The Effects of Positive Affect and Mood Salience on Intertemporal Decision Making

by

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Author’s declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

The focus of this thesis is to explore the impact of positive affective state and mood salience on intertemporal decision making. We found that positive affect significantly influence intertemporal preference. We also found that when current mood becomes salient to the decision maker, the direction of preference changes. Specifically, we hypothesized and found that individuals with positive mood are more likely to choose the later larger (long term) rewards than the individuals with a neutral mood. We discuss three factors that could explain choice behaviour in such situations. These factors are the willingness to maintain positive mood, temporal orientation and risk perception, and increase in the level of dopamine in brain. Moreover, our results indicate that when current positive mood is salient, individuals become more concerned about their affective state, and are more likely to engage in affect regulation, and as a result, more likely to prefer the sooner smaller (immediate) rewards. These findings suggest that experiencing positive affect would increase patience and self-control. However, this is the case when the level of mood salience is not high. When individuals' attention is directed to their emotional states, they tend to choose sooner smaller rewards that could assist them in keeping their good mood and avoiding negative feelings.

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Dedicated to my lovely parents:

In appreciation of all their unconditional love and unlimited support

Table of Contents

List of Tables

List of Figures

1. Introduction

Imagine you arrive at a restaurant when you are on a strict diet and have just received bad news regarding the results of your exams. What would you order as desert? A healthy fruit salad which is good for your diet or your favourite desert, tiramisu, which is not good for your diet? What if you have received good news? What would you do in this case? Do you think being happy or upset would change your preference between short term benefits and long term ones? Each day we make many decisions similar to this example whose consequences are distributed over time. In these intertemporal decisions we trade-off a sooner but smaller benefit/cost (*SS* from now on) and a larger benefit/cost (*LL* from now on) that will be received later. Such decisions are not made in isolation and previous research has identified various contextual and individual factors that influence intertemporal decisions. Intertemporal choices depend on individuals' pure time preferences (i.e. how patient or impatient they are) which itself varies with factors such as age and cognitive ability of the decision maker (Chabris, Laibson, & Schuldt, 2008; Frederick, 2005), as well as some contextual factors (e.g. whether the rewards are gains or losses, or whether the individual is asked to expedite or delay the reward) (Frederick, Loewenstein, & O'Donoghue, 2002). The current research aims to contribute to this growing literature that investigates the antecedents of time preferences. More specifically, our goal is to investigate the impact of individuals' positive emotions on their intertemporal decisions.

Emotions and their impacts on decision making has been the focus of many studies (e.g., Caruso & Shafir, 2006; Forgas, 1990; Hornik, 1993; Isen, 2001; Raghunathan & Pham, 1999). Our goal in this research is to bring these two fields of research together and investigate the impact of current emotional state on intertemporal decisions. More specifically, we investigate the following research questions: (1) whether and how positive mood of a decision maker, at the

time she makes an intertemporal decision, influences her willingness to wait for the larger-later reward, and (2) whether the degree of decision makers' awareness of their emotions or, in other terms, salience of their emotions, make a difference.

We conjecture that while positive affect increases the willingness to wait for *LL*-rewards when those emotions are not particularly salient, it will make the opposite effect when individuals are consciously aware that they are experiencing positive emotions. In other words, we hypothesize that positive affect often leads to more patience and resistance to temptation except in situations where the decision makers' attention is explicitly directed to their feelings.

We discuss three reasons that may explain why individuals with positive mood are more likely to choose *LL*- rewards. These reasons are mood maintenance, temporal orientation and risk perception, and dopamine increase in brain. First, to protect and maintain their positive affect, individuals avoid choosing tempting options that lead to experiencing negative feelings such as guilt. Second, as individuals in positive mood often underestimate time durations (Hornik, 1993), we believe they would perceive the delay to the *LL*- rewards shorter, hence they would be more likely to wait for the *LL*-reward. Also, previous research has found that under positive mood individuals are more optimistic and have more willingness to take risks (Andrade & Cohen, 2007; Lerner & Tiedens, 2006; Peters, Västfjäll, Gärling, & Slovic, 2006). For this reason, we believe that they would find it easier to wait for the delayed benefits as there is considerable amount of evidence showing that processing of time and risk are quite similar (Keren & Roelofsma, 1995). Third, positive affect increases the level of a neurotransmitter in brain, named dopamine (Ashby, Isen, & Turken, 1999) and dopamine increase leads to efficient decision making and better cognitive abilities (Isen & Labroo, 2003) and, hence as a result, we conjecture that increased dopamine levels due to positive mood would lead to more patience. We suggest

these factors altogether would lead to resistance to temptation and thus choosing long term benefits and rewards (*LL*- rewards).

Next, we investigate the role of mood salience on how people make trade-offs over time. Previous research has found that when we call individuals' attention to their current mood, in an attempt to improve their mood state, they would become more likely to engage in mood regulation (Caruso & Shafir, 2006). In accordance with this research on the effect of mood salience on decision making (e.g., Caruso & Shafir, 2006; Siemer & Reisenzein, 1998), we hypothesize that asking individuals to think about their feelings increases concerns for affective state and highlights the importance of affect regulation. In other words, when the level of mood salience is high, that is when individuals' attention is directed toward their current affective state, they are more likely to engage in affect regulation and prioritize affect regulation over self-regulation and hence less likely to resist temptation. Moreover when a threat or danger becomes salient to decision makers, they would avoid risk taking (Andrade & Cohen, 2007). In intertemporal decision making with high level of mood salience, we predict that when people think about their current positive mood, mood change could be viewed as a threat and as a result they would be motivated to avoid this mood change. Hence, under salient positive mood individuals tend to choose sooner smaller rewards which correspond to less risky options in decision making under risk.

The rest of this thesis is organized as follows. In the next section we briefly review the intertemporal choice literature and discuss the Discounted Utility Model and its anomalies. Then we discuss the various factors that influence intertemporal decision making. Next, we review previous research work on affect and its effects on decision making. We next develop our hypotheses regarding the effect of positive affective states on intertemporal decision making by

integrating the findings of these two lines of research. In the methodology and results sections we discuss an experimental study and results. In the conclusion section, we summarize our findings and explain how this research contributes to the intertemporal decision making literature. Finally, we discuss some limitations of this study and suggest directions for future research in this field.

2. Literature Review

2.1. Intertemporal choice

Intertemporal decisions range from simple mundane ones such as a decision between eating a healthy dessert such as fruit salad and an unhealthy tiramisu (Read, 2004; Read & van Leeuwen, 1998) to more complicated ones that may have lifetime impacts such as deciding to pursue education or taking a higher paying job (Hesketh, 2000). When you choose a healthy food for its future benefits, you forgo immediate pleasures of tasty but not healthy food. Likewise when you decide to pursue further education for a higher future income, you forgo some immediate or earlier income. Another example of such decisions is purchasing electrical appliances with low/high initial purchase price and high/low energy usage costs (Gately, 1980). Individuals face a trade-off between buying cheap appliances that are not efficient in energy usage (less costly now but more costly in the future) and expensive appliances that use less energy (more costly now but less so in the future). Intertemporal decisions also include saving decisions such as saving and investing money in an investment plan, purchasing a TV now, or in general, how much to spend now and how much to save for future (Hesketh, 2000; Read, 2004).

