Economic situation and time discounting: Does construal level matter?

Matúš Adamkovič^{1,2,3}, Pavol Kačmár⁴, Marcel Martončík¹, and Peter Babinčák¹

¹Institute of psychology, Faculty of Arts, University of Presov, Slovakia

²Institute of social sciences, CSPS Slovak Academy of Sciences, Slovakia

³Center for meta-research in education, Faculty of Education, Charles University, Czechia

⁴Department of psychology, Faculty of Arts, Pavol Jozef Šafárik University in Košice, Slovakia

Author's note

Conflict of interest

We have no known conflict of interest to disclose.

Author Contributions

The authors collectively conceived the main idea and the design of the study. PK and MM wrote the theoretical framework and discussion with inputs from MA. MA performed the statistical analyses. PB supervised the study. All authors have revised the manuscript, made a substantial contribution to this work and approved it for publication.

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Data Availability Statement

The data and analytic code are freely available at <https://osf.io/gw2rz/>.

Correspondence concerning this article should be addressed to Matúš Adamkovič, Institute of Psychology, Faculty of Arts, University of Prešov, Prešov, 080 01, Slovakia. Email: matho.adamkovic@gmail.com

Abstract

A promising factor in explaining the relationship between the economic situation and time preferences is one's construal level (i.e., the abstractness/concreteness of thinking). In this preregistered experiment (N = 252), A) the effects of construal level manipulation on time discounting as well as B) the relationship between the economic situation and time discounting were examined in tasks involving both real incentives and hypothetical rewards. The objective economic situation but not the subjective economic situation was found to significantly predict delay discounting in the hypothetical scenario, however, neither of the two significantly predicted delay discounting in the task with the real monetary reward. Although there was also a small effect of construal level manipulation on one's time preferences concerning hypothetical (but not real) rewards, we remain sceptical about this finding. Crucially, it was found that in comparison to the condition without any mindset induction, both low and high construal level manipulation led to more patient decisions-making in the task involving hypothetical rewards. Further replication attempts on this topic are needed and recommended.

Keywords: construal level theory; construal level manipulation; abstract construal; concrete construal; time discounting; economic situation

The human being, as a biological entity, is embedded in an egocentric present characterized by "me, here, and now" (Trope & Liberman, 2010). However, as stressed by Trope & Liberman (2010), the inherent part of human nature is to transcend such restrictions in various ways, for many of which, psychological distance plays a crucial role. Psychological distance could be conceptualized as a distance from "me, here, and now" on a hypothetical continuum across many dimensions (e.g., social, spatial, and temporal) through the process of mental construal of representations (Carnevale & Fujita, 2016; Ledgerwood et al., 2015; Trope & Liberman, 2010). More specifically, according to the Construal-Level Theory of Psychological Distance (Trope & Liberman, 2010), mental representations of objects can be construed on a continuum spanning from representations that are abstract, structured and encompassing central and goal-related aspects to representations that are concrete, detailed and contextually specific. The former uses the terms abstract or high-level construals while the latter uses the terms concrete or low-level construals. Accordingly, self-control failure can be understood as "goal short-sightedness" caused by a concrete, low-level construal mindset (Carnevale & Fujita, 2016; Fujita et al., 2006). Crucially, such goal-related myopia seems to be associated with economic decision-making (Bischoff & Hansen, 2016; Fujita et al., 2006; Li et al., 2016; Rudzinska-Wojciechowska, 2017; Yi et al., 2017) and it has been found that high delay discounting (impatient behavior) contributes to a person's adverse economic situation (Carvalho, 2010; Haushofer & Fehr, 2019). Giving this, it seems that the construal level could play an important part in poverty research.

In concrete/low-level construal, the ability to see the forest beyond trees is no longer preserved and an individual keeps losing a broader perspective and finds themselves to be lost in concreteness (Fujita et al., 2006). Based on such conceptualization, self-control failure can be understood as a "goal short-sightedness" caused by a concrete, low-level construal mindset (Carnevale & Fujita, 2016; Fujita et al., 2006; Fujita & Han, 2009). Crucially, such goal-related myopia is associated not only with various health-related self-regulatory issues (Chiou et al., 2013; Fujita et al., 2006; Fujita & Han, 2009) but also with economic decision-making, as indicated by an emerging body of evidence (e.g., Bischoff & Hansen, 2016; Fujita et al., 2006; Malkoc et al., 2010; Li et al., 2016; Rudzinska-Wojciechowska, 2017; Yi et al., 2017). Furthermore, it is believed that high delay discounting, that is, high impulsivity or impatient behavior contributes to a person's adverse economic situation or traps the person in the poverty cycle (Carvalho, 2010; Epper et al., 2019; Farah & Hook, 2017; Haushofer & Fehr, 2019).

