

Original Research Report

Social Discounting in the Elderly: Senior Citizens are Good Samaritans to Strangers

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Received December 10, 2016; Editorial Decision Date March 19, 2017

Decision Editor: Bob G. Knight, PhD

Abstract

Objectives. People tend to become more generous as they grow older, which may reflect an increase in their ego-transcending motives (i.e., concern more for the benefit of recipients than of the benefactors). The current study aimed to examine evidence for an enhanced ego-transcending motive among older adults.

Methods. We adapted the social-discounting framework to quantify generosity toward people of different social distances, ranging from socially close others (e.g., family and close friends) to socially distant others (e.g., total strangers), in both young and older adults. We hypothesized that the normative decrease in generosity as a function of social distance (e.g., less generous towards strangers compared to close friends) will be mitigated in older adults.

Results. Our results supported that older adults were more generous toward socially distant others (i.e., less social discounting) compared to younger adults.

Discussion. Thus, consistent with the idea that the elderly are more oriented to ego-transcending goals, older adults are generous even when their generosity is unlikely to be reciprocated.

Keywords: Aging—Altruism—Ego transcendence—Generosity—Prosociality—Social Discounting

There is growing evidence to suggest that generosity increases as a function of age (Bekkers, 2010; McAdams, St Aubin, & Logan, 1993). As people grow older, they tend to volunteer more frequently (Cornwell, Laumann, & Schumm, 2008) and concern more about environmental issues (Freund & Blanchard-Fields, 2014). In laboratory settings, compared to young adults, older adults usually distribute more money to another stranger in an economic game, known as the dictator game (Engel, 2011; Matsumoto, Yamagishi, Li, & Kiyonari, 2016), and donate more money to charities (Freund & Blanchard-Fields, 2014; Midlarsky & Hannah, 1989; Sze, Gyurak, Goodkind, & Levenson, 2012). In fact, the enhanced generosity among older adults has been found across cultures. The World Giving Index

(2016; <https://www.cafonline.org>), which surveyed individuals of different ages from 153 countries on the amount of money they donated to charities, reports donation to be highest among those aged 50 years and above.

Researchers have explained enhanced generosity in older adults to be evidence in support of a shift in motivation towards ‘ego-transcending’ goals (i.e., away from purely personal interests to more enduring sources of meaning in life) (Brandtstadter, Rothermund, Kranz, & Kuhn, 2010; Carstensen, 1992; Hubbard, Harbaugh, Srivastava, Degras, & Mayr, 2016). This ego-transcending account is extended from the socioemotional selectivity theory (SST; Carstensen, 1992; Carstensen, 2006) which posits an orientation toward sources of greater emotional gratification

in late life. Specifically, because their time horizons are constrained, older adults may be more likely to disengage themselves from instrumental-extrinsic goals associated with long-term rewards (such as striving for career and status), and prioritize present-oriented goals that are more emotionally meaningful (such as caring for the environment and helping out others in need). With cross-cultural evidence of prosocial spending being related to greater well-being and positive emotions (Dunn, Aknin, & Norton, 2014), as well as greater perception of meaning in life (Klein, 2016; Van Tongeren, Green, Davis, Hook, & Hulsey, 2016), greater generosity in late life may be an avenue for emotional gratification and sense of purpose for older adults.

Nonetheless, so far, no research has directly tested the core motive of the ego-transcending account in relation to generosity, which is that it should expand beyond oneself and close others. Generosity is not always purely motivated to be for the sake of others. For instance, generosity toward people of different social distances (e.g., a close friend versus a stranger) is normatively explained by the reciprocal-altruism motive (Axelrod & Hamilton, 1981; Trivers, 1971). If individuals behave based on the reciprocal-altruism motive, then they are generous towards others with the expectation of immediate or future reciprocation. As social distance between two individuals increases (e.g., from between two family members to between two strangers), the probability of future interaction, degree of social collateral (e.g., common friends) as well as concerns of damaging the relation by defection likely decreases. This reduces the likelihood of reciprocation by the recipient, which in turn decreases the reciprocal-altruism motive in the benefactor (Leider, Möbius, Rosenblat, & Do, 2009).

