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# The Age of Connection: Interdependent Self-Construal Links Age and Prosociality

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# The Age of Connection: Interdependent Self-Construal Links Age and Prosociality

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## Biography

The author was born in Chicago, on October 5th, 1995. He graduated from Oak Lawn Community High School, in Oak Lawn, 2014. He received his bachelor's degree in psychology from Northeastern Illinois University in 2018 and received his master's degree in Psychological Science from DePaul University in 2021.

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## Abstract

Theories of aging have major implications for age differences in the self-concept across the adult lifespan that remain largely untested. Here, I propose a new perspective that draws from prominent aging theories to argue that people come to adopt a more interdependent self-construal with age as social environments become increasingly interdependent. Accordingly, I explain how ontogenetic development across the adult lifespan may emphasize interdependent social environments and subsequently encourage one to adopt a more interdependent self, explore how this perspective dovetails with prominent aging theories, and apply this perspective within the context of aging and prosocial behavior to support three studies (and one pilot study) within a Western cultural context to investigate the connection between aging, interdependence, and prosociality. In Study 1, I demonstrate within- and between-person age differences in the conduciveness of immediate social environments to the internalization of an interdependent self-construal. In Study 2, I replicate previous findings of an association between age and prosociality and interdependent self-construal and prosociality whilst demonstrating a positive relationship between age and interdependent self-construal. Lastly, in Studies 3a and 3b I validate and use a manipulation that makes participants experience some aspects of aging (using software that progresses the age of participants' faces) and a novel manipulation of salience of interdependence to generate differences in interdependent self-construal, prosocial values, and actual prosocial behavior that are consistent with previously reported age differences in these constructs. Overall, these findings provide triangulating evidence across a variety of samples and methodologies to support a connection between aging, interdependence, and prosociality.

*Key words*: Aging, Self-Construal, Interdependence, Prosocial Behavior

**The Age of Connection: Interdependent Self-Construal Links Age and Prosociality**

> *First we only want to be seen, but once we're seen, that's not enough anymore. After that, we want to be remembered.*
>
> -Emily St. John Mandel, *Station Eleven*

Figuring out who we are is a life-long process. In youth, answering the question "who am I?" takes center-stage, driving the choices of young people everywhere. Interests, hobbies, friends, college majors, and careers all have something to say about one's identity. But as we get older—as the quote above so powerfully observes—our attention is focused away from defining who we are for our own sake and refocused toward defining who we are to somebody else. In other words, whereas we may have once been determined to answer the question "who am I?", we grow to ask, "who am I *to someone else?*" instead. Most often, we define ourselves in our connections with those closest to us. Accordingly, people often become more focused on their meaningful close relationships with age (English & Carstensen, 2014).

A growing emphasis on relationships with close others with age is not a new idea from a psychological perspective. Psychologists since Erikson (1968, 1980) have been sensitive to the idea that peoples' goals in life are likely to differ based on the unique needs that are prioritized across one's lifespan. In particular, younger adulthood is often associated with the need for autonomy and identity formation whereas older adulthood is more often associated with the need for identity stability and relatedness with others. Moreover, it is well-established that people are more selective with their social networks as they age so that they are more inclusive of close and meaningful relationship partners

(English & Carstensen, 2014; Lang, 2000; Lang & Carstensen, 2002). What is less well understood, however, is the implication that this shift in priorities and emphasis on close relationships has for how one defines their sense of self, and how the potential changes in the self across the lifespan that may result from this process relate to social behavior.

The term "self" is very broadly used in psychology research and has been defined in several ways. Here, I adopt Markus and Kitayama's (2010) conceptualization of the self as "a continually developing sense of awareness and agency that guides actions and takes shape as the individual, both brain and body, become attuned to various environments" (p. 421). This definition of "self" was originally developed and applied within the study of cultural psychology, with the "various environments" component of the definition mainly referring to differences in cultural contexts. Despite its origins in cultural psychology, I believe this definition is also broadly applicable to the context of aging given the emphasis on continual development and that environments (and particularly social environments) often differ temporally across one's lifespan (English & Carstensen, 2014; Lang, 2000; Lang & Carstensen, 2002). Accordingly, one might expect that changes in one's social environment across one's lifespan should relate to further attunement of one's sense of self with these socio-environmental changes. Taken together with the increased emphasis on close interpersonal relationships that comes with age, one's social environments may become increasingly focused on the self in relation to others over time, encouraging one to reflexively incorporate these relationships into one's self-concept. Simply, we may grow to define ourselves more in terms of our close relationships when we are surrounded by social environments that emphasize these relationships.

The "tendency to define the self in terms of one's embeddedness in a network of relationships with others"—or interdependent self-construal (American Psychological Association, 2007)—is a well-studied psychological construct that has interestingly received little attention in the context of aging. Given the above implications that changing social environments and a newfound importance of relationships and social roles (e.g., spouse, parent, caregiver) as one ages might have for defining one's sense of self and identity, it seems plausible that one could come to adopt a more interdependent self-construal over the course of the lifespan as one adjusts to these social environments and internalizes these roles. This idea has considerable implications for the study of aging, as interdependent self-construal is tied to unique social cognitive, emotional, motivational, and behavioral patterns (Markus & Kitayama, 1991, 2010). As such, age-related increases in interdependent self-construal may be associated with similar patterns in these domains within the context of aging and may help to further account for age differences and developmental changes in social cognition, emotion, motivation, and behavior. The current work begins to test this idea within a relevant and prominent context of aging research—age differences in prosocial behavior. Specifically, I believe that the application of age differences in interdependent self-construal might be helpful in accounting for the multitude of studies that observe heightened prosocial behavior for older relative to younger adults (see Midlarsky et al., 2015, for a more comprehensive review of the literature on aging and prosocial behavior). Specifically, I aim to evaluate the extent to which the adoption of an interdependent sense of self among older people might encourage them to be more attentive to the needs of others and engage in more prosocial behavior relative to younger adults.

Accordingly, I first explore the plausibility of a link between aging and interdependence from a theoretical perspective before examining the literatures on aging, interdependent self-construal, and their respective correspondence with prosociality. Following the review of the literature, I describe a series of studies situated within a Western cultural context to (a) investigate longitudinal changes in some of the qualities of one's immediate social environment that may make these environments more conducive to interdependence over the adult lifespan and that may inform the internalization of an interdependent sense of self, (b) explore adult age differences in self-reported interdependent self-construal and prosociality as well as the correspondence between these constructs, and (c) evaluate the extent to which making participants experience some aspects of aging (using software that progresses the age of participants' faces) and manipulating salience of interdependent self-construal among younger adults may lead to increases in prosocial values and behavior. Although I situate this work within a Western cultural context, I acknowledge that inter-cultural differences are certainly relevant to this research, as age-related changes in socially prescribed roles and expectations about aging also differ cross-culturally (Kitayama et al., 2020). Presumably, these additional socio-environmental differences should affect the continual development of the self in ways that may differ from those I discuss here. However, investigating these differences is beyond the scope of the current research, although certainly of interest in future work.

## Aging and the Interdependent Self

As stated above, shifting needs and motivations throughout one's lifespan (Erikson, 1980) and changes in social environments as one ages (English & Carstensen, 2014) are likely to have implications for one's sense of self. Specifically, younger adulthood may correspond more closely with an *independent* self, whereas middle and older adulthood may align with an *interdependent* self. In emerging adulthood (between the ages of 18 and 25), identity exploration and self-focus is encouraged and prioritized (Arnett, 2004). Accordingly, a sense of self that is not as strongly defined by others (i.e., independent) may support emerging adults' efforts, as trying on new identities and roles should be easier when defining the self as distinct from others, especially when independence is emphasized in the social context (e.g., going to college, living on one's own). As such, alignment between one's sense of self and one's cultural environment has been associated with decreased stress when adjusting to a new context (Cross, 1995). Moreover, immersion in social environments with themes of identity exploration and self-focus that are typical of this period of development (e.g., college, starting one's career/joining the workforce) may emphasize the accessibility and internalization of cultural messages about independence and encourage one to adopt an independent self-construal even if one does not strongly endorse independence at the outset.

As social environments continue to change and one's identity begins to stabilize in middle adulthood, however, new opportunities and priorities redirect one's attention toward maintaining stability and deepening relationships with close others. Deepening relationships with close others and embracing values that support these relationships is a common theme in many important life events as one ages into adulthood and, moreover,

navigating these events may immerse one in social environments that encourage a more interdependent self. For instance, getting married, becoming a parent, and caring for one's aging parents are experiences that are likely to shift one's social environment and one's perspective of themselves to be more interdependent. Specifically, one may be inclined to suppress their own needs and refocus attention toward satisfying the needs of close others to maintain the relationship. These shifts are likely accompanied by new social roles (e.g., spouse, parent, caregiver) that carry further expectations about taking on the qualities of these roles, which are often relationship-enhancing (e.g., loyal, loving, attentive). Over time, immersion in these interdependent social environments and the internalization of these social roles and qualities could lead one to embrace them as a part of oneself, overall increasing the aspects of the self that are defined as interdependent. Some findings are consistent with this argument. For instance, behaviors that enhance relationship harmony are associated with greater relational-interdependent self-construal (Cross et al., 2000; Morry & Kito, 2009), marital satisfaction over time is related to cognitive indicators of interdependence (e.g., "we" talk; Oullet-Courtois et al., 2022), greater parental role salience and care motivations are related to greater interdependent self-construal (Li & Gong, 2018), and limited research has observed greater interdependent construal for older relative to younger participants (Antalíková et al., 2018; Ashman et al., 2006). These patterns converge around the idea that common mid- and late-life stages and social environments (i.e., increased salience of relationships, marriage, parenthood) correspond to interdependent self-construal.

However, this is not to say that aging only and uniformly pressures one to adopt an interdependent sense of self. For instance, changes in social environments with age

could also be conducive to an *independent* sense of self as well. Take, for example, the financial independence gained from advancing in one's career, "empty nesters" regaining independence after their children have moved out, or even having more time for the pursuit of interests and hobbies after one has retired. Each of these experiences constitute socio-environmental changes that may nudge one's sense of self in the direction of independence and add nuance to the socio-environmental changes that come with age. Indeed, some findings have documented greater independent self-construal among older relative to younger adults (Guo et al., 2008). Moreover, the socio-environmental pressures that may emphasize interdependence could even be unwelcome to some, leading to a reassertion of one's independence in the face of these pressures. Consequently, despite the presence of several socio-environmental pressures that could encourage the development of a more interdependent sense of self there are also pressures that could counteract or moderate this process.

On a related note, age-related changes in the self are likely to be further moderated by inter-cultural differences, even though the socio-environmental pressures described above are likely to be present in some form across cultures (e.g., similar cross-cultural emphasis on age-related familial roles). Specifically, it would be reasonable to expect that a shift toward an interdependent self would be more pronounced in cultures that emphasize independence (e.g., Western cultures) and less pronounced in cultures that are more innately interdependent (e.g., Eastern cultures), as individuals from more independent cultural contexts may start out with a lower emphasis on interdependence but "catch up" over time to be more similar to individuals from interdependent cultures. Some findings exist that could be interpreted along these lines (e.g., Grossman et al.,

2012; Kitayama et al., 2019), but further research would be needed to firmly establish this pattern. Given these (and other) moderating factors, I attempt to remain cautious regarding the constraints on generalizability of the current research.

## Aging and the Interdependent Self in the Context of Prominent Theories of Aging

Although prominent theories of aging do not explain how the self might change with age, the ideas presented above are implicit in many of them and age differences in interdependent self-construal remain largely untested. For instance, both socioemotional selectivity theory (Carstensen, 1992, 2006) and the selective optimization with compensation model (Baltes & Baltes, 1990; Baltes, 1997) reason from the perspective that people become more selective about the life domains they prioritize as they age and that family and close relationships become more important, but do not go so far as to explicate how these differences affect the self. From a slightly different perspective, the motivational theory of life-span development (Heckhausen et al., 2010) focuses on developmental changes in primary and secondary control with age, which has additional implications for lifespan changes in the self with respect to declines in physical functioning. Particularly, the motivational theory of life-span development proposes that losses in physical functioning with age may hinder older adults' ability to directly influence their environments (i.e., primary control) but that they may compensate for this loss via enhanced self-regulation and regulation of social situations (i.e., secondary control). The idea that one's sense of self becomes more interdependent seems to be a plausible extension of each of these theories and some evidence for these theories can be re-interpreted with respect to aging and interdependent self-construal.

From the socioemotional selectivity theory perspective, people are theorized to be selective about the goals that they pursue as they age because of a perception of shortening time horizons. Specifically, vast time horizons in youth are associated with prioritizing knowledge and resource acquisition to prepare for an uncertain future. As time horizons narrow with age, these priorities shift toward experiencing more positivity and meaning in the present.

In the social context, this shift in priorities that results from shorter time-horizons is accompanied by an active pruning of one's social network (Lang, 2000) so that it is smaller and contains more close social partners (Lang & Carstensen, 2002), as close relationships are likely to be positive and emotionally meaningful (Carstensen, 2006; English & Carstensen, 2014), ultimately aligning with older adults' motivations. Further, older adults have been found to prefer close social partners over novel partners (Fredrickson & Carstensen, 1990; Fung & Carstensen, 2004; Fung, Carstensen, & Lutz, 1999). Family members and close others are especially formative components of the interdependent self (Markus & Kitayama, 1991), and as such these close relationships may be more likely to contribute to one's sense of self in older relative to younger adulthood given that these close relationships are more actively sought after and feature more prominently in one's social environment.

Similarly, the selective optimization with compensation model also posits that people become more selective about their priorities with age, but emphasizes the role of balancing age-related gains and losses in this process. Specifically, the selective optimization with compensation model explains that age-related losses lead people to select goals that are more personally relevant and to invest resources such as time,

attention, and effort into those goals (i.e., optimization). As stated above, close relationships are increasingly personally relevant and meaningful in older adulthood, so people may be more likely to select and optimize relationship goals as they age. Over time, the prioritization of relationship goals could lead one to increasingly construe the self in terms of one's relationships, as investing time and effort into these relationships should increase their prominence in one's social environment. It is important to note, however, the likely bidirectional association between these constructs—namely, that integrating social roles into one's sense of self may also relate to greater investment in the relationships that define these roles.

The motivational theory of life-span development also reasons from the idea that aging is associated with various gains and losses in functioning and states that these gains and losses are directly tied to changes in the use of control strategies. The motivational theory of life-span development proposes that the capacity to directly control one's environment (e.g., via the investment of effort, persistence) decreases with age due to natural losses in physical functioning, but that these losses are counteracted through increased use of secondary control strategies (e.g., self-regulation, goal adjustment). Investigations into the use of control strategies across the lifespan support the idea that use of secondary control is greater in older age, with older adults (relative to younger adults) indicating greater preference for and use of secondary control strategies (Ashman et al., 2006; Brandtstädter & Renner, 1990; Heckhausen, 1997; Wrosch, et al., 2005; Wrosch & Heckhausen, 1999, 2002; Wrosch et al., 2000) and with secondary control strategies being more strongly related to well-being in older relative to younger adulthood (Wrosch et al., 2000). Additionally, relative to younger adults, older adults respond more

successfully to disagreeable interpersonal interactions via more effective use of emotion regulation strategies (Luong & Charles, 2014), which may be considered a form of secondary control.

These findings indicate that older adults may be more skilled at managing themselves to fit their social environment, which aligns with an interdependent self-construal. Specifically, interdependence has been associated with greater preference and self-reported use of secondary control strategies (i.e., adjusting the self to fit the environment) whereas independent self-construal aligns with greater preference and self-reported use of primary control strategies (i.e., adjusting the environment to fit the self; Ashman et al., 2006; Morling et al., 2002). Moreover, observed age differences in interdependence were also found to partially account for age differences in preference for control strategies, with greater interdependent self-construal in older adults accounting for increased preference for secondary control (Ashman et al., 2006). However, an increased use of secondary control strategies in older adulthood is likely to be determined by more than just interdependent self-construal as there are multiple reasons why secondary control may be used. Specifically, self-adjustment may be preferred either because one does not want to upset the balance of a social environment by using a more direct strategy (as is documented for more interdependent cultures; Church, 1987; Morling et al., 2002) *or* because one has simply lost the ability to exert primary control and has no other option but to adjust the self. As such, the relationship between interdependence and use of adjustment strategies in older adulthood may be more straightforward when considered specifically in a social setting, as adjustment in social settings is likely to derive from one's motivation to maintain the social balance rather

than from one lacking direct control over the situation. In support of this idea, relative to younger adults, older adults respond more successfully to disagreeable interpersonal interactions via more effective use of emotion regulation strategies (Luong & Charles, 2014) and resolve conflict more harmoniously (Carstensen et al., 1995; Levenson et al., 1994). These findings indicate that older adults may be more skilled at adjusting themselves, specifically within the context of social situations, which aligns with the motivation to maintain harmonious social relationships that is a key component of the interdependent self (Kojima, 1984).

## Aging, Interdependence, and Prosociality

So far, I have argued about people adapting the self to become more interdependent as they age from a theoretical standpoint, but what implications might such a shift have for behavior? I aim to answer this question by applying a comparative lens within the context of age differences in prosocial behavior (for a review, see Midlarsky et al., 2015). Specifically, if people internalize the self to be more interdependent with age, then similar patterns of findings should emerge between prosocial behavior and constructs that contribute to prosociality when comparing between age differences (either longitudinal or cross-sectional) and between populations that construe the self as more versus less interdependent (e.g., people from cultures high vs. low on collectivism, intra-cultural variation in interdependence). I chose the context of aging and prosocial behavior given that this phenomenon is unresolved in the aging literature, has been receiving increased attention (Bailey et al., 2021), and because the interdependent self has implications for prosocial behavior and prosociality broadly (e.g., for prosocial behavior, Burton et al., 2012; Lee & Bradford, 2015; Moorman & Blakely,

1995; Skarmeas & Shabbir, 2011; for prosocial values, Harb & Smith, 2008; Oishi et al., 1998; for empathic concern, Meyer et al., 2015). Accordingly, I distinguish between prosocial behavior itself as well as constructs that may differ with age and that contribute to prosocial behavior (i.e., antecedents of prosocial behavior).

Prosocial behavior is a broad term that has previously been used to capture altruism, volunteering, generativity, caregiving, and compassion (Midlarsky & Kahana, 2007). I retain this broad conceptualization and discuss age and self-construal differences that fall within these categories. However, I chose to be more selective about the literature that I present here given that the goal was to compare between the aging and self-construal literature and not to systematically review and summarize the literature on age differences in each of these aspects of prosocial behavior which has been done elsewhere (e.g., Midlarsky et al., 2015; for a review within the context of prosocial motivation, see Isaacowitz et al., 2021).

### *Prosocial Behavior*

With respect to age differences in prosocial behavior, studies have observed greater prosocial behavior among middle and older (relative to younger) adults in several of the domains identified above. For instance, Hubbard and colleagues (2016) found that greater general benevolence among older adults was associated with greater neural activity when witnessing altruistic events. Such a correspondence between benevolence and altruism is consistent with theoretical models of altruism in late life that suggest that altruistic helping among older adults is driven by concern for others and is a normative aspect of older adulthood (Midlarsky & Kahana, 1994). In the domain of volunteering, US national rates of volunteering were consistently the highest among 35–54 year-olds

and lowest among 20–24 year-olds (Bureau of Labor Statistics, 2002, 2007, 2012, 2016). Additionally, those aged 65 and over consistently had the highest median annual number of hours spent volunteering whereas those under 35 had the lowest (Bureau of Labor Statistics, 2002, 2007, 2012, 2016). Motives for volunteering also differ by age, with one study finding a negative correlation between age and volunteering to gain career experience, and a positive correlation with age and volunteering to strengthen social relationships (Okun & Schultz, 2003). Moreover, volunteering has been identified as a way for older adults to express altruistic values (Nelson et al., 2004; Okun & Schultz, 2003) and volunteering behavior is more pronounced for older adults who experience a greater sense of alignment with their communities (Okun & Michel, 2006). Older adults have also been found to be disproportionately philanthropic, both in terms of the proportion of older adults who donate, as well as the amount donated after accounting for financial costs (Midlarsky & Hannah, 1989; Steinberg et al., 2005), and are more motivated to help charities (Raposo et al., 2021) than their younger adult counterparts, suggesting that older people are relatively more generous with money as well. Although these findings indicate greater generosity with time and money among older relative to younger adults, age differences in resources (e.g., more disposable money with age, greater amounts of free time in older adulthood) are likely important contributing factors to older adults' willingness and ability to help others. Nonetheless, other work has found greater donation behavior among older adults even when monetary resources are fixed (Freund & Blanchard-Fields, 2014), which parallels nicely with older adults' more purely altruistic concerns (Hubbard et al., 2016), and alleviates some concerns about age

differences in prosociality merely being the result of age differences in the availability of resources.

