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The Influence of Social Connectedness on Hyperbolic Discounting

ERASMUS UNIVERSITY ROTTERDAM

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Marketing Master's Thesis

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Abstract

Countless studies have proved the existence of the phenomenon of hyperbolic discounting, which as a behavioral model, pertains to comparisons across decisions, when individuals are irrevocably faced with intertemporal choices. Due to a variety of motives that will be explored in length in this paper, there seems to exist a present bias in decision-making that reversals favoring present rewards and discounting future ones. Despite the advancements made in this subject matter, research in this field suggests that borrowing insight from the discipline of psychology will greatly aid and shed further light into identifying and understanding the antecedents of intertemporal decision-making.

This paper aims to unravel the extent in which social connectedness influences hyperbolic discounting and the consequences of such influence. In addition to the responses gathered by means of an inquiry into the participants' subjective judgment, the core indicator is that the perception of future social connectedness was influenced in a lab setting. The findings reveal a significant effect of social connectedness on hyperbolic discounting and provide evidence that this important socio-psychological construct can substantially aid in attaining an enhanced understanding of the intertemporal choice.

A further purpose of this study is attempting to place the values of the derived parameters into a wider context through their application in the marketing world. Ultimately, due to the novelty of associations made in this paper, suggestions will be offered on potential research that will allow for future advancement in this field of study.

Keywords: *Hyperbolic Discounting, Intertemporal Choice, Social Connectedness, Present Bias*

1. Introduction:

"I count him brave who overcomes his desires than him who conquers his enemies; for the hardest victory is over self"   ~Aristotle

One of the main struggles consumers face is to be able to defy their impulsive nature. In a utopian society, all individuals comprising the society would make a perfectly rational decision which would lead to the maximization of social utility, while taking present and future choices into account. The model of hyperbolic discounting invokes that individuals tend to place a higher value to those rewards coming sooner rather than at a further point in time. This occurs when an individual is faced with an intertemporal choice, hence deciding between alternatives whose consequences arise at different temporal points. In other words, "a decision maker needs to trade off utility (or value) of one outcome that is temporally proximal with another one that is temporally distant" (Soman et al. 2005). Placing this phenomenon in a broader context implies that we make such decisions repeatedly, whether saving for retirement (Wiener and Doescher 2008), negotiating maturity of deposits, getting a lower paid job or going to university to obtain higher pay (Green et al. 1994). The latter presupposes even daily decisions, such as health effects of food and smoking (Wertenbroch 1998), choice between initial and operating costs (Housman 1979) or delivery options (Lowenstein 1988, Malkoc and Zauberman 2006). Even though one cannot be expected to analyze behavior through a limited set of factors that influence choice, the question of where should one focus their attention in order to establish the true antecedents of hyperbolic discounting becomes apparent.

In the paper by Soman et al. (2005), the authors clearly demonstrate the importance of using a manipulation in order to examine the true relation between the variables in play. They explain that the resulting effects need to be isolated, and that merely calculating the discount factor from the provision of choices has often lead to inconclusive results, as also proven by Frederic et al. (2002). In this manner one can observe the antecedents of time preference and present a more informed analysis on the choice individuals make. By means of the research proposed in this paper, the respondents' perceptions of social connectedness will be manipulated in order to investigate whether this psychological state affects the intertemporal choices made.

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There is a common tendency among people to look back into their lives and emphasize the importance of shared experiences with others rather than solely what they have achieved. People by nature are social creatures and this inevitably affects all the decisions and choices they make regarding their present and future. It is not conceivable that the majority of individuals make a choice while merely taking their interest into account. While many analysts have studied the impact of others on our purchasing decisions (Johnston and Bonoma 1981, Dahl et al. 2005), in particular Kurt, Innam and Argo (2010) most recently, they focus on aspects such as time spent and/or joint decisions made in a business environment. This paper aims at understanding whether a greater connection to those around us, and especially those we consider to be an integral part of our lives, have an effect on the level of hyperbolic discounting manifested.

Initially, the reader will be presented with the theoretical framework of this paper that provides an understanding of the terminology and correlation between the variables. This will inevitably lead to a set of basic expectations and the rationale behind them prior to introducing the research experiment. Following the clarification of the experiment and its advantages, the results and their implications will be provided. This paper proposes that social connectivity provides insight into the antecedents of intertemporal decision-making. Furthermore, evidence will show that through the manipulation of such a psychological state, one is able to influence the choices made by consumers. Ultimately, this study aims at enhancing the understanding of the mechanism that lead to such behavior.

2. Literature background

2.1 Hyperbolic discounting

Taking into consideration the fact that research has revealed several reasons leading to hyperbolic discounting and that the results show significant differences while calculating the rate of discount (Frederic et al. 2002), there seems to be a wide consensus among authors that this phenomenon significantly affects the behavior of consumers (e.g. Thaler 1981, Ainslie 1992, Zauberman 2003). As early as 1920, Pigou stated that:

"*this preference for the present pleasure does not… imply that a present pleasure of given magnitude is any greater than a future pleasure of the same magnitude. It implies only that our telescopic faculty is defective*" (cited in Ainslie and Haslam 1992 and Zauberman et al. 2009).

Starting with Samuelson (1937) who first placed the discounted utility model into context, intertemporal preferences have been attributed to:

- impulsivity (Ainslie 1975, Loewenstein 1996),
- differences in cognitive representations between near and future events (Malkoc and Zauberman 2006, Trope and Liberman 2003, Zauberman and Lynch 2005),
- pervasive devaluation of the future (Ainslie and Haslam 1992),
- individual differences between time horizons (Carstensen, Issacowitz, and Charles 1999, Zimbardo and Boyd 1999),
- magnitude, sign and delay-speedup effect (Loewenstein and Prelec (1992),
- and individuals' subjective perception of prospective duration (Zauberman et al. 2009).

These psychological processes have a relation of direct opposition with the constant discount rate assumed in exponential discounting which produces consistent choice over time (Frederick, Loewenstein and O`donoghue, 2002). The dynamic inconsistency proposed has lead to the formulation of discount functions which aid in calculating hyperbolic discounting. The most widely used formula (e.g. Ainslie 1975, Ainslie and Haslam 1984, Kirby et al 1991, Soman et al. 2005, Laibson et al, working paper), which was adopted from Mazur (1984 and 1987) takes the following construct

$$v_t = \frac{V}{1+kt} \quad ,$$

where v_t is the initial value, V is the larger delayed reward, t is the delay to the reward and k is a parameter representing the degree of discounting. In light of the previously described psychological processes that lead to hyperbolic discounting, this formula acknowledges the effect of a delay in the time of the reward. Its functional form imposes a declining discount rate with delay (t) (Zauberman et al. 2009).

A body of research also provides an alternative measure for this phenomenon in the form of quasi-hyperbolic discounting (e.g. Laibson 1997, Zauberman 2003), which takes into account the difference in weight given to the first period of consumption. Hence, one might prefer €100 now over €200 in one year, but make the reverse choice if the question is presented as €100 in a year or €200 in two years, despite the fact that the difference in time and value between the rewards remains the same.

"Hyperbolic discount functions induce dynamically inconsistent preferences, implying a motive for consumers to constrain their own future choices" (Laibson 1997). The question rises as to how these choices might be affected if this consumer in the example above is able to envision the future and if he takes those around them into consideration, including them into the "equation" as it were.