2.1.1 Factors influencing discounting behaviour

As shown by many researchers people tend to discount future benefits and costs (Ainslie, 1975; Loewenstein & Thaler, 1989). Nevertheless, research indicates that the extent to which people discount future utility is different among people. Frederick, et al. (2002) summarized the estimated discount rates elicited in previous research studies and found that they range from -6 percent to infinity. Read (2004) mentions that there are two important reasons for discounting future benefits or rewards that are “opportunity cost” and pure time preference or “impatience”.

Time delay is often costly and also people often grow wealthier over time, and therefore a given quantity of a resource brings more benefit now than in the future. In other words, waiting for the later rewards results in losing additional benefit or money, namely opportunity cost. Therefore, preferring more now rather than later seems rational (Read, 2004).

The second reason that makes people discount future utility is impatience. Impatience or pure time preference refers to people's tendency to put more weight on the expected utility of outcomes that occur earlier. As impatience leads to reduction in lifetime utility, it is difficult to justify (Read, 2004). Another possible explanation for discounting behaviour is that the decision makers find themselves more closely linked to the self now (or in close future) than the self in the distant future (Bartels & Rips, 2010). Read (2004) mentions that this idea was first addressed by Parfit (1984). Parfit (1984) described individuals as "a sequence of 'selves' distributed over time". You and the person you will be in future are not the same. Hence, it seems rational and justifiable to care about the utility of other people (e.g. future selves) less than ours. In accordance with this idea Bartels and Rips (2010) found that as the "psychological connectedness" between current self and expected future self decreases people prefer benefits to happen in closer future, but prefer costs to occur in distant future.

The first model of intertemporal decision making was the Discounted Utility (DU) Model (Koopmans, 1960; Samuelson, 1937). Samuelson (1937) and Koopmans (1960) introduced the DU model to capture discounting behaviour and since then their model has been widely used in economics. The DU model is used to represent individuals' preferences over consumption profiles $(c_0, \dots, c_T)$ that extends over time. The formulation of the DU model is as below.

$$\mathrm{U}_0(c_0, \dots, c_T) \ = \sum_{t=0}^{T} D(t)u(\, c_t), \text{ where } D(t) = \left(\frac{1}{1+\rho}\right)^t$$

where $U_0$is the discounted utility of the consumption profile $(c_0, \dots, c_T)$ where c_t refers to consumption at time *t*, $u(c_t)$ refers to the instantaneous utility function and $D(t)$ refers to decision makers discount function which is a decreasing function of *t* and takes values between 0 and 1, and ρ is the individual's discount rate or pure time preference.

According to the DU model, discount rates are constant for all time periods and also all types of goods and decisions (Koopmans, 1960; Samuelson, 1937). However, empirical research found convincing evidence on violations of these assumptions. Various empirical studies have found that discount rates are not constant but are decreasing with delay (Read, 1997; Read, 2004; Thaler, 1981). This discounting pattern is called *"hyperbolic discounting"* and is the most realistic representation of discounting behaviour (Read, 2004). Hyperbolic discount functions are used to explain a phenomenon called "time inconsistency". Time inconsistency refers to the change in preference during time (Strotz, 1955). When facing intertemporal decisions with a sooner smaller reward and a later larger one, when both options are delayed by the same amount, the preference for the later larger choice is augmented .That is, people are more likely to choose larger later rewards when the rewards are far but when the rewards becomes imminent, sooner-smaller reward is preferred (Read, 2004).

Another important issue is the difference between the decisions a person makes in various domains. A person might indicate preference for sooner-smaller reward making decision in a category while she prefers later-larger rewards in a different decision. For instance, a person might be a heavy smoker, which means they prefer immediate pleasures of smoking to later good health, but at the same time carefully consider the returns of different investment plans (Frederick, et al., 2002). In other words, people may have different discount rates for various acts of consumption.

Another line of research has focused on contextual factors that influence discounting behaviour (Loewenstein, 1988; Loewenstein & Prelec, 1991, 1992, 1993). Some of these factors are magnitude effect, sign effect, and delay-speed up asymmetry. Individuals tend to discount small amounts of money more heavily than larger ones (e.g., Benzion, Rapoport, & Yagil, 1989; Thaler, 1981). This is known as "*magnitude effect*". Second, gains and losses are discounted differently. Results of studies including gain and loss situations found that individuals discount gains more heavily than losses (e.g., Loewenstein & Prelec, 1991, 1992; Thaler, 1981). In other words, in loss situations, people tend to prefer losses to incur relatively sooner rather than delaying it. This effect is called "*sign effect*". The third anomaly is the "delay-speedup asymmetry" (Loewenstein, 1988). The change in delivery time of outcomes could be framed as an acceleration (expediting) or delay from a reference point in time and whether future rewards are framed as a delay or speed-up influences discount rates. More specifically, Loewenstein (1988) found that when the shift in the time of consumption is framed as a delay they discount future more heavily. In other words, individuals demand more to delay consumption than what they are willing to pay to expedite it.

Other than these contextual factors, individual differences are also a source of variation in elicited discount rates. Chabris, et al., (2008) summarized the findings of previous research works on the relationship between individual traits and behaviours and estimated discount rates. They report that people with addictive disorders such as smoking, drug use, excessive alcohol consumption, and gambling tend to have higher discount rates. In addition, Chabris, et al., (2008) mention that age and cognitive ability correlate with self-reported discount rates. Older people are found to be more patient than younger adults and as a result indicate lower discount rates. Nevertheless, Read and Read (2004) note that this is true for relatively shorter time delay

durations (less than one year) and for longer delays such as 3 to 10 years, this effect is reversed. The effect of cognitive ability and education on discount rates has also been tested by researchers. In general, top performance in school and also on cognitive decision making tasks correlates positively with patience (Chabris, et al., 2008). Those who are better performers indicate more patience for the later rewards. Also, higher level of education leads to more patience.

2.1.2. Parallels between risky and intertemporal decision making

Another important issue that could assist us in hypothesizing the influence of affective states on intertemporal decision making is the parallel between risky and intertemporal decision making. When a reward or benefit is not received immediately it seems uncertain. External uncertainty and the individuals' perceived uncertainty due to time delay have the same impact (Keren & Roelofsma, 1995).Therefore, the time delay in receiving the later larger reward might be perceived as uncertainty and thus such decisions seem to be risky. Previous research has found that time delay in intertemporal decision making, is similar to the risk in risky decision making.