Generativity, one's concern for guiding the next generation, is another domain of prosocial behavior for which age differences are apparent, as generativity becomes increasingly important in midlife (Erikson, 1963). However, evidence for age differences in generativity are somewhat mixed, with some studies finding a small peak in generative concern in midlife (Einolf, 2014; Keyes & Ryff, 1998; McAdams et al., 1993) and greater generative commitment for middle and older relative to younger adults (McAdams et al., 1993) whereas others have found no relation between generativity and age (McAdams & de St. Aubin, 1992). In a cross-cultural study of adults aged 60 and older, Hofer and colleagues (2014) found positive associations between age and generative concern. In a rare lab study of age differences in generative behavior, Freund and Blanchard-Fields (2014) found that older adults' behavior was consistent with more generative aims, whereas younger adults' behavior was consistent with self-focused aims in a complex problem-solving task. Longitudinal findings have also observed increases in generativity from younger to middle adulthood (Peterson & Klohnen, 1995; Shane et al., 2021). However, others found no relation between age and generativity from younger to middle adulthood (Whitbourne et al., 1992). As such, the relationship between age and generativity may be more nuanced and depend on the specific domain (e.g., generative concern vs. generative behavior) and operationalization of generativity (e.g., volunteering vs. donating to charity).

Interestingly, prosocial behavior also differs as a function of interdependent self-construal in many of the domains considered above. As mentioned previously,

interdependent self-construal is marked by defining oneself with respect to one's embeddedness in a network of inter-reliant relationships with others and is further defined by social roles, social obligations, and by emphasizing inter-reliance with relevant others (Markus & Kitayama, 1991). As such, people with an interdependent self-construal tend to value harmony and positive relations with others and are often more concerned for the well-being of others (Gardner et al., 1999; Holland et al., 2004).

As one might infer based on the centrality of attentiveness and concern for others to the interdependent self, interdependent self-construal is associated with engaging in more charitable behavior and altruistic motives (Burton et al., 2012; Lee & Bradford, 2015; Moorman & Blakely, 1995; Reizer & Mikulincer, 2007; Skarmeas & Shabbir, 2011). Similarly, in the domain of volunteering, those with higher interdependent self-construal have been found to be more likely to volunteer time rather than donate money, given that they were likely to place greater value on the charitable value of time (Lee & Bradford, 2015). Interestingly, married persons and those who have children under 18, two groups for whom interdependence is likely to be especially salient, are consistently more likely to volunteer relative to those who are unmarried and those without children (Bureau of Labor Statistics, 2002, 2007, 2012, 2016). However, further research would be needed to evaluate the motives for volunteering among these groups and whether interdependent self-construal actually contributes to the likelihood of volunteering or if this difference is driven by other mechanisms.

In the domain of altruism, Burton and colleagues (2012) found that relational interdependent self-construal was positively associated with self-reported liking and perceived effectiveness of charity advertisements, as well as a behavioral measure of

intent to volunteer across three samples of college students. Within the context of close relationships, several pro-relationship behaviors, such as willingness to sacrifice, fidelity, and forgiveness, are linked to interdependence given that interdependence is often associated with commitment to the relationship (for a thorough treatment of interdependence and pro-relationship behaviors, see Agnew & Le, 2015). Concerning generativity, cross-cultural comparisons have revealed higher levels of prosocial motivation, generative concern, and generative goals, as well as higher correlations between prosocial behavior and generative concern in more interdependent relative to independent cultures (Busch & Hofer, 2011; Hofer et al., 2008). However, these findings should be interpreted cautiously given that these studies only compared cross-culturally and did not investigate how within-culture variability in interdependence relates to generativity. Nonetheless, it is apparent that those with higher interdependent self-construal are concerned and committed to the network of relationships in which they embed themselves and the sense of interdependence that arises from this concern and commitment relates to a variety of operationalizations of prosocial behavior.

However, people with more interdependent self-construal may not be equally likely to help all those in need given the importance of group membership to the interdependent self. More precisely, prosocial behavior among those with a more interdependent self is likely to differ depending on whether the target is an ingroup versus outgroup member (Markus & Kitayama, 2010), with help more likely to be given to ingroup than outgroup members (e.g., Duclos & Barasch, 2014). Interestingly, some work has found that older adults are more charitable toward ingroup than outgroup causes (Cutler et al., 2021). As such, it could be the case that age differences in interdependent

self-construal might heighten the importance of group membership and thus explain differential behavior toward ingroup and outgroup targets. Such a finding would further substantiate the connection between aging and interdependent self-construal.

### *Antecedents of Prosociality*

In addition to age and self-construal differences in prosocial behavior, an individuals' tendency to engage in prosocial behavior is determined by many factors, several of which may differ as a function of age and self-construal to promote prosociality. Given the numerous constructs with ties to prosocial behavior (e.g., Thielmann et al., 2020, meta-analyzed 51 personality traits related to prosocial behavior), the following is not meant as an exhaustive list of antecedents of prosocial behavior, but rather a careful consideration of key factors that are helpful in evaluating the consistency between the aging and self-construal literatures and serve as a basis for empirical testing. Moreover, I acknowledge that interpersonal antecedents of prosocial behavior (e.g., perceived similarity to the target) may be implicated as well, but believe that the investigation of these factors is beyond the scope of the current work because I wish to focus on factors that are likely to differ intrapersonally across one's lifespan. Here, I focus on disposition, values, empathy, gratitude, and guilt.

**Disposition.** Personality traits are focal correlates of prosocial behavior. At the individual level, agreeableness, conscientiousness, and extraversion (Thielmann et al., 2020) are each linked with greater prosociality. At the societal level, Chopik and colleagues (2017) found consistent positive correlations between agreeableness, conscientiousness, and prosocial behavior using survey data collected across 63 nations, further substantiating the correspondence of these personality factors with prosociality. In

more tightly controlled experimental settings, agreeableness has been shown to play a unique role in facilitating cooperative behavior (Graziano et al., 1997).

Consistent with age-related increases in prosociality, people often become more agreeable with age (Allemand et al., 2008a; Chopik & Kitayama, 2018; Damian et al., 2019) and cross-sectional studies have found that older adults report higher agreeableness than younger adults (Allemand et al., 2008b). As such, a more agreeable personality may be one reason for increased prosociality with age.

These same traits also differ as a function of interdependence to reveal similar patterns. For instance, Realo and colleagues (1997) found that allocentrism (i.e., an individual-level correlate of collectivism) was positively correlated with agreeableness and conscientious, which mirror correlations between these personality traits and age. At the national level, more collectivistic countries also have higher average agreeableness, conscientiousness, and greater prosocial behavior (Chopik et al., 2017). Given the overlap between these patterns, age differences in dispositional traits, specifically agreeableness and conscientiousness, could be related to age differences in interdependent self-construal. For instance, a more easygoing disposition, as indicated by agreeableness, may result from wanting to get along with others more easily as one ages and greater conscientiousness may correspond with heightened attention to others' needs, both of which may spur prosocial behavior.

**Values.** Peoples' values are also important in guiding their prosocial behavior. For instance, endorsement of values such as universalism, benevolence, conformity, and security may motivate prosociality whereas valuing power and achievement may be inhibitory (Schwartz, 2010). Indeed, universalism and benevolence are robustly

positively correlated with other antecedents of prosocial behavior (Silfver et al., 2008). Conformity, one's sensitivity to adhering to social norms, and security, one's valuation of safety and harmony with others, also contribute to prosocial motivation, but possibly to a lesser extent than the values of universalism and benevolence (Silfver et al., 2008). In contrast, power and achievement are likely to place one's focus on self-enhancement rather than on aiding others (Schwartz, 2010).

With respect to age differences in values, older adults more strongly endorse the values of benevolence, security (i.e., harmony and welfare of society), and universalism (i.e., tolerance and social justice) and less strongly endorse achievement and power than do younger adults (Ritter & Freund, 2014). These findings are also consistent with the self-related psychological needs that are evident in these different life stages outlined earlier—valuing power and achievement in younger adulthood facilitates resource acquisition whereas valuing benevolence, security, and universalism in older adulthood facilitates meaning and relatedness needs. Accordingly, greater valuation of self-transcendence (i.e., benevolence and universalism) and lesser valuation of self-enhancement (i.e., power and achievement) may contribute to older adults' prosocial motivations.

We again see similarities in the self-construal literature. With respect to values, Harb and Smith (2008) found robust positive correlations between the collective self and the values of benevolence, security, and universalism, in addition to tradition and conformity. These findings are consistent with other work showing that collectivism is associated positively with self-transcendence values and negatively with self-enhancement values (Oishi et al., 1998). Given the overlap in the values that are

important to older people and to people with a more interdependent self-construal, they may serve as similar motivators of prosocial behavior. For instance, each of these groups heightened valuation of benevolence and universalism may guide individuals' actions toward friendliness and helpfulness toward others by default and make cooperation and helping behavior more likely.

**Empathy.** Perspective taking (Tusche et al., 2016) and empathic concern (Edele et al., 2013; FeldmanHall et al., 2015), the cognitive and emotional components of empathy (Richter & Kunzmann, 2011), are theorized to motivate altruistic behavior. For instance, greater perspective taking has been related to treating others more like one would treat oneself (Hodges et al., 2011) and greater empathic concern is associated with altruistic behavior even when there is no direct benefit to the actor (FeldmanHall et al., 2015). However, empathic concern may be a more robust motivator of prosocial behavior given methodological limitations with perspective taking manipulations and corresponding mixed findings (McAuliffe et al., 2017). Indeed, Thielmann and colleagues' (2020) meta-analysis found that concern for others is more highly correlated with prosocial behavior than empathy broadly, suggesting that being concerned for others' well-being may be a more proximal factor in driving prosociality.

Research on age differences in empathy has yielded mixed findings for the different components of empathy. For instance, some researchers have found that older adults report increased empathic concern (Richter & Kunzmann, 2011; Sze et al., 2012) but either stable or decreased perspective taking (Henry et al., 2013; Richter & Kunzmann, 2011). It is interesting to note, though, that relative to younger adults, older adults have been shown to be superior at perspective taking within the context of age

differences in emotional experiences (Sullivan et al., 2010). However, given that lower levels of perspective taking in older adulthood may result from natural declines in executive functioning with age (Cho & Cohen, 2019) and that executive functioning may be less implicated in empathic concern (Yan et al., 2020), age differences in empathic concern may account for age differences in prosocial behavior more robustly than age differences in perspective taking. Additionally, these patterns suggest that empathic concern is a well-preserved function in older adulthood that could be related to older adults' disproportionate prosocial behavior.

Interdependent self-construal has been argued to relate to empathy broadly (Surrey, 1991) and small-to-moderate positive correlations have been found between relational self-construal and perspective taking ($r$ = .13) and empathic concern ($r$ = .34, Cross et al., 2000). Other research has found that interdependence is related to an enhanced ability to empathize (Meyer et al., 2015), although this ability is likely to be used selectively to empathize with close others rather than strangers (Markus & Kitayama, 2010; Meyer et al., 2015). Despite its possible selective use, empathy is emphasized in collectivistic cultures (Triandis & Gelfand, 1998). Interestingly, correlations between relational self-construal and empathic concern are stronger than those for perspective-taking, similar to what has been found in the aging literature. Although these two findings have some unique determinants (i.e., cognitive decline in the case of aging), this pattern may yet reflect the more proximal connection between the emotional component of empathy and the importance of relationships, at least to some degree, given that this theme is present in both literatures.

**Gratitude.** Gratitude is an emotion that facilitates social bonding by encouraging new relationships, reinforcing existing relationships, and strengthening bonds between people (Algoe et al., 2008; Algoe, 2012). Naturally, gratitude has also been linked to increased prosociality, both directly via a "returning the favor" mentality (Bartlett & DeSteno, 2006; DeSteno et al., 2010) and indirectly via motivating a need for relatedness with others and a "pay it forward" attitude (Shiraki & Igarashi, 2018).

Limited work has investigated gratitude across the lifespan, but evidence points to curvilinear relationships with age. Gratitude has been found to typically increase from younger adulthood into middle adulthood before stabilizing into older adulthood (Chopik et al., 2019), with middle and older adults reporting comparable levels of gratitude (Chopik et al., 2022). These findings are consistent with the importance of close relationships in late life, as heightened gratitude should help to enhance the social bonds that are increasingly important in older adulthood. Accordingly, increased gratitude is related to greater relationship satisfaction in representative and culturally diverse samples (Robustelli & Whisman, 2018). The correlation between these variables is likely to go both ways, with more grateful people experiencing more satisfaction in their relationships and with people who are more satisfied with their relationships experiencing more gratitude. Reasoning from this speculation, people who are relatively more satisfied with their relationships, like older adults (Bühler et al., 2021), may experience more gratitude and consequently be more motivated to engage in prosocial behavior, at least within the context of the gratitude-evoking relationship.

Given that gratitude is a social emotion, it is natural that gratitude is deeply embedded in collectivistic cultures. For instance, positive relationships in Japan are based

on gratitude, love, friendship, and obligation (Yoshida et al., 1966) and people in collectivistic cultures are socialized to be aware of interdependence and reciprocity (Markus & Kitayama, 1991; Triandis, 1995). However, the relationship between gratitude and culture is complex, as definitions and measures of gratitude are likely to be culturally bound (Cohen, 2006).

Counterintuitively, evidence from cross-cultural studies of gratitude suggests that mean levels of gratitude are higher in the U.S. than in Japan (Robustelli & Whisman, 2018) and Western cultures show greater expressions of gratitude (Floyd et al., 2018). However, these differences may be explained by cultural differences in indulgence (i.e., the tendency to intensely experience positive emotions), with more individualistic cultures reporting greater indulgence (Chopik et al., 2022). Additionally, gratitude may not be strictly positive in interdependent cultures. For instance, indebtedness and obligation are tightly linked with gratitude in Japan (Ide, 1998; Kotani, 2002) which may make gratitude more of a mixed emotion, whereas gratitude may be more explicitly positive in independent and indulgent cultures (Floyd et al., 2018).

Accordingly, this complicates the comparison of age and self-construal differences in gratitude, as diverging patterns might represent differences in definitions and operationalizations of gratitude rather than a lack of similarity between the two groups. As such, any cross-cultural investigations of gratitude and prosociality should consider the role of indulgence. The current work, however, was situated only within a Western cultural context and, as such, cross-cultural differences in indulgence should not have interfered with any observed relationships between gratitude and prosocial behavior.

**Guilt.** Guilt is a self-conscious and social emotion that comes from awareness that one has harmed another (Hoffman, 1982; Tangney & Dearing, 2002). Typically, guilt encourages prosocial behavior toward the target of one's transgression by motivating one to seek amends (Hoffman, 1982; Keltner, 1995; Riek, 2010). Thus, guilt promotes greater helping behavior toward the target (Ketelaar & Au, 2003) and facilitates cooperative behavior and relationship restoration (Baumeister et al., 1994). Correspondingly, people who are predisposed to feelings of guilt report increased volunteerism (Quiles & Bybee, 1997) suggesting that proneness to guilt can also motivate prosocial behavior outside of the context of specific transgressions. Simply, individuals who are prone to feeling guilt may also be more likely to help others in general.

Given the importance of relationships in older adulthood, it is not surprising to find that older adults report greater proneness to guilt (Orth et al., 2010). Reasoning from the functions of guilt outlined above, higher levels of guilt proneness in older adulthood could function as a way of monitoring one's close social relationships and facilitating maintenance and restoration. Accordingly, guilt proneness in older adulthood may increase prosocial behavior most strongly within the context of close relationships. It is also possible that higher levels of guilt proneness in older adulthood may motivate prosocial behavior even when the individual does not have a relationship with the beneficiary (e.g., donating money to charity) as a side-effect of the adaptive function of guilt. For instance, proneness to guilt may make older adults more sensitive to imagined transgressions of social norms (e.g., "*not* donating to charity makes me a bad person") and preemptively cooperate to avoid such a transgression and minimize feelings of guilt. In accordance, hypothetical older adults are judged more harshly when they violate

prescriptive social norms that correspond to generativity, altruism, and sharing (Isaacowitz et al., 2021; North & Fiske, 2013). As such, avoiding judgment (and the resulting imagined guilt) that results from the violation of prescriptive social norms may be relevant to older adults' prosocial motives.

Guilt is also central to the ethos of collectivism, considering it is embedded in social contexts and that it facilitates relationship maintenance. Collectivistic cultures emphasize guilt as an inherent aspect of social life (Miller et al., 2008) and collectivistic cultures that emphasize social harmony (i.e., horizontal collectivist cultures) report greater guilt-motivated reparative behavior (Young et al., 2021). Moreover, the prescriptive norms to maintain interdependence that are prevalent in highly collectivistic cultures are often related to feelings of guilt (Markus & Kitayama, 1991) and potential violation of these norms may be taken into account when deciding to act prosocially, as explained above for older adults. Similarly, proneness to feeling guilt may encourage one to engage in prosocial behavior to preemptively demonstrate one's place as a good group member and to help avoid judgment by other group members.

## The Current Research

Across four studies situated within a Western cultural context, the current work aimed to investigate longitudinal changes in the quality of relationships in one's immediate social network, the extent to which there are age differences in interdependent self-construal and how these potential differences correspond with prosociality, as well as how age and interdependent self-construal interact to affect prosocial behavior. In Study 1, I evaluated the extent to which the quality of relationships in peoples' immediate social networks are conducive to an interdependent self-construal over time using pre-existing

longitudinal data. In Study 2, I tested age differences in interdependent self-construal and prosociality and evaluated the extent to which (a) there are age differences in interdependent self-construal and antecedents of prosociality and (b) whether interdependence accounts for age differences in antecedents of prosociality. In Study 3a, I present a pilot study of new manipulations of perceived age of the self (using software that progresses the age of participants' faces) and state interdependent self-construal. Lastly, in Study 3b I evaluated the extent to which prosocial values and actual prosocial behavior can be increased by experimentally manipulating perceived age of the self and interdependent self-construal using these newly created manipulations.

## Study 1

Study 1 evaluated the extent to which the quality of relationships in peoples' immediate social networks are conducive to an interdependent self-construal over time. As established above, the self is a continually developing entity that can reflect one's sociocultural environment (Markus & Kitayama, 2010). In other words, as one's immediate social environment changes, so too should the self. As such, immediate social environments that are more conducive to interdependence may encourage the alignment of the self-concept to be more interdependent. To address the question of how much peoples' immediate social environments facilitate interdependence over time, I analyzed pre-existing longitudinal data to evaluate the extent to which people's close personal relationships become more harmonious and less straining over time. Such an increase in relational harmony and a decrease in relationship strain may both encourage and result from the adoption of a more interdependent sense of self. Specifically, greater synergy with close others may lead to the incorporation of these close others into the self-concept,

and the more people incorporate others into their sense of self may inherently increase the quality of those relationships (see Agnew & Le, 2015, for a review of the link between interdependence and pro-relationship behaviors).

## Method

### *Participants*

Data for Study 1 were gathered from the national survey of Midlife Development in the US (MIDUS; Brim et al., 2004). The MIDUS project surveyed a nationally representative sample of US adult participants across three waves of data collection with each wave separated by approximately nine years, spanning approximately 27 years in total. Participants were recruited through nationwide random digit dialing and were all English speaking and non-institutionalized. First-wave MIDUS data (MIDUS-I) were collected from 1994–1995, second-wave data (MIDUS-II) were collected from 2003–2004, and third-wave data (MIDUS-III) were collected from 2012–2013.