Thus, to test that older adults have a stronger ego-transcending motive (as opposed to the reciprocal-altruism motive), one needs to demonstrate the enhanced generosity among older adults when the expectation of immediate or future reciprocation is low (as in the case of the interaction between two strangers). While no research has directly tested this proposition, there are some pieces of indirect evidence for enhanced generosity without expectation of reciprocation. For instance, older adults have stronger heart beat reactivity and emotional empathy when seeing others in need, and this emotional empathy mediates their decision to donate money to help others (Sze et al., 2012). Similarly, in an fMRI study, activity in the reward-related brain areas (including nucleus accumbens and caudate) that enhances during donating money to a charity (compared to receiving money) is particularly pronounced among older adults (Hubbard et al., 2016). Subjectively, older adults also report a higher level of positive emotion after donation compared to younger adults (Bjälkebring, Västfjäll, Dickert, & Slovic, 2016).

To directly test whether older adults have a stronger ego-transcending motive while controlling for the reciprocal-altruism motive, here we adapted the social-discounting framework (Jones & Rachlin, 2006; Osiński, 2009). Inspired

by other discounting frameworks in economics, the social-discounting framework capitalizes on the following ideas: (a) that people are more willing to forgo resources to someone closer in social distance (e.g., family members and close friends) than to someone further away in social distance (e.g., total strangers), and (b) that there are individual differences in the decrease in generosity as a function of social distance. Greater willingness to forego resources to someone further away in social distance (also known as less social discounting) is associated with elevated generosity in other domains, such as contributing more in a public-good game (Jones & Rachlin, 2009) and stopping smoking during pregnancy for the sake of the child (Bradstreet et al., 2012).

Employing the social-discounting framework (Jones & Rachlin, 2006), the current study aimed to examine evidence for an enhanced ego-transcending motive among older adults while controlling for their reciprocal-altruism motive. Conceptually, in the social-discounting framework, when giving out resources to socially distant others (e.g., total strangers), people rely less on the reciprocal-altruism motive, but more on the ego-transcendent motive, given fewer possibility for future reciprocation (Osiński, 2009). Thus, if older adults have a stronger ego-transcending motive (Brandtstadter et al., 2010; Carstensen, 1992; Hubbard et al., 2016), we should expect more generosity toward socially distant others such as total strangers (i.e., less social discounting) from older adults, compared to younger adults.

Methods

Participants

The sample size in our study was specified a priori on the basis of previous research that used a similar design (Strombach et al., 2014). Participants were 39 older adults (21 females; age $M = 69.69$ years, $SD = 3.66$; education $M = 8.82$ years, $SD = 3.06$) and 39 younger adults (25 females; age $M = 22.79$ years, $SD = 2.54$; education $M = 15.35$ years, $SD = 2.02$), residing in Singapore. The older participants were invited and screened for their abilities to participate in the experiment by trained nurses, as part of a larger longitudinal study. Experimenters also tested older participants' understanding of the task before starting the experiment. All participants provided informed consent prior to the experiment and were given S\$15 for showing-up. All participants provided informed consent and performed the session based on a protocol that was approved by the NUS Institutional Review Board.

Social-Discounting Task

We used the social-discounting task, following an established paradigm recently used and validated among Asian participants (Ma, Pei, & Jin, 2015; Strombach et al., 2014). First, to familiarize participants with the concept of social distance, we asked them to rate how close they were (1 = closest; 100 = most distant) to people in their social

environment (e.g., mother = ~1, total stranger = ~100). Then, we asked participants to think of people whose social distance was equal to 1, 2, 3, 5, 10, 20, 50, 100, and wrote down these people’s names and the relationship participants had with them (except for people at social distance 50 and 100 as these two were strangers). In each trial of the formal task (see Figure 1), participants chose between (a) the selfish option—taking a specific amount of money (nine possibilities, varied from S\$75 to S\$165 in increments of 10) for themselves—or (b) the generous option—equally splitting S\$150 with a partner at one of the eight social-distance levels whom they thought of earlier. We randomized the order of the 72 unique trials (9 monetary-amount possibilities for the selfish option × 8 social-distance levels). We used hypothetical rewards, instead of real rewards, based on a previous recommendation from research showing a similar pattern of responses between hypothetical and real monetary rewards in this task (Locey, Jones, & Rachlin, 2011).

Figure 1.