2.2 Social connectedness

Ultimately, people make choices with the hope that this will lead to higher well-being and eventually happiness throughout the course of their lives. Lowenstein (1992) stated that *"…human behavior is simply a matter of taking actions in order to satisfy one`s preferences."* Even though these terms are quite subjective, researchers have attempted to measure the factors that lead to such conditions. Despite large increases in purchasing power, self reports combined with insight from neuro-economics provide evidence that the level of happiness in the West has not improved since the 1950`s (Layard 2006). Even though income remains one of the most sought after goals, research has to consider other factors which provide incentive for behavior and lead to certain choices in intertemporal decisions.

When considering the psychological factors that exert a large influence on one`s daily life, social connectedness has to be considered as a major determinant of the choices individuals make. Research into this field has lead to the creation of a personal acquaintance measure (PAM), which assesses connectedness in terms of: *1. Duration of acquaintance/relationship, 2. Knowledge of goals, 3. Frequency of interaction, 4. Social network familiarity, 5. Level of self-disclosure, 6. Degree of physical intimacy of a relationship with another person* (Starzyk et al,

2006). These factors also become apparent when analyzing the literature (E.g. Twenge 2001, Twenge et al. 2002, Maner et al. 2007) that has attempted to manipulate social connectedness in order to observe its effects on aspects such as aggression, interpersonal relationship, and self-defeating behavior (taking risks, unhealthy eating and procrastination). The most important proposition posed in this paper would be that those around consumers and the relationship consumers have created with them greatly affect our behavior. Hence the research will explain how expectations of future social connectedness will affect hyperbolic discounting.

Further insight on the topic at hand comes from position papers written by Lee and Robbins (1955) and Lee et al. (2001), who build upon the psychological theories of Kohut (1984) and constructed a social connectedness scale. The authors state that:

"Social connectedness appears to be related to one`s opinion of self in relation to other people. In particular the scale focuses on the emotional distance or connectedness between the self and other people, both friends and society. … taps those aspects of belongingness that Kohut (1984) describes as an "intense and pervasive sense of security" and the sense of being "human among humans."

One of the main aspects the authors focus upon, which lies at the heart of their scale, reflects the individuals' need for belonging and social inclusion. They further explain that this psychological state has proven to lead to higher well-being (Rook 1987) and improve leisure experience (Unger 1984), once again providing a basis to analyze its effects on intertemporal choices. Therefore, the combination of social connectedness and the need to belong scale (Leary et al. 2001) will provide insight into the respondents' state of mind and allow for an analysis of its effect on behavior.

2.3 Self theories and relationship with social connectedness

Another theory worthy of consideration is that of dynamic inconsistency (time inconsistency), which examines the fact that preferences change over time. One reason for this inconsistence can be attributed to hyperbolic discounting as individuals make a decision under uncertainty today that their future self would not have otherwise made (Laibson, 1997). In this respect, psychological connectedness, first introduced by Derek Parfit (1984) has to be explored as it

states that we are much more connected to the person we will be tomorrow than the one in a distant future. Consequently we make decisions that provide gains or avoid losses for the one closest to our current selves. Recent research (Bartels & Rips, 2010) has found evidence that psychological connectedness is directly related to intertemporal choices and there is a belief that *"intertemporal choices will progress most rapidly by continuing to import insights from psychology."* (Frederick, Loewenstein and O`donoghue, 2002)

Ainslie and Haslam (1992) maintain this train of thought and propose the theory of multiple selves. They explain discounted utility and theories such as self-defeating behavior by suggesting that the person we are at the moment and the one we will be in the future are not necessarily the same in a theoretical point of view. Hence, people tend to make decisions for the ones they are more closely related, while providing benefits to those closest to themselves and costs to those in the distant future. According to Parfit (1984): *"If one should care less about a distant future self than a proximal self, then one should speed up benefits so that the proximal self can enjoy them."* (Bartels and Rips, 2010)

Ultimately, for most of the decisions an individual makes, one cannot infer whether they imply the right or wrong choice to make, but creating a situation where considerations of the future are made more apparent, will generally aid someone in making a more informed decision or at least one which theory claims to maximize utility. Taking these factors into consideration, the experiment conducted in this research will place an individual in a scenario where they are more closely related to their future selves through the manipulation of social connectedness, in order for their decisions to be made with regard for time. This will therefore lead to more practical and social applications of the findings through the understanding of the underlying reasons for the change in behavior.

In this respect, Wiener and Doescher (2008) have examined the construct that leads to retirement savings. While they find that structural changes and education seem to be relatively ineffective, the authors provide evidence that persuasion through normative pressure and increasing the perceived importance of retirement lead to greater results. One of the aspects directly related to social connectedness proposed in this paper, would be that of societal norms such as "injunctive

social norms." It explains the effect of relevant others on the decisions we make. The authors state that "*a person's retirement plan participation decision is not purely a private decision, but rather one that is subject to social influence.*" Even though the paper concentrates on pension schemes, one can infer that these effects transcend into other aspects of an individual's life.

3.   Hypotheses

3.1 Hyperbolic discounting

Due to the overwhelming research in this field which demonstrates a clear bias of individuals towards the present, the first step to be taken would be to examine whether these theories apply to the sample at hand. Taking that portion of the population that has not been manipulated (control group) should provide evidence that respondents show preferences for sooner rewards, hence:

H1: Respondents will show a preference for smaller earlier rewards (SER) rather than larger later rewards (LLR)

3.2 Manipulation

The manipulation mechanism, initially introduced by Twenge et al. (2001), places respondents in either a future socially *alone*, or in a *belonging* condition. It directly aims to affect the perception of social connectedness and will have opposed effects depending on the state that is randomly assigned to each participant. One would expect that through the belonging condition, which increases both social and psychological connectedness, participants would make a choice for the more "rational" larger later rewards. In this respect, the alone condition will exert the opposite effect and lead to the choice of smaller earlier rewards. The positive effect would occur as respondents would be primed to consider others in their choice, and think of the larger rewards as a benefit that they can enjoy collectively. Furthermore, there will be higher consideration towards their future selves and a better perception of time. On the other hand, the alone condition will lead them to only consider themselves and become inclined to wanting immediate rewards.

Consistent with the analysis provided by Soman et al. (2005) and Bartels and Rips (2010), if they do not associate their present with the future self, or do not connect to the traits presented in the manipulation, they would prefer to assign benefits to the present. This would lead to:

*H2a: Placing respondents in the future **belonging** condition will lead to a higher proportion of choices towards the larger later rewards (LLR)*

*H2b: Placing respondents in the future **alone** condition will lead to a higher proportion of choices towards the smaller earlier rewards (SER)*

3.3 Social connectedness

The participants will also be requested to provide their opinion on twelve statements regarding social connectedness, allowing for an examination in relation to intertemporal choices. The assessment of previous research presents evidence that aspects of social connectedness could lead to a larger proportion of choice towards the larger later rewards. Even though this correlation has not been explicitly stated, the analyses of hypothesis 2a and 2b and the upcoming hypothesis 3, will attempt to confirm this novel association. Furthermore, the subsequent research will offer further insight into the rationale behind the attained results.

As with the previous hypothesis, one would expect those that manifest higher social connectedness to consider others in their choice and make a more "optimal/rational" decision. Moreover, these participants should exhibit a higher regard for the well-being of their future selves and take into account that the larger reward can bring benefits that would be shared with others. Placing this into context, if an individual takes into account their family life they would regard a superior pension plan as a necessity, or would engage in less self-defeating activities (e.g. eating unhealthy, high impulsive spending, procrastinating important tasks), as they would consider their effect on others and their opinion of them. This would lead to:

H3: Higher social connectedness moderates the choice of later larger rewards.

3.4 Further considerations

The in-depth analysis of the results will also provide insight into the specific factors that influence choice. One example would be the distinctive aspect of social connectivity presented in table 1 (pg. 9). Due to the characteristics they observe and the diversity of questions being posed, their impact might differ across dependent variables. Having this in mind, the lack of research on this particular correlation, makes it difficult for a well-built hypothesis to be formulated.