Loewenstein and Prelec (1991) compared the DU model and the Expected utility model and showed that there are striking parallels between the DU and EU anomalies such as the similarities between *common ratio* effect of the EU model and the *common difference* effect of the DU model, *sign* effect of the EU model and *reflection* effect of the DU model and, the *magnitude* effect of the DU model and the *peanut effect* of the EU model . According to Loewenstein and Prelec (1991), this similarity could not be considered coincidental but it rather

indicates that the behavioural assumptions underlying the two models are similar and that the findings regarding each of the models could be assumed to be applicable to the other one. Another evidence for the similarity between the risky decision making and intertemporal choice are *immediacy* and *certainty* effects (Keren & Roelofsma, 1995). Immediacy effect refers to people's tendency to overweight outcomes that are immediate (i.e. do not have any time delay). Similarly, certainty effect refers to individuals' tendency to overweight outcomes that are certain relative to those that are less probable (Kahneman & Tversky, 1979). In their experiment, Keren and Roelofsma (1995) found that external uncertainty (such as introducing probabilities of less than 1 for occurrence of the outcome) has the same impact as the individuals' perceived uncertainty of time delay of the outcome. They also mention that it is more likely that immediacy is a derivative of certainty than the reverse.

In their research paper, Wakslak, Trope, Liberman, and Aloni (2006) go beyond the rational argument regarding the parallel between intertemporal and risky decisions and conceptualize probability as distance. According to Construal Level Theory (CLT) developed by Trope and Liberman (2003), events that are psychologically distant and represented by high-level construals such as their "essential, abstract, and global features". On the other hand, events that occur in close future are represented by low-level construals that is by their "incidental, concrete, and local features" (Wakslak, et al., 2006). Wakslak, et al. (2006) argue that probability is associated with abstraction. In fact, decreasing the probability of an event results in representing the event as a high -rather than low- level construal. When an event is less probable, people tend to treat it as something they do not have information or direct experience about and approach it with "abstract processing orientation". To summarize, people have less information

and experience about future and therefore, treat it as something that is less probable (with higher level of abstraction).

In this section, we reviewed the literature on the factors that influence discounting behaviour. Our goal in this paper is to look at one of these factors, namely positive affect, on intertemporal decision making. Thus, next we briefly review the literature on the relation between emotions and decision making.

2.2. Affect and Decision-making literature

2.2.1. Affect, Emotions, and Mood

In general, affect is used as an umbrella term for emotions and moods (Gross, 1999; Gross & Thompson, 2007; Visperas & Mathies, 2008). While some research papers report no neat distinction among the terms emotion, affect and mood and use them interchangeably (Gross & Thompson, 2007), the others differentiate them (e.g., Dunn & Schweitzer, 2005; Vohs, Baumeister, & Loewenstein, 2007)). Vohs, et al., (2007) argue that affect is automatic, rapid, non-conscious, and is a reactions to stimuli and events. Emotion, however, is described as a slow process that involves subjective feelings and physical responses and contains attributes that are major causes of an individual's behaviour (Vohs, et al., 2007).

Regarding the differences between mood and emotion, emotions are reactions to specific events and are typically shorter and more intense than moods (Gross, 1999; Schwarz, 1990). Moods however, result from some mild events that are either pleasant or unpleasant and may not have identifiable cause (Schwarz, 1990). In general, as Gross (1999) mentions, affect is the "super-ordinate category" for various emotional valences that include emotions, moods, dispositional states, and traits.

Loewenstein and Lerner (2003) categorize emotional factors influencing decision into two categories that differ in the time of occurrence. These factors are incidental and anticipatory emotional factors. Incidental factors are those that are often not related to the decision at hand and could be related to individual's immediate environment. On the other hand, anticipatory factors are those that consider the outcome of the decision and potential expectations and feeling regarding the outcomes. In this paper, we use the terms emotions, moods, and affect interchangeably. In addition, although both incidental and anticipatory factors are quite relevant to intertemporal decision making, we focus on the effect of incidental emotional factors on intertemporal decisions. In other words, rather than how emotions generated by, for instance, anticipating future consumption, we focus on how current incidental mood influences intertemporal decision making.

2.2.2. Affect and decision making

There has been a comprehensive research on the effects of mood, emotions and affect on judgment and decision making (e.g., Caruso & Shafir, 2006; Dunn & Schweitzer, 2005; Forgas, 1990; Hornik, 1993; Isen, 2001; Raghunathan & Pham, 1999). In general, mood states have been found to have both direct and indirect effects on individuals' behaviour, estimation, and recall (Gardner, 1985). In fact, different aspects of emotions and categories of emotional processes have varying influence on decision making. Early research on the effects of affect on decision making has mostly found negative effects caused by emotions but later on some researchers found evidence showing that they could be beneficial in some cases (Gross & Thompson, 2007; Loewenstein & Lerner, 2003; Vohs, et al., 2007).

Lerner and Tiedens (2006) argue that an emotion could be negative and disliked itself but that does not mean that it will always have a negative effect on decision making. They found that the appraisal tendencies may lead to undesirable outcomes in some situations but result in some desirable outcomes in other situations. For instance, on one hand anger leads to aggression, unrealistic optimism, and overconfidence and could harm decision making in some situations but on the other hand it can assist decision maker in some situations as it buffers decision makers from indecision, risk aversion and over analysis (Lerner and Tiedens, 2006). Therefore, in considering how helpful or harmful specific emotions are to decision making, other than the valence of specific emotions cognitive appraisal of the experiencing situation is also important (Peters, Västfjäll, Gärling, & Slovic, 2006).

Peters, et al. (2006) mention four important roles of affect in decision making and judgment. Affect can act as information, common currency, spotlight, and motivator. First, affect can act as information when choosing among alternative options or courses of actions. When an individual wants to judge options and choose one, she consults her feelings about those options (Schwarz & Clore, 1983; Slovic, Finucane, Peters, & MacGregor, 2002). These feelings guide their behaviour and could be related to past experiences, thoughts or even other less relevant emotions. Second, affective evaluation of choices could play an important role in decision making process as a common currency. By comparing and evaluating various values of the options and integrating both bad and good feelings individuals are better able to simplify complex decision making processes (Peters et al., 2006). Third, affect may influence decision making as a spotlight. Affect highlights some information and makes them more accessible to the decision maker. Rather than the feelings themselves, using this new information would guide individuals' judgment (Peters et al., 2006). In this case, for people who have already developed

positive feelings about an option, new positive information will be more salient and they would spend more time and effort considering this positive information. For options that are evaluated negatively, the opposite is true (Peters, Lipkus, & Diefenbach, 2006). The last role affect can play in decision making process could be as a motivator of information processing and behaviour. For instance, negative affect could motivate people to take actions to improve and repair their negative feelings. Likewise positive affect might motivate to take actions that would help in keeping good moods.

The affect-as-information theory by Schwarz and Clore (1983) suggests that individuals in negative (unpleasant) mood states are more likely to search for and use information to explain their emotional state than are people in positive (pleasant) state. For most people the negative or unpleasant mood is often a deviation from their regular positive mood. Therefore, under negative affective state, individuals are motivated to search for factors that account for them feeling bad. When the true reason of the negative mood is not available or salient, people tend to misattribute their negative affect to irrelevant factors. Schwarz and Clore (1983) found that introducing a plausible reason for negative mood eliminates this misattribution tendency. In their experiments regarding life satisfaction, Schwarz and Clore (1983) found that individuals use their momentary emotional states as information in making judgments.