Data Analyses and Results

Conforming to previous research (Ma et al., 2015; Strombach et al., 2014), we first employed a logistic regression separately at each social-distance level to determine indifference points of all levels where statistical probabilities of choosing each option were at 50%. Each indifference point indicates the amount of money in which one is willing to forgo to a person at a particular social-distance

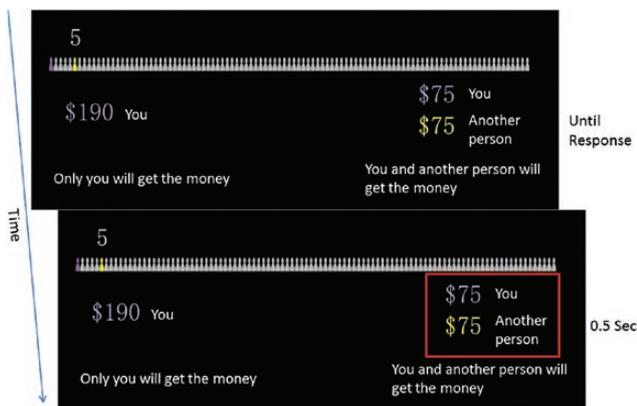


Figure 1. Social discounting task. In each trial, we showed participants social-distance information on the top of the screen using both number and icons. Number (including 1, 2, 3, 5, 10, 20, 50, 100) indicated the social-distance level of the interacting partners (5 here). As for icons, there were 101 icons in total. The leftmost icon represented a participant him/herself, shown in purple color. One of the right icons represented his/her interaction partner, shown in yellow color. Thus, the distance between the purple and yellow icons indicated social-distance levels. A participant was asked to choose between the selfish option (here taking S\$190 for his/herself) and the generous option (here equally splitting S\$150 with his/her interaction partner, so each received S\$75). A participant had unlimited time to choose. After choosing, a feedback was presented for 0.5 s confirming his/her decision, followed by a 1-s fixation ITI.

level (Jones & Rachlin, 2006). When the selfish or generous option was selected throughout a particular social-distance level, the amount forgone would be set at S\$65 to S\$175, respectively. We then normalized the amount forgone, such that 1 and 0 mean the highest and lowest amount forgone, respectively.

Two analytic strategies were employed. First, to investigate the association between aging and amount forgone at each social-distance level, we ran a 2 between-subject (aging: older vs younger participants) × 8 within-subject (social-distance levels) mixed-design ANOVA on the amount forgone (see Figure 2) (Ma et al., 2015; Strombach et al., 2014). While a main effect of aging was not significant ($F(1, 76) = .07, p = .53, \eta_p^2 = 0.005$), there were a main effect of social distance ($F(3.72, 282.48) = 89.14, p < .0001, \eta_p^2 = .54$, Greenhouse-Geisser corrected) and an interaction ($F(3.72, 282.48) = 2.81, p = .029, \eta_p^2 = .036$, Greenhouse-Geisser corrected). To follow up this interaction, we performed simple-effect analyses to test the effect of aging at each social-distance level.

To control for potential non-normal distribution at each social-distance level, we employed a bootstrap with 2,500 samples. At social-distance 50, older participants ($M = .3397, SD = .3958$) had higher amount forgone than younger participants ($M = 0.1660, SD = 0.2284; p = .021, 95\% CI [0.0274, 0.3201]$, controlling for inhomogeneity of variances). Similarly, at social-distance 100, older participants ($M = 0.3353, SD = 0.3933$) had higher amount forgone than younger participants ($M = 0.1619, SD = 0.2552; p = .024, 95\% CI [0.0235, 0.3234]$, controlling for inhomogeneity of variances). There was no significant effect of aging at other social-distance levels (p 's > .16) (We performed simple-effect analyses to test the effect of aging at each social-distance level given that our a-priori hypothesis concerned the difference between older and younger participants in generosity at each social distance. For completeness, we also performed simple-effect analyses to test the effect of social-distance levels for younger and older participants separately. The effect of social-distance

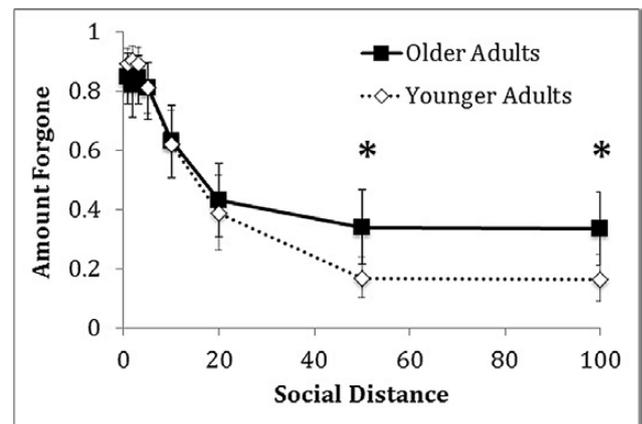


Figure 2. Mean amount of money forgone for another person as a function of social distance. Error bars represent bootstrapped 95% CI. * $p < .05$.