Based on the current literature, deductions can be made only after the analysis reveals certain patterns. This thought process also leads one to believe that even though some general results are expected, differences in response might evolve due to the variation in each set of questions. This is to say that there might be a difference between the strictly monetary and the contextual questions that will be presented to the respondents (e.g. vacation amount and product delivery)

Furthermore, it can be expected that the demographic and general questions included in the research are associated with the preferences of consumers, such as those dealing with health issues, level of involvement in social networks and retirement plans. Due to the lack of detailed information requested, only superficial conclusions can be drawn, however this will provide ideas and a modest basis for further research to be conducted in the field.

4. Methodology

4.1 Participants and experiment design

The self-administered questionnaire was completed by one hundred and eighty-eight students of the Erasmus University of Rotterdam in The Netherlands, who were each rewarded €5 for their participation. The manipulation used in this experiment involves sixty-seven of these students, thirty-four of whom were placed in one condition and the remaining thirty-three in another. To begin with, the participants were asked to make a choice between several binary choices that would be used to analyze their hyperbolic discounting level through the provision of intertemporal alternatives. This was followed by a series of questions regarding their social connectivity and several background and demographic questions. Further detail on the

manipulation and specific questions will be provided in the next section and the complete questionnaire can be found in the appendix[1]. In order to allow for the most reliable results, the experiment was conducted in the behavioral lab of the Erasmus University, in which all respondents were provided with a personal cubicle to fill in the questionnaire. Due to the sensitivity of some sections, the participants maintained full anonymity and were carefully and clearly informed that the manipulation conditions were randomly assigned.

4.2 Design of questionnaire

4.2.1   Hyperbolic discounting/intertemporal preference

The predominant amount of research has posed the respondents with a series a questions distinguishing between the choice of €100 today or an x amount in one year (e.g. Thaler 1982, Zauberman et al. 2009, Bartels and Rips 2010), or with the provision of two options from which to choose from (e.g. Rachlin et al. 1991, Borghans and Golsteyn 2006). Based on the later options this research proposed a set of six binary options from which the respondent could choose from. Naturally, it followed the structure of a smaller earlier reward and a larger later one[2].

As a number of previous studies only concentrate on monetary outcomes, this research attempts to formulate questions in a variety of constructs in order to observe whether temporal decision-making follows a particular pattern and can transcend across choices, or alternatively whether the lack of stability brings to light further reflection. Despite its benefits, this format has been adopted at the expense of biases that arise when dealing with individual preferences for certain product categories.

Consequently, following the strictly monetary series of questions, the respondents were requested to choose between various amounts of vacation time they would prefer. They were told that, on their birthday, their work offered them extended holidays, but due to a prior engagement they could choose between a shorter vacation at a closer point in time, or a longer one at a later time. This question has been adapted from several previous papers (e.g. Prelec and Lowenstein 1997,

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[1] The full questionnaire can be found in appendix 1, pages 30-46
[2] For details refer to appendix 1, pages 42-43

Frederick et al. 2002, Lowenstein et al. 2003) and attempts to measure intertemporal decision-making in a more contextual manner. Furthermore, this particular format was chosen based on the assumption that it would manifest a relationship with social connectedness. The inference would be that vacations are more often than not a highly social activity combined with a situation where one is confronted with new people. However, the need to get away from everyday life for a longer period of time might have an effect on choice.

Yet another widely employed (e.g. Lowenstein 1988, Mowen et al. 1991, Malkoc and Zauberman 2006, Zauberman et al. 2008) variety of questions deal with the time of delivery of a purchased product and hence the delay premium or speed up costs. With the increase in online expenditure, the large demand for newly released products and the relatively high delivery costs, research into the preferences of consumers has gained greater importance. The respondents were told that they purchased a game for €50 that they have been waiting for months, but due to overbooking the company has offered them several delivery options. As expected, these options included a shorter delivery time, or a longer one with a premium attached (discount on price) due to the inconvenience of waiting.

Taking the above construct into consideration, the subsequent table attempts to provide a clearer perspective of the variables involved. The development of each of these aspects aids in providing a enhanced analysis of the results achieved. It begins with hyperbolic discounting, which as previously presented, can be explained by several psychological antecedents. Even though it would be difficult for this paper to identify the specific factor that influences the respondents' choice, it is important to understand that several aspects lead to this behavior and that the manipulation inadvertently affects these concepts. Furthermore, one has to be aware of the fact that social connectedness is constructed through several underlying notions, and that each of them might have a distinct effect on the conduct of consumers. Yet another consideration to be kept in mind is that the manipulation presented has both an effect on social and psychological connectedness. Lastly, due to the diversity of questions posed, the research will attempt to provide an explanation for the variation of responses and their implications.

Table 1: Further insight into variables involved

Hyperbolic Discounting	Social connectedness	Manipulation	Alternative chosen
• Impulsivity • Differences in cognitive representations between near and future events • Pervasive devaluation of the future • Individual differences between time horizons • Magnitude, sign and delay-speedup effect • Individuals subjective perception of prospective duration • Multiple selves	• Need to belong • Social connectedness • Comfort with others	• Psychological connectedness • Social connectedness	• Strictly monetary • Amount of vacation • Speed-up/Delay on receiving product purchased

4.2.2   Manipulation

In addition to the direct correlation that will be tested between social connectedness and intertemporal choices, this paper aims to examine whether the manipulation of such a psychological state has an effect on the preference of respondents. The previously presented theory clearly acknowledged that such a manipulation is necessary in order to form a comprehensible relationship linking the variables and to understand the antecedents of hyperbolic discounting. Changing an individual's perception of their social connectedness has been attempted by several authors (e.g. Baumeister et al. 2002, Twenge 2002, Maner et al. 2007, Twenge et al. 2007 and Wildschut et al. 2010), who have all adopted the original method as described by Twenge (2001), which will also be the methodology pursued in this paper.

Initially, the respondents will be presented with a condensed version of a personality questionnaire (the Eysenck Personality Questionnaire; Eysenck and Eysenck 1975), which will serve as a gateway to providing the participants with a randomly assigned personality type description. Those in the future-belonging condition are told:

"You're the type who has rewarding relationships throughout life. You're likely to have a long and stable marriage and have friendships that will last into your later years. The odds are that you'll always have friends and people who care about you."

On the other hand, another set of participants will be placed in the future-alone condition. It goes without saying that all respondents were very carefully and clearly debriefed at the end of the experiment that the manipulation was assigned at random and that their personality description was in no way related to the answers provided in the questionnaire. Furthermore, previous research (e.g. Twenge 2001, Twenge et al 2007) has also tested whether the resulting responses came as a consequence of simple emotional distress and all concluded that this was not the case. It is important to make the below clarification regarding the future-alone condition:

"You're the type who will end up alone later in life. You may have friends and relationships now, but by your mid-20s most of these will have drifted away. You may even marry or have several marriages, but these are likely to be short-lived and not continue into your 30s. Relationships don't last, and when you're past the age where people are constantly forming new relationships, the odds are you'll end up being alone more and more."

4.2.3   Social connectedness

In addition to the conclusion that can be drawn from the preceding manipulation, it is also necessary to measure whether a direct relationship between perceptions of social connectedness and intertemporal decision is at place. This analysis will be possible through the examination of the responses provided to a series of twelve statements, which combines two separate scales allowing for a deeper and more extensive study.