The MIDUS-I data consist of 7,108 participants (age range: 20–75 years, $M$ = 46.40, $SD$ = 13.00). From the first-wave participants, 4,963 were recontacted in the second wave (retention rate = 69.8%; age range: 28–84 years, $M$ = 55.40, $SD$ = 12.45), and 3294 in the third wave (retention rate: 46.3%; age range: 39–93 years, $M$ = 63.60, $SD$ = 11.35). At each wave, participants were mailed questionnaire packets that were to be completed on their own and subsequently returned. Participants were compensated with monetary incentives throughout all waves of data collection. Data collection was approved by Institutional Review Boards at participating sites and all participants provided informed consent.

For the current project, participants were included in the final dataset for analyses if they participated in all three waves of data collection and if they had complete data for all of the measures to be analyzed. Applying these exclusions left a final sample of 3,249 participants.

### *Measures*

**Conduciveness to Interdependence.** Conduciveness of one's immediate social environment to interdependence was assessed with scales designed to measure harmony and absence of strain in one's close relationships. Specifically, these scales measure relational harmony and strain with family members (8 items; $\alpha_{harmony} = .82$, $\alpha_{strain} = .80$) and friends (8 items; $\alpha_{harmony} = .88$, $\alpha_{strain} = .79$; Whalen & Lachman, 2000). See Appendix A for full text of all items. This scale construction has been used by past researchers as a proxy for interdependence (Kitayama et al., 2010). These measures could constitute an approximation of interdependent self-construal, but I believe them to reflect more closely the quality of social relationships in one's immediate social network (e.g., "How much can you rely on [your family/friends] for help if you have a serious problem"). Following dimensionality analyses conducted by Kitayama and colleagues (2010), I averaged the family and friend strain scales and the family and friend harmony scales to create scales for "relational strain" and "relational harmony", respectively. Relational strain and relational harmony were treated as separate criterion variables, as they are independently related to multiple facets of interdependent culture (Oyserman et al., 2002). Higher scores represent greater relational strain and greater relational harmony in one's immediate social network, respectively. I consider immediate social networks with less relational strain and more relational harmony as being more conducive to an

interdependent self, as immediate social environments with more harmonious and less straining relationships should increase their availability in one's social environment and encourage one to attune their self-concept to include them (e.g., people are more likely to be invested in and committed to these relationships and thus more likely to embrace these relationships as a part of oneself).

## Results

Because of the longitudinal and nested structure of the data, I used multi-level modeling for all analyses. Specifically, responses at each time point are nested within participants and within survey wave (e.g., all responses in Wave 1 are more similar to each other). Accordingly, all analyses included a random intercept for each participant and a random intercept for each survey wave. Additionally, multi-level models have the capability of separating within-participant and between-participant variability. As such, I performed separate analyses to investigate the unique associations of within-participant changes in age and between-participant age differences with relational strain and relational harmony. Relevant effect sizes from these analyses were also used to inform a priori power analysis calculations for Study 2.

For analyses of *within-participant* change, relational strain and relational harmony were regressed on subject-mean-centered age (i.e., subtracting the participant's average age across the three waves from the participant's raw age at each time point). Significant relationships indicate that within-participant variability in age is associated with variability in the criterion. For analyses of *between-participant* differences, each criterion variable was regressed on grand-mean-centered age (i.e., subtracting the average age of all participants from the participant's age at each time point), as well as the subject-mean-

centered age variable. Including the subject-mean-centered age variable is necessary so that the grand-mean-centered age variable reflects between-participant differences controlling for within-participant variability.

In the analyses focused on within-participant change, I expected that relational strain would decrease, and relational harmony would increase as participants got older. In the analyses of between-participant differences, I expected that older aged participants would report less relational strain and more relational harmony than younger aged participants. If observed, these patterns would suggest that the quality of relationships in one's immediate social network becomes more conducive to interdependence as one ages and that older adults report that the quality of relationships in their immediate social networks is more conducive to interdependence relative to younger adults.

**Relational Strain.** In the model focused on within-person changes in age, age was significantly associated with decreased strain ($b$ = -0.01, $d$ = -0.58, $p$ = .001), suggesting that people report less strain in their immediate social relationships as they age. In the model focused on between-person differences in age, age was also negatively associated with relational strain ($b$ = -0.01, $d$ = 0.48, $p$ < .001), demonstrating that older (relative to younger) people reported less strain in their immediate social relationships after accounting for within-person changes in age. See Table 1 for a more complete summary of the regression coefficients for all Study 1 models.

**Relational Harmony.** In the model focused on within-person changes in age, age was not significantly associated with relational harmony ($b$ = 0.002, $d$ = 0.04, $p$ = .314).

Table 1

*Model Coefficients for the Within- and Between-Person Models with Relational Strain and Relational Harmony as the Criterion Variables*

| | Relational Strain (Within-Person) | | | | | | Relational Strain (Between-Person) | | | | | | Relational Harmony (Within-Person) | | | | | | Relational Harmony (Between-Person) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coefficient | b | Std. Error | df | t | d | p | b | Std. Error | df | t | d | p | b | Std. Error | df | t | d | p | b | Std. Error | df | t | d | p |
| Intercept | 1.94 | 0.007 | 21.11 | 258.47 | - | < .001 | 1.95 | 0.007 | 18.58 | 260.85 | - | < .001 | 3.40 | 0.01 | 5.51 | 269.27 | - | < .001 | 3.39 | 0.01 | 5.62 | 269.26 | - | < .001 |
| Age (within-person) | -0.01 | 0.001 | 2.50 | -16.63 | -0.58 | .001 | -0.002 | 0.001 | 9.84 | -1.93 | -0.07 | .083 | 0.002 | 0.001 | 2.98 | 1.21 | 0.04 | .314 | -.020 | 0.002 | 4.44 | -1.01 | -0.04 | 0.363 |
| Age (between-person) | | | | | | | -0.01 | 0.001 | 3223.6 | -13.59 | -0.48 | < .001 | | | | | | | 0.003 | 0.001 | 3238.43 | 4.99 | 0.17 | < .001 |
| Observations | 3249 | | | | | | 3249 | | | | | | 3249 | | | | | | 3249 | | | | | |
| $R^2$ (fixed / fixed + random) | 0.02 / 0.54 | | | | | | 0.06 / 0.54 | | | | | | 0.001 / 0.56 | | | | | | 0.01 / 0.56 | | | | | |

*Note.* Unstandardized model coefficients for the within- and between-person models predicting relational strain and relational harmony. *p* values that are significant at < .05 are indicated in bold. Blank rows indicate that that predictor was not included in that model. R-squared values indicate the variance accounted for only by the fixed effects (first values) as well as the variance accounted for by both the fixed and random effects (second values).

However, in the model focused on between-person differences in age, age was positively associated with relational harmony ($b = 0.003$, $d = 0.17$, $p < .001$), demonstrating that older (relative to younger) people reported more harmony in their immediate social relationships after accounting for within-person changes in age.

## Discussion

Study 1 yielded mixed evidence for the hypothesis that there are adult age differences in the conduciveness of immediate social networks to interdependence, with partial support from the models evaluating within-participant changes in age and more consistent support from the models evaluating between-participant age differences. Specifically, the within-participant analyses revealed decreases in relationship strain but no statistically significant changes in relationship harmony over time. The between-participant analyses revealed age differences in both relationship strain and harmony, with older people reporting less strain and more harmony relative to younger people. Together these findings are generally supportive of predictions (i.e., no patterns were observed in the opposite direction of predictions), although there are some important limitations to these patterns that I will return to shortly.

Most important of these findings is the observation of within-participant decreases in relationship strain over time. This pattern is the most consistent with the theorizing outlined in the introduction section and constitutes the strongest evidence (at least out of these analyses) that immediate social environments are more conducive to an interdependent self across the lifespan. Specifically, reductions in strain in one's relationships over time should be related to heightened accessibility of these relationships in one's immediate social environment, assuming that people are more likely to be

invested in close relationships when they are less straining. In other words, one may be more likely to construe the self in terms of close others when one's relationships with close others in one's immediate social network is less straining. The observed pattern is also consistent with past research demonstrating that people selectively prune their social networks with age (English & Carstensen, 2014; Lang, 2000; Lang & Carstensen, 2002). For instance, it could be argued that pruning of one's immediate social network could be informed by the degree of strain in a relationship, as it is reasonable that highly straining relationships would be more likely to be selectively removed from one's network than less straining relationships. However, the association between selective pruning and strain is likely bidirectional, as relationship strain could very well be informed by other factors that may lead one to selectively prefer a relationship. Said another way, certain qualities of close relationships such as shared interests or values may lead one to prefer these relationships, and these same qualities could lead to reduced strain. Regardless of the directionality of the association between relationship pruning and strain, the findings from Study 1 demonstrate a connection between aging and the quality of relationships in one's immediate social network. Furthermore, these findings support the argument that the quality of relationships in one's immediate social network, at least in terms of reduced strain, becomes more conducive to the adoption of an interdependent self over time.

Turning to the analyses of between-participant age differences, both models yielded between-participant age differences that were consistent with the perspective that immediate social environments are less straining and more harmonious for older relative to younger people. These patterns would also be expected based on past research (Baltes

& Baltes, 1990; Baltes, 1997; English & Carstensen, 2014; Lang, 2000; Lang & Carstensen, 2002) and many of the same implications as discussed above for the within-participant observations could apply to these results as well. However, a more cautious interpretation is warranted given that between-participant differences could reflect "true" age differences over time, cohort differences, other unobserved third variables that are confounded with age, or a combination of the three. As such, stronger conclusions can be drawn where the within-participant and between-participant patterns converge (i.e., with relationship strain). Nonetheless, observing between-participant age differences in the absence of within-participant changes, such as with relationship harmony, does not entirely rule out longitudinal differences. For example, the age range of the within-participant analyses (~27 years from Wave I to Wave III) is more limited than the age range of the between-participant analyses (participants' average ages collapsing across the three waves spanned from roughly 30 to 80). This restriction of range could dampen the overall within-participant difference in the model; a limitation which does not apply to the between-participant age difference models. Moreover, maintaining social harmony is an important goal for older adults (Carstensen et al., 1999; Charles & Carstensen, 2010; Sorkin & Rook, 2006), and so there is a theoretical and empirical basis for such an age difference. Regardless, more caution is warranted when interpreting these between-participant differences and further research would be needed to draw stronger conclusions about age differences in relationship harmony.

Despite the observation of patterns consistent with expectations, Study 1 has a number of limitations. First and foremost is the lack of a direct measure of self-construal at all three measurement points and a lack of constructs related to prosociality. Without

these measures, it is only possible to speculate about how the current findings relate to the development of the self and any implications that such development may have for prosociality and prosocial behavior. This limitation will be addressed in Study 2. Additionally, these data are correlational in nature and cannot firmly establish causality. And although we can be certain that the quality of relationships in one's immediate social environment does not cause age (although it may feel that way sometimes), there could still be longitudinal confounders that covary with age to produce the observed pattern of results, but that do not encourage a more interdependent self-construal. For example, one might be more experienced at navigating one's relationships such that strain is reduced (e.g., by becoming a better communicator), but being a more effective navigator of relationships does not necessarily entail that one will internalize these relationships into one's self-concept. As such, methods that are more appropriate for addressing causal relationships would be better suited to explore the causal nature of these associations. Studies 3a and 3b were designed to address limitations of correlation vs. causation.

On a different note, selection effects pose another limitation to Study 1. Specifically, participants were only included if they had responded at all three waves of data collection, which may have introduced selection biases into the sample. Although the initial MIDUS sample should be fairly representative (because random sampling methodology was used for recruitment), it is possible that potential causes of attrition could have contributed to the observed patterns. For example, perhaps only the most agreeable participants provided data for all three survey waves and only highly agreeable people's immediate social networks change over time whereas less agreeable people see no change in harmony/strain. Moreover, relationship strain itself could introduce a

selection effect, as people with high degrees of strain in their personal relationships later in life could be in poorer health or be at higher risk of mortality relative to their less strained counterparts and could be underrepresented in the final sample due to their inability to respond. Although selection biases are a larger problem that affect research in general, it is still noteworthy given the fairly high attrition rate in the MIDUS data (only about 50% of the original sample was able to be recontacted at the final wave) as well as the specific selection pressures that exist within the context of longitudinal aging research.

## Study 2

Study 2 was designed to address measurement limitations of Study 1. Specifically, Study 2 included a direct measure of interdependence, allowing for a direct assessment of age-differences in interdependent self-construal. Additionally, Study 2 included measures of the antecedents of prosocial behavior that were previously identified in the introduction section to assess the relationship between age, interdependent self-construal, and prosociality for constructs that are likely related to both age and interdependent self-construal (generativity, values, agreeableness and conscientiousness, empathic concern, gratitude, and guilt).

### Method

#### *Participants*

An a priori power analysis using G*Power (Erdfelder et al., 1996) was conducted to determine optimal sample size. This analysis was based on the relationship of the between-person age effect and relational harmony and strain in Study 1. To determine the predicted effect size, two mixed-effects models were used to estimate how much variance

was accounted for in relational harmony and strain by between-person age-differences, after controlling for within-person changes in age over time. In both models, a random intercept was included for each participant and each data collection wave. In these analyses, the between-subject age predictor accounted for roughly 1% of variance in relational harmony and 4% of variance in relational strain. Assuming that the amount of variance in interdependent self-construal that is explained by between-person age differences is nearer the lower end of this interval (i.e., 2%, which is 0.5% less than the average of the two estimates), a sample size of 387 would be sufficient to detect this effect at $\alpha = .05$ (two-tailed) with 80% power assuming a single predictor in a linear multiple regression model (i.e., interdependent self-construal regressed on participants' ages).

Accordingly, an adult lifespan sample of 400 participants was recruited from Prolific Academic. Three participants were excluded from final analyses for failing at least one of two attention check questions, leaving a total sample of 397 participants. Based on the power analysis, this sample size was large enough to detect the hypothesized effects with sufficient statistical power. Participants varied in age from 18 to 93 years-old ($M_{age} = 48.21$, $SD = 18.48$) and were residing in the US at the time of data collection. See Table 2 for additional demographic information on the sample. In accordance with IRB requirements, all participants received information on the study procedure and provided informed consent prior to participating. Following the completion of all tasks, participants were compensated with $3.00 for their participation.

Table 2
*Additional Demographic Information for Study 2*

| Factor | | Total sample |
|---|---|---|
| Age Group | | |
| | n | 397 |
| | % Younger Adult (Under 35) | 34.01% |
| | % Middle Adult (35–64) | 33.25% |
| | % Older Adult (65+) | 32.75% |
| Gender | | |
| | % Female | 54.66% |
| | % Male | 44.33% |
| | % Non-Binary | 0.76% |
| | % Prefer Not to Say | 0.25% |
| Race | | |
| | % Asian or Asian-American | 6.80% |
| | % American Indian or Alaskan Native | 0.25% |
| | % Black or African-American | 7.81% |
| | % White | 76.57% |
| | % Other | 8.75% |

### *Measures*

Appendix A provides comprehensive information on the materials that were used for all studies. For this study, Appendix A includes the full text of all scale instructions and items. For all scale measures, confirmatory factor analyses were conducted to assess whether the measures met psychometric criteria for reliability. For my purposes, I considered scales that met at least two out of the following three criteria as demonstrating acceptable fit: CFI > .9, RMSEA < .06, SRMR < .08. In the event that these standards were met, I computed scale averages using all items and the theorized factor structure for the scale. Alternatively, exploratory factor analyses were conducted to determine alternative approaches to scale construction and score aggregation for any measures that

failed to meet these reliability standards. Specifically, these exploratory factor analyses were carried out to determine which items on a given scale loaded together consistently in the current sample. In some cases, this resulted in calculating scale averages in ways that differed from the original structure of the scale (i.e., not using all items to compute the average score). However, using only items that load consistently for the current sample should help to achieve greater reliability of average scale scores, as scale items that do not load consistently in the sample (i.e., that contribute excess noise) are excluded. All exploratory factor analyses were conducted using varimax rotation. The number of factors that were initially specified for each exploratory analysis varied depending on the theoretical structure of the scale. Items with factor loadings less than 0.5 were considered unreliable and were not used to create scale averages. More detailed information about the model fit statistics for each scale measure and about the exploratory factor analyses for measures that failed to meet acceptable psychometric standards for reliability is available in Appendix B.

**Self-Construal.** Interdependent and independent self-construal were measured with Singelis' (1994) scale. The original scale contains 24 items in total, with 12 items each for the dimensions of interdependent (e.g., "It is important for me to maintain harmony within my group") and independent (e.g., "My personal identity, independent of others, is very important to me") self-construal. Two items from each subscale that were

not equally applicable to all age groups were not included for the current study[1], leaving 10 items for each subscale. The interdependent and independent subscales were treated as separate variables. Items were rated on a scale of 1, *not at all descriptive of me,* to 7, *perfectly descriptive of me*, with greater scores indicating stronger endorsement of an interdependent or independent self-construal. The independent self-construal subscale was measured primarily for exploratory purposes and will not be discussed further.

The confirmatory factor analysis for the interdependent self-construal subscale demonstrated that a single-factor model was unsatisfactory for these items (CFI = .804, RMSEA = .103, SRMR = .071). An exploratory factor analysis with a single factor was conducted to determine which items loaded reliably onto a single factor. This exploratory factor analysis yielded 4 items that loaded reliably (see Appendix B). These items were averaged for each participant to create a composite score for interdependent self-construal.

**Generativity.** The 20-item Loyola Generativity Scale (LGS; McAdams & de St Aubin, 1992) was used to measure participants' inclinations to be generative across the multiple domains of passing on knowledge and skills to future generations (e.g., "I try to pass along the knowledge I have gained through my experiences"), making significant contributions to one's community (e.g., "I have a responsibility to improve the

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[1] These items were: *I would offer my seat in a bus to my professor; I should take into consideration my parents' advice when making education/career plans; speaking up during a class is not a problem for me; I am the same person at home that I am at school.*

neighborhood in which I live"), contributing to one's legacy (e.g., "I think that I will be remembered for a long time after I die"), being productive (e.g., "Other people say that I am a very productive person"), and caring for other people (e.g., "I feel as though I have made a difference to many people"). Each item was rated on a scale of 1, *not at all*, to 4, *a lot*. Relevant items were reverse scored prior to factor analyses.

The model fit statistics from the confirmatory factor analysis demonstrated that a single-factor model did not meet reliability standards (CFI = .826, RMSEA = .094, SRMR = .066). Exploratory factor analyses indicated that four factors were supported by the data (determined by factors with Eigenvalues greater than 1.0). However, given that the original scale did not consider items as a part of distinct subscales but rather as representing different domains of generativity (McAdams & de St Aubin, 1992) and for the sake of simplicity of the analysis, the 15 items with factor loadings greater than 0.5 were averaged together for each participant to create a composite score that reflected overall generative concern across multiple domains (passing on knowledge, contributing to one's community, contributing to one's legacy, being productive, and caring for others).

**Basic Cultural Values.** The Portrait Values Questionnaire (PVQ-21; Schwartz, 2003) was used to measure the basic cultural values of self-transcendence, self-enhancement, openness to change, and conservation. Each of these superordinate values is composed of items related to other minor values. In particular, self-transcendence is composed of items relating to benevolence and universalism, self-enhancement of items relating to achievement and power, openness to change of items relating to self-direction, stimulation, and hedonism, and conservation of items relating to security, conformity,

and tradition. Each minor value is measured with two items, except for universalism which is measured with three items. For each item, participants indicated how much they believed they are like a person who places importance on a particular value (e.g., "It's very important for him/her to help the people around him/her") on the scale of 1, *not like me at all,* to 6, *very much like me*. Higher scores correspond to stronger endorsement of a particular value.

Self-transcendence and self-enhancement, as well as their subordinate values, were of primary interest, whereas openness to change and conservation were measured only for exploratory purposes. Confirmatory factor analyses of single-factor models for self-transcendence (CFI = .961, RMSEA = .084, SRMR = .042) and self-enhancement (CFI = .970, RMSEA = .138, SRMR = .032) demonstrated acceptable fit according to the above standards for psychometric reliability, and therefore all items were used to create separate composite averages for each participants' valuation of self-transcendence and self-enhancement.

