ZTPI-PN | Conscientiousness | Students and Community adults | 38.5 | 31.6 | Lithuania | Cross-sectional | 527 | -0.18 |
|  | ZTPI-PP | Conscientiousness | Students and Community adults | 38.5 | 31.6 | Lithuania | Cross-sectional | 521 | 0.206 |
|  | ZTPI-PF | Conscientiousness | Students and Community adults | 38.5 | 31.6 | Lithuania | Cross-sectional | 523 | -0.161 |
|  | ZTPI-PH | Conscientiousness | Students and Community adults | 38.5 | 31.6 | Lithuania | Cross-sectional | 516 | -0.197 |
| Keough, Zimbardo & Boyd - study 2 | ZTPI-22 Present | Conscientiousness | community college | 23.63 | 35 | USA | Cross-sectional | 206 | -0.065 |
| Lennings | Future | Impulsivity/ Sensation seeking | University | 21.9 | 21.57 | Australia | Cross-sectional | 102 | -0.05 |
|  | Present | Impulsivity/ Sensation seeking | University | 21.4 | 30.23 | Australia | Cross-sectional | 86 | -0.06 |
|  | Past | Impulsivity/ Sensation seeking | University | 21.9 | 21.57 | Australia | Cross-sectional | 102 | 0.063 |
|  | Past | Impulsivity/ Sensation seeking | University | 21.4 | 30.23 | Australia | Cross-sectional | 86 | 0.24 |
|  | Future | Impulsivity | University & High school | 18 | 74.01 | Australia | Cross-sectional | 395 | -0.04 |
|  | Past | Impulsivity | University & High school | 18 | 74.01 | Australia | Cross-sectional | 395 | 0.11 |
| Lennings & Burns - study 1 | Future | Impulsivity | University | 22.5 | 21.74 | Australia | Cross-sectional | 69 | 0.11 |
|  | Past | Impulsivity | University | 22.5 | 21.74 | Australia | Cross-sectional | 69 | 0.137 |
| Lennings & Burns - study 2 | Future | Impulsivity | University | 22.24 | 24.68 | Australia | Cross-sectional | 77 | -0.25 |
| Lilienfeld, Hess & Rowland | Future | Impulsivity | University | 18.89 | 38.61 | USA | Cross-sectional | 84 | -0.48 |
| Louch, Dalkin, Bodansky & Conner | Future | Conscientiousness | Clinical (Diabetes) | - | 38.89 | UK | Cross-sectional | 18 | .45 |
| Lynch | Future | Impulsivity | Community | 79.95 | 0 | USA | Cross-sectional | 80 | .1455 |
| MacKillop, Castelda, Mattson, & Donovick | ZTPI- Future | Impulsivity | University | 19.45 | 75.5 | USA | Cross-sectional | 105 | -.44 |
|  | ZTPI- Past Negative | Impulsivity | University | 19.45 | 75.5 | USA | Cross-sectional | 105 | -.31 |
|  | ZTPI - Past Positive | Impulsivity | University | 19.45 | 75.5 | USA | Cross-sectional | 105 | .19 |
|  | ZTPI- Present Fatalistic | Impulsivity | University | 19.45 | 75.5 | USA | Cross-sectional | 105 | -.46 |
|  | Present hedonistic | Impulsivity | University | 19.45 | 75.5 | USA | Cross-sectional | 105 | -.65 |
| McKay, Cole, Percy, Worrell & Mello | Future Negative | Sensation seeking | Adolescents | 12.5 | 58.3 | UK | Cross-sectional | 1580 | -.06 |
|  | Future Positive | Sensation seeking | Adolescents | - | 58.3 | UK | Cross-sectional | 1580 | .06 |
|  | Future Positive | Sensation seeking | Adolescents | - | 51.9 | UK | Cross-sectional | 813 | .10 |
|  | Past Negative | Sensation seeking | Adolescents | - | 58.3 | UK | Cross-sectional | 1580 | -0.1 |
|  | Past Positive | Sensation seeking | Adolescents | - | 58.3 | UK | Cross-sectional | 1580 | .03 |
|  | Past Positive | Sensation seeking | Adolescents | - | 51.9 | UK | Cross-sectional | 813 | -.02 |
| Milfont & Schwarzenthal | ZTPI-DBTP | Delay of gratification | University | 18.9 | 28.9 | New Zealand | Cross-sectional | 142 | .44 |
|  | Present | Delay of gratification | University | 18.9 | 28.9 | New Zealand | Cross-sectional | 142 | -.10 |
|  | Past Negative | Delay of gratification | University | 18.9 | 28.9 | New Zealand | Cross-sectional | 142 | -.39 |
|  | Past Positive | Delay of gratification | University | 18.9 | 28.9 | New Zealand | Cross-sectional | 142 | .19 |
|  | Present Fatalistic | Delay of gratification | University | 18.9 | 28.9 | New Zealand | Cross-sectional | 142 | -.37 |
|  | Present hedonistic | Delay of gratification | University | 18.9 | 28.9 | New Zealand | Cross-sectional | 142 | -.09 |
|  | Past | Delay of gratification | University | 18.9 | 28.9 | New Zealand | Cross-sectional | 142 | -.09 |
| Monahan, Steinberg, Cauffman & Mulvey | Future | Impulse control | Adolescents | 16.5 | 100 | USA | Cross-sectional | 1105 | .21 |
| Moore & Dahlen | Future | Anger tendencies | University | - | 35 | USA | Cross-sectional | 316 | .02 |
| Morsanyi & Fogarasi | ZTPI - Future | Delayed discounting | Adolescents | 16.7 | 60 | Hungary | Cross-sectional | 40 | -.04 |
|  | Past Negative | Delayed discounting | Adolescents | 16.7 | 60 | Hungary | Cross-sectional | 40 | -.12 |
|  | Past Positive | Delayed discounting | Adolescents | 16.7 | 60 | Hungary | Cross-sectional | 40 | .14 |
|  | Present Fatalistic | Delayed discounting | Adolescents | 16.7 | 60 | Hungary | Cross-sectional | 40 | .23 |
|  | Present hedonistic | Delayed discounting | Adolescents | 16.7 | 60 | Hungary | Cross-sectional | 40 | -0.05 |
| Mullan, Allom, Brogan, Kothe & Todd | Future | Impulsivity | University | 20.3 | 26 | Australian | Cross-sectional | 154 | -.51 |
| Muro, Castella, Sotoca, Estaun, Valero & Goma-i-Freixanet | Future | Impulsivity | University | 19.98 | 55.6 | Spain | Cross-sectional | 196 | -.478 |
|  | Past-Negative | Impulsivity | University | 19.98 | 55.6 | Spain | Cross-sectional | 196 | -.03 |
| Muro, Castella, Sotoca, Estaun, Valero & Goma-i-Freixanet | Present Hedonistic | Impulsivity | University | 19.98 | 55.6 | Spain | Cross-sectional | 196 | -.47 |
| Olate, Salas-Wright & Vaughn | Negative-Future | Impulsivity | high risk non-gang members and gang members | - | - | Mexico | Cross-sectional | 174 | -.16 |
| Oncel | Future | Proactivity | University | 22.84 | 52.7 | Turkey | Cross-sectional | 332 | .31 |
| Orkibi | ZTPI-DBTP | Self-control | University | - | 3 | Israel | Cross-sectional | 112 | .15 |
|  | Future | Self-control | University | - | 3 | Israel | Cross-sectional | 112 | .44 |
|  | Past Negative | Self-control | University | - | 3 | Israel | Cross-sectional | 112 | .12 |
|  | ZTPI-Past Positive | Self-control | University | - | 3 | Israel | Cross-sectional | 112 | .25 |
|  | ZTPI-Present Fatalistic | Self-control | University | - | 3 | Israel | Cross-sectional | 112 | .09 |
|  | ZTPI-Present Hedoinstic | Self-control | University | - | 3 | Israel | Cross-sectional | 112 | .27 |
| Ouwehand, de Ridder & Bensing | Future | Proactive coping | Community | 61.8 | 51.22 | Netherlands | Cross-sectional | 123 | .36 |
| Pearson, Kite & Henson | Future | Problem solving | University | - | 31.7 | USA | Cross-sectional | 278 | .53 |
|  | Present | Problem solving | University | - | 31.7 | USA | Cross-sectional | 278 | -.43 |
| Prenda & Lachman - Study 1 | Future | Conscientiousness | Community | 46.9 | 49 | USA | Cross-sectional | 2971 | .26 |
| Prenda & Lachman - Study 2 | Future | Conscientiousness | Community | 47.9 | 56 | USA | Cross-sectional | 300 | .24 |
| Rappange, Brouwer & van Exel | Future | Delay discounting | Adolescents | 13.2 | 46.96 | Netherlands | Cross-sectional | 1761 | .2 |
| Romer, Duckworth, Sznitman & Park | Future | Delay of gratification | Mixed | 17.75 | - | USA | Cross-sectional | 888 | .09 |
| Rossi & Mebert | Future | Proactive coping | High school/ University | - | - | USA | Cross-sectional | 347 | .42 |
| Seidmahmoodi, Rahimi & Mohamadi | Positive-Future | Novelty seeking | University (experienced a traumatic event) | 22.03 | 49.75 | Iran | Cross-sectional | 201 | .32 |
| Shipp, Edwards, & Lambert - study 2 | Present | Risk taking tendencies | University | 21 | 53.4 | USA | Cross-sectional | 360 | -.253 |
|  | ZTPI-PN | Risk taking tendencies | University | 21 | 53.4 | USA | Cross-sectional | 360 | -.08 |
|  | ZTPI-PP | Conscientiousness | University | 21 | 53.4 | USA | Cross-sectional | 360 | .25 |
|  | ZTPI-PF | Conscientiousness | University | 21 | 53.4 | USA | Cross-sectional | 360 | -.47 |
|  | ZTPI-PH | Risk taking tendencies | University | 21 | 53.4 | USA | Cross-sectional | 360 | -.416 |
| Shipp, Edwards, & Lambert - study 2 | Temporal Orientation Scale - Past | Risk taking | University | 21 | 53.4 | USA | Cross-sectional | 360 | -.068 |
| Strathman, Boninger & Edwards - study 2 | Future | Conscientiousness | University | - | - | USA | Cross-sectional | 60 | .49 |
| Strobel, Tumasjan, Sporrle, Welpe | Future | Conscientiousness | Community | 39.62 | 45 | Germany | Cross-sectional | 845 | .05 |
| Treadway, Breland, Adams, Duke & Williams | Future | Political skill | Community | 30.6 | 47.4 | USA | Cross-sectional | 267 | 0.36 |
| van Beek, Berghuis, Kerkhof & Beekman | ZTPI-PN | Self-Control | Community | 31 | 40 | Netherlands | Cross-sectional | 76 | -.74 |
|  | ZTPI-PP | Self-Control | Community | 31 | 40 | Netherlands | Cross-sectional | 76 | .47 |
|  | ZTPI-PF | Self-Control | Community | 31 | 40 | Netherlands | Cross-sectional | 76 | -.51 |
|  | ZTPI-PH | Self-Control | Community | 31 | 40 | Netherlands | Cross-sectional | 76 | -.04 |
| van den Bos, Rodriguez, Schweitzer, McClure | ZTPI- Future | Delay discounting | Adolescents | 16.76 | 48 | - | Cross-sectional | 50 | .42 |
|  | Present-Hedonistic | Delay discounting | Adolescents | 16.76 | 48 | - | Cross-sectional | 50 | -.22 |
| Vowinckel, Westerhof, Bohlmeijer & Webster | BTPS - Past (Webster) | Flow-Proneness at work | University | 25.7 | 44.27 | Netherlands | Cross-sectional | 131 | .28 |
|  | ZTPI-PN | Flow-Proneness at work | University | 25.7 | 44.27 | Netherlands | Cross-sectional | 131 | -.30 |
|  | ZTPI-PP | Flow-Proneness at work | University | 25.7 | 44.27 | Netherlands | Cross-sectional | 131 | .26 |
|  | ZTPI-PF | Flow-Proneness at work | University | 25.7 | 44.27 | Netherlands | Cross-sectional | 131 | -.20 |
|  | ZTPI-PH | Flow-Proneness at work | University | 25.7 | 44.27 | Netherlands | Cross-sectional | 131 | .195 |
| Wakefield, Homewood, Taylot, Mahmut & Meiser - study 1 | ZTPI-Future | Sensation Seeking | Community | 35.4 | 32.2 | Australia | Cross-sectional | 276 | -.25 |
|  | ZTPI-PN | Sensation Seeking | Community | 35.4 | 32.2 | Australia | Cross-sectional | 276 | -.02 |
|  | ZTPI-PP | Sensation Seeking | Community | 35.4 | 32.2 | Australia | Cross-sectional | 276 | -.16 |
|  | ZTPI-PF | Sensation Seeking | Community | 35.4 | 32.2 | Australia | Cross-sectional | 276 | -.14 |
|  | ZTPI-PH | Sensation Seeking | Community | 35.4 | 32.2 | Australia | Cross-sectional | 276 | -.50 |
| Wei & Taormina | Future | Determination subscale of Personal Resilience | Community | 34.31 | 47.14 | China | Cross-sectional | 70 | .79 |
| Wei & Taormina | Future | Determination subscale of Personal Resilience | Community | 37.42 | 30.74 | China | Cross-sectional | 244 | .40 |
| Willis, Sandy & Yaeger | Present | Ability to resist smoking | High School | 11.8 | 52 | USA | Cross-sectional | 440 | -.15 |
| Yi, Carter & Landes | ZTPI-Future | Future discounting | Community / Clinical | 35.2 | 60 | USA | Cross-sectional | 65 | -.44 |
|  | ZTPI-PF | Future discounting | Community / Clinical | 35.2 | 60 | USA | Cross-sectional | 65 | .50 |
|  | ZTPI-PH | Future discounting | Community / Clinical | 35.2 | 60 | USA | Cross-sectional | 65 | -.39 |
|  | ZTPI-Past | Future discounting | Community / Clinical | 35.2 | 60 | USA | Cross-sectional | 65 | -.19 |
| Zacher | Future | Conscientiousness | Community | 48.17 | 48.9 | Australia | Cross-sectional | 659 | .05 |
|  | Future | Conscientiousness | Community | 57.66 | 44.5 | Australia | Cross-sectional | 182 | .34 |
|  | Present | Conscientiousness | Community | 48.17 | 48.9 | Australia | Cross-sectional | 659 | .19 |
|  | Past | Conscientiousness | Community | 48.17 | 48.9 | Australia | Cross-sectional | 659 | .01 |
| Zacher & Frese | Future | Conscientiousness | Community | 38.66 | 43.75 | Germany | Cross-sectional | 176 | -.28 |
| Zambianchi & Bitti | Present | Proactive coping | University | 22 | 25 | Italy | Cross-sectional | 232 | -.16 |
| Zhang & Howell | ZTPI-Future | Conscientiousness | University | 25.02 | 25.73 | USA | Cross-sectional | 754 | .54 |
|  | ZTPI-PN | Conscientiousness | University | 25.02 | 25.73 | USA | Cross-sectional | 754 | -.25 |
|  | ZTPI-PP | Conscientiousness | University | 25.02 | 25.73 | USA | Cross-sectional | 754 | .19 |
|  | ZTPI-PF | Conscientiousness | University | 25.02 | 25.73 | USA | Cross-sectional | 754 | -.29 |
|  | ZTPI-PH | Conscientiousness | University | 25.02 | 25.73 | USA | Cross-sectional | 754 | -.14 |
| Zhang, Wang & Pearce | Future | Conscientiousness | University/ Community | 35.96 | 39.8 | China | Cross-sectional | 161 | 0.10 |
| Zimbardo & Boyd (1999) | ZTPI-PN | Conscientiousness | University | 23.6 | 35 | USA | Cross-sectional | 205 | -.09 |
|  | ZTPI-PP | Conscientiousness | University | 23.6 | 35 | USA | Cross-sectional | 205 | .04 |
|  | ZTPI-PF | Conscientiousness | University | 23.6 | 35 | USA | Cross-sectional | 205 | -.12 |
|  | ZTPI-PH | Conscientiousness | University | 23.6 | 35 | USA | Cross-sectional | 205 | -.17 |