1.1 On poverty, time discounting, and construal level

There exists a belief, according to which the poor people usually have lowered self-control and thus often opt for short-sighted decisions focused on current consumption (here and now), which, in turn, could contribute to their poverty perpetuation (Epper et al., 2019; Hampton et al., 2018; Lindqvist & Björklund, 2017). Such decision-making tendencies can be explained by the Slack Theory (see Lynch et al., 2015; Urminsky & Zauberman, 2016), according to

which, poor people ought to prefer a more immediate smaller reward if they are expecting to have fewer resources in the future compared to what is available to them at the moment. This applies to people who are objectively poor, but perhaps even more to those who subjectively consider themselves as poor. Adamkovič and Martončík (2017) proposed a model of a cognitive mechanism attempting to explain myopic economic decision-making in poverty. The model, however, has been recently disconfirmed (see Adamkovič, 2020) and hence a search for an alternative investigation is needed.

Sheehy-Skeffington and Haushofer (2014) have outlined the possibility that a person living in poverty adapts their mindset by narrowing the focus to more concrete and proximal things, tasks, goals, or events. With that being said, impulsive decision-making patterns could be attributed to diminished construal levels.

In fact, the current literature suggests a positive effect of abstract (high-level) construal induction on self-control in general and on delay discounting in particular (see e.g., Bischoff & Hansen, 2016; Fujita et al., 2006; Li et al., 2016; Malkoc et al., 2010; Rudzinska-Wojciechowska, 2017; Yi et al., 2017). For example, Fujita et al. (2006) procedurally primed participants to construe a situation at a low vs. high level of construals. Next, participants read four scenarios and reported how much they want to pay for the outcome immediately or after some delay in time. Results indicated that immediate outcomes were preferred over delayed outcomes to the lesser degree by participants primed to high-level construals. In line with these results, Rudzinska-Wojciechowska (2017) found that activation of high-level construal led to diminished delay discounting and had consequences for long-time savings. Similarly, Bischoff and Hansen (2016) found a role of construal level manipulation in the context of investing time and money into charity, and Li et al. (2016) in the context of internet addicts. Conceptually similar results have also been found when manipulating abstractness of processing style, rather than construal level per se (see e.g., Malkoc et al., 2010).

In the present study, we aimed to replicate and extend the previous studies. We focused on examining the role of one's economic situation and construal level manipulation on delay discounting (A) pre-registering the study and with a priori power considerations, (B) in a general (non-student) population, (C) with both hypothetical and real money, and with (D) direct manipulation of construal level via category-exemplar task (rather than by manipulating psychological distance or using more commonly used how-why task).

Our decision is motivated not only by the attempt to connect poverty research with research dedicated to the construal level but also by the observation that the non-negligible body of existing research literature used hypothetical scenarios (e.g., Fujita et al., 2006; Rudzinska-Wojciechowska, 2017; Yi et al., 2017); worked mainly with student populations (e.g., Bischoff & Hansen, 2016; Fujita et al., 2006; Yi et al., 2017); assess delay discounting without well-established measures (e.g., Fujita et al., 2006; Bischoff & Hansen, 2016); manipulated with construal level indirectly (e.g., via processing style as Malkoc et al., 2010) or used predominantly why/how task (Fujita et al., 2006; Rudzinska-Wojciechowska, 2017; Yi et al.,

2017). Moreover, some of the analyzed studies present results that are either non-significant or with p-values just below the conventional .05 significance threshold (e.g., Bischoff & Hansen, 2016; Fujita et al., 2006; Rudzinska-Wojciechowska, 2017), did not limit degrees of freedom during the data analysis via pre-registration (e.g., Fujita et al., 2006, Bischoff & Hansen, 2016; Rudzinska-Wojciechowska, 2017), did not consider power in the planning stage of research, or used rather modest sample sizes (e.g., Fujita et al., 2006; Bischoff & Hansen, 2016)¹.