**Horizontal Collectivism.** Four items from Triandis and Gelfand (1998) were used to capture horizontal collectivism. This scale was included because measures of individualism-collectivism are thought to reflect the cultural level of analysis more broadly (Triandis, 2001), which can differ from the individual level (e.g., not all people in collectivistic cultures have strongly interdependent selves). For each item, participants indicated how likely it was that they might experience what was described in the statement (e.g., "If a close other gets a prize, I would feel proud") on a scale of 1, *never* or *definitely no,* to 9, *always* or *definitely yes*. Higher scores indicate greater endorsement of horizontal collectivism. Confirmatory factor analyses indicated good model fit for a

single-factor model (CFI = .974, RMSEA = .038, SRMR = .031), and all items were used to create an average score for each participants' endorsement of horizontal collectivism.

**Agreeableness and Conscientiousness.** The Big-Five Mini-IPIP (Donnellan et al., 2006) was used to assess the personality dimensions of agreeableness (e.g., "I sympathize with others' feelings") and conscientiousness (e.g., "I get chores done right away"). Each dimension was measured with four items. For each item, participants indicated how much the statement accurately or inaccurately described them on the scale of 1, *very inaccurate,* to 5, *very accurate,* with higher scores indicating greater endorsement of agreeableness and conscientiousness, respectively.

Confirmatory factor analyses indicated poor fit for a single-factor model of agreeableness (CFI = .819, RMSEA = .379, SRMR = .092) and excellent fit for a single-factor model of conscientiousness (CFI = 1.00, RMSEA = .000, SRMR = .01). Despite the poor fit of the agreeableness items in the confirmatory factor analysis, an exploratory factor analysis indicated that all items still loaded reliably onto a single factor. As such, all items were used for both agreeableness and conscientiousness to create separate average scores for each participant for these constructs.

**Empathic Concern.** The Emotional Response Questionnaire (ERQ; Coke et al., 1978) was used to assess empathic concern for a person in need. For this measure, participants learned that they would read a short scenario about a person in need and that they should try to concentrate on the person's experiences and feelings while reading the scenario. Participants were also encouraged to visualize how they would feel if they were in the same situation. Participants then read a short scenario about a fictional person, Katie Banks. In the scenario, Katie was a senior in college whose parents had recently

died in a tragic car accident. As a result, Katie was struggling to take care of her younger brother and sister while she was finishing her degree. The scenario also described Katie's struggle for money and time, as well as Katie's fears that she would not be able to continue caring for her siblings if she did not graduate and get a good job.

Following the scenario, participants were presented with 12 emotion words and indicated how much they felt each emotion while reading the scenario on the scale of 1, *did not experience this emotion at all,* to 7, *experienced this emotion very much*. Six of the emotion words corresponded to empathic concern and the other six were filler emotion words. Of the six empathic concern items, three emotion words corresponded to sympathy (*sympathetic, moved, compassionate*) and three to tenderness (*tender, warm,* and *softhearted*). Higher scores indicate experiencing more empathic concern in response to the scenario. Confirmatory factor analysis indicated that a single-factor model was a good fit for the six empathic concern items (CFI = .938, RMSEA = .155, SRMR = .050). Accordingly, all six items were used to create an average score for each participants' empathic concern for a person in need.

**Gratitude.** Gratitude was measured with eight items from the Values in Action Inventory of Strengths (VAIS; Peterson & Seligman, 2004). For each item, participants indicated how much each statement described them on the scale of 1, *very much unlike me,* to 5, *very much like me.* One sample item is "I have been richly blessed in my life." Higher scores indicate greater proneness to feelings of gratitude. Confirmatory factor analyses indicated that a single-factor model was a good fit for these eight items (CFI = .906, RMSEA = .129, SRMR = .059). As such, a single composite average was created to reflect each participants' proneness to feeling gratitude.

**Guilt.** Proneness to feelings of guilt were measured with the short client version of the Test of Self-Conscious Affect (TOSCA-3S; Tangney et al., 2007). The TOSCA-3S is a scale in which participants respond to 11 negative scenarios. For each scenario, participants indicate the likelihood that they would exhibit the provided reaction on a scale from 1, *not likely*, to 5, *very likely*. The full TOSCA-3S includes three subscales: shame self-talk, guilt self-talk, and blaming others. For this study, participants were only asked about their guilt responses. Higher scores reflect greater proneness to guilt following negative scenarios. A confirmatory factor analysis indicated mediocre fit for a single-factor model of these items (CFI = .887, RMSEA = .070, SRMR = .055). A subsequent exploratory factor analysis yielded five items that loaded reliably onto a single factor (see Appendix B). These five items were averaged to create a composite score for each participant's proneness to feelings of guilt.

***Procedure***

Participants first read some general instructions explaining that they would be responding to a variety of survey measures and that it was important to respond to the questions honestly. Participants then completed a short demographic questionnaire asking about their age, gender, ethnicity, and race before moving on to complete the survey measures described above. Asking the demographic questions first was necessary, as items on one of the scale measures (the PVQ-21) were customized to participants' gender (e.g., item stems used "he/him" pronouns for men). They/them pronouns were used for participants who chose not to report gender (as well as for participants who were non-binary). Participants then responded to each of the survey measures in a random order, with items on each of the scale measures being randomized as well. Following

completion of all of the above measures, participants were thanked and compensated for their participation.

## Results

Analyses were conducted to evaluate two central components of the argument that an increasingly interdependent self accounts for age-differences in prosocial behavior. The first component is that older people endorse interdependent self-construal and antecedents of prosocial behavior more strongly relative to younger people and the second is that age differences in prosocial antecedents can be at least partially accounted for by age differences in interdependent self-construal. In other words, more strongly endorsing an interdependent self should help to explain why older people are more prosocial.

Zero-order correlations between age, interdependent, self-construal, and each of the prosocial antecedents are reported in Table 3. Prior to all analyses, age and interdependent self-construal were mean centered. One set of analyses was conducted to test each of the two components described above. In the first set of analyses, each criterion variable (interdependent self-construal, self-transcendence and self-enhancement, horizontal collectivism, agreeableness and conscientiousness, empathic concern, gratitude, and guilt) was regressed on mean-centered age. Following the review of the literature, I predicted that age would be positively associated with interdependent self-construal, self-transcendence, horizontal collectivism, agreeableness and

conscientiousness, empathic concern, gratitude, and guilt, and would be negatively associated with self-enhancement.

The second set of analyses used structural regression models to evaluate the extent to which interdependent self-construal accounts for the associations between age and each of the prosocial antecedents. Specifically, separate models were run to evaluate the indirect effect of age on each criterion through interdependent self-construal (see Figure 1 for an example model). Estimates were computed for the association between age and each prosocial antecedent (*c* path), between age and interdependent self-construal (*a* path), between interdependent self-construal and each prosocial antecedent (*b* path), and between age and each prosocial antecedent accounting for interdependent self-construal (*c'* path). Indirect effects and 95% confidence intervals for each model were computed via 5,000 bootstrapped samples using Hayes' (2009) bootstrap resampling method. All structural regression analyses were conducted in R (R Core Team, 2022) with the 'lavaan' package (Rosseel, 2012). For all models, I predicted that age would be significantly associated with each of the prosocial antecedents (see above for directionality of each association), that age and interdependent self-construal would be significantly and positively associated, that interdependent self-construal would be significantly associated with these antecedents in the same direction as with age, and that the relationship between age and each of the prosocial antecedents would be attenuated after accounting for interdependent self-construal. Simply, for each model I expected to

see significant *c*, *a*, and *b* paths, and that the *c'* path estimate would be smaller than the *c* path estimate (with the significance of the *c'* estimate indicating full or partial mediation).

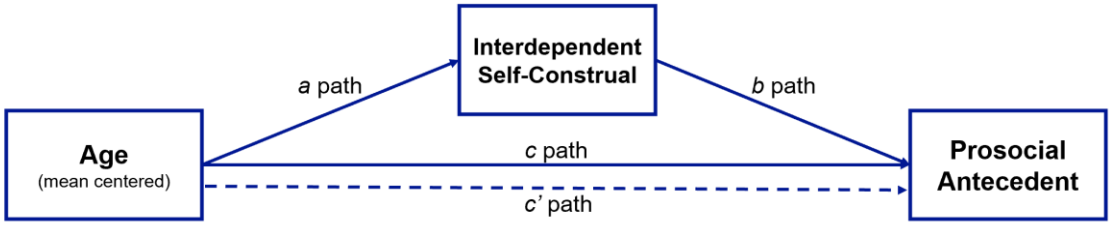


*Figure 1.* Path model for the structural regression analyses in Study 2. Separate models with the same predictor and mediator were estimated for each prosocial antecedent criterion.

**Testing the Association of Age, Interdependence, and Prosociality.** In the models where interdependent self-construal and each prosocial antecedent were regressed on mean-centered age, patterns aligned with predictions. Specifically, age was a significant and positive predictor of interdependent self-construal ($b = 0.01$, $\beta = 0.16$, $p = .003$), generativity ($b = 0.01$, $\beta = 0.18$, $p < .001$), self-transcendence values ($b = 0.01$, $\beta = 0.14$, $p < .001$), horizontal collectivism ($b = 0.02$, $\beta = 0.37$, $p < .001$), agreeableness ($b = 0.01$, $\beta = 0.21$, $p < .001$) and conscientiousness ($b = 0.003$, $\beta = 0.06$, $p = .028$), empathic concern ($b = 0.03$, $\beta = 0.50$, $p < .001$), gratitude ($b = 0.02$, $\beta = 0.30$, $p < .001$), and guilt ($b = 0.01$, $\beta = 0.12$, $p < .001$) and was a significant and negative predictor of self-enhancement values ($b = -0.01$, $\beta = -0.20$, $p < .001$). A summary of these models with additional information is reported in Table 4. These relationships establish a connection

between age and interdependent self-construal and reflect a convergence between the current sample and patterns that have previously been identified in the literature.

**Interdependent Self-Construal as a Mediator of Age and Prosociality.**

Structural regression analyses were carried out to evaluate the indirect association of age with each prosocial antecedent as mediated by interdependent self-construal[2]. Table 5 displays the path coefficients and indirect effect coefficients for all models. Mean-centered age was positively associated with interdependent self-construal in all models (i.e., all *a* paths were positive and significant) and mean-centered interdependent self-construal was positively associated with each prosocial antecedent (i.e., all *b* paths were

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[2] Because there were gender imbalances in the sample across the age continuum (i.e., there was a higher proportion of women than men as age increased) and because there are known gender differences in some prosocial antecedents that mirror age differences (Weisberg et al. (2011) replicated previous findings that women report more agreeableness than men, for example), I ran a series of ANCOVAs where age, gender, and their interaction predicted each criterion. Age was still significantly related to all criterion variables and there were significant Age × Gender interactions only for horizontal collectivism, empathic concern, and gratitude. For these antecedents, I constructed additional structural regression models that accounted for the age by gender interaction on the prosocial antecedent. All patterns that are reported in the main text held when accounting for the Age × Gender interaction, suggesting that the observed patterns were not due to confounding of age and gender differences.

positive and significant). These patterns generally conform with expectations, with the exception being the positive relationship between interdependent self-construal and self-enhancement values. I return to this unexpected finding in the discussion section.

All indirect effects of age on each prosocial antecedent as mediated by interdependent self-construal (i.e., *a* path * *b* path) were significant except for the model with guilt as the criterion. Additionally, accounting for interdependent self-construal in these models weakened the relationship between age and each antecedent (i.e., *c* paths were larger in magnitude than *c'* paths). However, the direct association between age and each prosocial antecedent, except conscientiousness, remained significant after accounting for interdependent self-construal. This suggests that interdependent self-construal accounts for some, but not all, of the variability that is shared between age and these prosocial antecedents. This finding is intuitive, as there are many mechanisms other than interdependent self-construal that should also account for age differences in prosociality (Mayr & Freund, 2020).

*Table 3*
*Zero-Order Correlations Between Age, Interdependent, Self-Construal, and Prosocial Antecedents*

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Age | | | | | | | | | | |
| 2. Interdependent Self-Construal | .15** [.05, .24] | | | | | | | | | |
| 3. Generativity | .27** [.18, .36] | .35** [.26, .43] | | | | | | | | |
| 4. Horizontal Collectivism | .28** [.19, .37] | .49** [.42, .57] | .43** [.35, .51] | | | | | | | |
| 5. Agreeableness | .25** [.16, .34] | .37** [.28, .45] | .44** [.36, .51] | .58** [.51, .64] | | | | | | |
| 6.Conscientiousness | .11* [.01, .21] | .31** [.21, .39] | .23** [.13, .32] | .18** [.09, .28] | .17** [.07, .26] | | | | | |
| 7. Empathic Concern | .39** [.30, .47] | .30** [.20, .38] | .31** [.22, .39] | .47** [.39, .54] | .50** [.43, .57] | .15** [.05, .24] | | | | |
| 8. Gratitude | .35** [.26, .44] | .44** [.36, .52] | .63** [.56, .68] | .54** [.46, .60] | .40** [.32, .48] | .23** [.13, .32] | .38** [.29, .46] | | | |
| 9. Guilt | .20** [.10, .29] | .13* [.03, .22] | .13** [.03, .23] | .33** [.24, .41] | .22** [.13, .31] | .03 [-.07, .13] | .20** [.11, .30] | .15** [.05, .24] | | |
| 10. Self-Transcendence | .17** [.07, .27] | .45** [.37, .53] | .33** [.24, .42] | .61** [.54, .67] | .47** [.38, .54] | .18** [.08, .27] | .37** [.28, .45] | .45** [.37, .53] | .39** [.31, .47] | |
| 11. Self-Enhancement | -.17** [-.26, -.07] | .14** [.04, .23] | .24** [.15, .33] | -.07 [-.17, .03] | -.04 [-.14, .05] | .12* [.02, .21] | -.01 [-.11, .09] | .01 [-.09, .10] | -.05 [-.14, .05] | -.05 [-.15, .05] |

*Note*. *M* and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. *$p < .05$. **$p < .01$.

*Table 4*

*Model Coefficients for the Models with Age as a Predictor of Interdependent Self-Construal and Each Prosocial Antecedent*

| | **Interdependent Self-Construal** | | **Generativity** | | **Self-Transcendence** | | **Self-Enhancement** | | **Horizontal Collectivism** | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Coefficient* | *b [LCL, UCL]* | *t* | *b [LCL, UCL]* | *t* | *b [LCL, UCL]* | *t* | *b [LCL, UCL]* | *t* | *b [LCL, UCL]* | *t* |
| Intercept | 4.94 [4.84, 5.05]*** | 91.74 | 2.70 [2.64, 2.76]*** | 86.49 | 4.84 [4.77, 4.92]*** | 122.48 | 3.20 [3.09, 3.32]*** | 54.6 | 7.56 [7.44, 7.69]*** | 118.56 |
| Age | 0.01 [0.003, 0.015]* | 3.00 | 0.01 [0.006, 0.013]*** | 5.63 | 0.01 [0.003, 0.012]*** | 3.45 | −0.01 [-0.017, -0.004]*** | -47.042 | 0.02 [0.01, 0.03]*** | 5.87 |

| | **Agreeableness** | | **Conscientiousness** | | **Empathic Concern** | | **Gratitude** | | **Guilt** | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Coefficient* | *b [LCL, UCL]* | *t* | *b [LCL, UCL]* | *t* | *b [LCL, UCL]* | *t* | *b [LCL, UCL]* | *t* | *b [LCL, UCL]* | *t* |
| Intercept | 3.45 [3.37, 3.53]*** | 84.54 | 2.99 [2.94, 3.05]*** | 104.66 | 5.58 [5.47, 5.70]*** | 94.12 | 3.88 [5.47, 5.70]*** | 97.23 | 6.60 [6.54, 6.66]*** | 222.45 |
| Age | 0.01 [0.007, 0.016]*** | 5.19 | 0.003 [0.0004, 0.006]* | 2.20 | 0.03 [0.02, 0.033]*** | 8.41 | 0.02 [0.01, 0.021]*** | 7.52 | 0.01 [0.003, 0.01]*** | 4.02 |

*Note.* Model coefficients for the models with age as a predictor of each prosocial antecedent. * $p < .05$, ** $p < .01$, *** $p < .001$. See results section text for exact $p$ values. *LCL = Lower Confidence Limit, UCL = Upper Confidence Limit*

## Discussion

In Study 2, I aimed to evaluate the direct association of age with interdependent self-construal in addition to testing the structural relationship between age, interdependent self-construal, and antecedents of prosocial behavior. In general, the results showed that age was associated with interdependent self-construal and prosocial antecedents and that age was indirectly related to these prosocial antecedents via interdependent self-construal. With a few exceptions that I will revisit below, these patterns conform with what would be expected on the basis of the literature outlined in the introduction.

First, irrespective of the focal relationship between age and interdependent self-construal, the zero-order correlations offer some evidence for the credibility of the current data. Namely, age and interdependent self-construal were related to all of the prosocial antecedents in the expected direction (except for the correlation between interdependent self-construal and self-enhancement, which was in the opposite direction than was predicted). These patterns, although expected on the basis of the literature, serve as a partial validation check of the current data, as they demonstrate support for existing theories and research unrelated to the primary goal of the current research and allow for greater confidence in the robustness of novel findings such as those relating to the association between age and interdependent self-construal.

Turning to the analyses investigating the associations between age, interdependent self-construal, and prosocial antecedents, the results showed general support for the hypothesis that age would be significantly related to interdependent self-construal and to each prosocial antecedent. In the models where age separately predicted

*Table 5*
*Model Coefficients for the Structural Regression Models*

| Prosocial Antecedent | Association Between Age and ISC (*a* path) | Association Between ISC and Criterion (*b* path) | Indirect Effect (*a***b*) | Direct Association Between Age and Criterion (*c* path) | Association Between Age and Criterion Controlling for ISC (*c′* path) |
|---|---|---|---|---|---|
| Generativity | 0.01 [0.003, 0.014]** | 0.19 [0.13, 0.25]*** | 0.002 [0.001, 0.003]** | 0.01 [0.006, 0.013]** | 0.01 [0.005, 0.011]** |
| Self-Transcendence | 0.01 [0.003, 0.014]** | 0.32 [0.243, 0.397]*** | 0.003 [0.001, 0.005]** | 0.007 [0.003, 0.012]** | 0.005 [0.000, 0.008]* |
| Self-Enhancement | 0.01 [0.003, 0.014]** | 0.18 [0.065, 0.295]** | 0.002 [0.000, 0.004]* | −0.011 [-0.017, -0.005] | −0.012 [-0.019, -0.006]*** |
| Horizontal Collectivism | 0.01 [0.003, 0.014]** | 0.56 [0.454, 0.673]*** | 0.005 [0.002, 0.008]** | 0.02 [0.014, 0.027]*** | 0.015 [0.009, 0.021]*** |
| Agreeableness | 0.01 [0.003, 0.014]** | 0.27 [0.188, 0.342]*** | 0.002 [0.001, 0.004]** | 0.01 [0.007, 0.016]*** | 0.009 [0.003, 0.014]*** |
| Conscientiousness | 0.01 [0.003, 0.014]** | 0.16 [0.107, 0.202]*** | 0.001 [0.000, 0.003]** | 0.003 [0.000, 0.007]* | 0.002 [-0.001, 0.005] |
| Empathic Concern | 0.01 [0.003, 0.014]** | 0.29 [0.166, 0.404]*** | 0.003 [0.001, 0.005]* | 0.027 [0.002, 0.033]*** | 0.025 [0.018, 0.031]*** |
| Gratitude | 0.01 [0.003, 0.014]** | 0.31 [0.237, 0.384]*** | 0.003 [0.001, 0.005]** | 0.016 [0.012, 0.021]*** | 0.014 [0.010, 0.018]*** |
| Guilt | 0.01 [0.003, 0.014]** | 0.06 [0.003, 0.107]* | 0.000 [0.000, 0.001] | 0.006 [0.003, 0.010]*** | 0.006 [0.002, 0.009]** |

*Note.* Model coefficients for the structural regression models examining the indirect association of age with each prosocial antecedent as mediated by interdependent self-construal. ISC = Interdependent Self-Construal; *$p < .05$, **$p < .01$, ***$p < .001$.

interdependent self-construal and each of the prosocial antecedents, age significantly predicted each criterion variable in the expected direction. These findings demonstrate an association between being older and more strongly endorsing an interdependent self while also supporting previous findings of age differences in prosociality. And although the observed age differences could have resulted from cohort or period effects, they offer incremental evidence that supports further investigation into age differences in interdependent self-construal.