Note. *An asterisks (\*) indicates instance where effect sizes have been combined prior to inclusion in the main analyses. A superscript “r” indicates instances where an effect size has been reverse scored.*

**Appendix 2.8**. Overview and characteristics of the studies exploring the relationship between time perspective and goal outcomes

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Authors (year)** | **Dimension of Time Perspective** | **Measure of Goal Outcomes** | **Type of Sample** | **Age (mean)** | **Gender (% males)** | **Country** | **Study design** | ***N*** | **Effect Size (*r*)** |
| Adams & Nettle (2009a) | Future | Probability of living to 75 years | Community | 34.7 | 18.2 | USA | Cross-sectional | 392 | .16\* |
| Adams & White (2009) | Future | Self-rated health/ BMI | Community | 50.5 | 41.42 | UK | Cross-sectional | 804 | .13\* |
| Adelabu (2008) | Future | GPA | High School | 15 | 41.27 | USA | Cross-sectional | 661 | .12\* |
| Adelabu (2007) | Future | GPA | High School | 16.5 | 40.09 | USA | Cross-sectional | 232 | .12 |
|  | Present | GPA | High School | 16.5 | 40.09 | USA | Cross-sectional | 232 | -.31 |
| Agnew & Loving (1999a) | Future | Condom use | University | - | 0 | USA | Cross-sectional | 59 | .19 |
| Agnew & Loving (1999b) | Future | Condom use | University | - | 100 | USA | Cross-sectional | 62 | .33 |
| Alberts & Dunton (2008) | Future | Illness self-management behaviours | Clinical (Osteoarthritis) | 70.2 | 0 | USA | Cross-sectional | 74 | -.11\* |
| Alea & Bluck (2013; Study 1) | Future | Self-rated health | University/ Community | - | 47 | USA | Cross-sectional | 174 | .16 |
| Alvos, Gregson & Ross (1993) | Future | Substance use | Community (Drug users) | - | 64 | Australia | Cross-sectional | 50 | .03r |
| Andretta, Worrell & Mello (2014) | Past-Positive | GPA | High School | 16 | 60 | USA | Cross-sectional | 300 | .20 |
|  | Past-Negative | GPA | High School | 16 | 60 | USA | Cross-sectional | 300 | -.18 |
|  | Present-Positive | GPA | High School | 16 | 60 | USA | Cross-sectional | 300 | .09 |
|  | Present-Negative | GPA | High School | 16 | 60 | USA | Cross-sectional | 300 | -.04 |
|  | Future-Positive | GPA | High School | 16 | 60 | USA | Cross-sectional | 300 | .05 |
|  | Future-Negative | GPA | High School | 16 | 60 | USA | Cross-sectional | 300 | -.25 |
| Apostolidis, Fieulaine & Soule (2006) | Future | Cannabis use | Adolescents | 15.6 | 46.38 | France | Cross-sectional | 114 | .19r |
| Apostolidis, Fieulaine, Simonin & Rolland (2006) | Past-Positive | Cannabis use | University | 21.8 | 50.51 | France | Cross-sectional | 198 | -.03 |
|  | Past-Negative | Cannabis use | University | 21.8 | 50.51 | France | Cross-sectional | 198 | .10 |
|  | Present-Hedonistic | Cannabis use | University | 21.8 | 50.51 | France | Cross-sectional | 198 | -.13 |
|  | Present-Fatalistic | Cannabis use | University | 21.8 | 50.51 | France | Cross-sectional | 198 | -.01 |
|  | Future | Cannabis use | University | 21.8 | 50.51 | France | Cross-sectional | 198 | .19 |
| Appleby, Marks, Ayala, Miller, Murphy & Mansergh (2016) | Future | Risky Sex behaviours | Community | - | 100 | USA | Cross-sectional | 310 | .20\* |
| Aronowitz, Morrison-Beedy (2004) | Positive-Future | Risky sexual behaviours/ substance use/ delinquent behaviour/ violence | Adolescents | 14 | 0 | USA | Cross-sectional | 443 | .08\* |
| Bal, de Lange, Zacher & Van der Heijden (2013) | Future | Self-rated health | Community | - | - | Belgium & Netherlands | Cross-sectional | 334 | -.28 |
| Bal, Jansen, van der Velde, de Lange & Rousseau (2010) | Future | Self-rated health | Community | 69 | 76 | Netherlands | Cross-sectional | 176 | .21 |
| Balliet & Ferris (2010; Study 2) | Future | Helping behaviour | Community | 48 | 52 | Singapore | Cross-sectional | 128 | .22 |
| Barabasz (1970) | Future | GPA | University | - | - | USA | Cross-sectional | 31 | .09 |
| Barber, Munz, Bagsby & Grawitch (2009) | Present-Hedonistic | GPA | University | 19.59 | 21.4 | USA | Cross-sectional | 318 | -.20 |
|  | Future | GPA | University | 19.59 | 21.4 | USA | Cross-sectional | 318 | .27 |
| Barndt & Johnson (1995) | Future | Committed a crime | Adolescents | 16.85 | 100 | USA | Cross-sectional | 52 | 0.28r |
| Barnett, Spruijt-Metz, Unger, Rohrbach, Sun & Sussman (2013) | Future | Engagement in risky health behaviours (e.g., smoking, drinking, drug use) | Adolescents | 16.8 | 58.2 | USA | Cross-sectional | 1279 | -.12r\* |
| Beenstock, Adams, White (2013) | Future | Alcohol use | University | - | 40.10 | UK | Cross-sectional | 322 | .50r |
| Beenstock, Lindson-Hawley, Aveyard & Adams (2014) | Future | Smoking cessation | Community (smokers) | - | 50.22 | UK | Longitudinal | 697 | .03\* |
| Bellone, Navarick & Mendoza (2012) | Present-Hedonistic | Task persistence (continued vs. quit) | University | - | - | USA | Cross-sectional | 70 | -.22 |
|  | Future | Task persistence (continued vs. quit) | University | - | - | USA | Cross-sectional | 70 | .24 |
| Bode, de Ridder, Kuijer & Bensing (2007) | Future | Self-rated health | Community | 61.46 | - | Netherlands | Cross-sectional | 158 | -.09 |
| Bowles (2008) | Future | Academic achievement | High school | 16.45 | 49.56 | Australia | Cross-sectional | 75.5 | .12\* |
|  | Past | Academic achievement | High school | 16.45 | 49.56 | Australia | Cross-sectional | 75.5 | -.19\* |
| Braitman & Henson (2015) | Past-Positive | Blood alcohol concentration/ days passed out from drinking | University | 20.41 | 34.9 | USA | Cross-sectional | 431 | .03r\* |
|  | Past-Negative | Blood alcohol concentration/ days passed out from drinking | University | 20.41 | 34.9 | USA | Cross-sectional | 431 | .03r\* |
|  | Present-Hedonistic | Blood alcohol concentration/ days passed out from drinking | University | 20.41 | 34.9 | USA | Cross-sectional | 431 | -.23r\* |
|  | Present-Fatalistic | Blood alcohol concentration/ days passed out from drinking | University | 20.41 | 34.9 | USA | Cross-sectional | 431 | -.12r\* |
|  | Future | Blood alcohol concentration/ days passed out from drinking | University | 20.41 | 34.9 | USA | Cross-sectional | 431 | .20r\* |
| Brothers, Chui & Diehl (2014) | Future | Self-rated health | Community | 34.7 | 48.25 | USA | Cross-sectional | 611 | .28 |
|  | Future-Negative | Self-rated health | Community | 34.7 | 48.25 | USA | Cross-sectional | 611 | -.14\* |
| Burns & Dillon (2005) | Future | Condom use | University | 21.1 | 32.1 | USA | Cross-sectional | 99 | .29\* |
| Carey, Henson, Carey & Maisto (2007) | Present-Hedonistic | Blood alcohol concentration/ problems arising from alcohol use | University | - | - | USA | Cross-sectional | 509 | -.30r\* |
|  | Future | Blood alcohol concentration/ problems arising from alcohol use | University | - | - | USA | Cross-sectional | 509 | .22r\* |
| Carmi (2012) | Future | Various health and pro-environmental behaviours | University | 24.2 | 27 | Israel | Cross-sectional | 333 | .23\* |
| Carmi & Arnon (2014) | Future | Engagement in various pro-environmental behaviours | Community | 46.1 | 46.2 | Israel | Cross-sectional | 1216 | .34 |
| Carmi & Bartal (2014) | Future | Engagement in various pro-environmental behaviours | University/ Community | 32.2 | 30.5 | Israel | Cross-sectional | 361 | .27 |
| Carvalho (2015; Study 1) | Future | GPA | Adolescents | 16 | 56 | Portugal | Cross-sectional | 429 | .32 |
| Carvalho & Novo (2015a) | Future | School achievement/ behavioural problems/ risk behaviours | Adolescents | 16 | 0 | Portugal | Cross-sectional | 351 | .17\* |
| Carvalho & Novo (2015b) | Future | School achievement/ behavioural problems/ risk behaviours | Adolescents | 16 | 100 | Portugal | Cross-sectional | 351 | .32\* |
| Chavarria, Allan, Moltisanti & Taylor (2015) | Past-Negative | Alcohol and drug use | Community | 33.36 | - | USA | Cross-sectional | 531 | -.23r\* |
|  | Present-Hedonistic | Alcohol and drug use | Community | 33.36 | - | USA | Cross-sectional | 531 | -.23r\* |
| Chittaro & Vianello (2013) | Past-Positive | Problematic internet use | Community | 32.4 | 53.02 | Italy | Cross-sectional | 149 | .08r |
|  | Past-Negative | Problematic internet use | Community | 32.4 | 53.02 | Italy | Cross-sectional | 149 | -.37r |
|  | Present-Hedonistic | Problematic internet use | Community | 32.4 | 53.02 | Italy | Cross-sectional | 149 | .03r |
|  | Present-Fatalistic | Problematic internet use | Community | 32.4 | 53.02 | Italy | Cross-sectional | 149 | -.26r |
|  | Future | Problematic internet use | Community | 32.4 | 53.02 | Italy | Cross-sectional | 149 | .09r |
| Chubick, Rider, Owen, Witherspoon & Witherspoon (1999) | Future | Successful completion of vocational training program in prison | Community (prisoners) | 30.65 | 100 | USA | Longitudinal | 34 | .38 |
| Copping, Campbell, & Muncer (2014) | Future | Aggression | Adolescent/ University | 16.87 | 41.3 | UK | Cross-sectional | 741 | .12r |
| Corral-Verdugo, Bonnes, Tapia-Fonllem, Fraijo-Sing, Frias-Armenta & Carrus (2014; Study 2) | Future | Engagment in pro-environmental behaviour | Community | 31.5 | 45.65 | Mexico | Cross-sectional | 230 | .26 |
| Daniel, Stanton & Epstein (2013) | Past-Positive | Weight (overweight/ obese vs. not) | University/ Community | 24.91 | 0 | USA | Cross-sectional | 48 | -.10r |
|  | Past-Negative | Weight (overweight/ obese vs. not) | University/ Community | 24.91 | 0 | USA | Cross-sectional | 48 | -.04r |
|  | Present-Hedonistic | Weight (overweight/ obese vs. not) | University/ Community | 24.91 | 0 | USA | Cross-sectional | 48 | .03r |
|  | Present-Fatalistic | Weight (overweight/ obese vs. not) | University/ Community | 24.91 | 0 | USA | Cross-sectional | 48 | .01r |
|  | Future | Weight (overweight/ obese vs. not) | University/ Community | 24.91 | 0 | USA | Cross-sectional | 48 | .09r |
| Dassen, Houben & Jansen (2015) | Future | Self-reported BMI | University/ Community | 31.5 | 22.37 | Netherlands | Cross-sectional | 151 | .06r |
| Daugherty & Brase (2010) | Present-Hedonistic | Age expected to live | University | 18.99 | 37.26 | USA | Cross-sectional | 467 | .11 |
|  | Present-Fatalistic | Age expected to live | University | 18.99 | 37.26 | USA | Cross-sectional | 467 | .00 |
|  | Future | Life expectancy | University | 18.99 | 37.26 | USA | Cross-sectional | 467 | .09\* |
| Dilorio, Parsons, Lehr, Adame, Carlone (1993) | Future | Engaging in behaviours that reduce HIV risk | University | 18.1 | 88.6 | USA | Cross-sectional | 352 | .22 |
| Donnelly, Iyer & Howell (2012; Study 4) | Past-Positive | Amount of savings | Community | 34.93 | 34.2 | USA | Cross-sectional | 199.5 | -.02\* |
|  | Past-Negative | Amount of savings | Community | 34.93 | 34.2 | USA | Cross-sectional | 199.5 | .02\* |
|  | Present-Hedonistic | Amount of savings | Community | 34.93 | 34.2 | USA | Cross-sectional | 199.5 | -.15\* |
|  | Present-Fatalistic | Amount of savings | Community | 34.93 | 34.2 | USA | Cross-sectional | 199.5 | -.04\* |
| Duangpatra, Bradley & Glendon (2009) | Future | Reckless behaviours (e.g., risky driving. substance use) | Community/ University | - | 52.6 | Australia | Cross-sectional | 607 | .13r\* |
|  | Present | Reckless behaviours (e.g., risky driving. substance use) | Community/ University | - | 52.6 | Australia | Cross-sectional | 607 | -.21r\* |
| Dunkel & Decker (201) | Future | Life expectancy | Community | 27.52 | 35.59 | USA | Cross-sectional | 236 | 0.18 |
| Earl, Bednall & Muratore (2015) | Past-Positive | Psychological well-being as a result of retirement | Community | 64.90 | 54 | Australia | Longitudinal | 367 | 0.12\* |
|  | Past-Negative | Psychological well-being as a result of retirement | Community | 64.90 | 54 | Australia | Longitudinal | 367 | -.24\* |
|  | Present-Hedonistic | Psychological well-being as a result of retirement | Community | 64.90 | 54 | Australia | Longitudinal | 367 | -.04\* |
|  | Present-Fatalistic | Psychological well-being as a result of retirement | Community | 64.90 | 54 | Australia | Longitudinal | 367 | -.24\* |
|  | Future | Psychological well-being as a result of retirement | Community | 64.90 | 54 | Australia | Longitudinal | 367 | .06\* |
| Ebreo & Vining (2001a) | Future | Waste reduction behaviours | Community | 46 | 40.63 | USA | Cross-sectional | 32 | -0.06 |
| Ebreo & Vining (2001b) | Future | Recycling behaviour | Community | 44.3 | 39.7 | USA | Cross-sectional | 63 | .41 |
| Enzler (2015) | Future | Various pro-environmental behaviours | Community | 54 | 44 | Switzerland | Cross-sectional | 1651 | .05\* |