1.2 Research questions and hypotheses

The present study aims to answer two main research questions:

- (1) What is the relationship between one's economic situation (both from an objective and subjective point of view) and their delay discounting when hypothetical/real financial rewards are involved?
- (2) How does the construal level manipulation (induced abstract thinking x induced concrete thinking x control baseline group without any mindset manipulation) affect one's time discounting after controlling for the objective/subjective economic situation and perceived reliability of the environment?

It is important to note that, based on the nature of the construal level, it is not reasonable to expect an absence of construal level. In fact, even in a group without any manipulation, people are always engaged in some kind of subjective representation of events. Thus, stemming from the CLT, induced contrast between low and high construal is crucial from a theoretical point of view. However, there is some preliminary evidence that the concrete mindset is the default mindset (Malkoc et al., 2010) and based on existing literature (e.g., Sheehy-Skeffington & Haushofer, 2014), one can easily assume that this is especially pronounced in relation to poverty. Thus, further information for potential intervention aiming at inducing abstract mindset could be of crucial importance in the present context. Nevertheless, without assessing a baseline (control group that did not undergo high-construal induction), it is hard to establish that this is the case. Thus, besides manipulation of low vs. high construal, we also included a baseline condition where neither concrete nor abstract construal was experimentally induced. Additionally, instead of creating ad hoc measures of delay discounting, we included a well-established measure of hypothetical delay discounting, and, besides including only a hypothetical scenario, we also included a task with real financial rewards. Moreover, as the majority of works in the realm of the CLT or delay discounting lack explicit power analysis and explicit restrictions related to the flexibility during data analysis, we conducted a priori power analysis and pre-registered main

¹ Note that we are not stressing that all these studies have the problems mentioned above (for a more nuanced overview of the studies see <https://osf.io/zufwv/>). Rather, we are inspired by some well-thought aspects of the existing studies and we aim to use such inspiration to fill the gap in the research literature.

hypotheses. The full list of our predictions (based on a combination of SESOI x budget constraints, previous studies, and best guesses) can be found at <https://osf.io/z3jyf>.

2 Methods

The preregistration of this study is available at <https://osf.io/z3jyf>.

2.1 Participants

In the pre-registration, our smallest effect size of interest regarding construal level manipulation on time discounting in the context of both hypothetical and real rewards was set to medium effect size². A priori power analysis ($\alpha = .05$, $\beta = .80$, effect size: $r = .2$ and $\alpha = .05$, $\beta = .80$, effect size: $f = .25$) indicated that approximately 150 participants in total were needed to detect a medium effect size. This was considered as feasible as the combination of financial incentives bound to the possible choices in the delay discounting task (for more information see Time discounting tasks) and our budget constraints (2400€) potentially allowed us to collect data from 120 to 400 participants.

We managed to recruit 252 participants until our budget was exhausted. About 80% of the sample identified themselves as women. The mean age of the participants was 34.92 years ($SD = 10.31$), ranging from 20 to 62 years. In order to capture the whole spectrum of economic status including hard-to-reach populations, some of the data collection was done at the unemployment office. In particular, the data collection took place in employment offices in quiet lecture halls, where each participant was provided with their writing desk. Each data collection day was accompanied by at least two research team members to promptly clarify any unclarities if they occur. From the perspective of economic status, about 65% of the participants had a job (at least part-time), about 19% were unemployed (excluding full-time students), with the remaining 16% consisted of all other social groups (e.g., full-time students, people receiving invalidity benefit, people on maternity leave, etc.). The mean equivalized net household income was approximately 659€ ($SD = 376$ €; $Me = 611$ €) per month (note that, at the time of data collection, mean equivalized disposable household income in Slovakia was 656€; Statistical Office of the Slovak Republic, 2020).

2.2 Data collection and measures

The participants were randomly assigned to one of the conditions (abstract, concrete, or baseline). Then, delay discounting tasks were administered. Additionally, the economic situation and perceived reliability of the environment were assessed.

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² Note that when analyzing studies that are most closely related to our purpose, a large effect size can be found (see e.g., Fujita et al., 2006). However, as these results could be inflated, we opted for a smaller effect. Additionally, our decision to focus on medium effect size is motivated by Funder and Ozer (2019) who stressed that effect size of such magnitude could have “some explanatory and practical use even in the short run” (p. 166).

(project no. APVV-15-0404), the test battery also involved several measures irrelevant to this study. After completing the test battery, the participants were compensated with gift cards according to their choice in the applied time discounting task. The whole testing procedure followed the ethical standards for human research as stated in the Declaration of Helsinki.