Considering the *b* path portions of the structural regression analyses, interdependent self-construal was also significantly related to each prosocial antecedent in the predicted direction (apart from self-enhancement, which was significantly related but in the opposite direction as predicted). These patterns align with past research and provide continued support for the relationship between interdependence and prosociality. Although unexpected, the positive relationship between interdependence and self-enhancement may be explained by differences in cultural contexts between the current study and previous research. Specifically, the current study was situated within a Western cultural context whereas past research has focused on values within Eastern cultural contexts (Oishi et al., 1998). As such, the relationship between interdependence and self-enhancement values found here may have differed given larger cross-cultural differences in the emphasis on certain values within certain cultural contexts (e.g., self-enhancement is more prominent in Western contexts broadly, Kurman, 2001, and so may have a unique relationship with interdependence that may differ from the relationship in Eastern cultures). Moreover, the specific self-enhancement items that were used in the current study could be considered more individualistic or agentic (e.g., “It is important to him/her

to show his/her abilities", "it is important to him/her to be rich"), which is also uniquely related to independence (Kurman, 2001) and could explain the positive relationship observed here. Regardless of this discrepant finding, the majority of the patterns observed in the current study were as expected and support known associations between interdependence and prosocial antecedents.

With respect to the potential mechanistic role of interdependent self-construal, the indirect effect patterns mostly converged with predictions and support that age differences in prosocial behavior could be mediated by interdependent self-construal. However, caution is necessary when interpreting the observed indirect effects as there are several limitations to the informativeness of mediation analyses that apply to the current study. Particularly, the current data are cross-sectional and observational and so mediation analyses may yield biased estimates that are more difficult to interpret as informative for causality (Mitchell & Maxwell, 2013). Time-lagged or experimental methods would be needed to determine a mechanistic relationship with greater certainty. Additionally, because of the cross-sectional nature of the data, interpretations of age differences are limited because they only reflect between-participant age differences. As such, any observed age differences in interdependent self-construal and prosocial antecedents could reflect true differences over the course of the lifespan, variability related to cohort or period differences, other unobserved third variables that are confounded with age or interdependent self-construal, or any combination of these sources of variability. Of course, these sources of variability are likely also present for all measured constructs, apply to all analyses in the current study (i.e., not just the mediation

analyses), and should be considered a broader limitation, despite their more immediate application to the mediation analyses specifically.

Other broad limitations of the current study include the likely bidirectional nature of the relationships between many of the prosocial antecedents and interdependent self-construal (e.g., having generally higher empathic concern for others could also influence the degree to which one incorporates others into the self), and the presence of such relationships would constitute misspecification of the structural regression model which could lead to biased or misleading estimates and conclusions. Lastly, the current sample is still one of convenience, despite sampling from the general population and demonstrating correlations that generally conform to past research that has used more robust sampling techniques. As such, replication with more representative data would be helpful in establishing the generalizability of the association between age, interdependence, and prosocial antecedents.

## Study 3a

In Studies 1 and 2, the use of only observational/correlational methods have been major limitations to the ability of the current research to establish evidence for the causal relationship of age with interdependent self-construal and prosociality. To account for this major limitation and to expand on these study designs, I planned to manipulate perceived age of the self and salience of interdependent self-construal to evaluate their combined effect on prosocial antecedents and prosocial behavior. To this effort, I created new manipulations of perceived age of the self and salience of interdependent self-construal. Specifically, I manipulated perceived age of the self via software that progresses the age of participants' faces (similar to what has been done in past research,

e.g., Hershfield et al., 2011; van Gelder et al., 2013) alongside a short corresponding activity where participants then reflected on themselves at near (2 months) vs. distant (20 years) points in the future. To manipulate salience of interdependent self-construal I created a new manipulation that encouraged participants to choose and reflect on either one close and interdependent social relationship versus one distant and independent social relationship. Given the novelty of these manipulations, Study 3a served as a pilot study to validate their effectiveness for use in Study 3b where I used these manipulations to test another key prediction—that adopting a more interdependent view of oneself as one ages should encourage prosocial behavior.

## Method

The experimental design was a 2 (Interdependence: interdependent, non-interdependent) × 2 (Age Progression: 2 months, 20 years) mixed design, with interdependence as the between-participants factor and age progression as the within-participants factor. Full detail on the measures and manipulations of all studies can be found in Appendix A.

To achieve optimal scale reliability in the current sample, exploratory factor analyses (EFA) were again conducted for all scales to inform the composition of all dependent variables. For scales that were administered multiple times, I created scale averages using only items that demonstrated a consistent factor solution and loaded reliably across repeated measurements. In other words, I computed scale averages for repeated measures by averaging items that loaded onto the same factor consistently at both measurement points. Items with factor loadings less than 0.5 were considered

unreliable and were not used to create scale averages. See Appendix B for EFA results and dependent variable computation for all scales.

***Participants***

Participants ($N$ = 105) were sampled from the Introduction to Psychology subject pool at DePaul University. A recruitment ad was posted on the SONA system and participants self-selected to participate in the study by signing up for the study on SONA. Participants were told to complete the study only on a laptop or desktop computer. A final sample of 80 participants ($M_{age}$ = 19.24 years, $SD$ = 1.44; see Table 6 for additional demographic information) remained for analyses after removing participants who did not pass both attention check items ($n$ = 17) and who experienced technical difficulties while completing the study ($n$ = 8). In accordance with IRB requirements, all participants received information on the study procedure and provided informed consent prior to participating. Following the completion of all tasks, participants were debriefed and compensated with course credit for completing the study.

Sample size was not pre-planned, but rather was limited to the number of participants that could be collected during the academic term that data collection was completed due to time constraints. However, a sensitivity analysis revealed that with the current sample I had 80% power to reliably detect effects of size $d$ = 0.56 or larger for any between-participants mean comparisons (one-tailed, $\alpha$ = .05) and $d$ = 0.28 or larger for any within-participants mean comparisons (one-tailed, $\alpha$ = .05). Effect size estimates obtained from this study were also used to inform a priori power analyses for Study 3b to ensure adequate statistical power.

Table 6
*Additional Demographic Information for Study 3a*

| Factor | | Total sample |
|---|---|---|
| Gender | | |
| | n | 80 |
| | % female | 78.75% |
| | % male | 17.50% |
| | % prefer not to say | 3.75% |
| Race | | |
| | % Asian or Asian-American | 10.00% |
| | % American Indian or Alaskan Native | 2.50% |
| | % Black or African-American | 6.25% |
| | % White | 71.25% |
| | % Other | 8.75% |

### *Materials*

**Positive and Negative Emotions.** I measured baseline positive and negative emotions using the Modified Differential Emotion Scale (mDES; Fredrickson et al., 2003) for control purposes. The mDES is a 20-item scale that measures how much participants were currently feeling 12 positive (amusement, awe, compassion, contentment, gratitude, hope, interest, joy, love, pride, surprise, flirtatious) and 8 negative emotions (anger, contempt, disgust, embarrassment, fear, guilt, sadness, shame). For each item, three emotion words were used to describe the particular emotion (e.g., *angry, irritated, annoyed* for anger). Participants responded to each item on 5-point scales (0 = *Not at all*, 4 = *Extremely*). An exploratory factor analysis indicated that all positive emotion items and all negative emotion items loaded onto two distinct factors (see Appendix B). As such, responses to each item were averaged to create positive and

negative emotion subscales, with higher scores indicating greater levels of positive and negative emotions.

**Interdependence Manipulation.** I manipulated salience of interdependent self-construal by randomly assigning participants to choose and reflect on one person in their social network with whom they currently had either an interdependent or non-interdependent relationship. In both conditions, participants were presented with a description of what a social network is and a visualization of a social network.

In the *interdependence condition*, participants were presented with instructions that suggested that social network graphs are often used to visualize close relationships, and that these types of relationships are with people that they know very well (e.g., family or a best friend), are central to their life, and are mutually interdependent (i.e., their respective actions affect each other's). The visualization of the social network was then presented again, but this time with the close connections emphasized (see Figure 2). In the *non-interdependence condition*, participants received similarly worded instructions that instead emphasized how social network graphs are used to visualize distant relationships, and that these relationships are most likely with people they consider acquaintances, are not central to their life, and are mutually independent (i.e., their respective actions do not really affect one another's). The visualization of the social network was also presented again, but instead the distant relationships were emphasized in the figure.

After engaging with these prompts, participants were asked to think of one person in one of their own social networks that fit the description they were given and were asked to write 3-4 sentences about who this person is and how/why they fit the

description. In the *interdependence condition*, participants were prompted to think of how they could depend on the person they chose as well as how this person could depend on them. In the *non-interdependence condition*, participants were instead prompted to think of things that might happen to their chosen person throughout their life (e.g., career changes, life decisions).

**Self-Construal.** I used the same measure of self-construal as in Study 2 (Singelis, 1994) to assess participants' interdependent self-construal following the manipulation. Based on EFA results, I averaged five items that loaded reliably onto a single factor to serve as the interdependence variable.

**Self-Other Overlap.** I measured how much participants' felt they overlapped with the person they chose to write about using the Inclusion of Others in the Self scale (IOS; Aron et al., 1992). This scale is a single item that presents participants with seven pairs of circles with increasing degrees of overlap. Participants were asked to indicate which pair of circles best represents their relationship with the person they wrote about. Higher values indicate greater self-other overlap between the participant and the person they wrote about.

**Age-Progression Manipulation.** I manipulated perceived age of the self by instructing participants to project themselves into the near vs more distant future. All participants read that the research team was interested in how people can imagine themselves at different points in the future, and that to complete this activity we would like them to take a picture of themselves to be used in the activity. This manipulation was within-participants, with all participants completing the *near future* portion of the task

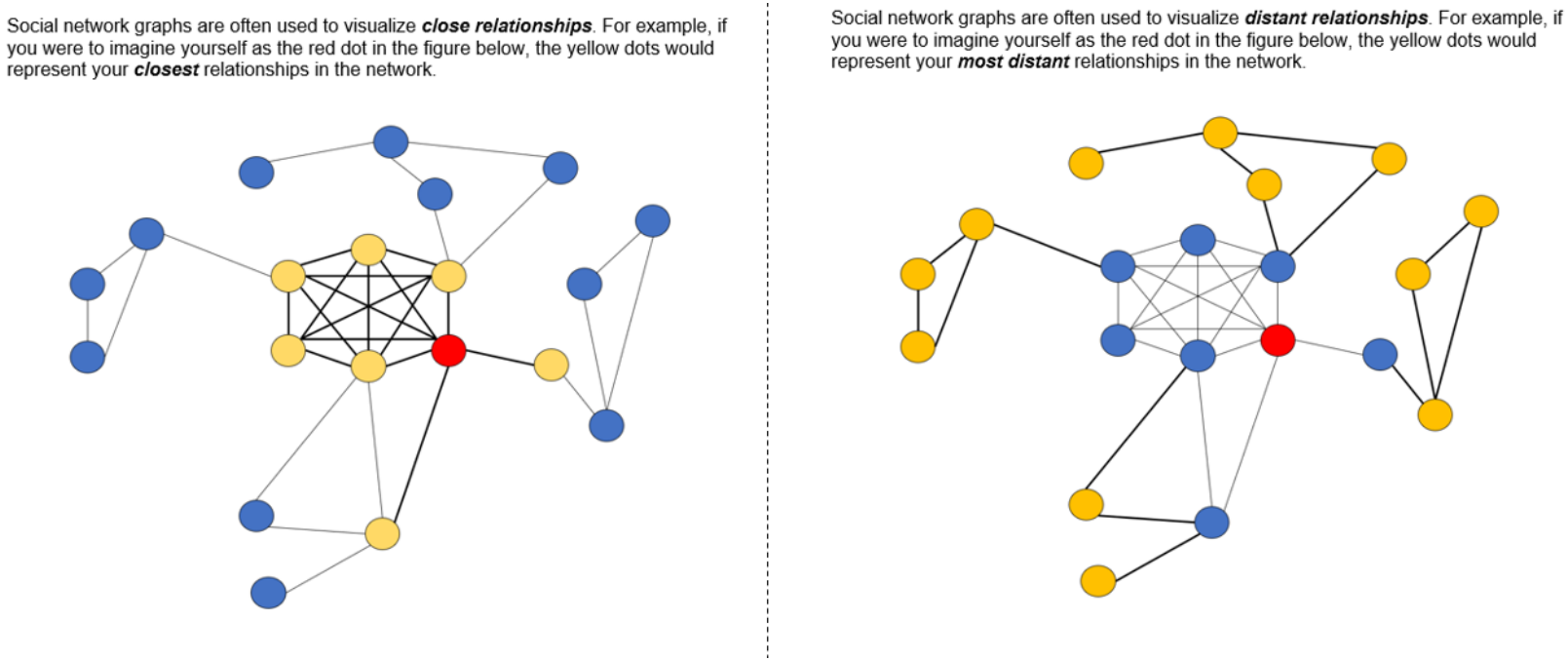


*Figure 2.* Social network images that were displayed to participants in the *Interdependence* (left) and *Non-Interdependence* (right) conditions in Study 3a. Both conditions also contained additional instructions for participants that emphasized interdependence and non-interdependence, respectively.

before moving on to the *distant future* portion of the task. First, we instructed participants to open their computer's camera and take a picture of themselves with a straight face while looking straight at the camera with no hats or glasses. A reference picture was provided to help participants understand how an acceptable picture should look.

After participants took their picture, they completed the *near future* portion of the task. In the *near future* task, participants were asked to open the picture they just took of themselves and to imagine that it was actually a picture of themselves from two months in the future. Participants were then asked to take a few moments to try to imagine what their life might be like two months in the future and to write 3–4 sentences describing their thoughts. Following this, participants completed a variety of scale measures (described in further detail below).

Next, participants read that they would complete the *distant future* portion of the task. In the *distant future* task, participants read that they were to imagine the picture was taken 20 years in the future. To aid participants, we provided a link to a website (changemyface.com[3]) that progressed the age of the photo they took by 10 years. Participants were also instructed to take a screenshot of their age-progressed photo to submit as proof they completed the task as instructed. To reduce the possible negative reactions associated with viewing age-progressed pictures of oneself (Rittenour & Cohen, 2016), we also told participants that the age-progression algorithms tend to over-

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[3] A special thanks to changemyface.com for their flexibility in working with me to make this research possible.

exaggerate the aging effect and that the photo is likely closer to a picture of their face in 15–20 years. After acquiring their age-progressed photo, participants were asked again to try and imagine what their life might be like 20 years in the future and write 3–4 sentences describing their thoughts. Participants then completed the same set of scale measures that followed the *near future* task.

**Perceived Age of the Self.** I used two separate items to measure how old participants felt after each age-progression task (two months/20 years). The first item asked participants to indicate how old they felt (in years) after reflecting on themselves in 2-months and in 20-years. The second item asked participants to indicate how much older they felt after reflecting on themselves in two months/20 years using a slider bar ranging from 0, *not at all older,* to 100, *extremely older*. Each of these items were analyzed as separate outcomes to evaluate how effective the manipulation was at increasing how old participants felt.

**Future Time Horizons.** Drawing from socioemotional selectivity theory (Carstensen, 1992, 2006), I created six items to measure participants' perception of their time horizons. Socioemotional selectivity theory posits that time horizons are often perceived as vast in youth and that this corresponds with prioritizing gaining knowledge and resources. Contrastingly, time horizons become narrower as one ages, leading people to focus on important goals in the present moment such as prioritizing emotional well-being. The three items measuring vast time horizons were "In this current moment, I feel that my time horizon is vast and expansive", "In this current moment, I feel like I have a lot of time left to achieve my goals", and "In the current moment, I want to focus on gaining new knowledge and resources." The narrow time horizon items were "In this

current moment, I feel that my time horizon is narrow and limited", "In this current moment, I feel like it is important to cherish the things that I have", and "In this current moment, I want to focus on my emotional well-being."

All items were measured on 7-point rating scales ranging from 1, *not at all*, to 7, *extremely*, with higher values greater endorsement of that particular time horizon. Given that the factor solutions were inconsistent between the 2-month and 20-year responses and that these items were newly generated, I decided to analyze each item separately rather than combining items to create an average score.

**Distress.** Because viewing an age-progressed image of oneself can induce negative emotions and stress (Rittenour & Cohen, 2016), I used Batson and colleagues' (1987) measure of personal distress to assess negative emotions following each age-progression task. The measure asks participants to indicate how much they felt six adjectives (*upset, grieved, sorrow, distressed, worried, anxious*) on a 7-point rating scale ranging from 1, *not at all*, to 7, *extremely*. EFA results indicated that ratings for *worried* and *anxious* loaded consistently on the same factor for both the 2-month and 20-year ratings. *Grieved* and *sorrowed* also loaded consistently onto a second factor, but given that these items are much more extreme descriptors of distress, I chose to only focus on the ratings for *worried* and *anxious*. As such, ratings for *worried* and *anxious* were averaged to create a distress score following both the 2-month and 20-year future self tasks.

**Satisfaction of Psychological Needs.** Satisfaction of psychological needs (belonging, self-esteem, and meaning) were measured to ensure that participants' needs were not differently impacted when reflecting on themselves two months versus 20 years

in the future. In particular, I wanted to be certain that participants who received the non-interdependence (relative to interdependence) instructions did not report decreased satisfaction of their psychological needs when thinking about themselves in the future, as thinking about going through one's life alone may threaten psychological needs and decrease prosocial behavior (Twenge et al., 2007).

To measure psychological need satisfaction, I used Williams's (2009) scale that included separate items for belonging (4 items), self-esteem (5 items), and meaning (5 items). Participants indicated how much they felt each item (e.g., "I felt like I belonged") after reflecting on themselves two months versus 20 years in the future on a scale of 1, *not at all*, to 5, *extremely*.

Results of the EFA indicated that consistent factor structures for both 2-month and 20-year ratings, but did not conform to the theoretical structure of the scale. Specifically, many of the items on the meaning scale reliably and consistently loaded either with the belonging or self-esteem items ("I felt invisible" and "I felt important", for example, were meaning items that loaded on the belonging and self-esteem factors, respectively). Accordingly, I created two dependent variables consisting of the dimensions of belonging and self-esteem, inclusive of the meaning items that loaded onto these factors (see Appendix B for further detail).

**Task Difficulty.** I included a single-item measure of task difficulty for both manipulations considering that it may be easier to write about a person close to you than a person you do not know well and to write about yourself in the near vs distant future. For both manipulations, participants responded to one 7-point item asking them how difficult it was to complete the tasks. For the interdependence manipulation, the item was

"how difficult was it to answer the prompt about the person you chose to write about?" For the future self manipulation, the items were "how difficult was it to picture yourself [two months/20 years] in the future?"

***Procedure***

The experimental procedure took place entirely online, with all participants completing the study on their own via Qualtrics. After indicating their consent, participants read that they would be completing two short activities and a variety of measures in a study of imagination capability. Participants then completed the mDES as a baseline measure of their current positive and negative emotions. Participants were then randomly assigned to either the *interdependence condition* or *non-interdependence condition*. After completing either task, participants completed the measures of interdependent self-construal, self-other overlap, and task difficulty in that order.

Following the interdependence manipulation, participants were then told they would complete another "imagination activity", which was the age-progression manipulation. Participants first completed the *near future* portion of the task and corresponding measures (perceived age of the self, time horizons, personal distress, psychological need satisfaction, and task difficulty) before completing the *distant future* portion of the task and corresponding measures.

Participants lastly answered a single question about whether they followed the instructions for the age-progression task[4] and submitted the screenshot of their age-

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[4] I was unable to edit the changemyface.com web app to exclude the option to apply a +20-year age filter to the photos. Because the more extreme age-progression could have

progressed picture. Finally, participants answered demographic questions (e.g., age, gender) and indicated whether their birthday fell within the next two months. Participants were then debriefed and compensated for their participation.

## Results

All dependent variables (except for those that were a single item) reported here were computed using only the items that loaded reliably in the previously mentioned EFAs. I did, however, conduct separate analyses using the full scales as a robustness check. These analyses generally conformed to the patterns reported here and, as such, I include these additional analyses in Appendix C.