|  | Present | Various pro-environmental behaviours | Community | 54 | 44 | Switzerland | Cross-sectional | 1651 | -.07\* |
| Epel, Bandura & Zimbardo (1999) | Future | Duration at homeless shelter | Community (homeless adults) | - | 36.59 | USA | Longitudinal | 82 | .18r |
|  | Present | Duration at homeless shelter | Community (homeless adults) | - | 36.59 | USA | Longitudinal | 82 | -.08r |
| Epstein, Jankowiak, Lin, Paluch, Koffarnus & Bickel (2014) | Future | Probability of living to 75 years | Community | 34.2 | 51.1 | USA | Cross-sectional | 975 | .12 |
| Gamboa, Ros, Imaginario & Ortuno (2011) | Past-Positive | Negative consequences as a result of problematic internet use | University | 21.77 | 34.9 | Portugal | Cross-sectional | 550 | .07r |
|  | Past-Negative | Negative consequences as a result of problematic internet use | University | 21.77 | 34.9 | Portugal | Cross-sectional | 550 | -.20r |
|  | Present-Hedonistic | Negative consequences as a result of problematic internet use | University | 21.77 | 34.9 | Portugal | Cross-sectional | 550 | -.01r |
|  | Present-Fatalistic | Negative consequences as a result of problematic internet use | University | 21.77 | 34.9 | Portugal | Cross-sectional | 550 | -.18r |
|  | Future | Negative consequences as a result of problematic internet use | University | 21.77 | 34.9 | Portugal | Cross-sectional | 550 | .12r |
| Gardner, Wansink, Kim & Park (2014; Study 3a) | Future | Choosing unhealthy foods | University | - | - | USA/ Korea | Experimental | 108 | .25 |
| Gardner, Wansink, Kim & Park (2014; Study 3b) | Future | Choosing unhealthy foods | University | - | - | USA | Experimental | 99 | .30 |
| Gellert, Ziegelmann, Lippke & Schwarzer (2012; Study 1) | Future | Fruit and Vegetable intake | Community | 37.81 | 18.92 | Germany | Longitudinal | 909 | .13\* |
| Gellert, Ziegelmann, Lippke & Schwarzer (2012; Study 2) | Future | Engagement in physical activity | Community | 66.6 | 51.9 | Germany | Longitudinal | 289 | .10\* |
| Getsinger & Leon (1979) | Future | Long-term adjustment after being discharged from hospital | Clinical | 33 | 93.75 | USA | Longitudinal | 80 | .27 |
| Griva, Anagnostopoulous & Potamianos (2013) | Past-Positive | Number of lifetime mammography screenings | Clinical | 50.9 | 0 | Greece | Cross-sectional | 194 | .18 |
|  | Past-Negative | Number of lifetime mammography screenings | Clinical | 50.9 | 0 | Greece | Cross-sectional | 194 | -.03 |
|  | Present-Hedonistic | Number of lifetime mammography screenings | Clinical | 50.9 | 0 | Greece | Cross-sectional | 194 | -.07 |
|  | Present-Fatalistic | Number of lifetime mammography screenings | Clinical | 50.9 | 0 | Greece | Cross-sectional | 194 | .01 |
|  | Future | Number of lifetime mammography screenings | Clinical | 50.9 | 0 | Greece | Cross-sectional | 194 | .23 |
| Guarino, Pascalis, D'Alessio & Zimbardo | Present-Hedonistic | Attendance at breast cancer screening | Community | 39.4 | 0 | Italy | Cross-sectional | 300 | -.15 |
|  | Present-Fatalistic | Attendance at breast cancer screening | Community | 39.4 | 0 | Italy | Cross-sectional | 300 | .07 |
|  | Future | Attendance at breast cancer screening | Community | 39.4 | 0 | Italy | Cross-sectional | 300 | .14 |
| Gulley (2012) | Past-Positive | Engagement in physical activity | High School | - | 48.1 | USA | Longitudinal | 185 | .01 |
|  | Past-Negative | Engagement in physical activity | High School | - | 48.1 | USA | Longitudinal | 185 | -.02 |
|  | Present-Hedonistic | Engagement in physical activity | High School | - | 48.1 | USA | Longitudinal | 180.5 | .06 |
|  | Present-Fatalistic | Engagement in physical activity | High School | - | 48.1 | USA | Longitudinal | 180.5 | -.03 |
|  | Future | Engagement in physical activity | High School | - | 48.1 | USA | Longitudinal | 185 | .08 |
| Guthrie, Lessl, Ochi & Ward (2013) | Present-Hedonistic | BMI | Community | 44.3 | 52.4 | USA | Cross-sectional | 265 | -.09r |
|  | Present-Fatalistic | BMI | Community | 44.3 | 52.4 | USA | Cross-sectional | 265 | -.02r |
|  | Future | BMI | Community | 44.3 | 52.4 | USA | Cross-sectional | 265 | .02r |
| Gutierrez-Braojos (2015) | Future | GPA | University | 22.02 | 16 | Spain | Cross-sectional | 100 | .06 |
| Hall & Epp | Future | BMI | Community | 45.21 | 24.8 | USA | Cross-sectional | 208 | .17r |
| Hall & Fong (2003; Study 1) | Future | Engagement in physical activity | University | 21.3 | 5.6 | Canada | Experimental | 9 | .25\* |
| Hall & Fong (2003; Study 2) | Future | Engagement in physical activity | University | 21.2 | 4.9 | Canada | Experimental | 34.5 | .19\* |
| Hall Fong & Meng (2014) | Future | Number of smoking quit attempts | Community (smokers) | - | 43.3 | Australia/ Canada/ USA/ UK | Cross-sectional | 9772 | .14 |
| Hall, Fong & Cheng (2012) | Future | Fatty foody consumption/ engagement in physical activity/ BMI/ HbA1c | Clinical (Type 2 diabetes) | 57 | 40.8 | Canada | Longitudinal | 204 | .04\* |
| Halvari (1991b) | Future | Maximal aerobic power | High School | - | 100 | Norway | Cross-sectional | 128 | .05 |
| Hamilton, Kives, Micevski & Grace (2003) | Past-Positive | Engagement in physical activity and healthy nutrition | Clinical (Cardiac rehabilitation) | 60.2 | 75.7 | Canada | Cross-sectional | 74 | .16\* |
|  | Past-Negative | Engagement in physical activity and healthy nutrition | Clinical (Cardiac rehabilitation) | 60.2 | 75.7 | Canada | Cross-sectional | 74 | .18\* |
|  | Present-Hedonistic | Engagement in physical activity and healthy nutrition | Clinical (Cardiac rehabilitation) | 60.2 | 75.7 | Canada | Cross-sectional | 74 | .13\* |
|  | Present-Fatalistic | Engagement in physical activity and healthy nutrition | Clinical (Cardiac rehabilitation) | 60.2 | 75.7 | Canada | Cross-sectional | 74 | .25\* |
|  | Future | Engagement in physical activity and healthy nutrition | Clinical (Cardiac rehabilitation) | 60.2 | 75.7 | Canada | Cross-sectional | 74 | .10\* |
| Heckman, Wilson & Ingersoll (2009) | Future | Sunscreen use | University | - | 25 | USA | Cross-sectional | 397 | -.03\* |
| Herrenkohl, Tajima, Whitney & Huang (2005) | Future | Antisocial behaviour | Community | 18.4 | 55.91 | USA | Cross-sectional | 474 | .12\* |
| Hershey & Mowen (2000) | Future | Saving for retirement | Community | 62.6 | - | USA | Cross-sectional | 230 | .50 |
| Hershey, Henkens & Van Dalen (2010) | Future | Investment assets | Community | - | - | USA/ Netherlands | Cross-sectional | 975 | -.38 |
| Hershey, Jacobs-Lawson, McArdle & Hamagami (2007) | Future | Amount of voluntary saving contributions | Community | 36.3 | 43.4 | USA | Cross-sectional | 265 | .32 |
| Hershfield, Goldstein, Sharpe, Fox, Yetkelis, Carstensen, Bailsenson (2011; Study 1) | Future | Amount of money saved for retirement | - | 20.13 | 34 | USA | Experimental | 50 | .25 |
| Hershfield, Goldstein, Sharpe, Fox, Yetkelis, Carstensen, Bailsenson (2011; Study 2) | Future | Amount of voluntary saving contributions | - | 20.08 | 28.57 | USA | Experimental | 21 | .26 |
| Hershfield, Goldstein, Sharpe, Fox, Yetkelis, Carstensen, Bailsenson (2011; Study 3a) | Future | Amount of money saved for retirement | University | 21 | 47.62 | USA | Experimental | 40 | .36 |
| Hershfield, Goldstein, Sharpe, Fox, Yetkelis, Carstensen, Bailsenson (2011; Study 3b) | Future | Amount of money saved for retirement | Community | 26.27 | 45 | USA | Experimental | 40 | .31 |
| Hirsch, Duberstien, Kenneth, Connor, Heisel, Beckman, Franus & Conwell (2007) | Future | Instrumental activities of daily living | Clinical (depression) | 66.55 | 42 | USA | Cross-sectional | 136 | -.04 |
| Hirsch, Molnar, Chang & Sirois (2015) | Future | Self-rated health | Clinical | 42.18 | 29 | USA | Cross-sectional | 101 | .27 |
| Hodgins & Engel (2002) | Past-Positive | Problematic gambling | Community | 41.05 | 45 | USA | Cross-sectional | 40 | .08r |
|  | Past-Negative | Problematic gambling | Community | 41.05 | 45 | USA | Cross-sectional | 40 | .00r |
|  | Present-Hedonistic | Problematic gambling | Community | 41.05 | 45 | USA | Cross-sectional | 40 | -.45r |
|  | Present-Fatalistic | Problematic gambling | Community | 41.05 | 45 | USA | Cross-sectional | 40 | -.09r |
|  | Future | Problematic gambling | Community | 41.05 | 45 | USA | Cross-sectional | 40 | .29r |
| Holman & Silver (1998; Study 1) | Past | Psychological distress as a result of childhood trauma | Community | 33 | 0 | USA | Cross-sectional | 77 | .08 |
| Holman & Silver (1998; Study 3) | Past | Psychological distress as a result of fire damaged community | Community | 47 | 48.25 | USA | Longitudinal | 65 | -.19 |
| Hughes, Fasaye, LaSalle & Finch (2003) | Future | Participation in genetic risk assessment for testing | Community | - | - | USA | Cross-sectional | 28 | .38 |
|  | Past | Participation in genetic risk assessment for testing | Community | - | - | USA | Cross-sectional | 28 | .04 |
|  | Present | Participation in genetic risk assessment for testing | Community | - | - | USA | Cross-sectional | 28 | .17 |
| Incollingo Belsky, Epel & Tomiyama (2014) | Past-Positive | BMI/ Fasting blood glucose | Community | 54.95 | 78.5 | USA | - | 65 | .08r\* |
|  | Past-Negative | BMI/ Fasting blood glucose | Community | 54.95 | 78.5 | USA | - | 65 | -.23r\* |
|  | Present-Hedonistic | BMI/ Fasting blood glucose | Community | 54.95 | 78.5 | USA | - | 65 | -.12r\* |
|  | Present-Fatalistic | BMI/ Fasting blood glucose | Community | 54.95 | 78.5 | USA | - | 65 | -.20r\* |
|  | Future | BMI/ Fasting blood glucose | Community | 54.95 | 78.5 | USA | - | 65 | .29r\* |
| Joireman, Kees & Sprott | Future | Amount of credit card debt | University | 21 | 45 | USA | Cross-sectional | 209 | .17r |
| Kairys (2010; Study 1) | Past-Positive | Self-rated health | - | - | - | Lithuania | Cross-sectional | 636 | .09 |
|  | Past-Negative | Self-rated health | - | - | - | Lithuania | Cross-sectional | 636 | .35 |
|  | Present-Hedonistic | Self-rated health | - | - | - | Lithuania | Cross-sectional | 636 | -.16 |
|  | Present-Fatalistic | Self-rated health | - | - | - | Lithuania | Cross-sectional | 636 | .31 |
|  | Future | Self-rated health | - | - | - | Lithuania | Cross-sectional | 636 | .09 |
| Kalichman, Rompa, Muhammad (1997) | Future | Low risk of HIV | Community | 33.24 | 100 | USA | Cross-sectional | 193 | .14 |
| Keough, Zimbardo & Boyd (1999; Study 1) | Future | Substance use | High School | - | 48.1 | USA | Cross-sectional | 210 | .19r |
|  | Future | Substance use | University | - | 40.29 | USA | Cross-sectional | 690 | .11r |
|  | Future | Substance use | University | - | 45.19 | USA | Cross-sectional | 582 | .20r |
|  | Future | Substance use | University | - | 42.95 | USA | Cross-sectional | 156 | .13r |
|  | Future | Substance use | University | - | 50.68 | USA | Cross-sectional | 146 | .08r |
|  | Future | Substance use | University | - | 42.6 | USA | Cross-sectional | 453 | .17r |
|  | Future | Substance use | University | - | 37.25 | USA | Cross-sectional | 255 | .16r |
|  | Future | Substance use | University | - | 100 | USA | Cross-sectional | 24 | .40r |
|  | Future | Substance use | Youth Offenders |  | 62.75 | USA | Cross-sectional | 102 | 0.10r |
| Keough, Zimbardo & Boyd (1999; Study 1) | Present | Substance use | High School | - | 48.1 | USA | Cross-sectional | 210 | -.42r |
|  | Present | Substance use | University | - | 40.29 | USA | Cross-sectional | 690 | -.32r |
|  | Present | Substance use | University | - | 45.19 | USA | Cross-sectional | 582 | -.35r |
|  | Present | Substance use | University | - | 42.95 | USA | Cross-sectional | 156 | -.32r |
|  | Present | Substance use | University | - | 50.68 | USA | Cross-sectional | 146 | -.25r |
|  | Present | Substance use | University | - | 42.6 | USA | Cross-sectional | 453 | -.26r |
|  | Present | Substance use | University | - | 37.25 | USA | Cross-sectional | 255 | -.36r |
|  | Present | Substance use | University | - | 100 | USA | Cross-sectional | 24 | -.24r |
|  | Present | Substance use | Youth Offenders |  | 62.75 | USA | Cross-sectional | 102 | -.28r |
| Keough, Zimbardo & Boyd (1999; Study 2) | Future | Substance use/ Aggression | University | 23.63 | 35 | USA | Cross-sectional | 206 | .23r\* |
|  | Present | Substance use/ Aggression | University | 23.63 | 35 | USA | Cross-sectional | 206 | .00r\* |
| Kim & Oh (2013) | Present | Academic achievement – percentile rank | High School | - | - | South Korea | Cross-sectional | 2957 | -.22 |