2.2.1 Economic situation

The objective economic situation was calculated as the equivalized net household income per month. The equivalization was done using the formula proposed by Hagenaars et al. (1994). The subjective economic situation was operationalized as an index consisting of 5 items: a) The MacArthur Scale of Subjective Social Status (see Giatti et al., 2012); b) own perception of poverty/wealth (Do you consider yourself: 1 = poor; 10 = rich); c) 3 measures of subjective perception of wealth (Are you satisfied with your monthly income? Are you able to handle unexpected financial expenses? Are you able to make ends meet? 1 = not at all; 10 = very much).

2.2.2 Construal level

The participants' construal level was manipulated by inducing abstract/concrete thinking through a category/exemplar task. The task was adapted from Fujita et al. (2006). Just before the time discounting tasks, the participants were administered a questionnaire in which they were presented with 40 words of a moderate level of abstraction. Their task was to produce a superordinate category (inducing abstract high-level construal) or subordinate example (inducing concrete low-level construals). For example, for the word "dog", the participants in the abstract condition should write, say, "mammal"; whereas the participants in the concrete condition should write, say, "golden retriever". At the beginning of this task, participants were provided with two specific examples. In the baseline control condition without induction, neither abstract nor concrete thinking was induced and participants continued to the next part of the battery. A more detailed description of this task and its translation is available in the online appendix. To be sure that inducing abstract/concrete conditions occurred, we checked whether the participants indeed respected their instructions and whether the words they produced were more abstract/concrete compared to the presented words. If a participant failed to produce words corresponding with their condition or if a participant skipped this task in experimental conditions (and thus no priming could have happened), we excluded them from the analyses.

2.2.3 Time discounting tasks

In terms of assessing delay discounting with hypothetical rewards, the Staircase model of time discounting proposed by Falk et al. (2016) was used. The time discounting task with a financial reward looked as follows. After completing the test battery, the participants were asked to choose their reward (in the form of a gift card). They could choose from one of four alternatives: receiving 6€ immediately, receiving 8€ in 10 days, receiving 10€ in 20 days, or receiving 12€ in a month. At the time of data collection, the smallest reward was more than 2-times higher than the minimum hourly wage in Slovakia.

2.2.4 Perceived reliability of the environment

In order to assess one's perception of the reliability of the environment (i.e., the

trustworthiness of the context), the participants were asked the following question: “Imagine you are taking part in research similar to this one. The scientist has promised to give you a reward now or a bigger reward later, depending solely on your preference. How likely are you to trust the scientist that they will keep their word and reward you exactly as promised?”. The participants responded on a 9-point scale, with the verbal cues: 1 = not likely at all; 9 = very much likely.

2.3 Statistical analysis

Firstly, participants were excluded (1) who failed more than one attention check (out of three), (2) whose longest response strings were greater than 2.5 *SD* of the average longstring or (3) who either skipped the whole construal level manipulation task or provided answers which contradicted the instructions (i.e., a participant in the abstract condition created mostly concrete words and vice versa). After removing these participants, the dataset included 223 observations ($N_{\text{abstract}} = 71$, $N_{\text{concrete}} = 76$, $N_{\text{control}} = 76$). Out of a potential maximum of 40 points, the scores were 30.01 (± 11.42) and 34.17 (± 9.34) for the abstract and the concrete construal-level groups, respectively.

The missing variables were then imputed (there were fewer than 2% of NAs in the main variables of interest). There were two generalized linear models fitted to verify the effect of the construal-level manipulation on time discounting. In the first one, hypothetical time discounting was predicted by group affiliation while controlling for the objective economic situation, subjective economic situation and perceived reliability of the environment. In the second model, the same variables served as predictors of time discounting with a real reward. In this case, however, only seven and ten participants opted for the mid-range rewards (in comparison, 111 participants chose the immediate reward and 95 participants waited for the biggest one). It was thus decided to exclude them from this analysis and compute a binary logistic regression. The statistics obtained from both models were converted to Cohen’s *ds*.

Furthermore, to test the relationships between time discounting and both objective and subjective economic situations, we calculated partial correlations for each experimental group using Spearman’s *Rho* coefficients. As there were some additional analyses conducted, despite the fact they yielded very similar results to those presented in the manuscript, we report them as supplementary materials. All the analyses were performed in R (R Core Team, 2020) and can be found at <https://osf.io/gw2rz/>.