levels was statistically significant for both older ($F(2.99, 113.51) = 27.27, p < .0001$, Greenhouse-Geisser corrected) and younger ($F(4, 152.22) = 69.83, p < .0001$, Greenhouse-Geisser corrected) participants. Because the effect size of social-distance levels was numerically lower for older participants ($\eta^2 = 0.42$) than younger participants ($\eta^2 = 0.65$), it suggests a tendency to be less social discounting (i.e., more generosity toward socially distant others) among older participants. This pattern is consistent with our main analyses looking at the effect of aging at each social-distance level and at the area-under-the-curve (AUC) index.

Second, to investigate the association between aging and overall social-discounting tendencies, we computed the area under the curve (AUC) of the subjective values (Myerson, Green, & Warusawitharana, 2001), following previous social-discounting studies (Jones & Rachlin, 2009; Olson, Rosso, Demers, Divatia, & Killgore, 2015; Osiński, 2010; Strombach et al., 2014). Given its model-free nature, the AUC is an appropriate index for accessing individual differences in social discounting (Myerson et al., 2001; Olson et al., 2015). In our case, the AUC does not assume that older and younger participants' discounting curves have the same shape (e.g., hyperbola, exponential or quasi-hyperbolic). We first plotted each participant's amount forgone against social-distance levels. We then summed all trapezoid areas falling under the curve of this plot (see Figure 2). The final value for the AUC was the proportion of this area to the total possible area. Accordingly, the range of the AUC was from 0 to 1; higher values indicate more generosity toward socially distant others. Similar to our earlier analyses, we implemented a bootstrap with 2,500 samples to control for potential non-normal distributions of the data. Older participants ($M = .4063, SD = .3159$) had higher AUC than younger participants ($M = 0.2859, SD = 0.2025; p = .049, 95\% CI [0.0004, 0.2404]$, controlling for inhomogeneity of variances).

Discussion

Our aim was to examine the enhanced ego-transcending motive among older adults while controlling for their reciprocal-altruism motive (Brandtstadter et al., 2010; Carstensen, 1992; Hubbard et al., 2016). Utilizing the social-discounting framework (Jones & Rachlin, 2006; Osiński, 2009) allowed us to systematically test and quantify the changes in generosity as a function of social distance. Given fewer chances of reciprocation from socially distant others (e.g., total strangers), it is argued that people rely more on the ego-transcending motive (due to the attenuation of reciprocal-altruism motive) when deciding to forego their resources to socially distant others (Osiński, 2009). Consistent with our hypothesis, we found that older participants in our study had a less social-discounting tendency. More specifically, they were more generous toward total strangers compared to younger participants. Being more generous toward total strangers among older participants in our study is not only in line with previous research showing enhanced generosity

as people age (Freund & Blanchard-Fields, 2014; Midlarsky & Hannah, 1989; Sze et al., 2012; Webb, Hine, & Bailey (2016)), but it also supports the notion that older adults have a stronger ego-transcending motive even after controlling for their reciprocal-altruism motive (Brandtstadter et al., 2010; Carstensen, 1992; Hubbard et al., 2016).

Our social-discounting results also reveal that the enhanced generosity among our older participants (compared to younger participants) was selective toward total strangers (i.e., at social distance levels 50 and 100). We did not find systematic differences between older and younger participants in the amount forgone toward socially close others. This is consistent with the proposal by Rachlin (2002) that some generosity may be explained as a learned behavioral pattern that has high personal value or meaning—similar to being a moral being, obeying god etc. Since people are normally less inclined to give to socially distant individuals, a higher order motivation to maintain a pattern of generous giving would be specially reflected in giving to distant others. However, it is important to note that some evolutionary theories of aging (Hawkes, 2003; Hawkes & Coxworth, 2013) may be extended to predict greater generosity towards socially close kin in late life. In this line of reasoning, older adults would display greater giving towards kin so as to improve the kin's reproductive success, thereby passing on their own gene. As we did not observe such a trend of increasing kin generosity in older adults, our results may not be in line with such a prediction. One possibility for the absence of such an effect may lie in the limitation of the social-discounting paradigm. While it is more straightforward to interpret generosity toward socially distant others in terms of a stronger ego-transcending motive and less of reciprocal-altruism and kin-favoritism motives, it is harder to interpret generosity toward socially close others. Future research would need to employ other paradigms to explain generosity toward close others more systematically.