| King & Gaerlan (2013) | Past-Positive | GPA | University | 17.66 | 54.8 | Philippines | Cross-sectional | 385 | .11 |
|  | Past-Negative | GPA | University | 17.66 | 54.8 | Philippines | Cross-sectional | 385 | -.02 |
|  | Present-Hedonistic | GPA | University | 17.66 | 54.8 | Philippines | Cross-sectional | 385 | -.06 |
|  | Present-Fatalistic | GPA | University | 17.66 | 54.8 | Philippines | Cross-sectional | 385 | -.06 |
|  | Future | GPA | University | 17.66 | 54.8 | Philippines | Cross-sectional | 385 | .34 |
| King & Manaster (1975) | Past | Substance use | University | - | 25.58 | USA | Cross-sectional | 74 | -.30r |
| Klingemann (2001) | Past-Positive | Alcohol use | Clinical/ Community | 45 | 74 | Switzerland | Cross-sectional | 126 | -.26r |
|  | Past-Positive | Drug use | Clinical/ Community | 45 | 52 | Switzerland | Cross-sectional | 135 | -.14r |
|  | Past-Negative | Alcohol use | Clinical/ Community | 45 | 74 | Switzerland | Cross-sectional | 126 | -.40r |
|  | Past-Negative | Drug use | Clinical/ Community | 45 | 52 | Switzerland | Cross-sectional | 135 | -.57r |
|  | Present-Hedonistic | Alcohol use | Clinical/ Community | 45 | 74 | Switzerland | Cross-sectional | 126 | -.01r |
|  | Present-Hedonistic | Drug use | Clinical/ Community | 45 | 52 | Switzerland | Cross-sectional | 135 | -.25r |
|  | Future | Alcohol use | Clinical/ Community | 45 | 74 | Switzerland | Cross-sectional | 126 | -.07r |
|  | Future | Drug use | Clinical/ Community | 45 | 52 | Switzerland | Cross-sectional | 135 | -.09r |
| Kooij & Van De Voorde  (2011) | Future | Self-rated health | Community | 43.9 | 49.7 | Netherlands | Longitudinal | 600 | .24 |
|  | Present | Self-rated health | Community | 43.9 | 49.7 | Netherlands | Longitudinal | 600 | -.23 |
| Kooij, de Lange, Jansen, Dikkers (2013; Study 1) | Future | Self-rated health | Community | 45.7 | 11 | Netherlands | Cross-sectional | 385 | .13 |
|  | Future | Self-rated health | Community | 45.7 | 11 | Netherlands | Cross-sectional | 1169 | .17 |
|  | Present | Self-rated health | Community | 45.7 | 11 | Netherlands | Cross-sectional | 385 | -.12 |
|  | Present | Self-rated health | Community | 45.7 | 11 | Netherlands | Cross-sectional | 1169 | -.18 |
| Kotter-Gruhn & Smith (2011) | Future | Self-rated health | Community | 84.92 | - | Germany | Cross-sectional | 513 | .18 |
| Kovac & Rise (2007) | Future | Quit smoking | University (smokers) | 22.8 | 37.6 | Norway | Longitudinal | 93 | .11 |
| Kovac, Lansing, Cameron & Hoigaard (2016) | Future | GPA | University (smokers) | 25 | 14 | Norway | Longitudinal | 106 | .13 |
| Kozik, Hoppmann & Gerstorf (2014) | Future | BMI | University | 71.94 | 33.33 | Canada | Cross-sectional | 66 | -.07r |
| Laghi, Liga, Baumgartner & Baiocco (2012) | Past-Positive | Binge eating scale/ Alcohol use | Adolescents | 17.46 | 47.19 | Italy | Cross-sectional | 1350 | .20r |
|  | Past-Negative | Binge eating scale/ Alcohol use | Adolescents | 17.46 | 47.19 | Italy | Cross-sectional | 1350 | -.17r |
|  | Present-Hedonistic | Binge eating scale/ Alcohol use | Adolescents | 17.46 | 47.19 | Italy | Cross-sectional | 1350 | -.02r |
|  | Present-Fatalistic | Binge eating scale/ Alcohol use | Adolescents | 17.46 | 47.19 | Italy | Cross-sectional | 1350 | -.18r |
|  | Future | Binge eating scale/ Alcohol use | Adolescents | 17.46 | 47.19 | Italy | Cross-sectional | 1350 | .19r |
| Levy & Earleywine (2004) | Future | Problems as a result of alcohol use | University | 20.8 | 29 | USA | Cross-sectional | 232 | .13r |
| Li (2013) | Future | Engagement in physical activity | Community | 76.02 | 20 | China | Cross-sectional | 300 | .13 |
| Lilienfeld, Hess & Rowland (1996) | Future | Engagement in antisocial behavioural practices | University | 18.89 | 38.61 | USA | Cross-sectional | 101 | .22r |
| Lukavska (2012) | Past-Positive | Problematic internet use | Community | 19.12 | 91.56 | Czech Republic | Cross-sectional | 152 | .06r |
|  | Past-Negative | Problematic internet use | Community | 19.12 | 91.56 | Czech Republic | Cross-sectional | 152 | -.04r |
|  | Present-Hedonistic | Problematic internet use | Community | 19.12 | 91.56 | Czech Republic | Cross-sectional | 152 | -.08r |
|  | Present-Fatalistic | Problematic internet use | Community | 19.12 | 91.56 | Czech Republic | Cross-sectional | 152 | -.24r |
|  | Future | Problematic internet use | Community | 19.12 | 91.56 | Czech Republic | Cross-sectional | 152 | .18r |
| Luszczynska, Gibbons, Piko & Tekozel (2004) | Future | Followed a healthy diet and engage in physical activity | High School | - | - | Hungary | Cross-sectional | 560 | .15 |
|  | Future | Followed a healthy diet and engage in physical activity | High School | - | - | Poland | Cross-sectional | 662 | .11 |
|  | Future | Followed a healthy diet and engage in physical activity | High School | - | - | Turkey | Cross-sectional | 626 | .11 |
|  | Future | Followed a healthy diet and engage in physical activity | High School | - | - | USA | Cross-sectional | 539 | .22 |
| Lynch (1971) | Future | Engagement in physical activity | Community | 79.95 | 0 | USA | Cross-sectional | 80 | .05 |
| MacKillop, Castelda, Mattson, & Donovick (2006) | Past-Positive | Engaging in pathological gambling | University | 19.45 | 75.5 | USA | Cross-sectional | 105 | .04r |
|  | Past-Negative | Engaging in pathological gambling | University | 19.45 | 75.5 | USA | Cross-sectional | 105 | -.16r |
|  | Present-Hedonistic | Engaging in pathological gambling | University | 19.45 | 75.5 | USA | Cross-sectional | 105 | -.24r |
|  | Present-Fatalistic | Engaging in pathological gambling | University | 19.45 | 75.5 | USA | Cross-sectional | 105 | -.30r |
|  | Future | Engaging in pathological gambling | University | 19.45 | 75.5 | USA | Cross-sectional | 105 | .20r |
| MacKillop, Mattson, Anderson MacKillop, Castelda & Donovick (2007) | Present-Hedonistic | Alcohol use | University | 19.55 | 83 | USA | Cross-sectional | 93 | -.34r |
|  | Future | Alcohol use | University | 19.55 | 83 | USA | Cross-sectional | 93 | .24r |
| Mahon & Yarcheski (1994a) | Future | Engagement in a variety of health behaviours | Adolescents | 16.2 | 47.62 | USA | Cross-sectional | 84 | .09 |
| Mahon & Yarcheski (1994b) | Future | Engagement in a variety of health behaviours | Community | 19.6 | 47.17 | USA | Cross-sectional | 106 | .17 |
| Mahon, Yarcheski & Yarcheski (2000) | Future | Engagement in a variety of health behaviours | Adolescents | 13.1 | 42.45 | USA | Cross-sectional | 139 | .46 |
| Mahon, Yarcheski & Yarcheski (1997) | Future | Engagement in a variety of health behaviours | Community | 24 | 60.87 | USA | Cross-sectional | 69 | .35 |
| Manganiello (1978) | Future | Drug use | Community | - | 100 | USA | Cross-sectional | 95 | .62r |
| Martin, Hernandez, Frias-Armenta & Hess | Future | Engagement in illegal anti-ecological behaviour | University | 22.4 | 23.01 | Spain | Cross-sectional | 439 | .12r |
| McKay, Andretta, Magee & Worrell (2014; Study 4) | Past-Positive | Alcohol use | Adolescents | - | 54.2 | UK | Cross-sectional | 1620 | .12r |
|  | Past-Negative | Alcohol use | Adolescents | - | 54.2 | UK | Cross-sectional | 1620 | -.18r |
|  | Present-Hedonistic | Alcohol use | Adolescents | - | 54.2 | UK | Cross-sectional | 1620 | -.40r |
|  | Present-Fatalistic | Alcohol use | Adolescents | - | 54.2 | UK | Cross-sectional | 1620 | -.28r |
|  | Future | Alcohol use | Adolescents | - | 54.2 | UK | Cross-sectional | 1620 | .35r |
| McKay, Cole & Percy (2015) | Future | Alcohol and drug use | University | 21.98 | 48.9 | UK | Cross-sectional | 313 | .00 |
|  | Present | Alcohol and drug use | University | 21.98 | 48.9 | UK | Cross-sectional | 313 | .01r |
| McKay, Dempster, & Mello (2015) | Future | Alcohol use and aggression | High School | - | 0 | UK | Cross-sectional | 515 | .02r |
|  | Future | Alcohol use and aggression | High School | - | 0 | UK | Cross-sectional | 543 | .06r |
|  | Present | Alcohol use and aggression | High School | - | 100 | UK | Cross-sectional | 515 | .18r |
|  | Present | Alcohol use and aggression | High School | - | 100 | UK | Cross-sectional | 543 | .26r |
| McKay, Morgan, Exel & Worrell (2015) | Future | Aggressive behaviour | High School | - | 49.6 | UK | Cross-sectional | 806 | -0.01r |
|  | Present | Aggressive behaviour | High School | - | 49.6 | UK | Cross-sectional | 806 | .23r |
| Mello & Worrell (2006) | Past-Positive | GPA | Adolescents | 14.5 | 46.68 | USA | Cross-sectional | 722 | -.08 |
|  | Past-Negative | GPA | Adolescents | 14.5 | 46.68 | USA | Cross-sectional | 722 | -.08 |
|  | Present-Hedonistic | GPA | Adolescents | 14.5 | 46.68 | USA | Cross-sectional | 722 | -.00 |
|  | Present-Fatalistic | GPA | Adolescents | 14.5 | 46.68 | USA | Cross-sectional | 722 | -.16 |
|  | Future-Positive | GPA | Adolescents | 14.5 | 46.68 | USA | Cross-sectional | 722 | .14 |
|  | Future-Negative | GPA | Adolescents | 14.5 | 46.68 | USA | Cross-sectional | 722 | -.11 |
| Mello, Finan & Worrell (2013; Study 1) | Future | GPA | Adolescents | 16.07 | 60 | USA | Cross-sectional | 214 | .28 |
| Milfont, Andrade, Belo & Pesso (2008) | Past-Positive | Alcohol Use | University | 22.47 | 40.49 | Brazil | Cross-sectional | 247 | -.04r |
|  | Past-Negative | Alcohol Use | University | 22.47 | 40.49 | Brazil | Cross-sectional | 247 | -.04r |
|  | Present-Hedonistic | Alcohol Use | University | 22.47 | 40.49 | Brazil | Cross-sectional | 247 | -.13r |
|  | Present-Fatalistic | Alcohol Use | University | 22.47 | 40.49 | Brazil | Cross-sectional | 247 | -.09r |
|  | Future | Alcohol Use | University | 22.47 | 40.49 | Brazil | Cross-sectional | 247 | .19r |
| Mindick, Oskamp & Berger (1977) | Future | Safe sex behaviours | Community | 22.5 | 0 | USA | Cross-sectional | 50 | .28 |
| Monahan, Steinberg, Cauffman & Mulvey (2009) | Future | Engagement in antisocial behaviour | Adolescents | 16.5 | 100 | USA | Cross-sectional | 1105 | .09r |
| Moore & Dahlen (2008) | Future | Risk driving | University | - | 35 | USA | Cross-sectional | 316 | .17r |
| Morgan, Hine, Bhullar & Loi (2015) | Future | Low Emissions Agricultural Practices | Community | 51.4 | 58 | Australia | Cross-sectional | 551 | .18 |
|  | Present | Low Emissions Agricultural Practices | Community | 51.4 | 58 | Australia | Cross-sectional | 551 | -.02 |
| Mullan, Allom, Brogan, Kothe & Todd | Future | Healthy eating | University | 20.3 | 26 | Australia | Cross-sectional | 152 | .15 |
| Nemeroff, Hoyt, Huebner & Proescholdbell (2008a) | Present-Fatalistic | Alcohol and drug use | Community | 35 | 100 | USA | Cross-sectional | 343 | -.35r |
| Nemeroff, Hoyt, Huebner & Proescholdbell (2008b) | Present-Fatalistic | Alcohol and drug use | Community | 35 | 100 | USA | Cross-sectional | 366 | -.39r |
| Noone, O'Loughlin & Kendig (2012) | Future | Self-rated health | Community | - | - | Australia | Cross-sectional | 705 | .05 |
| Nsamenang & Hirsch (2015) | Future | Adherence to treatment regime | Clinical | 42.18 | 29 | USA | Cross-sectional | 101 | .22 |
| Olate, Salas-Wright & Vaughn (2012) | Negative-Future | Engagement in a variety of antisocial behaviours | Community | - | - | Mexico | Cross-sectional | 174 | -.12 |
| Oncel | Future | GPA | University | 22.84 | 52.7 | Turkey | Cross-sectional | 332 | .39 |
| Orbell (unpublished) | Future | Alcohol use | University | 20.09 | 44.4 | UK | Longitudinal | 181 | -.09r |
| Ortuno (unpublished) | Past-Positive | GPA | - | - | - | Portugal | - | 249 | -.04 |
|  | Past-Negative | GPA | - | - | - | Portugal | - | 249 | -.13 |
|  | Present-Hedonistic | GPA | - | - | - | Portugal | - | 249 | -.19 |
|  | Present-Fatalistic | GPA | - | - | - | Portugal | - | 249 | -.24 |
|  | Future | GPA | - | - | - | Portugal | - | 249 | .16 |
| Ortuno & Echeverria (2013) | Past-Positive | GPA | University | 19.67 | 13.9 | Portugal | Cross-sectional | 334 | -.02 |
|  | Past-Negative | GPA | University | 19.67 | 13.9 | Portugal | Cross-sectional | 330 | .01 |
|  | Present-Hedonistic | GPA | University | 19.67 | 13.9 | Portugal | Cross-sectional | 327 | -.02 |
|  | Present-Fatalistic | GPA | University | 19.67 | 13.9 | Portugal | Cross-sectional | 332 | -.11 |
|  | Future | GPA | University | 19.67 | 13.9 | Portugal | Cross-sectional | 332 | .05 |
|  | Future-Negative | GPA | University | 19.67 | 13.9 | Portugal | Cross-sectional | 334 | -.08 |
|  | Transcendental Future | GPA | University | 19.67 | 13.9 | Portugal | Cross-sectional | 333 | .00 |