3.2 Deviations from the pre-registered procedure

Despite the fact the present study was pre-registered, we had to deviate from the planned procedure on several occasions. Hereby, we transparently report those deviations: 1) Each item dealing with the subjective economic situation used a scale 1 to 10 instead of 1 to 9. 2) After the pilot testing, we forgot to update the pre-registration document about the amounts of the real rewards, however, based on the results of our pilot, we kept the same amounts. 3) We did not check for Guttman’s errors and instead used the three above-described procedures to detect

careless participants. 4) Given the small percentage of missing values, we decided to impute all variables of our interest, not only the subjective economic status index. 5) Since the collected data does not allow us to calculate the proposed linear models and to report them in the form of ANCOVAs, we computed generalized linear models. In the case of the time discounting task with a real reward, we observed a U-shaped pattern (each of the middle two reward categories was chosen by less than 5% of the participants) and thus we primarily report the results of a binary logistic regression after keeping only the participants who opted either for the most immediate but smallest or the most distal but biggest rewards.

3 Results

3.1 Descriptive statistics

Descriptive statistics for each subgroup as well as for the whole sample combined are presented in Table 1.

Table 1

Descriptive statistics

	Abstract condition (N = 71)		Concrete condition (N = 76)		Control group without mindset induction (N = 76)		Total (N = 223)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Income	618	331	696	392	631	370	649	366
SES	4.96	1.41	5.21	1.56	4.58	1.72	4.91	1.59
Reliability of the environment	5.77	2.54	5.46	2.36	5.12	2.50	5.44	2.47
TD hypothetical	11.80	8.38	12.33	7.67	9.34	6.50	11.14	7.62
TD real	2.61	1.43	2.39	1.45	2.21	1.45	2.40	1.45

3.2 Entrance exploratory analyses related to the comparison of high vs. low construal induction in delay discounting

Given that the comparison between high vs. low-level construal is of crucial importance from a theoretical point of view and for meaningful comparison with previous research, we start with an examination of the difference in time discounting between the low vs. high construal induction even though our pre-registration focused mainly on more nuanced analysis depicted below. Results indicated there was a negligible effect for the hypothetical reward ($d = .01$) and a small effect for real incentives ($d = -.21$). The null hypothesis cannot be rejected (both $p > 0.05$).

However, as a non-significant result does not automatically indicate that the null hypothesis could be accepted, we conducted equivalence testing. Based on the results of equivalence testing, the presence of the SESOI ($r = .2 \sim d = .4$) may be statistically rejected in the hypothetical reward scenario ($p_{\text{lower}} = .023$; $p_{\text{upper}} = .003$) but not in the real reward task ($p_{\text{lower}} = .017$; $p_{\text{upper}} = .388$), leaving the latter result rather inconclusive.

3.3 Main confirmatory analyses related to the further examination of the role of construal level manipulation and economic situation in delay discounting

As expected, it was found that the participants in the abstract construal group were more patient than the controls without any mindset induction ($d = .33$) in the case of the hypothetical time discounting task. Surprisingly, the participants in the concrete construal group were also more patient than the controls ($d = .37$). Similarly, it was found that the participants in both mindset induced conditions showed a greater willingness to delay gratification for the intertemporal preference when a real reward was involved. In particular, the participants primed to the abstract construal were 1.8-times more likely to choose the more distal reward compared to the baseline controls without any mindset induction. The odds ratio was slightly lower for the participants in the concrete construal group who were about 1.3-times more likely to choose the delayed payment. When converted to Cohen's d 's, the effect sizes were .32 for the abstract construal group and .14 for the concrete construal group, respectively. There were fairly similar effect sizes (Cohen's $d = .27$ and .13) found when the dependent variable was modelled using all four payment categories. The summaries of the GLMs are presented in Table 2 and Table 3.

Table 2

GLM (gaussian family) for hypothetical reward time discounting as the outcome variable

	<i>b</i>	SE	<i>t</i>	<i>p</i>
Intercept	9.42	.86	10.97	< .001
Control baseline vs. abstract thinking	2.47	1.24	1.99	.047
Control baseline vs. concrete thinking	2.75	1.22	2.26	.025
Income	1.67	.57	2.95	.003
SES	-.33	.57	-.57	.567
Perceived reliability of environment	.50	.50	.99	.324
Null deviance 12875 on 222 degrees of freedom				
Residual deviance 11880 on 217 degrees of freedom				

Table 3*GLM (binomial family) for real reward time discounting as the outcome variable*