It is worth discussing our results with regards to the dominant model on prosociality, the warm-glow model (Andreoni, 1990; Dunn, Aknin, & Norton, 2008). This model posits that individuals donate from an egoistic motive to signal their good character and garner prestige, in order to feel good about themselves. Warm-glow motive is fundamentally different from an ego-transcendent motive for giving as the former is focused on boosting the benefactors' positive emotion about themselves by signaling a benevolent image, whereas the latter is aimed towards upholding timeless virtuous acts of generosity. Importantly, whether there is a quantitative difference in the experience of warm-glow from giving to socially close versus socially distant others remains to be investigated, and the social discounting paradigm used in the present study may not be able to infer such differences. As the act of signaling a generous image through generosity overlaps with being generous categorically and it is often difficult to disentangle these two motives behaviorally, future studies may use methods such as neuroimaging to see differences in voluntary versus collective

giving (such as taxation) to socially close versus socially distant others to explore this question (Harbaugh, Mayr, & Burghart, 2007). For the purpose of this paper, we take the concept of warm-glow as a purely egoistic motive for giving where positive emotions are essentially 'utility from the act of giving' (Andreoni, 1990, p. 473) and derived from a 'sense of agency' (Harbaugh et al., 2007, p. 473) while giving. Thus, generosity driven by an increased warm-glow motive would be indifferent to social distance of recipient, as long as the benefactor gives voluntarily. Conversely, as our results reflect a more selective (and may be more meaningful) endeavor in older adults to regulate their social discounting towards distant others, it is more coherent with an ego-transcendent account, as opposed to a general increase in giving overall for all social distances.

It is also essential to relate our findings to the SST, which the ego-transcending account was extended from (Brandtstadter et al., 2010; Carstensen, 1992; Hubbard et al., 2016). The SST generally asserts that 'perceived limitations on time lead to motivational shifts that direct attention to emotionally meaningful goals' (Carstensen, Fung, & Charles, 2003, p. 104). The main supporting evidence for this theory is a shrinking social-network size later in life (Carstensen, 2003). That is, a shortened time-perspective in later life propels individuals to prioritize emotionally meaningful goals, and paying more attention to emotionally meaningful relationships with close others (and discarding less important ones) fits with the prioritization of the emotionally meaningful goals. Thus, enhanced generosity toward socially distant others found in the current study seems to be at odd with the SST. However, our current study made a prediction based on the extension of the SST (i.e., the ego-transcending account) that focuses on enhanced motivation to seek emotionally meaningful goals in later life (Brandtstadter et al., 2010). Being generous to socially distant others, such as donating to charities, is associated with greater perception of meaning in life (Klein, 2016; Van Tongeren et al., 2016). In this regard, one might be motivated to find emotionally meaningful goals from (a) being part of a close-knit social network, as well as (b) contributing to the greater good (such as donating to charities to socially distant others) (Brandtstadter et al., 2010; Carstensen, 1992; Hubbard et al., 2016). Empirical evidence shows a support to this extension of the SST. Older adults were more generous to targets outside of their shrinking social network. They, for instance, give more to strangers and charities, volunteer more frequently and concern more about the environment (Bekkers, 2010; Cornwell et al., 2008; Engel, 2011; Freund & Blanchard-Fields, 2014; Matsumoto et al., 2016; McAdams et al., 1993; Midlarsky & Hannah, 1989; Sze et al., 2012). Thus, being more generous toward social-distant others found here is consistent with (a) the ego-transcending extension of the SST and (b) empirical evidence for enhanced generosity outside older adults' close social network.