| Oyanadel & Buela-Casal (2014) | Past-Positive | Self-rated health/ BMI | Clinical/ Community | - | - | Chile | Longitudinal | 334 | -.09\* |
|  | Past-Negative | Self-rated health/ BMI | Clinical/ Community | - | - | Chile | Longitudinal | 334 | -.07\* |
|  | Present-Hedonistic | Self-rated health/ BMI | Clinical/ Community | - | - | Chile | Longitudinal | 334 | .12\* |
|  | Present-Fatalistic | Self-rated health/ BMI | Clinical/ Community | - | - | Chile | Longitudinal | 334 | -.07\* |
|  | Future | Self-rated health/ BMI | Clinical/ Community | - | - | Chile | Longitudinal | 334 | .10\* |
| Park, Hyun, Kim and Lee  (2014) | Future | Smart-phone addiction | High School | - | 0 | Korea | Cross-sectional | 203 | .39r |
| Park, Lee, Yun & Cui (2014) | Future | Smoking behaviour | Adolescents | - | 100 | China | Cross-sectional | 768 | .06r |
| Pearson, Kite & Henson  (2013) | Future | Alcohol Use | University | - | 31.7 | USA | Cross-sectional | 278 | .23r\* |
|  | Present | Alcohol Use | University | - | 31.7 | USA | Cross-sectional | 278 | -.17r\* |
| Perry, McKay, Worrell, Zivkovic, Mello & Musil (2015) | Past-Positive | Aggressive behaviour | High School | - | 49.8 | USA | Cross-sectional | 913 | .26r |
|  | Past-Negative | Aggressive behaviour | High School | - | 49.8 | USA | Cross-sectional | 913 | -.27r |
|  | Present-Hedonistic | Aggressive behaviour | High School | - | 49.8 | USA | Cross-sectional | 913 | -.19r |
|  | Present-Fatalistic | Aggressive behaviour | High School | - | 49.8 | USA | Cross-sectional | 913 | -.44r |
|  | Future | Aggressive behaviour | High School | - | 49.8 | USA | Cross-sectional | 913 | .35r |
| Petry, Bickel, & Arnett (1998) | Present-Hedonistic | Drug use | Community | - | - | USA | Cross-sectional | 93 | -.36r |
|  | Present-Fatalistic | Drug use | Community | - | - | USA | Cross-sectional | 93 | -.33r |
|  | Future | Drug use | Community | - | - | USA | Cross-sectional | 93 | .35r\* |
| Phan (2009) | Future | Academic achievement | University | 22 | 39.27 | Fiji | Cross-sectional | 275 | .09 |
| Pluck, Lee, Lauder, Fox, Spence, Parks (2008) | Present-Hedonistic | Drug use | Community | 33.45 | 84 | UK | Cross-sectional | 100 | -.23r |
| Polonsky, Vocino, Grimmer & Miles (2003) | Future | Engagement in pro-environmental behaviour | Community | 48.37 | - | Australia | Cross-sectional | 2369 | .20 |
|  | Past | Engagement in pro-environmental behaviour | Community | 48.37 | - | Australia | Cross-sectional | 2369 | .10 |
| Ponzi, Henry, Kubicki, Nickels, Wilson & Maestripieri (2015) | Present-Hedonistic | Risky sexual behaviours | University | 22.4 | 100 | USA | Cross-sectional | 95 | -.24r |
|  | Present-Fatalistic | Risky sexual behaviours | University | 22.4 | 100 | USA | Cross-sectional | 95 | -.21r |
|  | Future | Risky sexual behaviours | University | 22.4 | 100 | USA | Cross-sectional | 95 | .30r |
| Rappange, Brouwer & van Exel (2009) | Future | Health expectancy at 40 and 70 years old | Adolescents | 13.2 | 46.96 | Netherlands | Cross-sectional | 1761 | .15\* |
| Rew, Fouladi & Yockey (2002) | Future | Self-rated health / sexual self-care behaviours | Community | 18.5 | 58.9 | USA | Cross-sectional | 414 | -.21\* |
| Rise, Kovac, Kraft & Moan (2008) | Future | Quit smoking | University (smokers) | 24.6 | 76 | Norway | Longitudinal | 103 | .33 |
| Robbins & Bryan (2004) | Future | Alcohol and Drug use / risky sexual behaviours | Adolescents | 15.3 | 73 | USA | Cross-sectional | 300 | -.10r\* |
| Romer, Duckworth, Sznitman & Park (2010) | Future | Alcohol use/ Drug use/ Smoking | Community/ Adolescents | 17.75 | - | USA | Cross-sectional | 888 | .05r\* |
| Roos & Albers | Past-Positive | Alcohol Use | Community | 47.77 | 14.52 | USA | Cross-sectional | 62 | -.25 |
|  | Future | Alcohol Use | Community | 47.77 | 14.52 | USA | Cross-sectional | 62 | .58 |
|  | Present-Negative | Alcohol Use | Community | 47.77 | 14.52 | USA | Cross-sectional | 62 | -.41 |
|  | Present-Positive | Alcohol Use | Community | 47.77 | 14.52 | USA | Cross-sectional | 62 | .42 |
| Rothspan & Read (1996) | Present-Hedonistic | Safe sex behaviours | University | 19 | 34.57 | USA | Cross-sectional | 130.5 | -.16\* |
|  | Present-Fatalistic | Safe sex behaviours | University | 19 | 34.57 | USA | Cross-sectional | 128.5 | -.08\* |
|  | Future | Safe sex behaviours | University | 19 | 34.57 | USA | Cross-sectional | 188 | .23\* |
| Sandler, Watson, & Levine (1992) | Future | Safe sex behaviours | Adolescents | - | 0 | USA | Cross-sectional | 25 | .47 |
| Sansbury, Dasgupta, Guthrie & Ward (2014) | Present-Hedonistic | Medication adherence | Clinical | 62.93 | 38.8 | USA | Cross-sectional | 178 | .02 |
|  | Present-Fatalistic | Medication adherence | Clinical | 62.93 | 38.8 | USA | Cross-sectional | 178 | .08 |
|  | Future | Medication adherence | Clinical | 62.93 | 38.8 | USA | Cross-sectional | 178 | .12 |
| Schechter & Francis (2010) | Future | Life expectancy | Adolescents | 15.25 | 55.06 | USA | Cross-sectional | 79 | .19 |
| Scholtens, Rydell & Yang-Wallentin (2013) | Future | Academic achievement | Adolescents | - | 53 | Sweden | Cross-sectional | 192 | .31\* |
| Schuz & Eid (2013; Study 1) | Future | Sun exposure behaviour | High School | 15.73 | 44.9 | Germany | Cross-sectional | 156 | .15r |
| Schuz & Eid (2013; Study 2) | Future | Sun exposure behaviour | High School | 14.32 | 49.1 | Germany | Cross-sectional | 253 | .03r |
| Seidmahmoodi, Rahimi & Mohamadi (2011) | Positive-Future | Post-traumatic growth | University (experienced trauma) | 22.03 | 49.75 | Iran | Cross-sectional | 201 | .32 |
| Shell & Husman  (2001) | Future | GPA | University | - | 30.3 | USA | Cross-sectional | 198 | .10 |
| Shirai, Shimomura, Kawasaki, Adachi & Wakamatsu (2013) | Past-Positive | Found a job | Community | - | 28.05 | Japan | Cross-sectional | 3512 | -.01 |
|  | Future | Found a job | Community | - | 28.05 | Japan | Cross-sectional | 3512 | .05 |
|  | Present-Future | Found a job | Community | - | 28.05 | Japan | Cross-sectional | 3512 | -.04 |
| Stahl & Patrick (2011) | Future | BMI | Community | 38.53 | 30.53 | USA | Cross-sectional | 226 | .21r |
| Stein, Sarbin & Kulik (1968) | Future | Delinquent behaviour | Adolescents | 16.45 | 100 | USA | Cross-sectional | 200 | -.27r |
|  |  | Delinquent behaviour | Adolescents | - | 100 | USA | Cross-sectional | 200 | -.31r |
| Stolarski, Zajenkowski, Zajenkowska (2016) | Past-Positive | Aggressive behaviour | Community | 24.94 | 33 | Poland | Cross-sectional | 300 | .09\*r |
|  | Past-Negative | Aggressive behaviour | Community | 24.94 | 33 | Poland | Cross-sectional | 300 | -.30\*r |
|  | Present-Hedonistic | Aggressive behaviour | Community | 24.94 | 33 | Poland | Cross-sectional | 300 | -.26\*r |
|  | Present-Fatalistic | Aggressive behaviour | Community | 24.94 | 33 | Poland | Cross-sectional | 300 | -.30\*r |
|  | Future | Aggressive behaviour | Community | 24.94 | 33 | Poland | Cross-sectional | 300 | .11\*r |
| Strathman, Boninger & Edwards (1994; Study 2) | Future | Smoking and drinking behaviour | University | - | - | USA | Cross-sectional | 60 | .29\*r |
| Tamaroff, Festa, Adesman, Walco (1991) | Future | Compliance with treatment regime | Clinical | 18.2 | 47.06 | USA | Cross-sectional | 34 | .08 |
| Tatsumi (2014) | Future | Extent to which injury has healed | Community (injured athletes) | 20.22 | - | Japan | Cross-sectional | 113 | .22\* |
|  | Past | Extent to which injury has healed | Community (injured athletes) | 20.22 | - | Japan | Cross-sectional | 113 | .10\* |
|  | Present | Extent to which injury has healed | Community (injured athletes) | 20.22 | - | Japan | Cross-sectional | 113 | .11\* |
| Thompson & Fitzpatrick (2008) | Future | Various health behaviours | Community | 56.49 | 19 | USA | Cross-sectional | 67 | -.19 |
| Treadway, Breland, Adams, Duke & Williams (2010) | Future | Career networking behaviour | Community | 30.6 | 47.4 | USA | Cross-sectional | 267 | .22 |
| van Lill & Naude (2014) | Past-Positive | Final semester grade | University | - | 27 | South Africa | - | 178 | -.03 |
|  | Past-Negative | Final semester grade | University | - | 27 | South Africa | - | 178 | -.13 |
|  | Present-Hedonistic | Final semester grade | University | - | 27 | South Africa | - | 178 | -.07 |
|  | Present-Fatalistic | Final semester grade | University | - | 27 | South Africa | - | 178 | -.03 |
|  | Future | Final semester grade | University | - | 27 | South Africa | - | 178 | .10 |
| Vinkers, Adriaanse & de Ridder (2013) | Future | BMI / drop out of weight management | Community | 55.86 | 46.11 | Netherlands | Cross-sectional | 167 | .08 |
| Visser & Hirsch (2014) | Future | Various health behaviours | University | 21.02 | 29.16 | USA | Cross-sectional | 439 | .24\* |
| Wakefield, Homewood, Taylot, Mahmut & Meiser (2010; Study 1) | Past-Positive | Aggressive behaviour | Community | 35.4 | 32.2 | Australia | Cross-sectional | 276 | .12r |
|  | Past-Negative | Aggressive behaviour | Community | 35.4 | 32.2 | Australia | Cross-sectional | 276 | -.42r |
|  | Present-Hedonistic | Aggressive behaviour | Community | 35.4 | 32.2 | Australia | Cross-sectional | 276 | -.27r |
|  | Present-Fatalistic | Aggressive behaviour | Community | 35.4 | 32.2 | Australia | Cross-sectional | 276 | -.29r |
|  | Future | Aggressive behaviour | Community | 35.4 | 32.2 | Australia | Cross-sectional | 276 | .16r |
| Whitaker, Good, Miles, Robb, Wardel & von Wagner (2011) | Future | Colorectal cancer screening | Community | 60.15 | 42.4 | UK | Longitudinal | 709 | .15 |
| Willis, Sandy & Yaeger (2001) | Future | Substance use | Adolescents | 11.8 | 52 | USA | Cross-sectional | 440 | .10r |
|  | Present | Substance use | Adolescents | 11.8 | 52 | USA | Cross-sectional | 440 | -.12r |
| Windsor, Fiori & Crisp (2011) | Future | Self-rated health | Community | 65.38 | 47.77 | Australia | Cross-sectional | 552 | .26 |
| Xie, Liu & Gan (2011) | Future | Depression and Anxiety after trauma (earthquake) | University | 20.31 | 30.4 | China | Cross-sectional | 494 | .31r\* |
| Zacher (2013) | Future | Duration of unemployment in months | Community | 57.66 | 44.5 | Australia | Cross-sectional | 182 | .04r\* |
| Zacher, Heusner, Schmitz, Zwierzanska, & Frese (2010) | Future | Work performance rated by participants' peers | Community | 40.22 | 52.4 | Germany & Switzerland | Cross-sectional | 168 | .19 |
| Zentsova & Leonov (2013) | Past-Positive | Substance abuse | Community | - | - | Russia | Cross-sectional | 154 | .31 |
|  | Past-Negative | Substance abuse | Community | - | - | Russia | Cross-sectional | 154 | -.43 |
|  | Present-Hedonistic | Substance abuse | Community | - | - | Russia | Cross-sectional | 154 | -.01 |
|  | Present-Fatalistic | Substance abuse | Community | - | - | Russia | Cross-sectional | 154 | -.23 |
|  | Future | Substance abuse | Community | - | - | Russia | Cross-sectional | 154 | -.30 |
| Zhang, Wang & Pearce (2014) | Future | Effective leadership | University/ Community | 35.96 | 39.8 | China | Cross-sectional | 161 | .23 |
| Zimbardo & Boyd (1999) | Past-Positive | Aggressive behaviour | University | 23.6 | 35 | USA | Cross-sectional | 205 | .16r |
|  | Past-Negative | Aggressive behaviour | University | 23.6 | 35 | USA | Cross-sectional | 205 | -.49r |
|  | Present-Hedonistic | Aggressive behaviour | University | 23.6 | 35 | USA | Cross-sectional | 205 | -.29r |
|  | Present-Fatalistic | Aggressive behaviour | University | 23.6 | 35 | USA | Cross-sectional | 205 | -.39r |
|  | Future | Aggressive behaviour | University | 23.6 | 35 | USA | Cross-sectional | 205 | .31r |
| Zimbardo & Boyd (1999) | Past-Positive | GPA | University | - | - | USA | Cross-sectional | 566 | .07 |
|  | Past-Negative | GPA | University | - | - | USA | Cross-sectional | 566 | -.05 |
|  | Present-Hedonistic | GPA | University | - | - | USA | Cross-sectional | 566 | -.07 |
|  | Present-Fatalistic | GPA | University | - | - | USA | Cross-sectional | 566 | -.08 |
|  | Future | GPA | University | - | - | USA | Cross-sectional | 566 | .21 |
| Zimbardo, Keough & Boyd (1997; Study 1) | Future | Risky driving | University | - | 42.65 | USA | Cross-sectional | 1662 | .08r |
|  | Present | Risky driving | University | - | 42.65 | USA | Cross-sectional | 1662 | -.29r |
| Zimbardo, Keough & Boyd (1997; Study 2) | Future | Risky driving | Mixed | - | - | USA | Cross-sectional | 916 | .15r |
|  | Present | Risky driving | Mixed | - | - | USA | Cross-sectional | 916 | -.32r |