**Interdependence Manipulation Check.** I performed an independent *t*-test to evaluate whether the interdependence manipulation was effective at priming a sense of interdependence. Consistent with our expectations, participants who reflected on a close and interdependent relationship reported greater interdependent self-construal ($M$ = 4.81, $SD$ = 1.01) than participants who reflected on a distant and independent relationship ($M$ = 4.21, $SD$ = 1.22; $t(70) = -2.41$, $p = .02$, $g = -0.54$).

I also performed an independent *t*-test to assess whether participants who reflected on an interdependent other reported greater self-other overlap than those who

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induced a greater degree of negative emotions and stress (Rittenour & Cohen, 2016), I asked participants whether they also viewed the +20-year filter for control purposes. Despite this concern, analyses indicated that participants who viewed the +20-year filter were not significantly more distressed than participants who did not view the +20-year filtered photo.

reflected on a distant and independent other. Findings were consistent with this expectation, with participants in the interdependent condition reporting greater self-other overlap ($M$ = 5.00, $SD$ = 1.39) than participants in the non-interdependence condition ($M$ = 2.11, $SD$ = 1.65; $t(70) = -8.51$, $p < .001$, $g = -1.87$). Together, these findings suggest that close interdependent relationships were successfully evoked by the manipulation.

**Age Progression Manipulation Check.** To evaluate whether reflecting on oneself in the more distant relative to the nearer future induced a perception of feeling older, I performed separate 2 (Interdependence Condition: interdependent, non-interdependent) × 2 (Age Progression Task: 2 months, 20 years) mixed-factorial ANOVAs on how old participants felt (in years) and along the 0-100 slider scale. Interdependence condition was the between-participants factor and age progression condition was the within-participants variable.

For both outcomes, there were no main effects of interdependence, nor Interdependence Condition × Age Progression Task interactions (age in years $p$s > .12; age slider $p$s > .64). There was a main effect of age-progression task for both outcomes, however. Specifically, participants reported feeling older after reflecting on themselves 20 years in future (age in years: $M$ = 36.90, $SD$ = 13.90; age slider: $M$ = 46.5, $SD$ = 28.9) relative to reflecting on themselves two months in the future (age in years: $M$ = 20.4, $SD$ = 4.71, $F$ (1, 76) = 138.46, $p < .001$, $g = 1.45$; age slider: $M$ = 20.90, $SD$ = 18.90, $F$ (1, 77) = 51.77, $p < .001$, $g = 1.06$).

**Time Horizons.** I submitted each of the six time horizons items to separate 2 (Interdependence Condition) × 2 (Age Progression Task) ANOVAs to evaluate whether projecting oneself 20 years (relative to two months) in the future evoked a less vast and

more narrow time horizon. Contrary to expectations, I found no significant differences in either the vast horizon items (main effect *p*s > .252, interaction *p*s > .307) nor the narrow horizon items (main effect *p*s > .100, interaction *p*s > .220).

**Checks for Potential Threats to Validity.** Despite general support for the effectiveness of both manipulations, I was interested in evaluating other potential differences they may have evoked, apart from those I intended. Namely, I was interested in evaluating potential differences in task difficulty for both manipulations and feelings of distress and satisfaction of psychological needs following the age-progression manipulation.

***Task Difficulty.*** For the interdependence manipulation, I performed an independent *t*-test to evaluate whether there were any differences in how hard participants judged the task of reflecting on a close and interdependent vs distant and independent relationship in one's social network. Not surprisingly, participants who reflected on a distant and independent relationship reported greater difficulty ($M = 3.32$, $SD = 1.56$) than those who reflected on a close and interdependent relationship ($M = 2.53$, $SD = 1.49$; $t(75) = 2.30$, $p = .02$, $g = 0.51$).

For the age progression manipulation, I performed a 2 (Interdependence Condition) × 2 (Age Progression Task) mixed-factorial ANOVA to evaluate whether there was a difference in difficulty between reflecting on oneself two months versus 20 years in the future, controlling for interdependence condition. There was no main effect of interdependence condition, nor an interaction between interdependence condition and age-progression task (*p*s > .44). There was, however, a main effect of age progression task on task difficulty. Specifically, participants found it more difficult to reflect on

themselves 20 years in the future ($M$ = 4.58, $SD$ = 1.98) than on themselves two months in the future ($M$ = 3.58, $SD$ = 1.87; $F(1, 78) = 26.20$, $p < .001$, $g = 0.51$).

***Distress.*** To evaluate whether reflecting on oneself 20 years (relative to two months) in the future was especially distressing, as is suggested in the literature (Rittenour & Cohen, 2016), I performed another 2 (Interdependence Condition) × 2 (Age Progression Task) mixed-factorial ANOVA. Contrary to concerns, neither the main effects nor the interaction were significant ($p$s > .18), suggesting that participants were not significantly more distressed following the 20-year relative to two-month future self task.

***Satisfaction of Psychological Needs.*** I conducted separate 2 (Interdependence Condition) × 2 (Age Progression Task) mixed-factorial ANOVAs for the psychological needs of belongingness and self-esteem. Particularly, I wanted to ensure that the combination of thinking of distant others and of oneself in the distant future did not threaten participants' belonging or self-esteem. Encouragingly, no main effects or interactions were significant for either belonging ($p$s > .292) or self-esteem ($p$s > .15), suggesting that projecting oneself into the distant future after thinking about distant others did not significantly threaten psychological needs.

## Discussion

The first goal for Study 3a was to evaluate the efficacy of the new manipulations of interdependence and perceived age of the self. Secondarily, I wished to evaluate the robustness of these manipulations against potential threats to validity (i.e., difficulty, distress, and threat to psychological needs). Findings generally supported that the

manipulations were effective and that threats to validity due to difficulty, distress, and threat to psychological needs were minimal.

In support of the first goal, I found that participants assigned to the interdependence condition reported greater interdependent self-construal and self-other overlap than those assigned to the non-interdependence condition, suggesting that the manipulation functioned as expected. Although past manipulations that prime salient interdependent self-construal have been established in the literature (Lalwani & Shavitt, 2009; Trafimow et al., 1991), I believe the current manipulation to be more directly applicable to an aging context as it focuses on close and interdependent social relationships that are often prioritized with age (Lang & Carstensen, 1994, 2002; English & Carstensen, 2014). Additionally, and as hypothesized, participants reported feeling older (both in terms of years and how old they felt) following the 20-year age-progression task, relative to the two-month task. Such a finding is consistent with past research focused on behavioral outcomes following interactions with one's age-progressed self (e.g., increases in investment and retirement planning, Hershfield et al., 2011; decreases in immoral behavior, van Gelder et al., 2013), which bodes well for evaluating the effect of the current manipulation on real prosocial behavior. However, it would be prudent to note that both of these manipulations produced states of heightened interdependent self-construal and perceived age when true age differences (either over time or cross-sectionally) would likely be closer to trait differences. As such, it will be important to remain cautious with interpretations given this constraint to generalizability.

Contrary to expectations, I did not find an effect of either manipulation on the vast versus narrow time horizons items, suggesting that participants' time horizons were

not reliably narrowed by the age-progression manipulation. This pattern may have resulted from highly variable responses to these items. Particularly, participants may have had trouble answering the time horizon items because their actual perspective was still that of a younger adult. In other words, even if participants reported feeling older their ages did not actually change, and so participants would still have been reflecting on their future time horizon through their current younger adult eyes, so to speak. This may have led to varied responses in opposite directions from participants. For instance, some participants may have experienced the intended effect (i.e., "In 20 years I will have less time left in my life") while others could have experienced the opposite effect (i.e., "Thinking about myself in 20 years reminds me of how vast my future is"). Accordingly, the standard deviation for the vast time horizon items was generally high (*SD*s between 1.39 and 1.82 for a 7-point scale), indicating considerable variability in responses. Given this, I do not consider these findings as strong evidence for or against the efficacy of the age-progression manipulation and future research would be needed to re-evaluate the effect of the manipulation on perceived time horizons with a more valid measure.

Regarding the second goal to evaluate potential threats to validity, I only observed significant differences in task difficulty for each manipulation. Specifically, participants assigned to reflect on a close and interdependent relationship indicated the task was less difficult than participants who reflected on a distant and independent relationship. Although I had hoped for the two conditions to be balanced in terms of difficulty, this pattern is intuitive. Understandably, it should be easier to write a few sentences about a person you know very well relative to a person with whom you are only acquainted. That said, the mean ratings were below the midpoint of the scale in both conditions which

suggests that neither condition was especially difficult. With respect to the difficulty of the age-progression manipulation, participants indicated that thinking about oneself 20 years in the future was more difficult than thinking about oneself two months in the future. Again, although I had hoped for these tasks to be comparable in difficulty, it is not surprising that participants would have a harder time imagining themselves in 20 years than in two months. Moreover, the average difficulty rating for both tasks clustered around the scale midpoint (2-month = 3.58, 20-years = 4.58), albeit on opposite sides, suggesting that neither task was especially difficult. Despite differences in difficulty, the null effects of the age-progression manipulation on distress or satisfaction of psychological needs were promising. Specifically, these findings suggest that the age-progression manipulation did not significantly increase distress as has been found with other age-progression manipulations (Rittenour & Cohen, 2016), nor threaten psychological needs (Twenge et al., 2007), which helps to assuage concerns about undesirable side-effects of the age-progression manipulation.

Overall, I believed the findings from Study 3a indicated that the manipulations produced the desired effects on salient interdependent self-construal and perceived age of the self, and that the validity of these manipulations was not threatened, at least with respect to the specific threats that were measured. As such, these findings were supportive of the use of these new manipulations for Study 3b, where I tested their combined effect on key antecedents of prosociality and on real prosocial behavior.

## Study 3b

As mentioned earlier, Study 3b was designed to expand on Study 2 by manipulating interdependence with close others and perceived age of the self in younger

adults using the manipulations from Study 3a to assess their interactive impact on actual prosocial behavior. If coming to adopt a more interdependent self-construal with age is a mechanism that increases prosocial behavior, then participants who reflect on their close and interdependent (relative to distant and independent) relationships should engage in disproportionately more prosocial behavior after reflecting on themselves 20 years in the future. Additionally, given the importance of generativity to aging and prosocial motivation (Isaacowitz et al., 2021), Study 3b also evaluated whether the combined effect of interdependence and perceived age of the self on prosocial behavior is stronger for charitable causes whose focus is on the future relative to the present (i.e., generative vs non-generative causes).

## Method

### *Participants*

To determine optimal sample size, I performed an a priori power analysis using the R package Superpower (Lakens & Caldwell, 2021). Specifically, I used the effect size that I observed for the interdependence manipulation in Study 3a to inform the expected pattern of means for the interaction (see Figure 3). Using this expected pattern of means and the observed standard deviation for interdependent self-construal ($SD$ = 1.14), the power simulation suggested that a sample size of 47 would provide 90% power to detect the Interdependence × Age-Progression interaction at $\alpha = .05$. However, because I did not know the size of either manipulation's effect on the other dependent measures included in Study 3b (self-transcendence, self-enhancement, and prosocial behavior), I believed it to be prudent to considerably increase the sample size accordingly. As such, I planned to

recruit 450 participants, roughly 10 times the number of participants to obtain 90% power to detect the Interdependence × Age-Progression interaction.

Accordingly, 450 participants were recruited using Prolific Academic. All participants were US residents at the time of participation. Given that the age progression manipulation encouraged participants to project themselves 20 years into the future, participation was limited to only younger adults (adults aged 18–30) so that a 20-year age progression would place all participants in roughly the same age range (~38–50 years old). Sixteen participants were excluded prior to analyses for failing at least one out of two manipulation check items and three participants were excluded for being older than 30 years old, leaving a final sample of 431 participants.

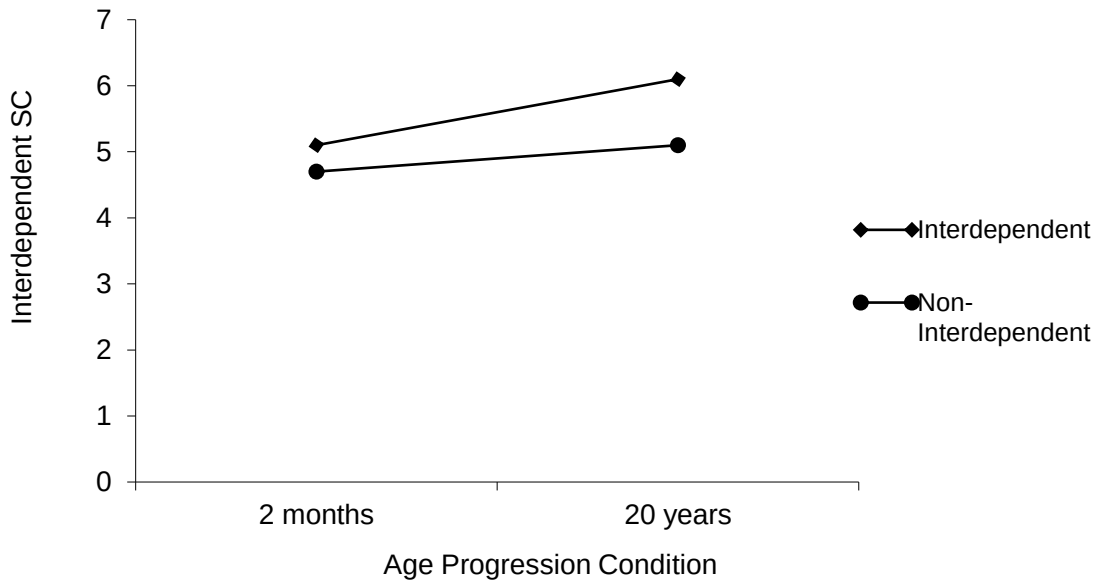


*Figure 3.* Pattern of expected results for Interdependence Condition × Age Progression Condition interaction on interdependent self-construal for Study 3b. This interaction pattern informed the a priori power analysis for Study 3b.

Participants varied in age from 18 to 30 years old ($M_{age}$ = 24.78, *SD* = 3.45). See Table 7 for additional demographic information. Participants were only allowed to complete the study on a laptop or desktop computer by limiting accessibility to the survey to these devices within Prolific. In accordance with IRB requirements, all participants received information on the study procedure and provided informed consent prior to participating. Following the completion of all tasks, participants were debriefed and compensated with $3.00 for completing the study.

Table 7
*Additional Demographic Information for Study 3b*

| Factor | | Total sample |
|---|---|---|
| | n | 431 |
| Condition | | |
| | Interdependence | 216 |
| | Non-Interdependence | 215 |
| Gender | | |
| | % Female | 43.85% |
| | % Male | 49.19% |
| | % Non-Binary | 6.26% |
| | % Prefer Not to Say | 0.70% |
| Race | | |
| | % Asian or Asian-American | 10.21% |
| | % American Indian or Alaskan Native | 0.23% |
| | % Black or African-American | 11.14% |
| | % Latinx | 6.73% |
| | % White | 58.24% |
| | % Other | 0.93% |

*Note.* Race categories do not sum to exactly 100% because race was asked as a 'select all that apply' question. The remaining participants indicated more than one category and make up the remaining percentage.

***Materials***

Appendix A provides comprehensive information on the materials that were used for all studies. As with Study 3a, I created scale averages for scales that were administered multiple times using only items that demonstrated a consistent factor solution and loaded reliably across repeated measurements. Exploratory factor analyses were used to determine which items loaded consistently across repeated measures. Unless specified otherwise, all exploratory factor analyses were conducted using varimax rotation and with a single factor (because all scale measures were intended to be unidimensional). Items with factor loadings less than 0.5 were considered unreliable and were not used to create scale averages. More detailed information about the exploratory factor analyses is available in Appendix B.

**Positive and Negative Emotions.** Baseline positive and negative emotions were measured with the Modified Differential Emotion Scale (mDES; Fredrickson et al., 2003) for control purposes as in Study 3a. Confirmatory factor analysis indicated that a two-factor model had mediocre fit to the data (CFI = 0.863, RMSEA = 0.108, SRMR = 0.112), so an exploratory factor analysis with two factors was carried out. This exploratory factor analysis indicated that all items loaded reliably onto their intended factor (i.e., positive items loaded together, and negative items loaded together). As such, all items were used to create an average score for participants' baseline positive and negative emotions. Higher scores indicate experiencing more positive or negative emotions at the time of measurement.

**Interdependence Manipulation.** The same manipulation of salient interdependent self-construal from Study 3a was used in the current study. Participants were randomly assigned to choose and reflect on one person with whom they were either

closely connected and interdependent (*interdependence condition*) or distantly connected and independent (*non-interdependence condition*) at the time of response.

**Age-Progression Manipulation.** The same age-progression manipulation that was used in Study 3a was used in the current study. After the *near future* portion of the task, participants completed the interdependent self-construal scale, the basic cultural values measure, and one prosocial behavior drawing task (described below in more detail) with respect to themselves 2-months in the future. Participants then completed the *distant future* portion of the task and responded to the same measures again but instead with respect to themselves 20-years in the future.

**Interdependent Self-Construal.** The same measure of interdependent self-construal that was used in Study 2 and Study 3a (Singelis, 1994) was used to assess participants' interdependent self-construal following the manipulations. However, the items were slightly modified so that their wording was more aligned with the manipulation (e.g., "It is important for me to maintain harmony *within my close relationships"* instead of "(...) *within my group.*" This change was intended to further strengthen the experimental manipulation of interdependence. Exploratory factor analyses yielded seven items that loaded reliably across repeated measures (see Appendix A). These seven items were used to create composite averages for participants' endorsement of interdependent self-construal following the two month and 20 year future self tasks. Higher scores indicate stronger endorsement of an interdependent self-construal.

**Basic Cultural Values.** The Portrait Values Questionnaire (PVQ-21; Schwartz, 2003) that was used in Study 2 was used again to measure the basic cultural values of

self-transcendence and self-enhancement, as well as the minor values they subsume (benevolence and universalism; achievement and power). Importantly, participants responded to each item in the frame of reference of their future self (i.e., How much is this person like you, two months/20 years in the future?). For each item, participants indicated how much they believed their future self would be like the person in each item (e.g., "It's very important for him/her to help the people around him/her") on the scale of 1, *not like me at all,* to 6, *very much like me*. Separate exploratory factor analyses were carried out for the self-transcendence and self-enhancement items. Both exploratory factor analyses demonstrated that all items loaded reliably onto the same factor at both points of measurement. As such, all items were used to create composite averages for participants' valuation of self-transcendence and self-enhancement following both portions of the age-progression task. Higher scores correspond to greater endorsement of self-transcendence and self-enhancement values, respectively.

**Prosocial Behavior.** Prosocial behavior was measured using a contingent donation paradigm similar to what has been used in past research (e.g., Lindauer et al., 2020; Soyer & Hogarth, 2011). The basic concept of the paradigm is that participants are told that they will be entered into a drawing to potentially win money in addition to their compensation for participating. Participants are then given the option to keep any portion of the bonus payment, donate any portion of the bonus payment to a charitable organization, or some combination of the two, should they win the drawing. For example, if the drawing prize were $10, a participant might elect to keep $5 as a bonus payment and donate $5 to charity if they win the drawing. As such, prosocial behavior is measured in terms of how much money participants allocate to charity. At the end of data

collection, one participant is chosen as a winner and their decisions are carried out (i.e., they are paid whatever they elected as a bonus and any donations are made on their behalf).

To assess whether imagining oneself in the near vs distant future influences prosocial behavior, I used one drawing task to measure prosocial behavior following each age-progression manipulation task (i.e., one drawing following the *near future* task and one following the *distant future* task). Specific instructions were given to participants to encourage them to treat the drawing tasks as independent, and that they should not feel bound by their choices in the first drawing.

For each drawing task (see Appendix A), participants were allowed to allocate a total of $15 between charitable donations and a bonus payment. Participants were presented with the rules of the drawing and were given information about two charities to which they could donate their potential winnings. All charities were real charities that focused on environmental issues (Natural Resources Defense Council and The Sierra Club, The Nature Conservancy and Friends of the Earth), but the presentation of the charities' missions differed such that one charity's mission emphasized its impact in the present, whereas the other emphasized its impact on future generations (see Appendix A for the stimuli that were presented to participants). The order of presentation of the two pairs of charities was counterbalanced across the two drawing tasks to minimize error variability due to repeated testing.