Eight of the statements were obtained from the social connectedness scale introduced by Lee and Robbins (1995) and revised by Lee et al. (2001). They include statements such as: "I catch myself losing sense of connectedness with society" and "I feel understood by people I know."[3]

As several authors provided evidence that social connectedness is closely related to the need to belong, the following four statements were acquired from a scale by Leary et al. (2001) and used

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[3] For a detailed list of statement, refer to appendix 1, page 44

in similar studies (e.g. Cremer and Blader 2005, Carvallo and Pelman 2006), incorporating propositions such as: "I try hard not to do things that will make other people avoid or reject me" and "I need to feel that there are people I can turn to in times of need."

The respondents were required to identify their point of view in a six point Likert scale ranging from 'strongly disagree' on one side and 'strongly agree' on the other side of the spectrum. The upcoming section will provide further insight on the manner in which these responses were used for the purposes of this study.

4.3 Variables and statistics

4.3.1   Dependent

Ultimately, the issue under examination would be the intertemporal choice made by the respondents. This can however be measured in multiple ways and by means of multiple questions, leading to a variety of dependent variables. To begin with, each choice made by the consumer will be studied individually. This is important as each of the binary options presented to the respondents corresponds to a different discount rate, and considering all questions in their entirety might lead to results influenced by only a section of the questionnaire. Furthermore, by examining each question separately, the analysis might lead to a disclosure of underlining patterns in the data.

The next step entails combining each set of questions into a single dependent variable allowing for a broader perspective on intertemporal choice. Initially, each question consisting of a set of binary choices will be analyzed separately due to the previously stated differences in construct and context. Two distinct methodologies will be applied to combine these preferences. The first involves a straightforward calculation of patient versus impatient choices, meaning the proportion of time determined for a smaller-sooner reward (impatient) as opposed to preferring the larger-later reward (patient). This will later be used to calculate the total proportion of patience/impatience considering all questions simultaneously and the sample as a whole.

While offering valuable insight, calculating the proportions of preferences towards the present or future does not tell the entire story. This comes as a result of the fact that each pair of choices

represents a different discount rate. Hence, further computations are necessary to find a threshold or point of indifference between the rewards. This leads to the second technique used to combine preferences, namely the estimation of the individual discount rates through the hyperbolic discounting formula formerly presented. Offering an example with the first pair of choices from the questionnaire, the computation would adhere to the following structure:

In the choice between: | ☐ *€50 now*   *or*   ☐ *€70 in a year* |

The formula $v_t = \dfrac{V}{1+kt}$ *, would become* $50 = \dfrac{70}{1+k(1)}$ *, leading to k= 0.4*

Consequently, choosing the sooner-smaller reward would signify that the respondent has a discount rate of at least 40%. Since we cannot infer the precise number, for calculation purposes, this is the value given if they choose €50 now, and alternatively a value of zero is assumed. For the measure to be more precise and reliable, a set of questions is combined to calculate the average individual discount rate. This type of calculation fully serves the purpose of this paper in light of the fact that the differences between respondents matter more than the absolute value of the discount rate.

4.3.2 Independent

The independent variables come as a result of the manipulation and responses measuring the level of social connectedness. Therefore, the first step would be testing whether the manipulation had an effect on the intertemporal choice made by the respondents. This entails assessing the existence of a significant difference between the responses of the two manipulated groups. Further insight will be provided by weighing this data against the preferences of the control group.

Due to a substantial degree of association between the statements determining the level of social connectedness, and following the path proposed by all previous authors using this construct, the twelve responses will be reduced through factor analysis[4]. The resulting computations will then

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[4] A graphical representation of factors and their respective loadings can be found in appendix 2, page 47

be utilized as the independent variables in an attempt to investigate their effect on preferences. To avoid the possibility of unreliable results, analysis will be conducted on both the manipulated and control group separately as well as jointly.

4.3.3   Extraneous variable and control group

Background and demographic questions will be explored to test whether there is an effect on the respondents' preferences. Demographic questions included questions such as age, gender, income and nationality. Further responses were obtained regarding their use of social media, phone, and health related matters.

The respondents were placed in three distinct groups, two of which belonged to the manipulated group and the remainder pertaining to the control group. This is done in order to examine the magnitude of effects that manipulation exerts. It was also essential due to the fact that even though social connectedness questions are supposed to measure a stable trait, manipulation might have affected the responses in this section.

5.   Results

5.1 General information

The research revealed that the age of the respondents ranged from 18 to 29 with an average age of 22 years old. One hundred of the participants were females while the remaining eighty-eight were males. They were also asked questions to measure their financial literacy in order to analyze whether their financial condition and considerations they have made for the future would lead to different responses. Eighty-nine percent stated that they did not make any arrangement for retirement, while eighty-five percent did not invest in financial instruments such as funds and stock. Furthermore, the participants' monthly income ranged from €500 to €3500 with an average of €500 per month. This is however considering that students in the Netherlands receive money from the government and some might have judged that to be income, while others did not, as they do not have to work to receive it. Lastly, up to twenty-eight percent revealed that they had debt at the moment. Even though a direct relationship cannot be substantiated without further

information, as a variety of circumstances might have led to such financial positions, the research will analyze whether these extraneous variables might affect the preferences one holds.

5.2 Confirmation of theoretical background

Previous research stipulated that preferences create substantial bias towards the present. Considering the fact that most of the choices put forward represent exceedingly high gains in the future, as confirmed by their discount rate, if choices were made "rationally", most, if not all preferences, would lead towards the larger-later reward. A relatively simple test of this theory can be achieved through the computation of the average amount of responses towards the smaller-sooner as opposed to the larger-later reward.

Table 2: Proportion of preference for the later larger reward

Examined Statistic	All responses	Strictly monetary	Vacation time	Delivery Options
Proportion of patient	0.5	0.37	0.54	0.62
Proportion without manipulation	0.49	0.36	0.53	0.62

The above table illustrates the proportion of preferences that were made for the larger-later reward. In addition to the proportion of all the responses provided, it was important to compute this percentage excluding the effect that manipulation might have had and considering all three types of questions separately. As evidenced, manipulation does not lead to a different result in any of the cases when it comes to the average proportion of those who decide to wait. However, this does not prove that the manipulation was ineffective, but simply that the opposite effect that the alone and the belonging condition might have had, lead to a similar average eventually. The key result here is that when it comes to all the choices made, only half choose the larger-later reward, keeping true to the expectations of the theory. It is also interesting to observe that when it comes to the strictly monetary questions, which are also the ones predominantly used in previous research, the percentage of patience falls to thirty-seven. When it comes to the vacation time, the proportion falls around the average, while this becomes higher when the delivery options are concerned.

5.3 Effect of manipulation

The below table clearly demonstrates the significant effect of manipulation on the intertemporal preferences made by the respondents. To begin with, the research will concentrate on the strictly monetary question whose results illustrate the highest level of success.

Table 3: Effect of manipulation

Dependent variable	€50 now or €70 in 1 year	€100 now or €150 in 4 years	€50 in 1 year or €90 in 2 years	€50 now or €300 in 4 years	€100 in 1 year or €125 in 2 years	Proportion of patient (Q1)	Average discount rate (Q1)
Discount rate	40%	17%	80%	125%	25%	---	57%
Choice of smaller earlier reward for alone group	27 (80%)	30 (88%)	19 (56%)	8 (24%)	29 (85%)	67%	29%
Choice of larger later reward for belong group	17 (52%)	8 (24%)	27 (82%)	32 (97%)	16 (48%)	61%	45%
Test statistic (p-value) [b]	6,967 (0.008)*	1,773 (0.183)	10,176 (0.001)*	6,052 (0,014)*	8,879 (0.003)*	4,750 (0.000)*	4,654 (0.000)*

a: Independent variable in all cases is the manipulation (belong vs. alone condition)
b: Pearson chi-square statistic for monetary questions and independent sample t-test for proportions and average discount rate
*Significant at the 5% level

Attention should be drawn to the fact that four out of the five choices available in the monetary question confirm a significant difference between the preferences made in the two manipulation groups. This significant difference at the 5% level is then verified when computing the variation in the proportion of patience and the average discount rate. Yet another interesting aspect is the fact that the only response that did not show significant difference is the one with the lowest discount rate (17%). In general, those in the future alone group chooses the smaller- sooner reward in 67% of the cases, leaving 33% choice to the larger-later reward. On the other hand, those in the future belong group only choose the smaller-sooner reward in 39% of the cases, hence choosing the larger-later one in 61% of the occasions.