Note. *An asterisks (\*) indicates instance where effect sizes have been combined prior to inclusion in the main analyses. A superscript “r” indicates instances where an effect size has been reverse scored.*

**Appendix 4.1.** *Participant Information Sheet for Study 1*

**UNIVERSITY OF SHEFFIELD**

**DEPARTMENT OF PSYCHOLOGY**

**Participant Information**

Thank you for your interest in our study. Before you decide whether you would like to take part please read the following information. If there is anything that you are unsure of, or if you would like any more information, please contact Harriet Baird (pcp11hmb@sheffield.ac.uk).

***What is the study about and what does it involve?***

The purpose of this study is to find out about people’s goals - what they are and how people assess whether they are making progress towards them. If you agree to take part, then you will be asked to complete a number of questionnaires about your goals, thoughts and attitudes. You will also be asked to complete two literacy tasks. One of these tasks involves creating sentences from a list of scrambled words, the other involves sorting words into categories as quickly as you can. In total the study will take around 45 minutes to complete.

***Who can take part?***

To be eligible to take part in this study you must have computer assess and be aged 18 or over.

***What are the incentives for taking part?***

We are looking for participants who are interested in helping us to learn more about people’s goals. However, if you complete the survey you also have the option to be entered into a prize draw to win a £50 Amazon voucher by providing your email address. This will be kept confidential and stored separately from your responses to the questionnaire. Having said this, providing your email address optional and you can still take part in the study without providing your email address if you prefer.

***Are there any risks involved in taking part?***

The study has received ethical approval from the Department of Psychology Research Ethics committee. We hope that participants will find this study enjoyable and there are no perceived risks in taking part. However, in the unlikely event that you do experience any distress as a result of your participation, then we would advise you to seek advice from you GP or counselling services.

***Do I have to take part?***

It is entirely up to you whether you choose to participate or not. If you decide to take part, then you are still able to withdraw from the study at any time, without giving a reason, simply by closing your browser window.

***Will my data be confidential?***

All of the information that is collected for this research will be kept confidential and stored in password protected files. Your data will only be accessible to members of the research team and the overall findings will be presented in such a way that the data from individuals cannot be identified. Please be aware, however, that although every precaution will be taken to protect your data, studies conducted online are at a small risk of being viewed by unauthorised third parties (e.g., computer hackers).

**Thank you for taking the time to consider being part of this study.**

**This study has received ethical approval from the Department of Psychology Ethics committee at the University of Sheffield.**

**Appendix 4.2.** *Consent Form for Study 1*

**UNIVERSITY OF SHEFFIELD**

**DEPARTMENT OF PSYCHOLOGY**

**Consent Form**

Please answer the questions below to indicate your consent to take part in this research:

|  |  |
| --- | --- |
| 1. I have read and understood the Participant Information Sheet. |  |
| 2. I have received enough information about this study and I have had the opportunity to ask questions. |  |
| 3. I understand that my participation in the study is voluntary and that I can withdraw from the survey at any time, without giving a reason, by closing my browser window. |  |
| 4. I understand that all the information I give will be stored anonymously and treated confidentially. |  |
| 5. I am aware that there is a small possibility that my responses could be viewed by unauthorised third parties (e.g., computer hackers). |  |
| 6. I confirm that I am over 18 years of age and therefore I am eligible to take part in this research. |  |
| 7. I agree to take part in this study. |  |

**Appendix 4.3.** *Outline of the procedure for the SC-IATs*

*Sequence of Trial Blocks for the Time Attitude SC-IAT*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Block | No. of trials | Function | Items assigned to left key response | Items assigned to right-key response |
|  |  |  |  |  |
| 1 | 20 | Practice | Positive words + Time | Negative words |
| 2 | 40 | Test | Positive words + Time | Negative words |
| 3 | 20 | Practice | Positive words | Negative words + Time |
| 4 | 40 | Test | Positive words | Negative words + Time |
| 5 | 20 | Practice | Negative words + Time | Positive words |
| 6 | 40 | Test | Negative words + Time | Positive words |
| 7 | 20 | Practice | Negative words | Positive words + Time |
| 8 | 40 | Test | Negative words | Positive words + Time |

*Words to use in the SC-IAT*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Time** | | | **Evaluative dimension words** | |
| **Past** | **Present** | **Future** | **Positive** | **Negative** |
| Yesterday | Today | Tomorrow | Pleasant | Unpleasant |
| Then | Now | Ahead | Happy | Sad |
| Before | Current | Upcoming | Enjoyable | Threatening |
| Earlier | Immediate | Later | Success | Failure |
| Former | Present | Forthcoming | Exciting | Boring |
| Previous | Nowadays | Onward | Hopeful | Hopeless |
|  |  |  | Accomplished | Disappointing |
|  |  |  | Cheerful | Painful |
|  |  |  | Pleasing | Terrible |
|  |  |  | Delight | Dislike |
|  |  |  | Content | Tragic |
|  |  |  | Joyful | Disaster |
|  |  |  | Blissful | Sickening |
|  |  |  | Likeable | Disagreeable |
|  |  |  | Gratifying | Unwelcome |
|  |  |  | Exciting | Horrible |

**Appendix 4.4.** *Measures to assess goal properties and the nature of monitoring*

Goal Properties and Methods of Monitoring Questionnaire

Goals are things that you want to achieve or avoid in the future. They can relate to any aspect of your life, such as;

- Education or work (e.g., you may want to achieve a particular grade or get a promotion)

- Finance (e.g., you may want to save money or pay off a loan)

- Health (e.g., you may want to lose weight or reduce your alcohol intake)

- Emotions or feelings (e.g., you may want to be happier or less stressed)

- Social life (e.g., you may want to take on new activities or spend more time with others)

- Relationships (e.g., you may want to improve your relationship with your family or build new friendships)

- Time management (e.g., you may want to finish a particular task or be more productive with your time)

- Moral or religious (e.g., you may want to be kind to others or uphold your religious beliefs).

Goals can be **short-term** (i.e., achievable in a few hours, days or weeks) or **long-term** (i.e., achievable after several months or years), and can be **vague** (e.g., “I want to lose weight”) or **specific** (e.g., “I want to lose 6lbs).

The purpose of this questionnaire is to find out about your goals; what they are and how you assess whether you are making progress towards them.

**PART 1: About your goals**

In the first part of this questionnaire, we are interested in the nature of your goals; that is, what your goals are and the characteristics of these goals.

First, we would like you to list **five** of your current goals. These can relate to any aspect of your life, and can be short- or long-term, vague or specific. Please list your current goals in the space below:

1.

2.

3.

4.

5.

Next, we would like you to choose **one** of the goals that you have listed above. Please write this goal in the box below.

The following questions refer **only** to the goal that you have listed above, so please keep this goal in mind while you answer the questions below. Remember, there are no right or wrong answers, just give the answer that most accurately reflects your opinion.

When do you hope to achieve this goal? Please specify in hours, days, weeks, or years.

Next; please think about the goal that you have chosen above and indicate the extent to which you agree or disagree with each of the following statements.

*Focus of Goal (Achieve vs. Avoid)*

My goal specifies something that I would like to achieve.

My goal specifies something that I would like to avoid.

My goal is concerned with avoiding a negative outcome. (r)

My goal is related to achieving a positive outcome. (r)

*Temporal distance*

The outcome that I would like to achieve is in the near future (i.e., days or weeks away). (r)

The outcome that I hope to achieve is in the distant future (i.e., months or years away).

My goal is short-term. (r)

My goal is long-term.

My goal is something that I would like to achieve soon. (r)

My goal is something that I hope to achieve in the far future.

*Does the goal have a specific deadline?*

My goal has a specific deadline.

My goal must be completed by a set date.

My goal has a clear end point.

My goal does not have a specific deadline (r).

*Goal clarity / level of construal:*

My goal is…

Detailed 1 2 3 4 5 6 7 Vague

Specific 1 2 3 4 5 6 7 General

Precise 1 2 3 4 5 6 7 Imprecise

Ambiguous 1 2 3 4 5 6 7 Unambiguous

Clear 1 2 3 4 5 6 7 Unclear

Well defined 1 2 3 4 5 6 7 Poorly defined

*Measurability*

It is hard to know what stage I am at with this goal. (r)

It is difficult to know how far I have progressed towards this goal. (r)

It is difficult to know how well I am doing in relation to this goal. (r)

I can measure, step by step, my progress towards this goal.

The outcome of my goal is quantifiable (i.e., it can be defined in terms of an amount or frequency of something).

My goal specifies a particular value or number of something to be achieved.

The outcome of my goal can be measured precisely.

The outcome of my goal can be objectively measured.

I can accurately measure whether or not I have achieved my goal.

My goal is not quantifiable (i.e., it cannot be defined in terms of an amount or frequency of something). (r)

There is no precise way of knowing whether or not I have achieved my goal. (r)

*Commitment*

I mean to achieve this goal.

I am really committed to achieving this goal.

I fully intend to achieve this goal.

I am determined to reach this goal.

*Success Expectation*

I doubt that I will achieve this goal. (r)

There is a good chance that I will achieve this goal.

I am sure that I will achieve this goal.

It is unlikely that I will achieve this goal. (r)

**PART 2: Assessing your progress towards your goal**

When people are trying to achieve a goal, they often try to find out how well they are doing; that is, whether they are reaching their goal or making progress towards it. In this part of the questionnaire, we are interested in how you assess your progress towards your goals.

As before, we would like you to answer the following questions using the goal that you chose earlier. To remind yourself of this goal, please write it in the box below:

Do you know whether you are making progress toward this goal?

Yes / No

***Skip logic if yes:***

If you do know whether you are making progress, how do you know this? In the box below, please list some of the ways in which you know how well you are doing on your goal:

***Skip logic if no:***

If you do not know whether you are making progress, please think about how you might find out. In the box below, please list some of the ways in which you could find out how well you are doing on your goal:

Next; please indicate the extent to which you agree or disagree with each of the statements below. Remember, these questions refer **only** to the goal that you chose earlier.

***Progress:***

So far, progress on this goal has been slow. (r)

So far, I seem to be getting nowhere with this goal. (r)

So far, I have made a lot of progress towards achieving this goal.

So far, I am on course to achieving this goal.

***Reference Value****- Do participants compare their current state to the past, a desired outcome, or to other people?*

**Past:**

To evaluate how well I am progressing towards my goal, I compare where I am currently with where I was in the past.

I evaluate my progress towards my goal by thinking about a past state.

To assess my progress towards my goal, I compare my current state with a past state.

I refer to the past to help me to evaluate my progress toward my goal.

I rarely think about the past when evaluating my progress towards my goal. (r)

**Present:**

To evaluate my progress towards my goal, I think about how I am doing now.

When assessing my progress toward my goal, I only focus on my current state.

I tend to think about what is happening now in order to see if I am making progress toward my goal.

I evaluate my progress in terms of the here and now.

**Future:**

I compare my current progress towards my goal with how I would like it to be in the future.

To assess whether I am making progress towards my goal, I compare my current state with where I would like to be in the future.

I think about the future when assessing my progress toward my goal.

I rarely consider the future when evaluating my current progress toward my goal. (r)

**Others:**

I often compare my rate of progress toward my goal with that of other people who hold the same or a similar goal to me.

I compare my progress with that of others who hold the same or a similar goal.

I use other people’s progress to help me to evaluate my own progress toward my goal.

I rarely compare my own progress towards my goal to the progress of others. (r)

**Active monitoring-** *Do participants actively seek information to assess their goal progress?*

I do everything that I can to find out how well I am doing on this goal.

I always seek information about how well I am doing on my goal.

I pay a great deal of attention to information that informs me about my progress towards my goal.

I frequently check whether I am making progress towards my goal.

I am always looking out for information which will tell me how well I am doing on my goal.

I go out of my way to get information about my progress towards my goal.

I never seek information about how I am doing on my goal (r).

I pay no attention to information about how I am doing on my goal (r).

**Passive monitoring-** *Do participants use information which is readily available to assess their goal progress***?**

I notice whether I am making progress towards my goal.

I get information about my progress towards my goal whether I want it or not.

I get information about my progress towards my goal without looking for it.

Thoughts about my progress towards my goal tend to ‘pop’ into my mind, rather than me having to think about it.

I know how well I am doing on my goal without needing to look for information.

**Feedback**

Other people tell me how I am doing on my goal.

I get feedback from others about my progress towards my goal.

No-one tells me how I am progressing in relation to this goal (r).

Others keep me informed about my progress towards this goal.

**Concrete construals of progress**

I assess my progress towards my goal in terms of an amount or frequency of something.

I assess my progress towards my goal in terms of an outcome than can be easily measured.

I use numbers or specific values to measure my progress towards my goal.

I accurately measure my progress towards my goal.

I measure my progress towards my goal very precisely.

It is difficult to know precisely how much progress I am making towards my goal (r).

I do not accurately measure my progress towards my goal (r).

**Abstract construals of progress**

I assess my progress towards my goal in terms of a feeling, rather than a number.

I have a gut feeling about how I am doing, rather than knowing precisely.

My instincts tell me whether I am making progress towards my goal.

Whether or not I am making progress towards my goal feels quite ambiguous.

It is difficult to define whether I am making progress toward my goal.

I can tell whether I am making progress towards my goal by how I feel.

I have a general idea about my progress towards my goal.

I know precisely how well I am doing on my goal (r).

**Monitor behaviour**

I keep track of how often I perform behaviours related to my goal.

I record when I do things that are related to my goal.

I use my actions and behaviours to track my progress towards my goal.

I make a note each time that I do something to help me to achieve my goal.

When I perform behaviours that are related to my goal, I make sure to keep a record.

I do not keep track of my behaviour in relation to my goal. (r)

**Monitor outcomes of behaviour**

For this goal, I keep track of the outcomes of my behaviour.

I track the outcomes of my behaviour in order to assess whether I am making progress towards my goal.

I look at the consequences of my behaviours in order to assess my progress towards my goal

I monitor the outcomes of the things that I do related to this goal.

I do not consider the impact that my behaviour related to this goal has (r).

For this goal, I do not consider the consequences of my behaviour (r).

**Public monitoring-** *The information derived from progress monitoring is reported to at least one other person.*

I tell other people about my progress towards my goal.

I post information about my progress towards my goal online (e.g., using a mobile phone app, website, or via social media).

I keep a public record of the things that I do in relation to this goal.

I upload evidence of my progress online (e.g., by posting a picture or using a mobile phone app).

I record my progress towards my goal in a place where others can see it.

I let other people see my progress towards my goals.

**Private monitoring-** *The information derived from progress monitoring is kept private*

I keep the progress that I am making towards my goal private.

No-one else knows whether I am making progress toward my goal or not.

Only I know whether I am making progress towards my goal.

I do not tell others about my progress towards my goal.

I do not let others see whether I am making progress towards my goal.

I do not share information about my progress towards my goal with others.

I hide my progress towards my goal from others.

**Monitor rate of progress-** *The person monitors their rate of progress toward a specified goal.*

I do not really think about how quickly I am making progress toward my goal. (r)

I keep track of how fast or slow I am moving toward my goal.

I think about whether I am making sufficient progress toward my goal.