Following the presentation of the charities, participants then indicated how much money they wanted to keep for themselves and how much money they wanted to give to either charity, if they won the drawing. For each drawing, participants choices were

required to sum to $15. Participants also indicated which charity they intuitively preferred between the two on a 7-point bipolar rating scale. At the end of data collection, one participant was chosen as a winner for each drawing and their decisions were carried out (i.e., donations to charity were made and bonuses were paid to the participant).

***Procedure***

The experiment took place entirely online, with all participants completing the study on their own via Qualtrics. After indicating their consent, participants read that they would be completing a variety of short activities related to imagination and prosocial behavior. Participants first indicated their gender (for the purpose of customizing the PVQ-21) and completed the mDES (Fredrickson et al., 2003) as a baseline measure of positive and negative emotions. Participants then completed the same interdependence manipulation that was used in Study 3a. Participants were randomly assigned to either the *interdependence* or *non-interdependence* condition and completed the reflection task. Following this, participants then moved on to the *near future* portion of the age-progression manipulation and reflected on their unaltered photo and on themselves 2-months in the future. After completing this portion of the manipulation, participants completed the measure of interdependent self-construal, basic cultural values, and the first prosocial behavior drawing task. For the interdependent self-construal and cultural values measures, participants were instructed to respond as if they were themselves two months in the future. Participants then moved on to complete the *distant future* portion of the age-progression manipulation, reflected on their age-progressed photo and on themselves 20-years in the future, and responded again to measures of interdependent

self-construal, basic cultural values, this time as if they were responding as themselves 20-years in the future, and then completed the second prosocial behavior drawing task.

Participants lastly answered a single question about whether they followed the instructions for the age-progression task and submitted the screenshot of their age-progressed picture. Finally, participants answered demographic questions (e.g., age, race), indicated how often they donate to charity in a typical year, and how familiar they were with the charities presented to them before they participated in the study. Participants were then debriefed and compensated for their participation.

## Results

I aimed to test three key predictions in Study 3b. First, I aimed to evaluate whether the combination of reflecting on interdependent relationships and on oneself 20 years in the future disproportionately increases interdependent self-construal and influences key antecedents of prosocial behavior (i.e., self-transcendent and self-enhancement values). Second and third, I tested whether the combination of reflecting on interdependent relationships and on oneself 20 years in the future disproportionately increases prosocial behavior, especially toward future-focused (i.e., generative) causes.

**Testing the Effect of Interdependence and Age Progression on Interdependent Self-Construal and Cultural Values.** To test the first hypothesis, I conducted separate 2 (Interdependence: interdependent, non-interdependent) × 2 (Age Progression Task: 2 months, 20 years) mixed-factorial ANOVAs with interdependent self-construal, self-transcendence, and self-enhancement as outcomes. Interdependence

condition was the between-participants factor and age progression task was the within-participants factor.

***Interdependent Self-Construal.*** The Interdependence Condition × Age Progression Task ANOVA for interdependent self-construal revealed a significant main effect of age progression, $F$ (1, 429) = 7.33, $p$ = .007, $d$ = 0.11. Specifically, participants more strongly endorsed an interdependent self-construal after reflecting on themselves in 20 years ($M$ = 4.99, $SD$ = 1.13) relative to their two-month future self ($M$ = 4.88, $SD$ = 0.94). This main effect is visualized in Figure 4, panel A. Neither the main effect of interdependence condition ($p$ = .377) nor the interaction ($p$ = .464) were significant.

***Self-Transcendence Values.*** As with interdependent self-construal, the Interdependence Condition × Age Progression Task ANOVA for self-transcendence values showed only a main effect of age progression, $F$ (1, 429) = 18.49, $p$ < .001, $d$ = 0.15. Participants more strongly endorsed self-transcendence values after thinking of themselves 20 years in the future ($M$ = 5.00, $SD$ = 0.94), relative to themselves two months in the future ($M$ = 4.86, $SD$ = 0.85). Neither the main effect of interdependence condition ($p$ = .180) nor the interaction ($p$ = .068) were significant. See Figure 4, panel B for a visualization of the age progression main effect.

***Self-Enhancement Values.*** Again, the Interdependence Condition × Age Progression Task ANOVA revealed only a main effect of age progression, $F$ (1, 429) = 5.50, $p$ = .019, $d$ = -0.09. Participants less strongly endorsed self-enhancement values after reflecting on themselves 20 years in the future ($M$ = 3.95, $SD$ = 1.27) than after reflecting on themselves two months in the future ($M$ = 4.06, $SD$ = 1.11). Neither the

main effect of interdependence condition ($p$ = .112) nor the interaction were significant ($p$ = .786). See Figure 4, panel C for a visualization of the age progression main effect.

**Testing the Effect of Interdependence and Age Progression on Prosocial Behavior and Preference for Generative Causes.** To evaluate the second and third hypotheses, I conducted a 2 (Interdependence Condition) × 2 (Age Progression Task) × 2 (Charity Focus: future-focus vs. present-focus) mixed-factorial ANOVA with donation amounts from the drawing tasks as the outcome. This analysis allowed for simultaneous evaluation of whether interdependence and age progression interacted to predict prosocial behavior in general (i.e., two-way Interdependence Condition × Age Progression Task interaction) as well as how these factors interacted with future- and present-focused causes (i.e., a three-way interaction) to inform donation behavior and charity preference. I also conducted a separate 2 (Interdependence Condition) × 2 (Age Progression Task) ANOVA with participants' intuitive preferences for either charity on the bipolar rating scale as an outcome to further evaluate the influences of the independent variables on charity preference.

***Donation Amount.*** The 2 (Interdependence Condition) × 2 (Age Progression Task) × 2 (Charity Focus: future-focus vs. present-focus) mixed-factorial ANOVA with amount donated as the outcome yielded only significant main effects of age progression, $F$ (1, 429) = 6.28, $p$ = .013, $d$ = 0.07, and charity type, $F$ (1, 429) = 6.72, $p$ = .010, $d$ = -0.11. Averaging across interdependence condition and charity type, participants allocated more money to charity after reflecting on themselves 20 years in the future ($M$ = 2.66, $SD$ = 3.24) than after reflecting on themselves two months in the future ($M$ = 2.46, $SD$ = 2.71). See Figure 4, panel D for a visualization of the age progression main effect.

Averaging across interdependence condition and age progression task, participants allocated more money to the non-generative charities ($M$ = 2.73, $SD$ = 3.01) over the generative charities ($M$ = 2.40, $SD$ = 2.96). The main effect of interdependence condition was not significant ($p$ = .649) and no other two-way interactions ($p$s > .221) nor the three-way interaction ($p$ = .822) were significant either.

***Charity Preference.*** I also conducted a 2 (Interdependence Condition) × 2 (Age Progression Condition) mixed-factorial ANOVA with the single bipolar rating-scale item for charity preference as the outcome. For this item, a value close to four indicates no preference between the charities, values above four indicate preference for the generative charities, and values below four indicate preference for the non-generative charities. The analysis revealed only a main effect of interdependence condition, $F$ (1, 429) = 6.54, $p$ = .011, $d$ = 0.19. Collapsing across age progression task, participants in the interdependence condition indicated more intuitive preference for the non-generative charity ($M$ = 3.43, $SD$ = 1.91) relative to participants in the non-interdependence condition ($M$ = 3.81, $SD$ = 2.00).

## Discussion

The primary goal of Study 3b was to manipulate perceived age of the self and salience of interdependence to provide stronger evidence for a causal relationship between these constructs, interdependent self-construal, and prosociality. Across the focal outcomes of interest (interdependent self-construal, self-transcendence and self-enhancement values, and prosocial behavior), analyses revealed a consistent main effect of the age progression manipulation. Specifically, on average, participants reported that their 20-year future selves had a more interdependent self-construal, valued self-

transcendence more, and valued self-enhancement less relative to their 2-month future self. Participants also donated more money to charity after reflecting on themselves in 20 years (relative to two months) in the future. On average, participants also donated more money to the non-generative charities than to the generative charities. No other main effects or interactions were detected in analyses of these outcomes. Unexpectedly, in the analysis of the single-item bipolar rating of intuitive preference for non-generative versus generative charities there was also a main effect of interdependence condition, with participants in the interdependence condition indicating greater intuitive preference for the non-generative relative to the generative charities.

With respect to the main effects of the age progression manipulation, participants' 20-year future selves were in ways similar to people who are actually older, both as reported in the broader aging literature and as observed in Study 2. More specifically, participants in Study 3b more strongly endorsed an interdependent self, more highly valued self-transcendence, less highly valued self-enhancement, and were more prosocial after reflecting on themselves in 20 years. In Study 2, positive associations were observed between actual age and interdependent self-construal, self-transcendence values, and other antecedents of prosocial behavior. The correspondence in patterns between the "age" differences in the current experiment and more naturalistic observation of age differences engender confidence in a potential causal link between age, interdependence, and prosociality. More broadly, this correspondence offers continued support to past research regarding age differences in prosocial values (Rittter & Freund, 2014) and

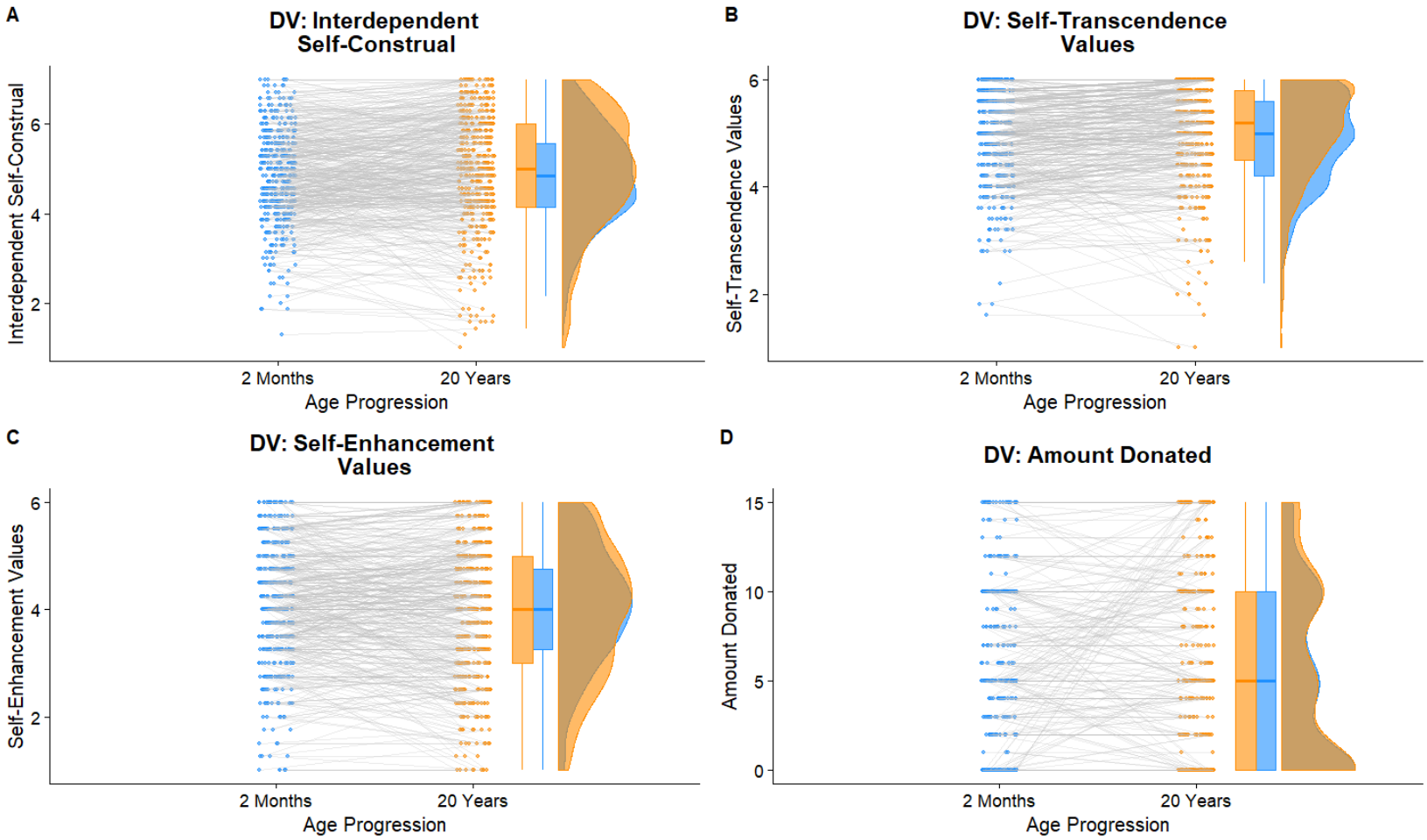


*Figure 4.* Main effects of age progression task on primary outcomes in Study 3b. Panel A = Interdependent Self-Construal; Panel B = Self-Transcendence Values; Panel C = Self-Enhancement Values; Panel D = Amount Donated.

prosocial behavior (Freund & Blanchard-Fields, 2014; Hubbard et al., 2016; Midlarsky & Kahana, 1994; Raposo et al., 2021) while simultaneously contributing further evidence that interdependent self-construal may be relevant to these differences.

Although these findings are promising, the question of a more exact mechanism for age differences in interdependent self-construal and prosociality still remains. For instance, there are multiple plausible explanations that could have produced the patterns observed in Study 3b. The explanation most consistent with the current research is that participants could have drawn on their cultural knowledge of how people should typically behave as they get older and, whether intentionally or not, responded to the measures in ways that would be more typical of older people. This account is consistent with past research using age-progression paradigms that showed that viewing an age-progressed image of one's face is related to greater (albeit, negative) stereotype activation of older adults (Rittenour & Cohen, 2016). If this interpretation is correct, it reveals that there is perceptible cultural information about age-related changes in interdependence and prosociality that is available to younger people and that activation of this cultural information may encourage people to endorse interdependent self-construal and adopt prosocial values and behaviors more strongly. Presumably, as one gets older and is subject to greater comparison against the cultural ideals of how one should stereotypically behave as an older person (i.e., as salience increases), they may adopt these behaviors, which could lead to observed age differences in self-construal and prosociality (e.g., as observed in Study 2). Such an explanation would be further supported if the internalization of an interdependent self and heightened prosociality was associated with the degree to which one follows (or wishes to follow) more stereotypical

age milestones (being in a committed relationship, having children, etc.) or subscribes to more stereotypical views of aging more broadly.

However, other rival (or even concurrent) explanations are plausible as well. For instance, participants could have seen their 20-year future selves as their "ideal" self and acted more like how they wished to be in the future more abstractly. In other words, participants might have responded as if they were "who they want to be" in 20 years and responded in a more virtuous way (i.e., more focused on others, more benevolent and universalistic, less self-focused, more generous with money). Such an interpretation is consistent with research that found a reduction in immoral behavior after people interacted with a realistic version of their age-progressed self (van Gelder et al., 2013). That said, the “ideal self” explanation is not necessarily inconsistent with the main argument of the current research, as ideals for behavior are likely to be informed by cultural norms around how one should behave in the first place, which do differ by age (e.g., North & Fiske, 2013). However, this explanation does complicate the exact mechanism of the observed pattern of “age” differences as it suggests a more active process of striving to be like one’s ideal self—a process that may or may not be related to aging. Simply, one could strive to be more like their ideal self specifically within an aging frame of mind (e.g., “When I am older, I want to be kinder”) or one could just generally grow more aligned with their ideal self over time via continuous striving (e.g., “I want to be kinder every day”) which could lead to age differences over time as people align with these ideals. Regardless, drawing a conclusion between these two (or possibly other) explanations based on the current data alone would be tenuous and further research

would be needed to tease apart these equally interesting explanations for the current findings.

Despite the effectiveness of the age progression manipulation and the conclusions that can be drawn based on these effects, some attention is warranted to the lack of effectiveness of the interdependence manipulation, the failure to detect significant interactions between the experimental manipulations, and the unexpected main effect of condition on intuitive charity preference. There are several reasons why the interdependence manipulation could have been generally ineffective, but one likely explanation is simply that there was too long of a delay between the manipulation and the outcome measures. Specifically, the interdependence manipulation occurred very early in the experimental procedure (and prior to the first age progression task), so effects could have been dampened or interfered with by the time participants responded to the outcome measures (a limitation that was not true for the pilot study, where effects of the interdependence manipulation were observed). Additionally, interdependent self-construal is much more of trait construct than a state construct. As such, it is more precise to consider any effect of the interdependence manipulation as a prime of interdependence, which is likely to be more ephemeral in nature. This same explanation could account for the lack of interactions between the manipulations, as it would be likely that any effect of the interdependence manipulation would be lost by the time participants completed the second portion of the age progression task and the final set of outcome measures. Despite the lack of significant main effects and interactions of the interdependence manipulation, the age progression effect was still significant with interdependent self-construal as the outcome which helps to maintain the connection

between age and interdependence in the face of these other null effects. With respect to the interdependence condition main effect for intuitive charity preference, it is possible that the priming effect of the interdependence, which primed close and familiar relationships, also primed a preference for the non-generative charities, which were indeed rated as significantly more familiar by participants overall (non-generative $M$ = 1.98, generative $M$ = 1.45). That said, this explanation is purely speculative and further research may suggest an interpretation that differs from this account. Nonetheless, this discrepant finding does not contradict any of the primary findings, does not have a basis in the literature, and should not be considered problematic for the general conclusions of the current study.

Lastly, the current study has several limitations. Mainly, and although efforts were taken to reduce noise due to repeated testing and potential anchoring effects (e.g., by counterbalancing charities in the donation task), the age progression manipulation itself was not counterbalanced which could have introduced variability due to anchoring/order effects. Specifically, participants could have used their two-month future self as a benchmark when responding to measures following the 20-year future self task. This explanation aligns with the "ideal self" account outlined above, as people may want to be "better" than their current selves in the distant future and subsequently respond in a more virtuous way. It would be difficult to address this limitation without giving up other beneficial elements of the current experimental design (e.g., the benefits of using a within-participants design for test-control comparison and statistical power), but perhaps future research could explore the age progression manipulation with a between-

participants design to see if age differences still persist when variability due to order effects is absent.

Another limitation was the online setting of the experiment, with all participants completing the study under what were presumably highly variable conditions. This instability of the experimental environment contributed noise to all manipulations and measures, which makes it difficult to estimate the size of effects and may lead to false negative conclusions (e.g., if excess error variability increased the confidence interval of a test statistic to include 0). Future research would benefit from replicating the current experiment under conditions with greater experimental control (i.e., in a lab setting). Finally, despite drawing from the general population and recruiting a diverse sample in terms of gender and race, the current study is reliant on a convenience sample which is unlikely to be fully representative of the population at large. As such, the use of a more robust sampling methodology in future research would allow stronger conclusions to be drawn regarding the generalizability of the current findings.

## General Discussion and Conclusions

Across a variety of participant samples, operational definitions, and research methods, the current work consistently found evidence supporting a connection between aging, interdependence, and prosociality. In Study 1, using longitudinal data I found within- and between-person age differences in qualities of immediate social environments that may foster the internalization of a more interdependent self-construal with age. In Study 2, using a lifespan sample of adults I found age differences in interdependent self-construal, in addition to replicating previously observed age and self differences in antecedents of prosociality. Lastly, in Study 3b, I used a newly validated age progression

manipulation to experimentally increase interdependent self-construal, prosocial values, and prosocial behavior. Together, this series of studies provides incremental and triangulating evidence to support a connection between aging, interdependence, and prosociality. In doing so, the current research adds specifically to knowledge of potential mechanisms that may increase prosocial behavior among older relative to younger adults while simultaneously demonstrating the utility of age differences in self-construal as a powerful lens from which to explore age differences in behavior more broadly. This is a pivotal first step considering that age differences in self-construal have remained largely unexplored and untested in aging research and that self-construal is very widely applicable to understanding differences in social cognitive, emotional, and behavioral phenomena in psychological research (Markus & Kitayama, 1991).