However, it is worth noting that the differences come as a result of two distinct causes. When it comes to the choices of those alternatives with low discount rates (25% and 40%), the difference in response is caused by the larger effect of the alone condition, leading to 85% and 80% of

impatient choices respectively. While the questions pertaining to higher discount rates (80% and 125%), were significantly different due to the greater effect of the belong condition, leading to 82% and 97% of patient choices respectively. This effect is especially so for the highest discount rate (125%), where the waiting time for the larger reward is four years (the highest in the dataset).

Even though significance at the 5% level was not reached in the other set of choices in addition to the ones provided above, there were three more cases that managed to reach significance at the 10% and 15% level. Two of these cases were included in the set of questions regarding delivery options and one in the question regarding the amount of vacation. Furthermore, a predominant number of questions showed the correct direction of responses, i.e. a tendency for the future group to choose more larger-later rewards and vice-versa, with only three out of fifteen questions showing the inverse direction albeit at a minimal amount. This however still means that when the proportion of a question in unison was taken, both responses to the vacation amount (p=.726) and the delivery time (p=.266) fell under the predicted direction.

5.4 Effect of social connectedness

In order to acknowledge the result of the manipulation, the subsequent step is to analyze whether the responses to the statements regarding social connectedness reveal a direct correlation to the preference of respondents. The first step to be taken was using factor analysis to diminish the amount of variables to be tested, considering that they are measuring similar traits. This led to the construction of three factors, namely social connectedness, need to belong and comfort with others.

This analysis takes into consideration the fact that manipulation includes only sixty-seven of the one hundred and eighty-eight respondents; eliminating the effect that manipulation itself has on the social connectedness statement responses. This is also proven by the fact that removing manipulation from the analysis showed the same results concerning the correlation between social connectedness factors and intertemporal preferences.

Table 4: Effect of social connectedness: monetary and vacation amount

Dependent Variable / Independent Variable	€50 now or €70 in 1 year	€100 now or €150 in 4 years	€50 in 1 year or €90 in 2 years	€50 now or €300 in 4 years	€100 in 1 year or €125 in 2 years	3 days now or 7 days in 6 months	5 days now or 10 days in 12 months	7 days now or 14 days in 18 months	9 days now or 19 days in 24 months
Constant	-1.409 (.244)*	-2.044 (.130)*	-.239 (.787)	1.216 (3.372)*	-1.804 (.165)*	1.633 (5.188)*	.455 (1.576)	-1.462 (0.232)*	-.055 (.947)
Manipulation	1,547 (4.699)*	.919 (2.506)*	1.863 (6.445)*	2.402 (11.048)*	1.834 (6.259)*	-.321 (.725)	.587 (1.799)	1.007 (2.737) **	-.502 (.605)
Social connectedness	-,097 (.907)	-.149 (.861)	.190 (1.209)	.400 (1.492)	.336 (1.399) ***	-.226 (.798)	-.079 (.924)	.430 (1.538) **	.205 (1.227)
Need to belong	.146 (1.157)	.069 (1.071)	-.288 (.750)	.011 (1.011)	-.235 (.790)	.562 (1.754) ***	.755 (2.127)*	1.114 (3.047)*	.624 (1.867)*
Comfort with others	-.286 (.751)	-.110 (.896)	-.224 (.787)	-.241 (.786)	-.321 (.726)	.566 (1.761) ***	-.307 (.736)	-.020 (.980)	-.347 (.707)

a: Binary logistic regression uzed as analysis tool
b: Statistics show the B value and Exp(B) in brackets

*Significant at the 5% level
 **Significant at the 10% level
 ***Significant at the 20% level

The preceding table provides information on the strictly monetary and vacation amount decisions. It becomes clear the manipulation was significant at the 5% level in all the monetary questions, leading to an increase in the likelihood of choosing the larger-later reward by up to 11 times if the respondent was part of the future belong group (Exp(B) = 11.048). Applying the same analysis to the remainder of the questions illustrates that, when significant, manipulation increases the odds of choosing the larger reward by a considerable amount.

While these results were expected from the previous section that provided evidence of the effect of manipulation, it is interesting to observe the effect of the remaining variables. In three out of the four questions regarding vacation time, the need to belong factor is positively and significantly associated with preference for the larger later reward at the 5% level. The social connectedness factor is also significant at the 10% level in one of the questions. When it come to the questions about the shipping decision, not included in an attempt not to overwhelm the reader with data, it is important to specify that the social connectedness factor was significant in all cases at the 10% level. Furthermore, there are several occasions in which a correlation exists at

the 20% level, but from which a precise conclusion cannot be drawn. Nevertheless, considering only those that reach higher significance levels, the impact of these factors on preferences for LLR is decisively influential.

To enrich the analysis and create a better idea of the antecedents of intertemporal preference, the following table shows the relation in the proportion of those who choose to be patient and the average discount rate. It illustrates all the variations of questions separately so that certain patterns can be disclosed, leading to extended conclusions.

The values regarding the average discount rate which need to be analyzed critically. The separate questions, while using the same formula, are constructed in terms of years for the first two questions and in terms of days for the last. This has been done in order to create more comprehensive results on the last set of question, and does not bias the conclusions as the relative differences between individuals is of importance for this research.

Table 5: Effect of social connectedness: proportion choosing for LLR and average discount rate

Dependent Variable / Independent Variable	Proportion of patient (Strictly monetary)	Average discount rate	Proportion of patient (Vacation time)	Average discount rate	Proportion of patient (Delivery options)	Average discount rate
Constant	.616 (.042)*	.452 (.025)*	.567 (.045)*	.876 (.067)*	.658 (.057)*	.032 (.003)*
Manipulation	.283 (.059)*	.164 (.035)*	.030 (.063)	.033 (.093)	.082 (.080)	.004 (.004)
Social connectedness	.016 (.026)	.012 (.015)	.017 (.028)	0.002 (.041)	.086 (.035)*	.004 (.002)*
Need to belong	-.008 (.033)	-.004 (.020)	.141 (.036)*	.178 (.053)*	-.026 (.045)	-.001 (.002)
Comfort with others	-.039 (.034)	-.020 (.020)	-.013 (.037)	.030 (.054)	.001 (.046)	.000 (.002)

a: Linear regression used as analysis tool
b: Statistics show the B value and standard error in brackets
*Significant at the 5% level

Even though the variable affecting the preferences of respondents differs throughout the set of questions, there is a definite relation between social connectedness and intertemporal choice. The strictly monetary set of questions displays a significant effect of manipulation at the 5% level. This level of significance is also present in the decision regarding the vacation amount, but in this case the need to belong factor seems to be the best predictor of choice. When it comes to delivery options, one can best predict preference through the analysis of the social connectedness factor. All the above deductions are verified by conclusions drawn through the examination of both the proportion of patient individuals and the average discount rate, providing similar significant results.