	Log OR	SE	<i>z</i>	<i>p</i>
Intercept	-.43	.24	-1.75	.080
Control baseline vs. abstract thinking	.59	.35	1.66	.098
Control baseline vs. concrete thinking	.26	.35	.74	.457
Income	.22	.17	1.29	.197
SES	-.17	.17	-1.00	.317
Perceived reliability of environment	.15	.14	1.07	.286
Null deviance 284.33 on 205 degrees of freedom				
Residual deviance 278.27 on 200 degrees of freedom				

3.4 Additional confirmatory analyses related to the relationship between economic situation and delay discounting

In order to further examine the relationships between one's economic situation (both objective and subjective) and their delay discounting (in both the hypothetical and the real reward tasks), the zero-order correlations were calculated using Spearman's rank coefficient (see Table 4; total column and columns for specific conditions). In the majority of conditions, the correlations were small. For example, a small effect was observed for the correlation between the subjective economic situation and delay discounting in the concrete mindset (positive correlation) and in the abstract mindset (negative correlation) conditions for both hypothetical and real rewards. The exception was the relationship between objective economic situation and hypothetical time discounting in a concrete condition where we observed a medium effect ($Rho = .43$).

Table 4*Spearman's correlation coefficients between the objective/subjective economic situation and time discounting*

	Abstract condition (N = 71)		Concrete condition (N = 76)		Control group without mindset induction (N = 76)		Total (N = 223)	
	Income	SES	Income	SES	Income	SES	Income	SES
TD hypothetical	.07	-.13	.43	.19	.21	.17	.25	.11
TD real	.02	-.17	.19	.17	-.02	-.12	.05	-.03

3.5 Exploratory analyses related to the relationship between economic situation and delay discounting

Additionally, as further inspection of correlations can provide valuable insights, we tested whether (A) the coefficients between the abstract, and concrete condition and between (B) baseline control condition and abstract, or between (C) between the baseline control condition and concrete condition differ significantly. Although some patterns seem interesting at a first glance, especially comparing abstract and concrete conditions, after adjusting for Type I error rate using Bonferroni's correction, we found no significant differences between the correlations across conditions (for a summary of the correlation coefficients for each subgroup and the combined sample see Table 4).

Furthermore, we examined to what extent participants' preferences in the hypothetical and the real reward tasks correlate. The observed correlations were, too, rather smallish, with $Rhos = .19, .23, .07$, and $.24$ for the whole sample, the abstract-thinking condition, the concrete-thinking condition, and the control group, respectively.

3.6 Further exploratory analyses

Additionally, as a part of the Psych of Psych initiative (Satchell, 2020), we examined how the participants' perception and feelings related to the study (e.g., their motivation to help; the perceived difficulty of the study as a whole; or their previous experiences with participating in studies) correlates with our outcome variables. Once again, the effects, in general, were small to nil - when we pooled the obtained correlation coefficients and ran a descriptive analysis on their magnitude, we found that they, surprisingly, copied a normal distribution with a mean of almost exactly zero and SD of $.1$. In the absolute values, the biggest correlation was $.24$. Most of the correlations did not exceed $.20$ (i.e., by a rule of thumb can be considered as a small effect) and are thus very hard to interpret taking into account the specific experimental condition in which they occurred. A table summarizing these coefficients is available at <https://osf.io/74xgh/>.

4 Discussion

The present study aimed to corroborate two main research questions. The first regards the relationship between one's economic situation and delay discounting when hypothetical and real financial rewards are involved. The second concerns how does the construal level manipulation affect one's time discounting after controlling for the objective and subjective economic situation and the perceived reliability of the environment.

4.1 Relationship between the economic situation and time discounting

Regarding the first research question, it was found that time discounting was significantly predicted by income. However, it should be highlighted that this only applied to time discounting in the hypothetical task. This might be due to the magnitude of the reward. In particular, a gift card (i.e., 6€ to 12€) would not make a difference to alleviating a person's poverty to the same