I assess the speed at which I am making progress towards my goal.

I assess how quickly I am making progress towards my goal.

**Monitor distance from the goal-** *The person monitors how far they are away from a goal or starting point****.***

I evaluate my progress towards my goal in terms of what I have achieved so far.

I evaluate my progress towards my goal in terms of how far I have to go.

I assess my progress by evaluating how close I am to achieving my goal.

I think about what I have achieved since I set my goal in order to evaluate my progress.

To assess my progress towards my goal, I think about what I have done already.

To measure my progress towards my goal, I think about what I still need to achieve.

**Appendix 4.4*.*** *The Ostrich Scales: Questions to measure whether people monitor their progress towards different goals*

Webb, T. L., Benn, Y., Chang, B. (in preparation). *The Ostrich Scales: Questions to measure whether people monitor their progress towards different goals*. Unpublished manuscript, University of Sheffield.

**Instructions:** This questionnaire focuses on your goals and how often you think about them. You will be asked about your goals in different areas of your life, such as work, health and relationships. Please indicate the extent to which you agree or disagree with each of the statements:

Strongly Disagree Not Sure Agree Strongly

Disagree Agree

**Monitoring nutritional information**

When shopping for food, I look at nutritional information on products.

I look at ingredients lists on food products.

I monitor how many calories I eat.

I rarely consider what foods I eat during the day. (r)

**Monitoring alcohol consumption**

I monitor how much alcohol I am drinking.

I think about how many units of alcohol I drink.

I rarely think about how much alcohol I am drinking. (r)

I do not notice how much alcohol I consume. (r)

**Monitoring exercise**

I notice when I have not done enough exercise.

I often think about how much physical activity I am doing.

I do not notice how much exercise I am doing. (r)

I keep a record of when I exercise.

**Monitoring household energy**

I monitor how much electricity I use at home.

I do not think about how much gas I use at home. (r)

I consider whether the amount of energy that I use at home is increasing or decreasing.

I look carefully at my gas and electricity bills.

**Monitoring cleanliness of house**

I notice when my home is dirty.

I do not pay attention to how clean the surfaces in my home are. (r)

I often think about how clean my house is.

My home has to be really dirty for me to notice that it needs cleaning. (r)

**Monitoring recycling**

I check whether items are recyclable.

I often put items in the bin without thinking about whether they could be recycled. (r)

I notice how much household waste I recycle.

I think about whether I am recycling as much as I want to.

**Monitoring money**

I look carefully at my bank statements.

I check my bank balance regularly.

I try not think about how much money I spend. (r)

I keep a record of how much money I spend on different things.

**Monitoring relationships**

I talk to friends and family about our relationships

I am attentive to signs that there are problems in my relationship.

I seek my friends and family’s opinion about our relationships.

I am attentive to changes in my friends/ family’s behaviour towards me.

**Monitoring work performance**

I wonder whether I am meeting my work objectives.

I seek feedback on how I am performing at work.

I wonder whether I am fulfilling my responsibilities at work

I often reflect on whether I am good at the work I do.

**Monitoring future goals**

I often think about how I will feel in the future.

I often reflect on whether I am likely to be successful in the future.

I often compare my current self with what I would like to be in the future.

I notice whether I am on track to achieving my future goals

**Appendix 5.1.** *Participant information sheet for Study 2*

**UNIVERSITY OF SHEFFIELD**

**DEPARTMENT OF PSYCHOLOGY**

**Participant Information**

Thank you for your interest in our research project. Prior to deciding whether or not you would like to participate in our study, please read the following information. If there is anything you are unclear about or if you would like any more information, please contact Devon Houlahan or Nathan Thurley (npthurley1@sheffield.ac.uk).

**What is the study about and what does it involve?**

The purpose of this study is to explore people’s experience of using the app ‘My Fitness Pal’. Because of this, we are **only recruiting participants who are currently interested in their diet and/ or exercise levels.**

If you agree to take part, then you will be asked to download the MyFitnessPal app (if you do not already have the app). You will also be asked some questions about you and your current health goals. Following this, you will receive an email each day for five days asking you to respond to a short question asking you to describe an event. These descriptions should take no longer than 2 minutes to write. On completion of these five days, you will be sent a follow up questionnaire that will ask you about your experience of using MyFitnessPal.

In total, this study will take approximately 30 minutes to complete.

**Who can take part?**

To be eligible to take part in this study, you must be **16 or older**, an **iPhone user,** and be **interested in managing your diet or exercise levels.**

**The incentives for taking part**

Level 1 psychology students will be awarded through 2 course credits for their participation. Other participants will not receive any incentives for taking part in this study.

**Are there any risks involved in taking part in study?**

This study has received ethical approval from the department of psychology research ethics committee. There are no perceived risks from taking part in this study, however if you were to experience any type of distress or emotional harm you can withdraw your data at any time, contact your GP or refer to the university counselling service by registering for SAMHS at <https://www.sheffield.ac.uk/ssid/counselling>.

**Do I have to take part?**

It is your choice whether to take part or not. If you do decide to take part you can withdraw at any time, without giving reason by emailing the researcher.

**Will my data be confidential?**

All the data will be kept strictly confidential and will remain on the both student researcher’s password secured laptops. Your data will only be accessible to the research team and you will be unidentifiable to the researchers once the data is downloaded from Qualtrics. Furthermore, the findings and results of this study will not be presented in a manner that you can be personally identified from. Finally, if you are unhappy during any part of the study, you can again withdraw at any time.

**Thank you for taking the time to consider participating in our study.**

**Appendix 5.2.** *Consent form for Study 2*

**UNIVERSITY OF SHEFFIELD**

**DEPARTMENT OF PSYCHOLOGY**

**Consent Form**

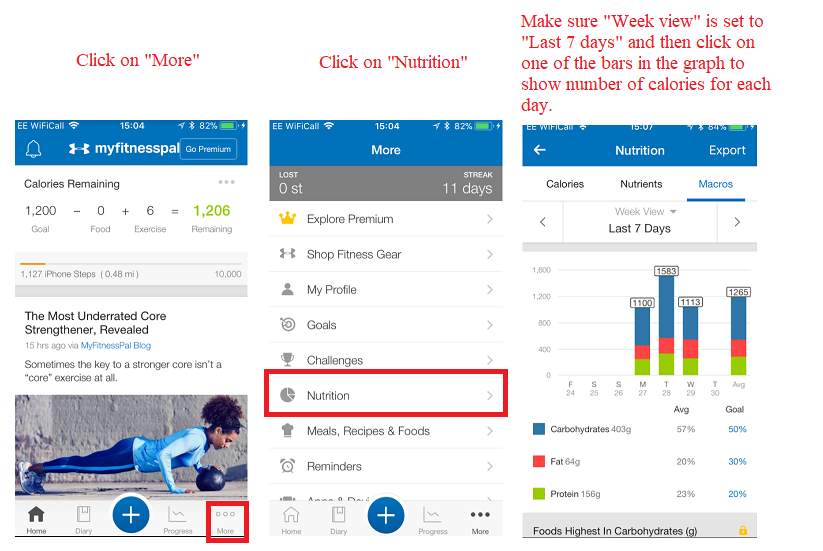
Please answer the questions below to indicate your consent to take part in this research:

|  |  |
| --- | --- |
| 1. I confirm that I have read and understand the information sheet; explaining the above research project and I have had the opportunity to ask questions about the project. |  |
| 2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline. I am also aware that I can contact the lead researcher at any time if I have further questions about the research project |  |
| 3. I understand that my responses will be kept strictly confidential. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research |  |
| 4. I agree for the data collected from me to be used in future research. |  |
| 5. I agree to take part in the above research project |  |

**Appendix 5.3:** *Information presented to participants in Study 2 regarding how to extract information regarding their calorie intake*

**About your calorie intake...**

First, we would like to know about your calorie intake over the past 7 days.  
  
Please follow the instructions below to access this information.



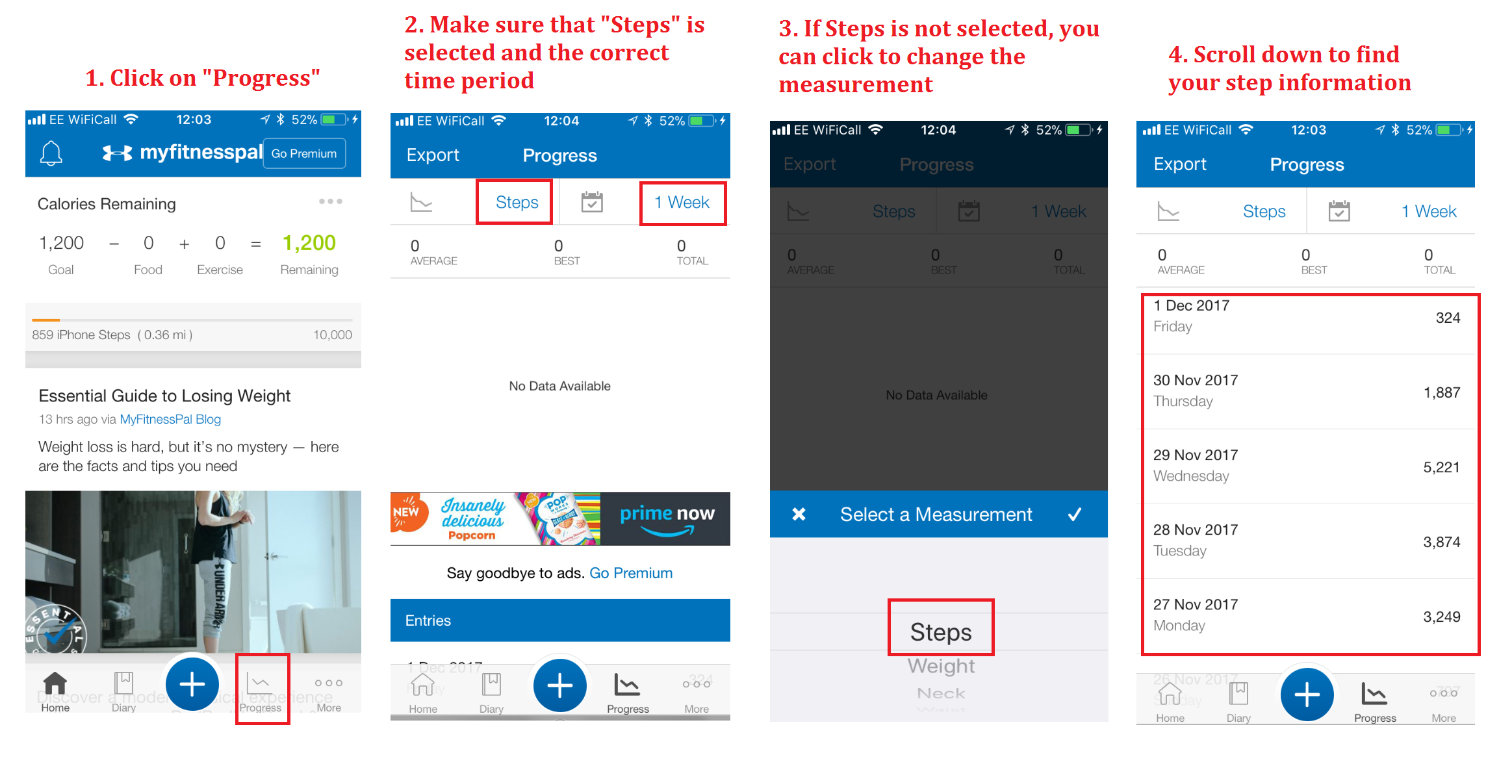
Please find information for the **first Monday** that you received an email asking you to describe an event.

Below, please enter the number of steps that you took that day. Then please do the same for the next 6 days. Where you do not have any information recorded, please leave the field blank.

**Appendix 5.4:** *Information presented to participants in Study 2 regarding how to extract information regarding the number of steps walked per day*

**About the number of steps that you have taken...**

Next, we would like to know about the number of steps that you have taken over the past 7 days.  
  
Please follow the instructions below to access this information.



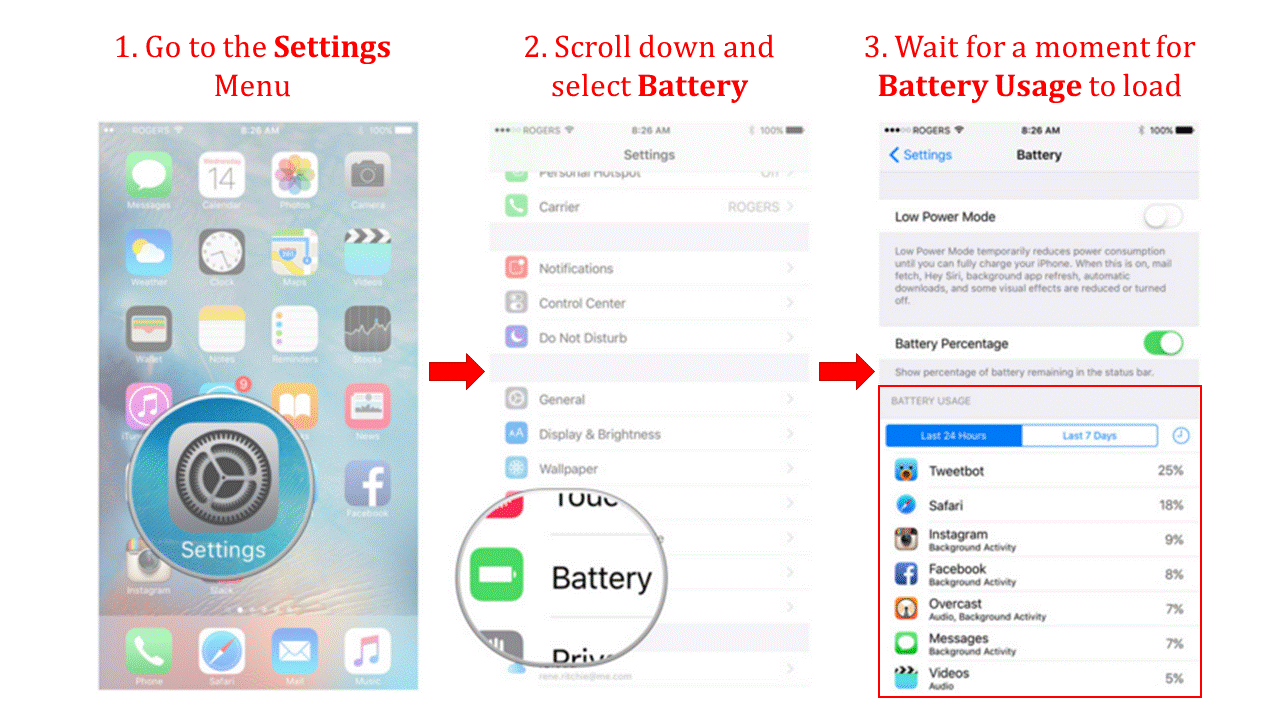
Please find information for the **first Monday** that you received an email asking you to describe an event.