Other research works in this area have specifically focused on positive or negative emotions (or both) and their potential effect on decision making. Examples range from those who have a more general view of affective states (either negative or positive) such as Isen (1984) that focuses on the influence of positive affect on decision making and cognitive organization to those such as Raghunathan and Pham (1999) that focus on more specific negative emotions and differentiate between sadness and anxiety according to their influence on decision making.

Another important factor that mediates the effect of mood on decision making is individuals' tendency to manage their emotional state. Research indicates that people are motivated to manage their mood. Isen (2001) found that people tend to avoid exposure to any unfavourable situation that might threaten their good mood. In addition, as a reaction to experiencing negative affect, individuals seek exposure to positive emotions that can assist them in repairing their negative mood (Caruso & Shafir, 2006; Cialdini, Darby, & Vincent, 1973). Thus, they engage in actions that assist them in repairing bad mood or maintaining good mood (Dunn & Schweitzer, 2005). Josephson, Singer, and Salovey (1996) found that when they ask subjects to recall negative or positive memories after negative mood induction, many individuals recalled a positive memory following a negative one and the majority of them (68%) explicitly said that this was an attempt to change their negative mood.

2.2.3. Positive affect and decision making

Early research on the impact of positive affect on decision making reported that positive affect impairs systematic cognitive processing and leads to superficial thinking and poor judgment (Isen & Labroo, 2003).Nevertheless, later research indicated that positive affect could have beneficial impact on decision making strategies, judgment, and problem solving (e.g., Isen, 1984, 2000, 2001; Isen, 2002). In summary, these studies report that positive affect promotes creativity, cognitive flexibility, organization of thoughts, variety seeking, negotiation tactics, responsiveness, generosity, and helpfulness. It would assist individuals in focusing on important material, shortening the decision making process, and reaching conclusion more efficiently (Isen & Labroo, 2003).

Positive affect might also have some behavioural effects such as motivating risk taking (Peters et al., 2006). When no threatening cue to emotions is known to an individual, positive affect results in increased risk taking (Andrade & Cohen, 2007). People in positive mood have an optimistic view of the world and thus perceive the situations as safer and less risky. Therefore, they are more prone to risk taking (Andrade & Cohen, 2007). Nevertheless, as mentioned above, this is only true unless people feel a threat to their good mood in the environment. If any danger to their positive affect (such as possible losses) becomes salient, they would become protective of their mood and avoid risk taking (Andrade & Cohen, 2007; Isen & Labroo, 2003). Nygren, Isen, Taylor, & Dulin (1996) also report that in risky decision making, positive affect leads to *cautious optimism.* That is, they found that positive affect leads to overestimation of winning probabilities in risky situations in likelihood evaluation tasks. On the other hand, positive affect subjects were less likely to bet in gambles which had a large loss with a small probability than neutral affect subjects but they were more likely to bet in gambles with a small loss-large probability outcome. In order to explain these findings, Nygren, et al (1996) suggested that positive affect shift individuals' focus from probabilities to outcomes. Furthermore, they pointed out that this shift might have motivational roots as individuals with positive affect would want to protect their positive emotional state and that possibility of a loss is more threatening for them than people in neutral mood. They found that in real situations (for instance real gambling) and where the potential loss is great, people with positive affect would become more risk averse than risk seeking.

3. Present Research: Positive Affect and Intertemporal Choice

In this paper, by integrating the findings of other research works in the related fields, we explore the influence of positive affect and mood salience on intertemporal decision making. We focus on how an induced positive mood influences preferences in intertemporal choice and also whether mood salience affects these preferences. We predict that under positive mood, some factors would increase patience and thus, would lead to more *LL*-reward choices. On the other hand, we hypothesize that when mood is salient the opposite would be true. When people become aware of their affective state, they would tend to prioritize affect regulation over self-regulation. Therefore, they would often prefer *SS*-rewards that bring immediate pleasure and could be helpful in keeping positive affect. Below, we discuss how we develop our hypotheses by integrating findings of other related studies.

3.1. Positive affect and intertemporal choice

Positive affect and its impact on various types of decisions have been of interest of many researchers (Isen, 2000, 2001; 2002; Isen & Labroo, 2003). Research indicates that positive affect tends to facilitate decision making, especially if the decision is important to the decision maker. In their review paper regarding the effects of positive affect on thinking and decision making, Isen and Labroo (2003) mention that researchers have found that positive affect facilitates organization of thought, increases risk-taking propensities, and leads to efficient decision making. We believe the facilitating role of positive affect assists decision makers in overcoming temptation and as a result they would choose the options with long term benefits more often.

In intertemporal decision making, choosing the later larger rewards may require self-control. In fact, people would either engage in self-control and wait for the larger benefits to be received in future or be impulsive and forgo the long-term or larger benefits in exchange with immediate pleasure. In general, self-control failure results from intentional self-destruction, shift in prioritization, or decrease in capacity of self-regulation and motivation to engage in self-regulation (Tice, Bratslavsky, & Baumeister, 2001). When people experience positive affective states such as happiness, they do not feel the urge for or the motivation to change current affective state (as they do under negative affect). Also, research on risky decision making indicates that negative affect leads to active mood regulation and depletion in self-regulation resources. As individuals gradually become weaker in self-control, they end up having less resistance to the tempting options (riskier options) (Bruyneel, Dewitte, Franses, & Dekimpe, 2009). For individuals with positive affect, we believe the opposite is true and as they do not experience negative feelings, they would not experience depletion in self-control resources. In other words, unlike negative affect, positive affect does not impair self-control. Hence, under positive affect we would expect individuals to resist temptation of immediate pleasure of sooner smaller rewards more easily and choose later rewards more often. We discuss three other factors that we believe increase willingness to choose *LL*-rewards. These factors are mood maintenance, temporal orientation and risk preference, and dopamine increase. Below we discuss each of them and indicate how the factors all together lead to patience.

Mood maintenance. Engaging in self-regulation failure and choosing tempting options might lead to experiencing negative feelings. According to affect regulation theory discussed earlier in this paper, individuals tend to protect their positive affective state. As a result, they behave in a manner that does not threaten their positive feelings (Andrade, 2005). Therefore, in

order to protect their positive mood, individuals would avoid choosing tempting options that leads to experiencing negative feelings resulting from self-control failure.

Temporal orientation and risk perception. Hornik (1993) suggests that positive mood has a significant positive effect on individuals' time estimation and their temporal orientation. People in positive mood often underestimate the time duration of recent events and mostly have a future orientation in their views and plans. We hypothesize that when people underestimate time duration of recent activities under positive mood and are optimistic, they would underestimate time duration of waiting for the delayed reward (future events) as well. As discussed earlier, time delay might be perceived as a risk and in this sense, intertemporal and risky decision making are similar. Thus, the risk people perceive to be associated with the waiting time would be less as well. Research also indicates that when no threat or danger is salient to the decision makers, individuals with positive mood are often willing to take risks (Andrade & Cohen, 2007; Peters, et al., 2006). In summary, we hypothesize that under positive mood individuals underestimate the duration of waiting time for the *LL*-rewards and thus underestimate the risk of waiting. At the same time, they have more willingness to take risks. Therefore, we believe these factors would often lead to preference for later larger rewards.