extent as the hypothetical reward (e.g., 150€) potentially would and thus people exhibited more impatient behavior. Previous research has corroborated that different goods have different discounting rates (Banerjee & Mullainathan, 2010) and that „myopia about some decisions coexists with being farsighted about others“ (p.3). The consumption of goods varies significantly even among people of low socioeconomic status. Given they tend to spend a substantial part of their income on goods that are not necessary for survival (Banerjee & Duflo, 2007; Collins et al. 2009), they could have been tempted by spending the extra money on alleviating their situation in the short term rather than using it in the long run. Alternatively, the choices might be explained by different habits in spending cash in comparison to vouchers. As demonstrated by Becker et al. (2019), people evaluate money as more valuable. The observed effects of the economic situation on time discounting are consistent with prior research (poorer people make more impulsive decisions; e.g., Banerjee & Mullainathan, 2010; Lawrance, 1991; Reimers et al., 2009; Tanaka et al., 2010), although it should be noted that the observed effects were small. There was no significant effect of subjective assessment of the economic situation on delay discounting found. This pattern could be partially explained by the Slack Theory (see Urminsky & Zauberman, 2016). According to this theory, poor people prefer a smaller and more immediate reward if they are expecting more resources in the future compared to what is available to them at the moment. Such present-biased behavior is perfectly rational in a situation of acute liquidity constraints and in situations where smaller liquidity constraints are expected in the future (Cassidy, 2018).

4.2 The effect of construal level manipulation on time discounting

As suggested by Bischoff and Hansen (2016), in comparison to concrete mindset, the abstract mindset “may trigger the expectation that a resource is equally available in the near and distant future, which would countervail the delay discounting effect. A concrete mindset, on the other hand, would emphasize the delay discounting effect because it enhances a focus on detail and a more context-dependent representation of the resources and lowers sensitivity to delay“ (p. 9). For instance, Malkoc et al. (2010; study 3) found that so-called present-bias was diminished in the abstract compared to the control mindset priming condition and a similar pattern of results could be found in an emerging body of literature concerning the role of construal level (and psychological distance in general) in delay discounting (see e.g., Bischoff & Hansen, 2016; Fujita et al., 2006; Malkoc et al., 2010; Li et al., 2016; Rudzinska-Wojciechowska, 2017; Yi et al., 2017).

The present results indicate that when delay discounting in concrete vs. abstract mindset was compared, a significant effect was not observed for hypothetical rewards, nor real incentives, with the observed effect being negligible to very small (Cohen’s d ’s were .01 and -.21, respectively). The presence of the SESOI ($r = .2 \sim d = .4$) may be statistically rejected in the hypothetical reward scenario but not in the real reward task.

The absence of statistically significant results in a case of real effect could be caused by a

lower effect of CLT manipulation on delay discounting than we considered as our SESOI and, consequently, by diminished power to detect small effect size in our study. However, the effect of mindset induction on the hypothetical situation was not only non-significant but also negligible.

Furthermore, note that previous studies did not conduct a priory power analysis. Although high powered studies can be found, there is some risk to the generalizability and replicability of some of the previous results. For instance, Fujita et al. (2006; study 1) found that participants primed with an abstract mindset exhibited an attenuated tendency to prefer immediate over delayed outcomes. However, they found a p -value of .04, used student population, had only hypothetical scenarios, used a non-standardized measure of delay-discounting and with $N = 15$ per group. This is an underpowered design to detect even large effects. Similarly, although Bischoff and Hansen (2016) provided higher N in their study regarding charitable contributions, they observed no significant effect of construal level manipulation, nor significant was the interaction of mindset manipulation and delay discounting. Only when the simple main effect was analyzed further, slightly stronger (although still non-significant) delay discounting was found in participants in the concrete mindset condition (study 1). Similarly, in the second study of Bischoff and Hansen (2016), the simple effect of construal level manipulation was, too, not statistically significant; “this time, however, interaction between mindset and delay reached significance” with $p = .04$ ” (Bischoff and Hansen, 2016, p. 8) (see <https://osf.io/zufwv/> for a more nuanced examination of the various aspects of analyzed studies). This indicates that future studies should conduct power calculation to find small (rather than medium or large effects) and should be pre-registered to minimize the researcher’s degrees of freedom.

Note, however, that our goal was not only to replicate but also to extend previous studies in several ways. For instance, (1) previous studies worked mainly with hypothetical delay discounting scenarios and although studies that worked with real scenarios can be identified (e.g., Bischoff & Hansen, 2016), to our best knowledge, a direct comparison between hypothetical and real scenarios in one study is absent in the available literature. Moreover, (2) research samples of the previous studies usually consisted of students, which could be a potential limitation hindering further generalizations as the financial situation of students is often idiosyncratic and does not reflect the situation of the general population. Related, (3) the objective economic situation and its subjective perception, nor perceived reliability of the environment were assessed in the previous studies although both could play an important role in delay discounting. Additionally, (4) previous research focused mainly on the comparison of the induction of control vs. abstract mindset. Even though induction of two contrasting mindsets is a crucial aspect that follows from CLT theory, an additional baseline condition without any induction could be of some importance (see, e.g. Malkoc et al., 2010). Thus, we thought that including a baseline condition can provide valuable insights to both, practical real-life application, as well as theoretical ramifications of the contrast between high vs. low construals,

and help to resolve some unexpected findings in previous studies (see, e.g., Scholten et al., 2019).