There are several limitations inherent in this study. To start with, we did not have any self-report measure that

explicitly asked participants the motivation of their choices. Instead of using self-report measures, we inferred participants' motivation based on their choice pattern in the social-discounting task. We decided to do so because, first, participants may not be consciously aware of the motivation of their choices (Dunning, Heath, & Suls, 2004). Second, some of the motives (e.g., reciprocal-altruism) may be associated with a stereotypically negative attitude (e.g., selfishness). Thus, when someone does not endorse these types of motives in a self-report scale, it may reflect their social desirability, as opposed to their real motive. Yet, even without the explicit measures, we argue that selectively enhanced generosity toward socially distant others among older participants found in the current study does not lend support to reciprocal altruism and warm-glow as the potential motives behind the age differences. Specifically, if older adults were driven by reciprocal-altruism motive in their generosity towards others, we would expect selectively greater generosity toward socially close others (as opposed to socially distant others). This is because giving to socially close others increases greater chances of reciprocity (Axelrod & Hamilton, 1981; Trivers, 1971). Next, as generosity driven by the warm-glow motive is primarily dependent upon a sense of agency in giving, an increase of it in older adults would predict that in comparison to young adults, older adults would be more generous toward everyone regardless of their social distance. Since our results in the present study are not consistent with these two predictions, we endorse the view of a greater ego-transcending motive in older adults. To confirm our interpretation here, we urge future research to implement different measures of motivations to access the underlying mechanisms of the selectively enhanced generosity toward socially distant others in older adults.

The second limitation is the use of hypothetical incentives in our study which may have generally weakened the reciprocal-altruism motive, and therefore may constraint our ability to interpret the results in terms of the (lack of) age differences in the reciprocal-altruism motive. We argue that, based on previous empirical studies, the results should not be changed regardless of whether we used real or hypothetical moneys. Specifically, research has showed a similar pattern of responses between hypothetical and real monetary rewards not only in the social-discounting task, but also in tasks that are designed to specifically assess reciprocal behaviors (such as the prisoner's dilemma and trust games) (Locey et al., 2011; Thielmann, Heck, Data, & Code, 2016). Accordingly, if someone decides to give money to another person based on his/her reciprocal motives in a hypothetical situation (such as in the social-discounting task, prisoner's dilemma game and trust game), it is likely that this person would decide to do the same in a real-monetary situation.

Another limitation is that our study was conducted in a collectivistic country (Singapore) which emphasizes that people should prioritize the welfare of a society over that of an individual (Markus & Kitayama, 1991). It is possible that the

pattern of generosity toward socially distant others among older Singaporeans may differ from the pattern among older Westerners. To the best of our knowledge, no cross-cultural studies have conducted to test this yet. Nonetheless, we argue that the generosity pattern in older adults may be similar across collectivistic and individualistic cultures. Heightened generosity among older adults has been found both in the West (Freund & Blanchard-Fields, 2014; Midlarsky & Hannah, 1989; Sze et al., 2012) and the East, such as Japan (Matsumoto et al., 2016). Moreover, database from 153 countries suggests higher donations in real life among older adults across countries (The World Giving Index, 2016; <https://www.cafonline.org>). Moreover, the cohort effect may influence our results since the older adults in our study are the pioneer generation in Singapore. Many of older Singaporeans moved to Singapore before it was a country in 1965. Thus, there are vast differences between older and younger cohorts in Singapore in terms of life style and educational opportunities. However, we argue that our approach of randomly selecting older and younger adults from the community is more ecological valid for a Singapore context than forcing older and younger adults to have similar demographics. Future research in a country where older and younger cohorts do not differ much in life style and educational opportunities is needed.

In summary, we demonstrated that older adults are good Samaritans to strangers. Compared to younger adults, older adults are more likely to forgo their resources to socially distant others in the social-discounting task. This tendency may reflect their enhanced ego-transcending motive, such that their prosocial behavior is aimed above and beyond close others—towards the society at large.

Funding

This work was supported by the MOE Tier 1 grant (R-581-000-191-112) and MOE Tier 2 (MOE2016-T2-1-015) to R.Y. for financial support.

Acknowledgements

We thank Bing Cai Kok, Jing Wen Chai, and Huimin Zheng for their help with data collection. N.P. and R.Y. developed the study concept. N.P. performed testing, data collection, the data analysis and interpretation. N.P. and A.C. drafted the manuscript, and F.L. and R.Y. provided critical revisions. All authors approved the final version of the manuscript for submission.