Dopamine increase. Another reason we believe positive affect might lead people to prefer *LL*-rewards is discussed through explaining how positive affect influences brain functions through the increase in a neurotransmitter named dopamine. Ashby, Isen, and Turken (1999) show with their dopaminergic theory of positive affect that positive affect increases the level of dopamine in brain. Dopamine mediates many behavioural and cognitive effects of positive affect such as facilitating decision making, problem solving (Isen & Labroo, 2003). Therefore, this elevated level of dopamine results in facilitated cognitive ability and problem solving. The study

by Frederick (2005) indicates that for a variety of rewards, those participants who scored high on some "cognitive reflection" problem solving task showed more patience. In summary, positive affect increases the level of dopamine in brain. This increase facilitates decision making and cognitive ability and thus, increases patience. To summarize and integrate these explanations, we suggest positive affect increases the level of dopamine in brain and this increase facilitates decision making. Also, positive affect results in underestimating time delay, improved cognitive abilities, optimism, and risk taking propensities. In addition, as affect regulation theory suggests, because individuals tend to protect their positive affect, they would avoid choosing tempting options that lead to experiencing negative feelings. These factors all together result in showing more patience. Therefore, we predict that positive affect leads to more patience and thus more willingness to wait for the later larger rewards.

Hypothesis One: *People are more likely to choose LL reward under positive affect*

3.2. Mood salience and intertemporal choice

As discussed above, we predict that positive affect leads to increased preference for *LL* rewards. Nevertheless, as Andrade (2005) mentions, we should not expect a unique behaviour from a specific affective state valence. There could be factors that influence decision behaviour and result in varying preference in intertemporal decision making in different situations. In this section, we explain one such factor, mood salience, which could change individuals' preference among *SS* and *LL* options.

Previously, consumer choice was assumed to be a conscious and deliberative process. Further research however, indicated that various factors affect decisions when the decision makers do not recognize (outside of the individual's conscious awareness) (Fitzsimmons, et al.,

2002; Visperas & Mathies, 2008). Affect is known as one such factor. That is, individuals are not always aware of how affect could influence and change their decisions. We believe individuals' intertemporal choices may differ when their attention is directed to their affect. In other words, when people consciously think about their current affective state they tend to choose options that are different from those they choose without considering their mood.

In their research paper, McFarland and Buehler (1997) mention that people should first acknowledge their emotional state to be able to repair or cope with it. They also mention that individuals differ in this affect acknowledgement ability. Mood acknowledgement increases the concerns decision makers have about the hedonic consequences of their choices and may result in making decisions that are not optimal (Caruso & Shafir, 2006). Siemer and Reisenzein (1998) found that mood can affect evaluative judgments only when it exceeds a threshold of salience. Therefore, the effect of mood on decision making and judgment depends on mood acknowledgement and the level of mood salience and a change in the level of mood salience would influence preference in intertemporal decision making.

The study by Caruso and Shafir (2006) found that when mood becomes salient (e.g., by calling individual's attention to their current mood), people become more likely to engage in mood regulation. They try to improve their emotional state especially when a repairing option is available at the moment of decision making. In one of their studies, they asked people to choose between comedy and drama movies to watch. The majority (65%) preferred drama. However, when they asked people to imagine themselves in a positive, neutral, or negative mood, most subjects in all conditions preferred the comedy option. They concluded that when individuals consider emotions, their concerns for their affective state increases and as a result they would

choose the option that is helpful for mood lifting (in negative and neutral conditions) or mood maintenance (in positive condition) which was the comedy clip in their experiment.

Andrade (2005) proposes a model that discusses how affect guides behaviour and behavioural intentions through two mechanisms, affect regulation (AR) and affect evaluation (AE). The AE theories assume that, individuals' current affect at a single point in time biases evaluative judgment and actions in a congruent manner. Such influence could be either direct (for instance through affect as information hypothesis) or indirect (e.g., mood congruency). According to AE theories, while negative affect is expected to lead to a less favourable evaluation of the environment, which inhibits action (e.g., decreased consumption), positive affect lead to a more favourable evaluation of the environment, and this would stimulate proactive behaviour (e.g., increased consumption) (Andrade, 2005). The AR theories however, assume that individuals' "projected discrepancy between feelings at two points in time (i.e., what they feel now and what they could feel in the future as a result of the behavioural activity)", guides behaviour (Andrade, 2005 , p. 359). According to this model, individuals with negative mood believe that proactive behaviour would improve their mood and therefore, they tend to engage in such behaviour while people in a positive mood are afraid of mood-threatening consequences of the behaviour and tend to avoid action. In other words, the AR theories explain how sometimes negative (positive) mood stimulates (inhibits) action.

When people believe that an activity could not change their mood, the affective evaluation mechanism guides behaviour. However, when people expect it to change their mood, a combination of affect regulation and affective evaluation mechanisms is in work. In this situation, if a mood-lifting cue exists, people would have more behavioural intention in compare with individuals in neutral mood and if a mood-threatening cue is present, their behavioural

intention decreases. Now the question is how these mechanisms could influence intertemporal choice.

We believe, when people do not consciously think about their mood, they would not view their choices as a cue for lifting or threatening their mood. Therefore, according to AE theories, their positive mood would lead them to choosing long term benefits in intertemporal decisions. However, when we explicitly ask them to think about their feelings, they would be more concerned about the impact of the consequences of their actions on their affect. As mentioned above, in this situation, mood change is expected and the *SS* and *LL* options would be perceived as helpful or harmful cues for affective state and a combination of AE and AR would guide behaviour. We predict, in such situations individuals would be more likely to choose *SS* rewards for two reasons.

First, when people experience positive affect, they tend to have a brighter view of future (Hornik, 1993). As affect evaluation theories say, in this case affect will act as information and influence behaviour directly. According to affect as information hypothesis by (Schwarz and Clore 1983), people with a negative affective state tend to misattribute their feelings to a reason that could accounts for the bad feelings but when a plausible reason is introduced, this misattribution does not occur. We predict that this could be applicable to positive affect experiences as well. We believe, when people think about their feelings and find themselves in a positive mood they would seek a reason for that and thus they start thinking that this is due to everything being fine in their environment and therefore, they would conclude that there is no reason to delay consumption and invest in future.

In addition, as mentioned earlier regarding risky decision making, when people are in positive mood, their attention would shift from probabilities to payoffs especially when those

payoffs are negative and threatening the mood (Nygren, et al., 1996). This is also consistent with what Isen & Labroo (2003) mention. They report that people with positive affect are more loss averse than people with neutral mood as in addition to actual loss to be incurred their positive mood is also at risk. Likewise, we hypothesize that calling attention to mood would focus people on the possibility of losing their positive affect and individuals would indicate more preference for less risky options that are immediate rewards in our case.

Second, according to AR theories, people with positive salient mood would think of the intertemporal options as cues for lifting or threatening mood. They find the *SS* options as a mood lifting option to add to their positive feelings with the pleasure of immediate rewards. *LL*-rewards in this situation, could act as a mood threatening cue that threaten their good mood by leading to experiencing negative feelings of waiting for the delayed rewards. Therefore, we predict people are more likely to choose *SS* rewards. These reasons indicate how a combination of both AE and AR are in work when positive affect is salient.