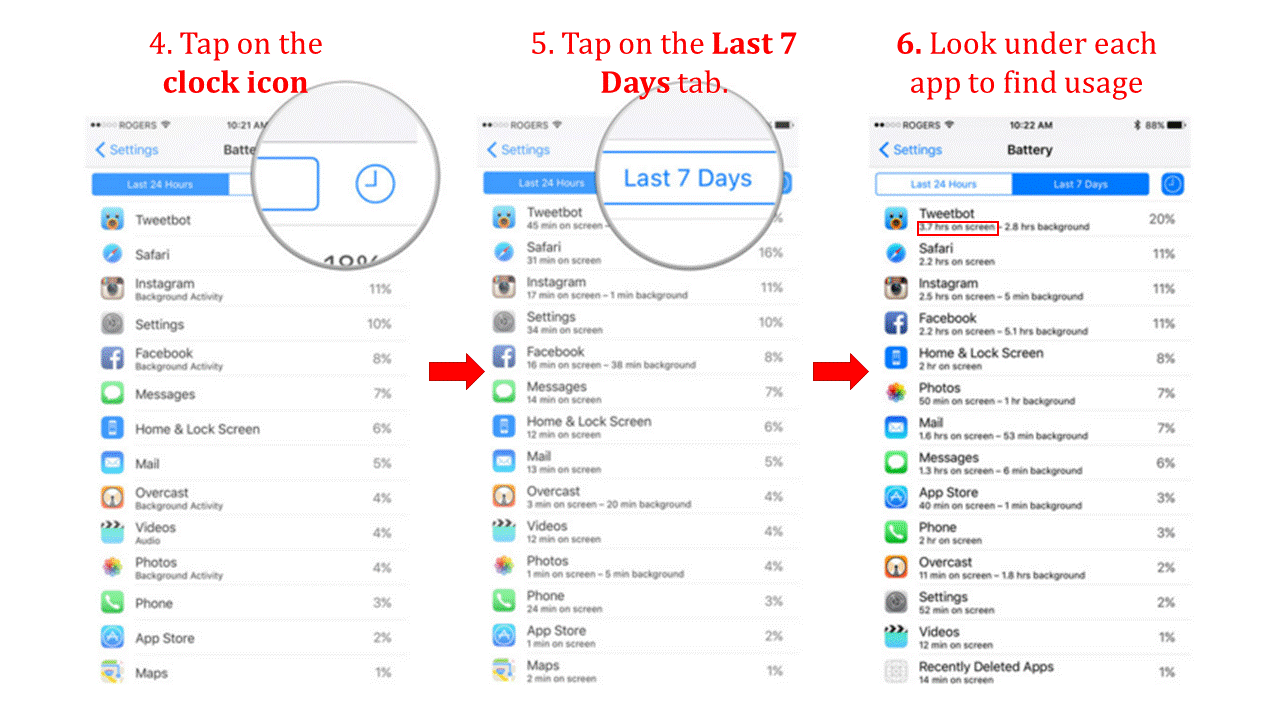
Below, please enter the number of steps that you took that day. Then please do the same for the next 6 days. Where you do not have any information recorded, please leave the field blank.

**Appendix 5.5:** *Information presented to participants in Study 2 regarding how =to find information about their use of the app, My Fitness Pal*

**Use of My Fitness Pal...**

Next, we would like you to tell us how often you have used the app, MyFitnessPal over the past week.

  
To find this information, please follow the steps below:



**Appendix 5.3** *(continued)*

Now you should have a breakdown of how much time you have spent using different apps over the**past 7  or 5 days.**Please make sure you are looking at your app breakdown for the last 7 days and not the last 24 hours (the **'Last 7 Days'**box should be highlighted in **blue).**

Under each app it will tell you the number of hours or minutes that the app has been on screen and the number of hours or minutes the app has been running in the background.

We are **only interested in the on screen activity** as this tells us how much time you have spent using the app.  Please **ignore the percentages** on the right - these numbers are not related to usage!

Please scroll down your list of apps to find information about the MyFitnessPal app.

**Appendix 6.1.** *Letter of invite for Study 3*



The Diabetes and Endocrine Centre

Northern General Hospital

Herries Road

Sheffield

S5 7AU

17th January 2017

Dear Sir/ Madam,

We are contacting you on behalf of researchers at the University of Sheffield who would like to invite you to take part in a research study that is being conducted in collaboration with the Adult Diabetes Outpatient Clinics at Sheffield Teaching Hospital NHS Foundation Trust (UK).

The purpose of this study is to explore the factors that influence the frequency with which people monitor their blood glucose levels and maintain glycaemic control. Before you decide whether you would like to take part, please read the information sheet included in this pack which will give you with more information about the study.

If you decide to take part, you will be asked to complete a consent form indicating that you have read and understood the information provided about the study. The consent form will also ask you to give the researchers’ permission to access your medical records and Diasend data. The researchers will access this information in order to obtain information about how often you monitor your blood glucose and levels of your glycaemic control. This data will be kept strictly confidential and will only be accessed by members of the research team.

Also included in this pack is a questionnaire which asks about your thoughts and attitudes towards your health. You can choose to complete the paper copy of the questionnaire, and return it along with your consent form, using the stamped address envelope provided, or you can complete the consent form and questionnaire online, using the study web link included in this information pack. Alternatively, you can complete the questionnaire during your next clinic visit. The questionnaire should take no longer than 30 minutes to complete.

Full details about this study can be found on the enclosed information sheet. If you would like any more information about this study, then please contact the researcher, Harriet Baird, either by telephone (0114 222 6528) or email (pcp11hmb@sheffield.ac.uk).

Thank you for taking the time to read this letter.

Yours sincerely,

Diabetes Clinical Care Team

**Appendix 6.2.** *Participant information sheet for Study 3*

**UNIVERSITY OF SHEFFIELD**

**DEPARTMENT OF PSYCHOLOGY**

**Research Title:** Self-monitoring of blood glucose among adults with type 1 diabetes

**Name of Researcher:** Harriet Baird

**Version:** 2.5

**Participant Information Sheet**

We would like to invite you to take part in a research study. Before you decide whether to take part, it is important for you to understand why this research is being done and what it will involve. Please take the time to read the following information carefully and discuss it with others if you wish.

First, wewill outline the purpose of this study and what will happen if you decide to take part. Then we will give you more detailed information about the conduct of the study. If anything is unclear, or you would like further information, then please feel free to contact us.

**What is the purpose of the study?**

Self-monitoring of blood glucose is an important component in the management of type 1 diabetes. However, there is currently little research on the factors that influence how often people monitor their blood glucose. As such, the purpose of this study is to explore the factors that influence the frequency with which people monitor their blood glucose. This research may inform interventions and strategies designed to promote self-monitoring of blood glucose among people with type 1 diabetes.

**What does the study involve?**

If you decide to take part, you will be asked to complete a consent form indicating that you have read and understood the information provided about the study. The consent form also asks you to give the researchers access to your medical records and Diasend database, held by the Adult Diabetes Outpatient Clinics at Sheffield Teaching Hospital NHS Foundation Trust (UK), so that we can record the frequency with which you monitor your blood glucose levels and your long-term glycaemic control (using HbA1c levels). In order to identify and locate your medical records, you will be asked to provide your address and date of birth.

Included in this pack is also a questionnaire about your thoughts and attitudes (e.g. the extent to which you think that monitoring you blood glucose is worthwhile). You can choose to complete the paper copy of the questionnaire, and return it along with your consent form using the stamped address envelope provided, or you can complete the consent form and questionnaire online, using the study web link provided at the end of this information sheet. Alternatively, you can complete the questionnaire during your next clinic visit. The questionnaire should take no longer than 30 minutes to complete.

**Why have I been asked to take part?**

You have been asked to take part because you have a diagnosis of type 1 Diabetes. We are seeking adults (aged 18 and above), who have had a diagnosis of type 1 Diabetes for longer than 12 months and use Diasend software to record their blood glucose readings.

**Do I have to take part?**

No. There is no obligation to take part in this study. If you decide to take part, then you will be asked to sign a consent form. However, you are still able to withdraw from the study at any time by telling the researchers. You do not need to give a reason.  If you decide to withdraw from the study, any data acquired will be kept for future analysis. Data collected during this study may also be used in future research projects or analyses performed by the group, subject to appropriate regulatory approvals.

**What are the possible disadvantages and risks of taking part?**

This study should not involve any additional inconvenience other than asking you to complete a questionnaire, which should take no longer than 30 minutes. The questionnaire will ask you how you think and feel about your health. If any questions cause you to feel upset, you can contact your GP or speak to your diabetes nurse specialist.

**What are the possible benefits of taking part?**

There are no direct benefits from taking part. However, the information collected as part of your participation in this study may improve our understanding of the reasons why people monitor their blood glucose and so may help to improve self-management for people with diabetes in the future.

**Will my data be confidential?**

All of the information that will be collected for this research will be kept strictly confidential and stored in password protected files at the University of Sheffield. Your name, contact details and date of birth are required to identify your medical records. However, this information will only be accessed by members of the research team and will be deleted once data collection is complete.

**What will happen to the results of the research study?**

The results of this study will be reported in the researcher’s PhD thesis and may be published in appropriate scientific journals. The findings of the research will always be presented in such a way that the data from individuals cannot be identified. You can request a summary of the results once the study is complete.

**Who is organising and funding the research?**

The research is being funded by the University of Sheffield.

**Who has reviewed the study?**

All research that involves NHS patients or staff, information from NHS medical records or uses NHS premises or facilities must be approved by an NHS Research Ethics Committee before it goes ahead. Approval means that the committee is satisfied that your rights will be respected, that any risks have been reduced to a minimum and balanced against possible benefits, and that you have been given sufficient information on which to make an informed decision. This research has received ethical approval from North West - Greater Manchester East Research Ethics Committee (Reference: 16/NW/0039).

**Where can I obtain further information if I needit?**

If you have any questions regarding this study, please feel free to contact Harriet Baird by telephone (0114 222 6528) or email ([pcp11hmb@sheffield.ac.uk](mailto:pcp11hmb@sheffield.ac.uk)).

Alternatively, you can contact Dr Thomas Webb (Email: [t.webb@sheffield.ac.uk](mailto:t.webb@sheffield.ac.uk)) or Dr Jilly Martin (Email: [jilly.martin@sheffield.ac.uk](mailto:jilly.martin@sheffield.ac.uk)) who are supervising this research.

**Concerns and complaints**

If you have any concerns about the study, you may contact Harriet directly. Alternatively, if you have any cause to complain about any aspect of the way in which you have been approached or treated during the course of this study, the normal National Health Service complaints mechanisms are available to you and are not compromised in any way because you have taken part in a research study.

If you wish to make a complaint you can contact Patient Services Team via phone 0114 271 2400, email on [PST@sth.nhs.uk](mailto:PST@sth.nhs.uk), or in person in the Patient Partnership Department on B Floor, Royal Hallamshire Hospital and the Huntsman main entrance on C Floor at the Northern General Hospital. Otherwise you can use the normal University complaints procedure and contact the Registrar and Secretary's Office, University of Sheffield, Firth Court, Western Bank, Sheffield S10 2TN, tel. 0114 222 1100.

**Thank you for taking the time to consider participating in this study.**

**If you would like to take part, please complete the consent form, and return it along with your questionnaire, using the stamped addressed envelope provided. Alternatively, you can provide your consent, and complete the questionnaire online, using the study web address link below:**

**https://sheffieldpsychology.eu.qualtrics.com/SE/?SID=SV\_85JjveMUwxfDjDf**

**Appendix 6.3.** *Consent form for Study 3*

**CONSENT FORM**

**Title of Project:** Self-monitoring of blood glucose for patients with Type 1 Diabetes

**Name of Researcher:** Harriet Baird

Please read the following statements. If you agree with each statement, ***please write your initials*** in the box to the right.*.*

|  |  |  |
| --- | --- | --- |
| 1 | I have read and understood the Participant Information Sheet for the above study. |  |
| 2 | I understand that my participation in this study is voluntary and that I am free to withdraw at any time, without giving a reason, and without my medical care or legal rights being affected. |  |
| 3 | I understand that sections of my medical notes, held by the Adult Diabetes Outpatient Clinics at Sheffield Teaching Hospital NHS Foundation Trust (UK), will be looked at by members of the research team and I give permission for these individuals to have access to my records. |  |
| 4 | I understand that members of the research team will access my Diasend database and I give permission for these individuals to have access to this information. |  |
| 5 | I agree to the use of the data collected during this study in future research projects or analyses performed by the group. |  |
| 6 | I agree to take part in the above study. |  |

Signature:………………………………………………………………………………………………

Print Full Name:………………………………………………………………………………………

**In order for us to identify your medical records, please tell us your postal address and date of birth:**

Address………………………………………………………………………………………………………………………..

.………………………………………………………………………….... Postcode……………………………………….

Date of Birth…………………………………………………………………………………………………………………

**Appendix 6.4.** Summary of hierarchical regression analyses predicting the frequency with which participants monitor their blood glucose and long-term glycaemic control from the individual dimensions of time perspective (*N* = 161).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Frequency of blood glucose monitoring | | | Long-term glycaemic control | | |
| Step | Predictor | *β* | *t-value* | *p* | *β* | *t-value* | *p* |
| 1 | DAFNE Attendance | .280 | 3.64 | <.001 | - | - | - |
|  | Level of Education | -.066 | -0.86 | .391 | - | - | - |
| 2 | DAFNE Attendance | .277 | 3.57 | <.001 | - | - | - |
|  | Level of Education | -.179 | -2.00 | .047 | - | - | - |
|  | Past-Negative | -.021 | -0.21 | .831 | .103 | 0.96 | .339 |
|  | Past-Positive | .002 | 0.02 | .985 | -.028 | -0.30 | .765 |
|  | Present-Hedonistic | .028 | 0.33 | .746 | .124 | 1.31 | .191 |
|  | Present-Fatalistic | -.208 | -1.97 | .051 | -.020 | -0.19 | .853 |
|  | Future | .058 | 0.69 | .492 | -.199 | -2.11 | .037 |
|  | *Model Summary* | *R2* = .077, *F*(2, 159) = 6.66,  *p* = .002 | | | *R2* = .079, *F*(5, 130) = 2.24, *p* = .054 | | |
|  | *Model Change* | *R2* = .039, *F*(5, 154) = 1.35  *p* = .248 | | | - | | |

*Notes.* β = standardised beta coefficients.

1. These analyses were also conducted by including the number of calories consumed each day of the study as a within-subjects factor (i.e., 3-between (time perspective manipulation: past vs. present vs. future) by 7-within (day of the study: day 1 to day 7) mixed ANOVA. However, neither of the main effects nor the interaction effect were significant in any of the analyses (*p* > .05) [↑](#footnote-ref-1)
2. These analyses were also conducted by including the number of steps walked each day of the study as a within-subjects factor (i.e., 3-between (time perspective manipulation: past vs. present vs. future) by 7-within (day of the study: day 1 to day 7) mixed ANOVA. The only significant effect was a main effect of the day of the study, *F*(4.27, 44259) = 3.19, *p* = .012. This suggested that the number of steps that participants walked each day increased during the study (irrespective of the time perspective manipulation). [↑](#footnote-ref-2)
3. No information is provided by the authors regarding the number of participants who have contributed to this database, nor have the authors provided any demographic information. Thus, the generalisability of the findings associated with the DBTP paradigm is currently unknown (McKay et al., 2018) [↑](#footnote-ref-3)