Conflict of Interest

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

References

- Axelrod, R., & Hamilton, W. D. (1981). The evolution of cooperation. *Science*, *211*, 1390–1396. doi:10.1126/science.7466396
- Andreoni, J. (1990). Impure altruism and donations to public goods: a theory of warm-glow giving. *The Economic Journal*, *100*, 464–477. doi:10.2307/2234133
- Bekkers, R. (2010). Who gives what and when? A scenario study of intentions to give time and money. *Social Science Research*, *39*, doi:10.1016/j.ssresearch.2009.08.008
- Bjälkebring, P., Västfjäll, D., Dickert, S., & Slovic, P. (2016). Greater emotional gain from giving in older adults: Age-related positivity bias in charitable giving. *Frontiers in Psychology*, *7*, doi:10.3389/fpsyg.2016.00846
- Bradstreet, M. P., Higgins, S. T., Heil, S. H., Badger, G. J., Skelly, J. M., Lynch, M. E., & Trayah, M. C. (2012). Social discounting and cigarette smoking during pregnancy. *Journal of Behavioral Decision Making*, *25*, 502–511. doi:10.1002/bdm.750
- Brandtstadter, J., Rothermund, K., Kranz, D., & Kuhn, W. (2010). Final decenterations: Personal goals, rationality perspectives, and the awareness of life's finitude. *European Psychologist*, *15*, 152–163. doi:10.1027/1016-9040/a000019
- Carstensen, L. L. (1992). Social and emotional patterns in adulthood: Support for socioemotional selectivity theory. *Psychology and Aging*, *7*, 331–338. doi:10.1037/0882-7974.7.3.331
- Carstensen, L. L. (2006). The influence of a sense of time on human development. *Science (New York, N.Y.)*, *312*, 1913–1915. doi:10.1126/science.1127488
- Carstensen, L. L., Fung, H. H., & Charles, S. T. (2003). Socioemotional selectivity theory and the regulation of emotion in the second half of life. *Motivation and Emotion*, *27*, 103–123. doi:10.1023/a:1024569803230
- Cornwell, B., Laumann, E. O., & Schumm, L. P. (2008). The social connectedness of older adults: A national profile. *American Sociological Review*, *73*, 185–203. doi:10.1177/000312240807300201
- Dunn, E. W., Aknin, L. B., & Norton, M. I. (2008). Spending money on others promotes happiness. *Science (New York, N.Y.)*, *319*, 1687–1688. doi:10.1126/science.1150952
- Dunn, E. W., Aknin, L. B., & Norton, M. I. (2014). 'Prosocial spending and happiness: Using money to benefit others pays off': Corrigendum. *Current Directions in Psychological Science*, *23*, doi:10.1177/0963721414525911
- Dunning, D., Heath, C., & Suls, J. M. (2004). Flawed self-assessment. *Psychological Science in the Public Interest*, *5*, 69–106. doi:10.1111/j.1529-1006.2004.00018.x
- Engel, C. (2011). Dictator games: a meta study. *Experimental Economics*, *14*, 583–610. doi:10.1007/s10683-011-9283-7
- Freund, A. M., & Blanchard-Fields, F. (2014). Age-related differences in altruism across adulthood: making personal financial gain versus contributing to the public good. *Developmental Psychology*, *50*, 1125–1136. doi:10.1037/a0034491
- Harbaugh, W. T., Mayr, U., & Burghart, D. R. (2007). Neural responses to taxation and voluntary giving reveal motives for charitable donations. *Science (New York, N.Y.)*, *316*, 1622–1625. doi:10.1126/science.1140738
- Hawkes, K. (2003). Grandmothers and the evolution of human longevity. *American Journal of Human Biology*, *15*, 380–400. doi:10.1002/ajhb.10156
- Hawkes, K., & Coxworth, J. E. (2013). Grandmothers and the evolution of human longevity: a review of findings and future directions. *Evolutionary anthropology*, *22*, 294–302. doi:10.1002/evan.21382
- Hubbard, J., Harbaugh, W. T., Srivastava, S., Degras, D., & Mayr, U. (2016). A general benevolence dimension that links neural, psychological, economic, and life-span data on altruistic tendencies. *Journal of Experimental Psychology*, *145*, 1351–1358. doi:10.1037/xge0000209