Hypothesis Two: *Under positive affect, calling attention to emotions increases preference for sooner smaller rewards*

4. Methodology

The purpose of this study was to test whether positive mood and mood salience affect impatience as we hypothesized. In order to test the hypotheses introduced in the previous section, we used experimental methodology in which we induced positive or neutral mood and manipulated subjects' attention to their feelings independently. Our study had a 2 (Mood: Neutral vs. Happy) by 2 (Attention: No attention to emotion vs. Attention to emotion) between subjects design. We manipulated participants mood by using the imagination mood induction procedure described more in detail below. In order to ensure mood salience in the" attention to emotion" conditions we asked participants to think about their affective state before making the decision. These questions were asked after the subjects experience mood induction but before they answered the intertemporal choice questionnaire. Some important issues in testing our hypotheses were to choose appropriate mood induction procedure, discount rate elicitation method, and using hypothetical or real payoffs. Below, we discuss these issues and the experimental procedure in detail.

Participants. A total of one hundred and thirty University of Waterloo undergraduate students participated in this study in exchange for course credit. In addition, we had a draw at the end of each of the eight sessions for a gift card that can be redeemed in a chain coffee shop. The value of the gift card was determined by the choices of the chosen subjects and hence to a degree our experiment was incentive compatible. For each winner, a number between 1 and 15 was selected randomly (this number corresponded to the numbers of the choice questions). The winner was rewarded based his or her answer to that question. For instance, if number 7 was chosen, we looked at the winner's answer to question number 7 and whatever the answer was (either the *SS* or the *LL* reward) it was rewarded to him or her.

Design. We randomly assigned participants to one of the four treatment conditions. These conditions were positive mood (with and without attention to emotions), and neutral mood (with and without attention to emotions). We should note that people might have been experiencing different moods at the time they participated in our experiment. As we were not aware of their feelings we had use a mood induction procedure that has been used previously and proven to be successful. Thus, for mood induction we followed the procedure used by Dunn and Schweitzer (2005). Many other studies in mood and decision making field of study have used similar method for mood induction (Schwarz & Clore, 1983; Siemer & Reisenzein, 1998). This induction method was first developed by Strack, Schwarz, and Gschneidinger (1985) and validated later in other studies (e.g., Keltner, Ellsworth, & Edwards, 1993; Lerner & Keltner, 2001; Tiedens & Linton, 2001). Westermann, Spies, Stahl, and Hesse (1996) tested 11 different mood induction procedures (MIPs) and found that this method is one of the most effective ways to induce moods.

As we also didn't want to make the mood salient in all conditions we need a mood manipulation that was relatively subtle. For this reason, we modified and used the cover story that Dunn and Schweitzer (2005) used in their experiment. We told participants that:

"*Our research team is attempting to develop a questionnaire to assess life events in a systematic and reliable manner. In order to design the questionnaire, it is necessary to collect a large sample of positive and negative life events from which to choose appropriate materials"*.

Then we induced positive or neutral mood by using the imagination mood induction procedure. More specifically, we asked people to remember three events of their past or present life that makes them feel a specific emotion. Participants in the positive mood condition read:

"*Describe in detail one situation that has made you the most happy you have been in your life, and describe it such that a person reading the description would become happy just from hearing about the situation"*.

For the neutral group, we asked them to remember events that they did not feel strong positive or negative feelings in and because we assumed that it would be difficult for people to talk about neutral events, we gave them an example of such events (e.g. washing hands).

In order to manipulate mood salience in the "attention to emotions" conditions we explicitly asked subjects to think about their current mood and rate how they were feeling at the moment. Subjects in these conditions first read the following sentence and filled the *Positive and Negative Affect Schedule* (PANAS):

"The table below consists of a number of different feelings and emotions. Read each item in the table below and then indicate to what extent you feel this way right now".

PANAS scale is developed by Watson, Clark, and Tellegen (1988) and is widely used in the emotions literature (e.g., Beedie, Terry, & Lane, 2005; Kugler, Ordóñez, & Connolly, 2010; Wakslak, et al., 2006). PANAS scale consists of 20 different feelings with positive and negative valence. Subjects rated the extend they experience each of those 20 feelings using a rating scale from 1 (very slightly or not at all) to 5 (extremely). The questionnaire can be found in appendices section. This scale also served as a manipulation check for our method of mood induction. Table 1 indicates the feelings that were rated and how they were categorized into positive and negative valenced groups.

Table 1. Categorization of feelings into positive and negative affect groups

Affect Group	PANAS Descriptors
Positive Affect	Enthusiastic, Interested, Determined, Excited, Inspired, Alert, Active, Strong, Proud, Attentive
Negative Affect	Scared, Afraid, Upset, Distressed, Jittery, Nervous, Ashamed, Guilty, Irritable, Hostile

In the second part of the experiment subjects answered a series of intertemporal choice questions. Previous studies has shown that observed discounting behaviour in experiments is sensitive to the elicitation method used (e.g., Frederick, et al. (2002)). Nevertheless, as in this study we use the same method for all groups the differences between methods is not a source of variation in elicited discount rates and does not affect our study. As the purpose of this study is to find the effect of emotions on individuals' preferences in intertemporal decisions and we are not interested in the specific rates, we used a choice task to elicit subjects' time preferences. In the choice task subjects answered fifteen questions in which they were asked to indicate their preferences between an *SS* and an *LL* reward. Across these fifteen choice questions, we varied the delays to rewards (today, in two weeks from today, and in four weeks from today) and the amount of the rewards (10 to 20 Dollars). The questionnaire could be found in the appendices section.

Another important issue regarding experiments of this type is the use of hypothetical questions and incentives. As using real payoffs would have been very costly, we used hypothetical payoffs. We should also note that previous studies have not found a significant difference in observed time preferences elicited using hypothetical or real payoffs (Frederick, et al., 2002). However, to motivate subjects for reporting their real preferences, in each of our eight

experiment sessions, we had a draw and one person was selected and for that person, one of his or her choices was played for real. We informed student about this draw before the study started so that they would choose more carefully.

5. Results

5.1. Manipulation check

As discussed before, in the "no attention to emotion" conditions, we did not want to make mood salient. Therefore, we did not ask people to rate their feelings. Instead, we used a mood induction procedure that has been proved successful in other studies. However, rating the PANAS scale in the salient mood conditions could be a measure for manipulation check. We can test to see if subjects in the positive mood condition have reported higher positive feelings than the subjects in the neutral condition. As discussed earlier in the methodology section, our questionnaire consisted of 10 emotions with positive valence and 10 with negative valence. For each subject, we averaged the positive ratings (out of 5) and reported it as the Positive Affect (PA) score for that person. Similarly, we reported a score for negative feelings ratings, NA. In our analysis of the effectiveness of our mood manipulation method, we used these scores as an indicator of how positive or negative subjects feel. We summarized the descriptive statistics of these scores in table 1.