Considering that a relation exists between social connectedness and intertemporal decision, either manipulation or another distinct factor provide evidence of this relationship. This becomes increasingly interesting taking into account the construct of the questions posed and draws attention to the fact that different aspects of social connectedness have an effect depending on the context in which choice is made. Hence, implications, such as connectedness, important in delivery options and the need to belong, playing a significant role in vacation preferences, need to be taken into consideration.

5.5 Extraneous variables

The analysis of the demographics factor combined with several research-related general questions lead one to believe that there exists a correlation with the choices made. Considering the general nature of these questions not examined in depth in this paper, evidence points to certain deductions. The most significant results are achieved by examining the relation to the strictly monetary questions and by using the proportion of patient choices as the dependent variable. The strongest relations here do however remain so throughout all computations and sets of questions.

Age (B= -.026; p= .10), the number of friends on facebook (B=.000; p= .10), and whether contributions began for the retirement fund (B= .272; p= .061) are significant at the 10% level. Even though the effect is quite modest, the older one is, the more propensities one displays to choose the earlier reward. When it comes to the number of friends on facebook, no real conclusion can be drawn due to its minimal effect. This is also influenced by the range of

responses, as some had up to 2100 friends while others only 40. However, the standardized beta coefficient shows that the effect is negative, meaning that the larger the number of friends in this case, can lead to impatient choices, but further research is necessary for an accurate conclusion to be drawn. The most interesting evidence comes from the quite substantial association to having already planned for retirement. In fact, those who have already started making such plans seem to be prone to opting for the larger-later reward.

Two of the responses were significant at the 5% level, namely the amount of messages sent on a monthly basis (B= .000; p= .031) and the engagement in smoking (B= -.206; p= .049). As with the facebook question, the larger range of responses leads to minimal effects, and a similar conclusion can be drawn by observing the negative value of the standardized beta. It is not surprising to see that smokers tend to prefer the smaller-sooner reward. Even though providing evidence merely through this one question, it seems to confirm the vast research that is being done in terms of the relationship of health with intertemporal decision.

5.6 Verification of hypotheses

5.6.1 Hyperbolic discounting

The first step taken by the research was to examine whether the conclusions drawn in previous research applied to the responses in this sample. The theory of hyperbolic discounting dictates that individuals tend to be biased toward present gains. For the purpose of our research, this would mean that despite the high discount rates, going up to 125%, respondents would still choose for the smaller-sooner reward. Taking into account that theoretically most, if not all the choices made should have been for the larger-later reward, the computations clearly show a bias towards the present. Taking all the questions into consideration, only half of the individuals preferred the "rational" option. Furthermore, when examining the strictly monetary set of choices, the percentage of those choosing the larger reward falls to thirty-seven percent. This provides clear support for the first hypothesis claiming that respondents will show a preference for the smaller-sooner reward rather than the larger-later rewards.

5.6.2 Manipulation

The second hypothesis concentrated on the effect that each manipulation model would have on the respondents' preferences. First of all, it was checked whether there is a significant difference between the responses of the future belong versus the future alone groups. These would then be checked against the control group to test whether there is still such a magnitude of difference present. The most important results came from the strictly monetary question in which four out of the five questions showed a significant difference at the 5% level. This effect is strengthened when computing the difference in proportion between those that choose the patience option, most importantly the differences in the individuals' discount rate. Taking this into consideration, there is considerable evidence to verify the proposition made by the hypothesis. It has to be mentioned that when the other sets of questions are concerned, this level of significance is not present, while bearing in mind that the correct direction of results was present in twelve out of the fifteen sets of choices.

Furthermore, when comparing the responses of the two manipulation groups to the control group, one can conclude that the effect of the 'belong group' was considerably larger than the alone one, although this can be attributed to the conditions explained by the first hypothesis. If people are inherently prone to preferring present gains rather than waiting for larger-later ones, it would be difficult for a manipulation to lower this choice significantly. The results show that the 'future belong' manipulation was also significantly different from the control group (test statistic = 12,454; p= 0.053), while the alone condition although leading to a higher proportion of impatient choices than the control group, did not provide highly significant results (test statistic = 8,316; p= 0.216).

5.6.3 Social connectedness

The last hypothesis affirmed that higher social connectedness is positively correlated to the choice of larger-later rewards. The analysis shows that in one way or another the responses to the statements relating to this psychological state are noteworthy predictors of intertemporal preferences. Separating the responses into three distinct factors demonstrated that it was not always the same factor that led to the prediction of choice. When it came to the strictly monetary

questions, the manipulation showed a significant correlation (p= 0.000). Whereas for choices between length of vacation, the factor corresponding to the need to belong manifested predictive value (p= 0.000). Lastly, the delivery options were best correlated with the social connectedness factor (p= 0.018).

Despite the fact that there appears to be evidence to support the hypothesis, we should be cautious not to take these results as definite proof. First of all, imperfections exist in the conclusions due to both the positive and negative permeations embodied in the first factor. In general, one can conclude that social connectedness does in fact aid in predicting intertemporal choice, but the magnitude of the effect does not allow for this paper to make decisive deductions. Although manipulation provides evidence that altering connectedness does in fact lead to a variation in responses, the evaluation of the statements still leaves questions on how strong the predictive power of social connectedness truly is.

6. General discussion

The results drawn from the questionnaire responses lead to the discussion of several issues. The in-depth analysis could not be conducted before initially validating the theories upon which it was based. These assumptions proved to be accurate, once again confirming the existence of hyperbolic discounting and providing evidence of the reliability of the dataset used for this research. Although it is almost impossible to pin-point a singular motivation for such behavior, people do not make choices in what would be considered an economically rational manner and have a tendency to prefer earlier gratification at the expense of increasingly higher future benefits. No one ever said that 'living in the present' will always lead to negative consequences, but not considering the future is also a mistake that is made too often.

Manipulation demonstrated that presenting a scenario of a possible future in terms of the level of social connectedness leads to a significant change in preferences. Hence, people should not be restricted in the choices they make, but they should make sure that by taking the future and those surrounding them into consideration can lead to more socially optimal decisions. It is interesting to observe that when it comes to smaller discount rates (25% and 40%), hence smaller benefits

for delay, it seems easier to influence people towards choosing the smaller reward. While for the larger rates (80% and 125%), as can be expected, it is much simpler to exert influence through the future belong condition. This signifies that consumers, even at relatively high rates are easily swayed into hyperbolic discounting, and only at unusually large rewards can they be led to a wise intertemporal choice.

Manipulation also demonstrated that the strictly monetary alternatives had the most significance in the reported data. This indicates that the effect of perceived social connectedness seems to be context specific. In a more commercial implication, one cannot attempt to influence the consumer on a variety of products through the use of a precisely similar approach. The direction of results provided evidence that using a similar strategy, but making more specific inferences to the dependent variable under investigation might lead to improved results.

Similarly to the manipulation, when it came to the personal perception of social connectedness, the type of product being analyzed revealed diverse factors which could best predict choice. Hence, taking into consideration implications of this research, even though the correlation in principle exists, further research needs to be done in specific areas in order to determine how to influence consumers in fields with certain product qualities and characteristics.

By evaluating the results, there are specific details that also need to be taken under consideration. Seeing as the vacation length can be significantly predicted by the need to belong, it has to be made clear that a higher level of this determinant does not necessarily mean a lower level of social connectedness in general. It simply suggests that these individuals aspire to have high social connectivity and require the support of others. The significant effect of this factor on the vacation length could signify their desire to spend a longer time socializing and would accept a postponement of gratification in order to do so.