- Jones, B., & Rachlin, H. (2006). Social discounting. *Psychological Science*, *17*, 283–286. doi:10.1111/j.1467-9280.2006.01699.x
- Jones, B. A., & Rachlin, H. (2009). Delay, probability, and social discounting in a public goods game. *Journal of the Experimental Analysis of Behavior*, *91*, 61–73. doi:10.1901/jeab.2009.91-61
- Klein, N. (2016). Prosocial behavior increases perceptions of meaning in life. *The Journal of Positive Psychology*, 354–361. doi:10.1080/17439760.2016.1209541
- Leider, S., Möbius, M. M., Rosenblat, T., & Do, Q.-A. (2009). Directed altruism and enforced reciprocity in social networks. *The Quarterly Journal of Economics*, *124*, 1815–1851. doi:10.1162/qjec.2009.124.4.1815
- Locey, M. L., Jones, B. A., & Rachlin, H. (2011). Real and hypothetical rewards in self-control and social discounting. *Judgment and Decision Making*, *6*, 552–564. <http://journal.sjdm.org/11/11405/jdm11405.html>
- Ma, Q., Pei, G., & Jin, J. (2015). What makes you generous? The influence of rural and urban rearing on social discounting in China. *PLoS ONE*, *10*, e0133078. doi:10.1371/journal.pone.0133078
- Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, *98*, 224–253. doi:10.1037/0033-295x.98.2.224
- Matsumoto, Y., Yamagishi, T., Li, Y., & Kiyonari, T. (2016). Prosocial behavior increases with age across five economic games. *PLoS One*, *11*, e0158671. doi:10.1371/journal.pone.0158671
- McAdams, D. P., St Aubin, E. D., & Logan, R. L. (1993). Generativity among young, midlife, and older adults. *Psychology and Aging*, *8*, 221–230. doi:10.1037/0882-7974.8.2.221
- Midlarsky, E., & Hannah, M. E. (1989). The generous elderly: naturalistic studies of donations across the life span. *Psychology and Aging*, *4*, 346–351. doi:10.1037/0882-7974.4.3.346
- Myerson, J., Green, L., & Warusawitharana, M. (2001). Area under the curve as a measure of discounting. *Journal of the Experimental Analysis of Behavior*, *76*, 235–243. doi:10.1901/jeab.2001.76-235
- Olson, E. A., Rosso, I. M., Demers, L. A., Divatia, S., & Killgore, W. D. S. (2015). Sex differences in psychological factors associated with social discounting. *Journal of Behavioral Decision Making*, *29*, 60–66. doi:10.1002/bdm.1876
- Osiński, J. (2010). Social discounting: The effect of outcome uncertainty. *Behavioural Processes*, *85*, 24–27. doi:10.1016/j.beproc.2010.05.010
- Osiński, J. (2009). Kin altruism, reciprocal altruism and social discounting. *Personality and Individual Differences*, *47*, 374–378. doi:10.1016/j.paid.2009.04.011
- Rachlin, H. (2002). Altruism and selfishness. *The Behavioral and brain sciences*, *25*, 239–50; discussion 251. doi:10.1017/s0140525x02000055
- Strombach, T., Jin, J., Weber, B., Kenning, P., Shen, Q., Ma, Q., & Kalenscher, T. (2014). Charity begins at home: Cultural differences in social discounting and generosity. *Journal of Behavioral Decision Making*, *27*, 235–245. doi:10.1002/bdm.1802
- Sze, J. A., Gyurak, A., Goodkind, M. S., & Levenson, R. W. (2012). Greater emotional empathy and prosocial behavior in late life. *Emotion (Washington, D.C.)*, *12*, 1129–1140. doi:10.1037/a0025011
- Thielmann, I., Heck, D. W., Data, B. E. H., & Code, R. (2016). Anonymity and incentives: An investigation of techniques to reduce socially desirable responding in the trust game. *Judgment and Decision Making*, *11*, 527. <http://journal.sjdm.org/16/16613/jdm16613.html>
- Trivers, R. L. (1971). The evolution of reciprocal altruism. *The Quarterly Review of Biology*, *46*, 35–57. doi:10.1086/406755
- Van Tongeren, D. R., Green, J. D., Davis, D. E., Hook, J. N., & Hulseley, T. L. (2016). Prosociality enhances meaning in life. *The Journal of Positive Psychology*, *11*, 225–236. doi:10.1080/17439760.2015.1048814
- Webb, B., Hine, A. C., & Bailey, P. E. (2016). Difficulty in differentiating trustworthiness from untrustworthiness in older age. *Developmental Psychology*, *52*, 985–995. doi:10.1037/dev0000126