We found that when a real reward was involved, the participants primed to a high-level construal were 1.8-times more likely to choose the more distal reward compared to the baseline controls as expected. This is important as it seems that the abstract level construal attenuated the delay discounting, at least slightly. However, a similar pattern was also observed in participants in the low-level construal condition as they were still more likely to choose the delayed payment - about 1.3-times (Cohen's d s were .32 and .14, respectively). In other words, participants in the abstract construal group were more patient than the baseline controls in the case of the hypothetical time discounting task, but the participants in the concrete construal group were also more patient than the baseline controls (Cohen's d s = .33 and .37, respectively). This is a novel and interesting finding that is not easy to explain.

At first glance, such a pattern of the results seems to be counterintuitive from a CLT perspective. However, Scholten et al. (2019) have noted that both abstract and concrete mindsets seem to be related to a decrease in delay discounting rates. Thus, this finding could be a starting point for future studies. Additionally, future studies could focus on the mismatch of construal level during decision-making rather than on the difference between low and high construal level manipulation (see, e.g., Kim et al., 2013; Yi et al., 2017). As noted by Kim et al. (2013), the whole picture is more nuanced than previously assumed and delay discounting seems not to be simply caused by a lower level of construal per se, but rather by the frame in which the options are presented.

Another plausible interpretation could dwell on the extra effort the participants had to put into the testing. For instance, Fortes et al. (2015) found that an increase in the effort required to achieve a reward resulted in a decrease in delay-discounting (and led to better self-control). In the present study, both experimental tasks were the most time-consuming part of the whole test battery, thus requiring a significant amount of cognitive effort. It is possible that the construal level manipulation tasks were regarded as so effortful that participants believed they deserved a bigger reward. However, it should be noted that, as a part of the Psych of Psych initiative (Satchell, 2020), we collected data on the participants' perceptions and feelings related to the study and correlated those with the participants' preferences in both hypothetical and real reward tasks. We found only small correlations between the actual preferences and the feelings about the study (e.g., how exhausting was the study; how difficult was the study to complete; how did they like the study; etc.) in all conditions (see <https://osf.io/74xgh/>). This suggests that, at least in this case, the outcome of the present study was not substantially affected by various variables related to the participants' perceptions related to the study.

In sum, the present study can inspire future research as it provides novel insights into the effect of construal level manipulation on time discounting after controlling for both the objective and, subjective economic situation and perceived reliability of the environment. Furthermore, the study also shows how the participants' perceptions and feelings related to the study itself affect

their decisions in the time discounting tasks/study outcomes.

4.3 Limits and future perspectives

Despite its benefits, the present study has several caveats which should be reflected upon. (1) As real incentives were used, the present research was limited by finding an equilibrium between the available budget and the smallest effect size of interest. (2) In comparison to the available studies, considerably more effort was made to account for various potential confounders (i.e., objective and subjectively perceived economic situation, perceived reliability of the environment, and perception and feeling related to the study); nonetheless, there are likely other potentially confounding variables, such as fairness (Cappelen et al., 2013), meta-cognitive abilities (Thompson et al., 2011), perspectives towards future (Brown et al., 2015) which might play an important role in explaining delay discounting per se or the effect of construal level on it. (3) Due to financial constraints, the study was unable to match the amount of the reward in the hypothetical and real reward tasks, although this would be beneficial for more meaningful comparison between the two (4) There is a potential limit related to the character of the decision-making tasks. When making economic decisions, people tend to rely on previous experience. However, the mechanism underlying this process is different from the one underlying the decisions based on a description (Hertwig, 2015). (5) Although a medium effect was considered the smallest meaningful effect, focusing on a smaller effect might be of interest for future studies as it could be consequential in a long run (Funder and Ozer, 2019). Thus, a high-powered large-scale collaborative project (see, e.g., Moshontz et al., 2018) aiming to examine how design choices determine the results (see Tierney et al., 2021) could be an asset in future research in this area.

5 References

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