7. Conclusion

This research aims to investigate the influence of social connectedness on hyperbolic discounting. Drawing on insights from both the disciplines of economics and psychology in an attempt to discover such novel associations. The importance of the subject matter is demonstrated by the vast amount of research conducted in the field and the attention drawn towards these phenomena even from early philosophers. After all, virtually all decisions are in one way or another, intertemporal.

Considering the repercussion on greater societal issues, such as making provisions for retirement, living a healthier lifestyle and being environmentally conscious, measures should be taken to induce individuals into reflecting upon the greater picture. This is not to say that these theories cannot also be applicable in a more commercial setting through influencing the consumers' perception.

The analysis of the manipulation demonstrates the effects on hyperbolic discounting of creating greater future awareness and encouraging reflection on the consequences that one`s actions have on their social surroundings. Undoubtedly, the most constructive results come from the effectiveness of the future-belong condition, which provides a basis for attempting to influence consumers in such a manner and allowing for more informed decisions to be made.

While acknowledging the requirement of further research in this field to fully examine and comprehend the entirety of these concepts, this paper provides a stepping stone towards the consideration of social connectedness as an antecedent of intertemporal choice. Regardless of how individuals decide to conduct themselves, life in a modern society and emotional connections dictate that others influence the choices we make.

8. Theoretical and managerial implications

Individuals make many decisions through life which inevitably shape their paths and are constantly affected by variables that lead to certain choices. However, there are particular preferences that lead to major changes and individuals should be able to eliminate the bias explained by hyperbolic discounting in order to make the most "rational" assessment. As previously noted, by borrowing insight from psychology and making use of manipulation, this paper aims at shedding further light on the antecedents of intertemporal choice. In this respect, imagine the effect the job one takes has on their future, the pension plan and contributions one makes at a young age for retirement, the insurance plan when the unexpected actually happens, or the investment in stock or the purchase of a house.

Taking into consideration that such concerns cannot be so easily dealt with, the deduction drawn from this research can aid in alleviating several current issues. Based on recent articles (Meier and Werding 2010, Schieber 2011, Bengtsson and Scoot 2011), the aging population could have a large adverse effect on the well-being of several countries. This matter calls for an increased need for retirement funds, and especially those ones which involve voluntarily contribution. Providing individuals with a better perception of the future, the effects their savings have on their family could spur the renouncement of current benefits towards a better future in their older age.

Yet another issue that society is concerned with deals with the use of environmentally conscious products. Hyperbolic discounting seems to be a major deterrent towards the use of such goods (Karp 2002). A manipulation such as the belong condition proposed here could aid in creating higher consideration for those around us and once again making them understand that the higher costs that they might pay in the present for such products will lead to long-term benefits.

One of the most troubling behaviors discussed in most papers on hyperbolic discounting deals with the issue of health. Although this research does not make any concrete conclusions on this particular topic, the effects shown can be utilized to promote a healthier lifestyle considering that such a situation would lead to higher well-being in the future with the ability to share experiences with those closest to the individual decision maker.

9. Limitations and further research recommendations

No research comes without restriction and further analysis to enrich the conclusions obtained. Starting with the sample which, being restricted to students in one geographical location could have provided for larger diversity across nationalities, socio-economic conditions and age groups. It would be worthy to investigate whether the positive results of the manipulation transcend throughout a diverse set of individuals.

When examining the set of intertemporal questions posed to the respondents, one can acknowledge both the positive and negative aspects. On the one hand, it allows for conclusions to be drawn across several contexts while providing greater reliability of the proposed effects and on the other, it does not allow the in-depth analysis of particular situations or products. Future research focused on one particular topic would provide less generalized results but would inevitably offer a better understanding of the factors in play.

In this respect, using a structure such as that presented by Kirby et al. (1999), which utilizes a 27 item scale of strictly monetary questions[5], would allow for a more advanced calculation of the discount rate independent variable. Optimally, this would be made possible by using the method of Laibson et al (2008), who have constructed a model specifically designed for this computation. The calculation of each subjects discounting parameter (α_i), are obtained by maximizing the likelihood function:

$$\mathcal{L}_i(\alpha, d_i) = \prod_{t=1}^{27} \left[F_{\text{Logit}} \left(\frac{Y_t}{1+\alpha\tau_t} - X_t \right) \right]^{d_{it}} \left[1 - F_{\text{Logit}} \left(\frac{Y_t}{1+\alpha\tau_t} - X_t \right) \right]^{1-d_{it}}$$

,

Where $d_i = (d_{i1}, \ldots\ldots, d_{i27})$ is the vector of the 27 binary decisions of subject i. Dummy variable $d_{it} = 1$ if the respondent chooses the larger later reward (Y_t), and $d_{it} = 0$ if they chose the smaller earlier reward (X_t). In the equation, τ_t indicated the amount of time between the two rewards.

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[5] A complete set of choices, with values and time delay, can be found in appendix 3, page 48

A similar issue relates to the social connectedness statements that respondents had to reflect upon. Taking into consideration the research on the topic and hence the availability of such constructs, a larger set of propositions would have aided in generating more concise conclusions. This is especially so in light of the fact that these factors did manifest predictive power but not sufficiently so to draw the complete picture.

Moreover, the scope of this research does not go beyond understanding the influence of social connectedness on the choices made by the consumer. Future research should concentrate on shedding light on the inner workings of the theory proposed in this paper. The exact effect of manipulation on social connectedness and the specific interaction that exists with hyperbolic discounting need to be explored.

Undoubtedly, this theory and its implications can merely be seen as such until adapted to a real life situation where actual behavior is observed. The ultimate test would be the adaptation of these insights by governmental institutions or profit maximizing organizations, which can only be done in the field outside the lab. We hope the present research study encourages future work in this exciting domain of individual decision making.

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Appendix 1: The questionnaire

Dear Participant,

Thank you very much for your time and for your collaboration on our study about charity, time, and choices!

Please read all instructions carefully and answer what first comes to mind. There are no wrong answers.

Please write your Student Number: ……………………………………………

Please read the following text carefully.

Description of personality type: According to the personality questionnaire previously administered one would conclude that:

You're the type who has rewarding relationships throughout life. You're likely to have a long and stable marriage and have friendships that will last into your later years. The odds are that you'll always have friends and people who care about you.

OR

(You're the type who will end up alone later in life. You may have friends and relationships now, but by your mid-30s most of these will have drifted away. You may even marry or have several marriages, but these are likely to be short-lived and not continue into your 40s. Relationships don't last, and when you're past the age where people are constantly forming new relationships, the odds are you'll end up being alone more and more.)

Now, please answer to the questions in the following pages.

Please in indicate, between the pairs of options, which one you would prefer:

☐ €50 now   or   ☐ €70 in a year

☐ €100 in 1 year   or   ☐ €150 in 4 years

☐ €100 now   or   ☐ €100 in a year

☐ €50 in 1 year   or   ☐ €90 in 2 years

☐ €50 now   or   ☐   €300 in 4 years

☐ €100 in 1 year   or   ☐ €125 in 2 year

On your birthday, your work gave you a holiday as a gift. However you had a prior appointment on the days they had booked and gave you the following options. Please indicate which one you would choose:

☐ 3 days now   or   ☐ 7 days in 6 months

☐ 5 days now   or   ☐ 10 days in 12 months

☐ 7 days now   or   ☐ 14 days in 18 months

☐ 9 days now   or   ☐ 19 days in 24 months

Imagine that you are planning a one-week vacation to the Caribbean, six months from now. The vacation will cost $1,200. You have two options for financing the vacation:

A. Six monthly payments of €200 each during the six months before the vacation.

B. Six monthly payments of €220 each during the six months beginning after you return.

Imagine that, six months from now, you are planning to purchase a clothes washer and dryer for your new residence. The two machines together will cost $1,200. You have two options for financing the washer/dryer:

A. Six monthly payments of €200 each during the six months before the washer and dryer arrive.

B. Six monthly payments of €220 each during the six months beginning after the washer and dryer arrive.

You recently purchased a highly requested game online, paying €50, that you have been waiting to be released for months. Due to overbooking the company provided you with certain options. Please indicate which one you would choose:

☐ Receive tomorrow	or	☐ receive €5 to wait 3 days
☐ Receive in 4 days	or	☐ receive €5 to wait 6 days
☐ Receive in 7 days	or	☐ receive €5 to wait 9 days
☐ Receive tomorrow	or	☐ receive €10 to wait 6 days
☐ Receive in 7 days	or	☐ receive €10 to wait 12 days

Please indicate from 1 (= strongly disagree) to 6 (= strongly agree) how you believe the following statements to be in your case:

	Strongly disagree					Strongly agree
	1	2	3	4	5	6
I feel disconnected from the world around me						
Even around people I know, I don't feel that I really belong						
I catch myself losing all sense of connectedness with society						
I don't feel I participate with anyone or any group						
I feel understood by people I know						
I am able to connect with other people						
My friends feel like family						
I feel comfortable in the presence of strangers						
If other people don't seem to accept me, I don't let it bother me						
I need to feel that there are people I can turn to in times of need						
I have a strong need to belong						
I try hard not to do things that will make other people avoid or reject me						

Do you make use of facebook?

    a. Yes
    b. No

How many friends do you have on facebook approximately? _____

If yes, please indicate the level of usage. I check my facebook:

    a. Multiple times a day
    b. About once a day
    c. Multiple times a week
    d. About once a week
    e. Less often

Please indicate your agreement with the statement: I feel better connected to my friends through the use of social media

Strongly disagree   ▢ ▢ ▢ ▢ ▢ ▢   Strongly agree

To the best of your knowledge, how extensively do you make use of your phone?

_____minutes/month

On average, how many messages do you send on a monthly basis?

_____messages

Fill in or encircle your answer to the following questions:

What is your age? _____

What is your gender?   **Male**   **Female**

Since when are you registered as a student of the Erasmus University Rotterdam?

≤ 1 year   ≤ 2 years   ≤ 3 years   ≤ 4 years   > 4 years

What is your faculty?

Law (FRG)   RSM   ESE   Philosophy (FWB)   FHK   Erasmus MC   ISS

Do you smoke?   **Yes**   **No**

Do you use sunscreen when sunbathing?   **Yes**   **No**

Do you invest in funds, stocks, other?   **Yes**   **No**

Did you arrange something for retirement yet?   **Yes**   **No**
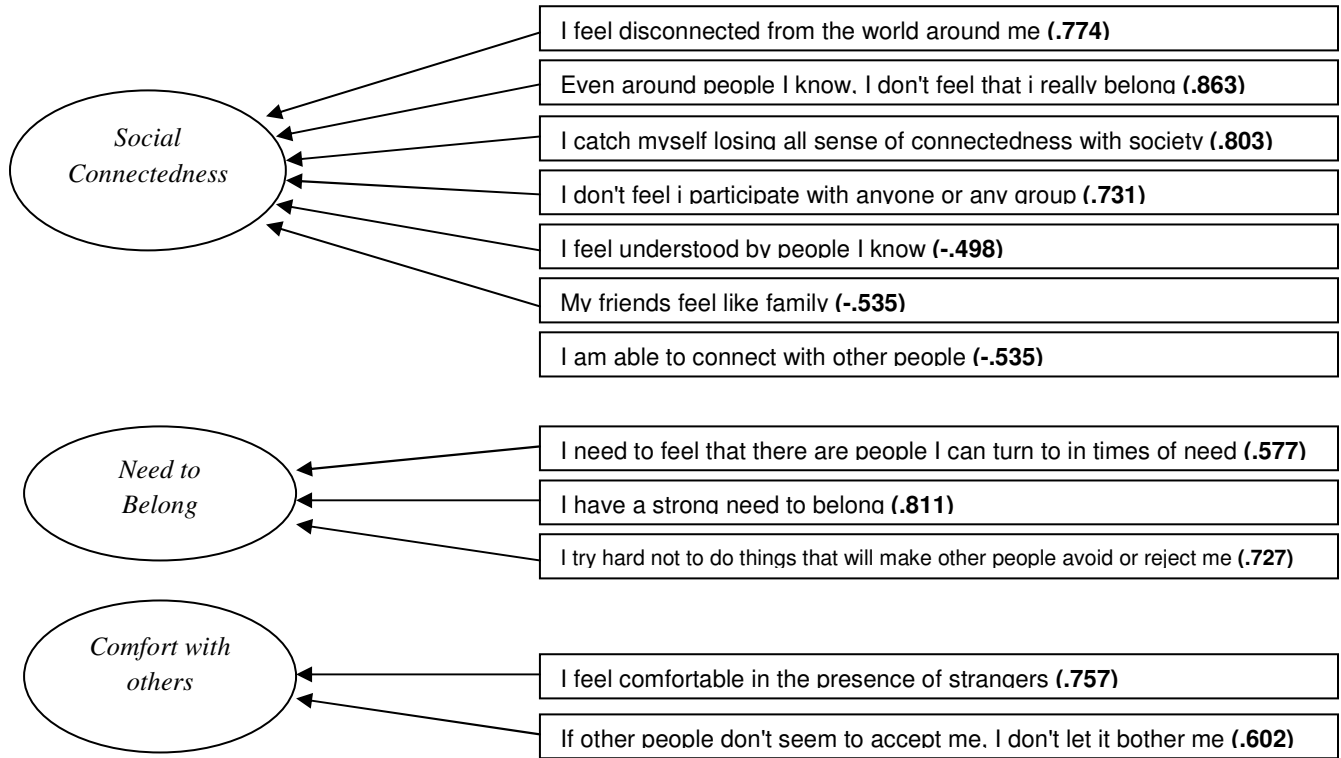
What is your monthly income?   _____

What is your debt amount at this moment?   _____

What is your saving amount approximately?   _____

Appendix 2: Factor analysis

Social Connectedness
- I feel disconnected from the world around me **(.774)**
- Even around people I know, I don't feel that i really belong **(.863)**
- I catch myself losing all sense of connectedness with society **(.803)**
- I don't feel i participate with anyone or any group **(.731)**
- I feel understood by people I know **(-.498)**
- My friends feel like family **(-.535)**
- I am able to connect with other people **(-.535)**

Need to Belong
- I need to feel that there are people I can turn to in times of need **(.577)**
- I have a strong need to belong **(.811)**
- I try hard not to do things that will make other people avoid or reject me **(.727)**

Comfort with others
- I feel comfortable in the presence of strangers **(.757)**
- If other people don't seem to accept me, I don't let it bother me **(.602)**

Appendix 3: Time discounting (27 item scale by Kirby et al. 1999)

Order	SER	LLR	Delay (days)
1	$54	$55	117
2	$55	$76	61
3	$19	$25	53
4	$31	$85	7
5	$14	$25	19
6	$47	$50	160
7	$15	$35	13
8	$25	$60	14
9	$78	$80	162
10	$40	$55	62
11	$11	$30	7
12	$67	$75	119
13	$34	$35	186
14	$27	$50	21
15	$69	$85	91
16	$49	$60	89
17	$80	$85	157
18	$24	$35	29
19	$33	$80	14
20	$28	$30	179
21	$34	$50	30
22	$25	$30	80
23	$41	$75	20
24	$54	$60	111
25	$54	$80	30
26	$22	$25	136
27	$20	$55	7