To analyze, we conducted a one-way multivariate analysis of variance (MANOVA) test to see if subjects' reported positive and negative affect varies between neutral and happy conditions. Our two dependant variables were PA (positive affect) and NA (negative affect). As we predicted, results revealed that PA (positive affect) reported by the subjects that were in the positive affect condition was significantly higher than the positive affect reported by the subjects that were in the neutral mood condition *(F (1, 41) = 4.4, p = .042)*. However, reported NA (negative affect) did not differ significantly between these two groups *(F (1, 41) = .01, p = N.S.)*. These results show that our mood manipulation procedure successfully induced positive mood in

the positive affect condition as desired. The table below summarizes the reported rates of positive and negative feelings in neutral and happy conditions.

Table 2. Descriptive Statistics for manipulation check

	Positive Affect Condition		**Neutral Condition**	
Affect Rate	Mean	Standard Deviation	Mean	Standard Deviation
Positive	2.97	0.66	2.51	0.77
Negative	1.47	0.59	1.49	0.54

5.2. Analysis

To analyze the results of the intertemporal questions, we counted the number of times a subject has chosen *LL*-reward (hereafter *LL*-score) and used this number as our dependent measure. Note that higher score in this variable indicates more patience than lower scores.The mean *LL*-score for each condition is summarized in Table 3.

In order to explore the impact of emotions and mood salience on intertemporal choice, we subjected our data to a 2 (happy vs. neutral) x 2 (salient vs. not salient) analysis of variance (ANOVA) using the *LL*-score as the dependant variable. ANOVA revealed a significant main effect of attention to emotions ($F\ (1, 81) = 7.97, p = .006$) and a significant interaction between emotion and mood salience ($F\ (1, 81) = 14.36, p = .000$). However, the main effect of emotion,

(F (1, 81) = 0.006, p = .94), did not reach statistical significance. This is mainly because of highly significant crossover interaction that we predicted. More specifically, as seen in Figure 1, below, while mean *LL*-score is higher in the positive affect condition than in the neutral affect condition when mood is not salient, the reverse is true under mood salience. This crossover makes the main effect of positive affect non-significant.

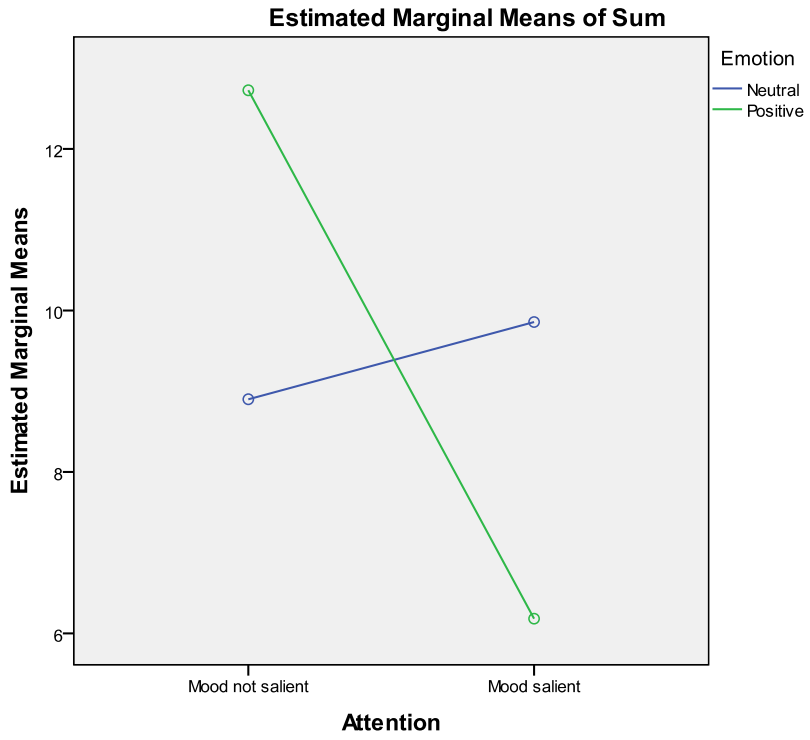
Table 3. Descriptive Statistics for analysis

	No attention to Emotions			**Attention to Emotions**		
Mood State	Number of Participants	Mean	Standard Deviation	Number of Participants	Mean	Standard Deviation
Neutral	20	8.9	3.70	21	9.86	5.40
Positive Affect	22	12.73	2.83	22	6.18	5.66

In our first hypothesis we predict that when mood is not salient, positive affect would lead to more preference for *LL* options. This was indeed the case as revealed by further analysis of our data. In order to test this hypothesis, we looked at the simple effect of mood under "no attention to emotions" condition by using the *LL*-score as the dependent variable. The results support our hypothesis. In the absence of our attention manipulation, subjects reported higher preference for *LL*-rewards in the positive affect condition (*M = 12.73, SD = 2.83*) than the neutral condition (*M* = 8.9, *SD* = 3.70), *F (1, 40) = 14.34, p = .001*. We conclude that, as predicted, people are more likely to choose *LL*-rewards when they have a positive mood.

On the other hand under mood salience subjects that were in the positive mood condition reported lower *LL*-score *(M = 6.18, SD = 5.66)* than the control group subjects *(M = 9.86, SD = 5.40)*. Again as predicted, we found a simple effect of emotion and the difference between the groups was statistically significant *F (1, 41) = 4.74, p = .035*, .This supports our hypothesis regarding the effect of mood salience on intertemporal decision making which was when mood is salient people are more likely to engage in affect regulation than self-control and hence are more likely to choose *SS*-rewards.

Figure 1. Mood salience and positive affect interaction



6. Conclusion and Discussion

6.1. Conclusion

This study, contributes to the growing body of research in emotions and decision making field by identifying the important role of affective states in intertemporal decision making. The first study supports our hypothesis regarding the effect of positive affect on intertemporal decision making. We found that positive affect increases patience and self-control. We also discussed three reasons that could explain why this happens. We believe, individuals attempt to keep their positive mood and avoidance of negative feelings (mood maintenance), their future time orientation, underestimation of time durations, and risk taking propensities (temporal orientation and risk perception), and increase in their cognitive ability as a result of the increase in the level of dopamine in their brain altogether lead to more patience..

On the other hand, we hypothesized and found that this is the case only when mood is not salient. When individuals' attention is directed to their emotions, they become more concerned about how they feel. This often leads to preference in the other direction, i.e., choosing immediate (*SS*) rewards. This happens because when mood is salient, people are more likely to engage in affect regulation. According to affect regulation and affective evaluation theories, a combination of these mechanisms governs behaviour when mood is salient. Individuals with positive mood have a brighter view of future and we explain that acknowledgement of this positive mood would lead to feeling that there is no need to invest in future (as it will be bright) and that it would be better to enjoy the pleasure of immediate rewards to maintain the present good mood (as they are more concerned about current mood state).

These findings support our conceptualization of the impact of positive affect on intertemporal decision making and also mood salience as a mediator of the relationship between affective states and intertemporal decision making. Therefore, we should not expect positive

affect to increase patience in all situations and the level of mood salience could play an important role and change the direction of preference.

6.2. Limitations and directions for future research

Even though, we tried to decrease the effect of possible other factors that might influence our results our study has some limitations that should be addressed in future research. First, our study focused on happiness as a representative of positive affect. Future research could test various types of feelings with positive valence to see if the results are different. In addition, we used the PANAS scale as a procedure for making mood salient. We believe it would be interesting to test other methods for increasing mood salience. Also, as mentioned earlier, we used a cover story for why subjects should fill the first questionnaire regarding life events first. We should ask subjects at the end of the session to see how many of them guessed that the two parts of the study were related. This way, we could make sure that our manipulation method for non-salient-mood condition was successful. Other studies could also focus on the difference in preference of individuals with negative mood.

Also, as our intertemporal choice questions are regarding some amount of money, factors such as age and wealth could influence making decisions. Therefore, relying on students as the population of this study could be another issue. In addition, in our study the variation in the size of the rewards was small (10 to 20 Dollars). Future research can use different ranges and sizes of monetary rewards. Future research should also look at other types of intertemporal decisions. For instance, questions regarding pursuing education, careers with short and long term costs/benefits, and eating behaviours could be used to see if our findings are restricted to monetary rewards. Finally, even though we discuss possible mechanisms that can explain our results we do not directly test which of these mechanisms is actually at work. Future research should focus on this

important gap and attempt to identify the underlying psychological mechanism(s) through which positive affect influences intertemporal decisions.

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Appendix A. Experiment Material for mood induction procedure

i) Part One- Happy Condition (No attention to emotion)

Part One

Ticket Number.....

Our research team is attempting to develop a questionnaire to assess life events in a systematic and reliable manner. In order to design the questionnaire, it is necessary to collect a large sample of positive and negative life events from which to choose appropriate materials. We would like to ask you to assist us by answering the following questions:

1. Gender

☐ Male

☐ Female

2. Think about your past and present life, and then write down three events that make you most **happy**. A short description of each event would be sufficient.

1.

2.

3.

Describe in detail one situation that has made you the most anxious you have been in your life, and describe it such that a person reading the description would become anxious just from hearing about the situation.

ii) Part One - Neutral Condition (No attention to emotions)

Part One

Ticket Number.....

Our research team is attempting to develop a questionnaire to assess life events in a systematic and reliable manner. In order to design the questionnaire, it is necessary to collect a large sample of positive and negative life events from which to choose appropriate materials. We would like to ask you to assist us by answering the following questions:

1. Gender

☐ Male

☐ Female

Think about your past and present life, and write down three events that make you feel **neutral**. In other words, we would like you to think about events or activities that are affectively neutral (are not associated with any strong negative or positive feelings). For instance, washing hands is not associated with any strong emotions by most people. A short description of each event would be sufficient.

1.

2.

3.

iii) Part One- Happy Condition (Attention to emotions)

Part One

Ticket Number.....

Our research team is attempting to develop a questionnaire to assess life events in a systematic and reliable manner. In order to design the questionnaire, it is necessary to collect a large sample of positive and negative life events from which to choose appropriate materials. We would like to ask you to assist us by answering the following questions:

1. Gender

☐ Male

☐ Female

2. Think about your past and present life, and then write down three events that make you most **happy**. A short description of each event would be sufficient.

1.

2.

3.

Describe in detail one situation that has made you the most anxious you have been in your life, and describe it such that a person reading the description would become anxious just from hearing about the situation.

The table below consists of a number of different feelings and emotions. Read each item in the table below and then indicate to what extent you feel this way right now.

Feeling/Level	1= very slightly or not at all	2=a bit	3=moderately	4=quite a bit	5=extremely
Attentive					
Jittery					
Active					
Afraid					
Interested					
Distressed					
Excited					
Irritable					
Ashamed					
Inspired					
Nervous					
Determined					
Alert					
Proud					
upset					
Strong					
Guilty					
Scared					
Hostile					
Enthusiastic					
Hostile					

iv) Part One - Neutral Condition (Attention to emotions)

Part One

Ticket Number.....

Our research team is attempting to develop a questionnaire to assess life events in a systematic and reliable manner. In order to design the questionnaire, it is necessary to collect a large sample of positive and negative life events from which to choose appropriate materials. We would like to ask you to assist us by answering the following questions:

1. Gender

☐ Male

☐ Female

Think about your past and present life, and write down three events that make you feel **neutral**. In other words, we would like you to think about events or activities that are affectively neutral (are not associated with any strong negative or positive feelings). For instance, washing hands is not associated with any strong emotions by most people. A short description of each event would be sufficient.

1.

2.

3.

The table below consists of a number of different feelings and emotions. Read each item in the table below and then indicate to what extent you feel this way right now.

Feeling/Level	1= very slightly or not at all	2=a bit	3=moderately	4=quite a bit	5=extremely
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Jittery					
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Irritable					
Ashamed					
Inspired					
Nervous					
Determined					
Alert					
Proud					
upset					
Strong					
Guilty					
Scared					
Hostile					
Enthusiastic					
Hostile					

Appendix B. Experiment material for intertemporal choice questions

Part Two (for all conditions)

Ticket Number.....

In this part of the study you are asked to answer a series 15 choice questions. In each question you will choose between two options. Each of these options specifies the dollar value of a Tim Horton's gift card that you can potentially win and the timing of the prize. In each question, Option A offers a gift card of a lower value that will received earlier and Option B offers a gift card of a higher value that will be received at a later time. You are simply asked to indicate your preference between these two options.

At the end of the session we will conduct a draw. In this draw first we will choose one participant randomly. Then, we will draw a number between 1 and 15 and the chosen participant will receive a Tim Horton's gift card based on his/her preference in that question. For instance, if question 7 is chosen in the second draw and the chosen participant's preference is Option A in that question, he/she will receive a gift card of the amount offered by Option A *at the time specified* in Option A.

Below are the 15 questions. Please indicate your preferred option in each question.

Question	Option A	Option B
1	$10 now ☐	$11 in **2** weeks from today ☐
2	$10 now ☐	$12 in **2** weeks from today ☐
3	$10 now ☐	$13 in **2** weeks from today ☐
4	$10 now ☐	$14 in **2** weeks from today ☐
5	$10 now ☐	$15 in **2** weeks from today ☐

6	$10 now ☐	$16 in **4** weeks from today ☐
7	$10 now ☐	$17 in **4** weeks from today ☐
8	$10 now ☐	$18 in **4** weeks from today ☐
9	$10 now ☐	$19 in **4** weeks from today ☐
10	$10 now ☐	$20 in **4** weeks from today ☐

11	$11 in **2** weeks from today ☐	$16 in **4** weeks from today ☐
12	$12 in **2** weeks from today ☐	$17 in **4** weeks from today ☐
13	$13 in **2** weeks from today ☐	$18 in **4** weeks from today ☐
14	$14 in **2** weeks from today ☐	$19 in **4** weeks from today ☐
15	$15 in **2** weeks from today ☐	$20 in **4** weeks from today ☐

Thank you for your interest in our research and for your assistance with this project.