More specifically, a newfound connection between aging and interdependent self-construal could be very useful for investigation of age differences in constructs where interdependence is implicated. For instance, age differences in reasoning in the context of interpersonal problem-solving (Blanchard-Fields et al., 1995, 1997), disproportionate preference for experiencing certain kinds of emotions with age (Scheibe et al., 2013), and in the use of self-adjustment coping strategies (Charles et al., 2003; Isaacowitz et al., 2006; Shiota & Levenson, 2009; Wrosch et al., 2000) all correspond with patterns that have been established among those with more interdependent selves (e.g., Ashman et al., 2006; Grossman et al., 2012; Lim, 2016; Morling et al., 2002). As such, age differences in interdependent self-construal can be considered as a potential explanatory variable in these research contexts, in addition to other contexts where interdependence is implicated.

Beyond the application of the current findings to specific psychological phenomena, the observed pattern of age differences in self-construal could be interpreted more broadly to suggest that different life stages, and the social environments that accompany them, may resemble psychologically different cultural contexts. Said another way, the current findings provide evidence for considering some age differences as cultural differences. This argument is intuitive given that the term "culture" can apply to the customs, values, beliefs, characteristics, attitudes, and behaviors of any group within a society (American Psychological Association, 2007), with age groups being no exception. And although it is much easier to think of *between-person* age differences as cultural differences (look no further for an example than the slew of sensationalized popular media articles about differences between Baby Boomers and Millennials), the potential that there could exist *within-person* differences in cultural contexts that track with age is certainly more intriguing. After all, people must transition between age groups at the very least in terms of their actual age. It should not be shocking to think that some people accept this transition and internalize some aspects of the culture of being older. If so, it might help to explain, among other things, some of the obstacles that people experience when navigating intergenerational relationships (e.g., conflicts between younger adult children and older adult parents could stem from the multiple sources of cultural variability between them, both at a cross-section and longitudinally over time). As such, the prospect of within-person differences in cultural contexts across the lifespan remains an intriguing and potentially very fruitful area for future exploration.

That said, as much (if not more) attention should be directed inward toward refining the current theorizing and psychological mechanisms as should be directed

toward generalizing the current findings. The current evidence is a considerable step in the right direction, but it is important not to be too hasty in attempting to apply these findings before fully understanding what caused them. Given the novelty of the current theorizing, it is incredibly important to continue exploring exactly how age could engender higher interdependent self-construal as well as moderating factors that may amplify or attenuate this association. The current research offers some broad-strokes explanations (e.g., age differences in social environments, cultural accessibility of information about age differences in behavior) and provides some admittedly general evidence for these accounts, but further research is necessary to pinpoint more specific mechanistic relationships. For instance, future research would benefit from examining other, more specific constructs that inform how one defines the self (e.g., the degree to which one feels embedded within their immediate social environment) in addition to examining the impact of specific life events on the internalization of an interdependent self (e.g., by comparing those with children to those without). In doing so, a more granular understanding of the exact mechanisms and developmental processes can be achieved, resulting in an overall richer and more valuable theory. To quote Kurt Lewin (1952), there is “nothing more practical than a good theory” (p. 169). In science, as in life, we have much to learn from the wisdom of our elders.

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## Appendix A: Scale Measures and Manipulations

*Note: Measures and manipulations that were used in more than one study only appear in this appendix in the first study in which they appeared (e.g., full text of interdependence manipulation and age progression manipulation are shown only for Study 3a because they were exactly the same when used in Study 3b).*

### Study 1

Family/Friend Harmony & Strain Scales (From MIDUS)

*Family harmony*

1. Not including your spouse or partner, how much do members of your family really care about you?
2. How much do they understand the way you feel about things?
3. How much can you rely on them for help if you have a serious problem?
4. How much can you open up to them if you need to talk about your worries?

*Family strain*

1. Not including your spouse or partner, how often do members of your family make too many demands of you?
2. How often do they criticize you?
3. How often do they let you down when you are counting on them?
4. How often do they get on your nerves?

*Friend harmony*

1. How much do your friends really care about you?
2. How much do they understand the way you feel about things?
3. How much can you rely on them for help if you have a serious problem?
4. How much can you open up to them if you need to talk about your worries?

*Friend strain*

1. How often do your friends make too many demands of you?
2. How often do they criticize you?
3. How often do they let you down when you are counting on them?
4. How often do they get on your nerves?

Harmony scales: 1 = Not at all; 2 = A little; 3 = Some; 4 = A lot

Strain scales: 1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Often

**Study 2**

*Self-Construal (Singelis, 1994)*

Instructions:

Please indicate how much each of the following statements is descriptive of you on a scale of 1, *not at all descriptive of me,* to 7, *perfectly descriptive of me*

*Interdependent*

1. I have respect for the authority figures with whom I interact
2. It is important for me to maintain harmony within my group
3. My happiness depends on the happiness of those around me
4. I respect people who are modest about themselves
5. I will sacrifice my self-interest for the benefit of the group I am in
6. I often have the feeling that my relationships with others are more important than my own accomplishments
7. It is important to me to respect decisions made by the group
8. I will stay in a group if they need me, even when I'm not happy with the group
9. If my brother or sister fails, I feel responsible
10. Even when I strongly disagree with group members, I avoid an argument

*Independent*

11. I'd rather say "No" directly than risk being misunderstood
12. Having a lively imagination is important to me
13. I am comfortable with being singled out for praise or rewards
14. Being able to take care of myself is a primary concern for me
15. I act the same way no matter who I am with
16. I feel comfortable using someone's first name soon after I meet them
17. I prefer to be direct and forthright when dealing with people I've just met
18. I enjoy being unique and different from others in many respects
19. My personal identity independent of others, is very important to me
20. I value being in good health above everything else

*Loyola Generativity Scale (McAdams & de St Aubin, 1992)*

1. I try to pass along the knowledge I have gained through my experiences.
2. I do not feel that other people need me.*
3. I think I would like the work of a teacher.
4. I feel as though I have made a difference to many people.
5. I do not volunteer to work for a charity.*
6. I have made and created things that have had an impact on other people.
7. I try to be creative in most things that I do.
8. I think that I will be remembered for a long time after I die.
9. I believe that society cannot be responsible for providing food and shelter for all homeless people.*
10. Others would say that I have made unique contributions to society.
11. If I were unable to have children of my own, I would like to adopt children.
12. I have important skills that I try to teach others.
13. I feel that I have done nothing that will survive after I die.*
14. In general, my actions do not have a positive effect on others.*
15. I feel as though I have done nothing of worth to contribute to others.*
16. I have made many commitments to many different kinds of people, groups, and activities in my life.
17. Other people say that I am a very productive person.
18. I have a responsibility to improve the neighborhood in which I live.
19. People come to me for advice.
20. I feel as though my contributions will exist after I die.

Coding: 1 Not at all; 2 A little; 3 Some; 4 A lot.

*Indicates reverse scored item

*Portrait Values Questionnaire (PVQ; Schwartz, 2003)*

Instructions: Here we briefly describe some people. Please read each description and think about how much each person is or is not like you. Please indicate how much the person in the description is like you on the scale of 1, *not like me at all*, to 6, *very much like me*.

1. Thinking up new ideas and being creative is important to him/her. He/she likes to do things in his own original way.
2. It is important to him/her to be rich. He/she wants to have a lot of money and expensive things.
3. He/she thinks it is important that every person in the world be treated equally. He/she believes everyone should have equal opportunities in life.
4. It's important to him/her to show his/her abilities. He/she wants people to admire what he/she does.
5. It is important to him/her to live in secure surroundings. He/she avoids anything that might endanger his/her safety.
6. He/she likes surprises and is always looking for new things to do. He/she thinks it is important to do lots of different things in life.
7. He/she believes that people should do what they're told. He/she thinks people should follow rules at all times, even when no-one is watching.
8. It is important to him/her to listen to people who are different from him/her. Even when he/she disagrees with them, he/she still wants to understand them.
9. It is important to him/her to be humble and modest. He/she tries not to draw attention to himself/herself.
10. Having a good time is important to him/her. He/she likes to “spoil” himself/herself.
11. It is important to him/her to make his/her own decisions about what he/she does. He/she likes to be free to plan and not depend on others.
12. It's very important to him/her to help the people around him/her. He/she wants to care for their well-being.
13. Being very successful is important to him/her. He/she hopes people will recognize his/her achievements.
14. It is important to him/her that the government insure his/her safety against all threats. He/she wants the state to be strong so it can defend its citizens.
15. He/she looks for adventures and likes to take risks. He/she wants to have an exciting life.
16. It is important to him/her always to behave properly. He/she wants to avoid doing anything people would say is wrong.
17. It is important to him/her to get respect from others. He/she wants people to do what he says.
18. It is important to him/her to be loyal to his/her friends. He/she wants to devote himself/herself to people close to him/her.
19. He/she strongly believes that people should care for nature. Looking after the environment is important to him/her.
20. Tradition is important to him/her. He/she tries to follow the customs handed down by his/her religion or his/her family.
21. He/she seeks every chance he/she can to have fun. It is important to him/her to do things that give him/her pleasure.

*Conformity:* 7,16
*Tradition:* 9,20
*Benevolence:* 12,18
*Universalism:* 3,8,9
*Self-direction:* 1,11
*Stimulation:* 6,15
*Hedonism:* 10,21
*Achievement:* 4,13
*Power:* 2,17
*Security:* 5,14

*Self-transcendence:* Combine benevolence and universalism
*Self-enhancement:* Combine achievement and power
*Openness to Change:* Combine self-direction, stimulation, and hedonism
*Conservation:* Combine security, conformity, and tradition

*Horizontal Collectivism (Triandis & Gelfand, 1998)*

Instructions: Please read each statement below and think about how likely it is that you might experience each one on the scale of 1, *never* or *definitely no,* to 9, *always* or *definitely yes*.

1. If a close other gets a prize, I would feel proud.
2. The well-being of my close others is important to me.
3. To me, pleasure is spending time with close others.
4. I feel good when I cooperate with close others.

*Note:* For item 1, I replaced "coworker" in the original item text with "close other." For item 4, I added the word "close" to refer to "others" (original item referred to just "others"). These changes were done so that the items were more age neutral and more aligned with the importance of close relationships with age.

*Agreeableness and Conscientiousness from the Big Five Mini-IPIP (Donnellan et al., 2006)*

Instructions: Below are phrases describing people's behavior. Please use the rating scale below to describe how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age. Please read each statement carefully, and select a number from 1 to 5 to describe how accurately the statement describes you.

1 = Very inaccurate
2 = Moderately inaccurate
3 = Neither inaccurate nor accurate
4 = Moderately accurate
5 = Very accurate

1. Sympathize with others' feelings. (A)
2. Get chores done right away. (C)
3. Am not interested in other people's problems.* (A)
4. Often forget to put things back in their place.* (C)
5. Feel others' emotions. (A)
6. Like order. (C)
7. Am not really interested in others.* (A)
8. Make a mess of things. (C)

*Item is reverse scored

*Empathic Concern - Empathic Response Questionnaire (ERQ; Coke et al., 1978)*

Instructions for Katie Banks scenario: In a few moments, you will read about a particular individual. As you read the story, please imagine how that person feels. Picture to yourself how that person feels. As you read the story, concentrate on the person's experiences. You should try to identify with the feelings and reactions that this person is experiencing. In your mind's eye, try to visualize how it would feel for you to be in this situation.

Scenario text: Katie Banks is a senior in college. Katie's parents were recently killed in a tragic car accident. Katie's father did not have life insurance, and Katie is desperately struggling to support her surviving younger brother and sister while finishing her last semester of college. Katie badly needs money, but she also needs transportation to the grocery store and laundry, and sitters to stay with her younger brother and sister while she attends her two night classes. Katie believes that it will be impossible to support her brother and sister unless she graduates and gets a good enough job. Katie fears that she will need to give up her brother and sister for adoption if she does not graduate.

Below are a few emotions. Please indicate how much you felt each emotion when hearing about Katie's story on the scale of 1, *did not experience this emotion at all,* to 7, *experienced this emotion very much*

1. *Sympathetic*
2. *Moved*
3. *Compassionate*
4. *Tender*
5. *Warm*
6. *Softhearted*
7. *Anxious*
8. *Upset*
9. *Bothered*
10. *Disturbed*
11. *Uneasy*
12. *Distressed*

*Sympathetic, moved, compassionate, tender, warm,* and *softhearted* can either be considered a single measure of empathic concern or can be split into sympathy (*sympathetic, compassionate, moved*) and tenderness (*tender, warm, softhearted*) as demonstrated by Niezink et al. (2012). Items 7-12 are intended to be filler items.

*Gratitude (from Values in Action Inventory of Strengths; Peterson & Seligman, 2004)*

Instructions: Please read each statement below and indicate how much each statement is like you on the scale of 1, *very much unlike me,* to 5, *very much like me.*

1. I express my thanks to those who care about me
2. I have been richly blessed in my life
3. I stop to count my blessings
4. I am an extremely grateful person
5. I feel thankful for what I have received in life
6. I feel a profound sense of appreciation every day
7. I do not see the need to acknowledge others who are good to me*
8. I find few things in my life to be grateful for*

*Item is reverse scored

*Guilt (Test of Self-Conscious Affect; Tangney et al., 2007)*

Instructions: Below are situations that people likely encounter in day-to-day life, followed by common reactions to those situations. As you read each scenario, try to imagine yourself in that situation. Then indicate how likely you would be to react in the way described.

1.You make plans to meet a friend for lunch. At five o'clock, you realize you have stood your friend up.
    a. You'd think you should make it up to your friend as soon as possible.

2.You break something at work and then hide it.
    a. You would think: "This is making me anxious. I need to either fix it or get someone else to."

3. At work you wait until the last minute to plan a project, and it turns out badly.
    a. You would feel: "I deserve to be reprimanded for mismanaging the project."

4.You make a mistake at work and find out a co-worker is blamed for the error.
    a. You would feel unhappy and eager to correct the situation.

5.While playing around, you throw a ball, and it hits your friend in the face.
    a. You would apologize and make sure your friend feels better.

6. You are driving down the road, and you hit a small animal.
    a. You'd feel bad you hadn't been more alert driving down the road.

7. You walk out of an exam thinking you did extremely well, then you find out you did poorly.
    a. You would think: "I should have studied harder."

8. While out with a group of friends, you make fun of a friend who's not there.
    a. You would apologize and talk about that person's good points.

9. You make a big mistake on an important project at work. People were depending on you, and your boss criticizes you.
    a. You would think: "I should have recognized the problem and done a better job."

10. You are taking care of your friend's dog while they are on vacation and the dog runs away.
    a. You would vow to be more careful next time.

11. You attend your co-worker's housewarming party, and you spill red wine on a new cream-colored carpet, but you think no one notices.
    a. You would stay late to help clean up the stain after the party.

**Study 3a**

*Modified Differential Emotion Scale (mDES; Fredrickson et al., 2003)*

*Instructions:* We would first like to get a sense of how you are feeling right now. In any given circumstance, people often have a number of different feelings. Please think about how you generally feel in the **current moment** and indicate how much of each emotion you are feeling.

Use the following 0 to 4 scale to make your ratings:

**0 = Not at all**
**1 = A little bit**
**2 = Moderately**
**3 = Quite a bit**
**4 = Extremely**

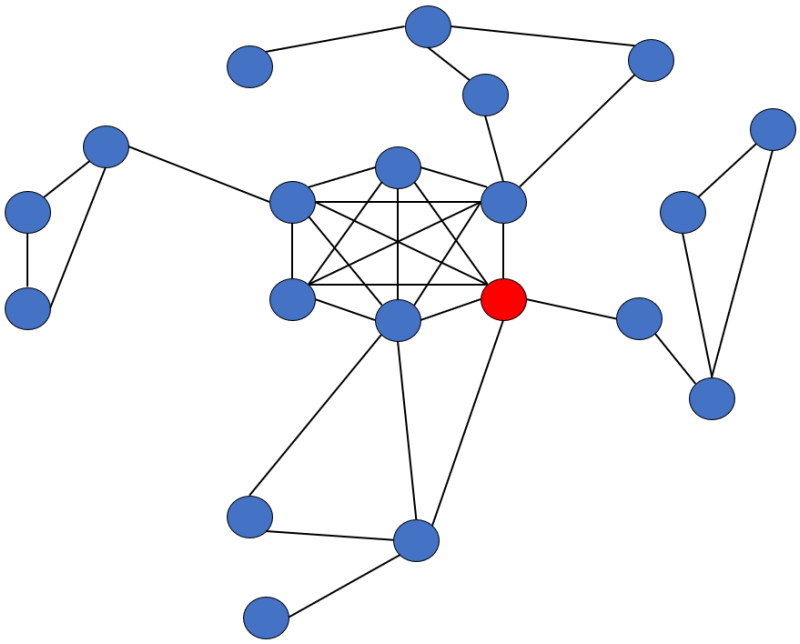
1. To what extent do you feel amused, fun-loving, silly?[P]
2. To what extent do you feel angry, irritated, annoyed?[N]
3. To what extent do you feel ashamed, humiliated, disgraced?[N]
4. To what extent do you feel awe, wonder, amazement?[P]
5. To what extent do you feel contemptuous, scornful, disdainful?[N]
6. To what extent do you feel content, serene, peaceful?[P]
7. To what extent do you feel disgust, distaste, revulsion?[N]
8. To what extent do you feel embarrassed, self-conscious, blushing?[N]
9. To what extent do you feel glad, happy, joyful?[P]
10. To what extent do you feel grateful, appreciative, thankful?[P]
11. To what extent do you feel hopeful, optimistic, encouraged?[P]
12. To what extent do you feel interested, alert, curious?[P]
13. To what extent do you feel love, closeness, trust?[P]
14. To what extent do you feel proud, confident, self-assured?[P]
15. To what extent do you feel repentant, guilty, blameworthy?[N]
16. To what extent do you feel sad, downhearted, unhappy?[N]
17. To what extent do you feel scared, fearful, afraid?[N]
18. To what extent do you feel sexual, desiring, flirtatious?[P]
19. To what extent do you feel surprised, amazed, astonished?
20. To what extent do you feel sympathy, concern, compassion?[P]

*Note.* P = Positive; N = Negative. Responses to the items are averaged across to create separate subscales for positive and negative emotions, with higher scores indicating higher levels of emotions experienced.

*Interdependence Manipulation*

Instructions: In life, we belong to many different social networks. A social network is a group of people with whom we are connected in some way. We can be connected to people in the network either directly, when we know someone else personally, or indirectly, when we know someone else through a person we are directly connected to (for example, a friend of a friend).

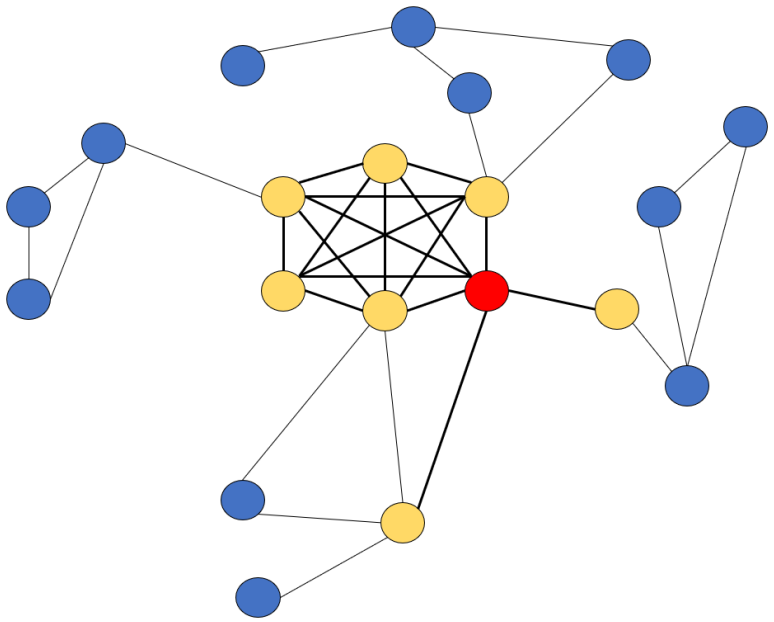
Below is an example of a social network, displayed visually. In the figure, the red dot might represent your place in the network.



**Page break in Qualtrics**
**Participants will be randomly assigned to one of the following conditions**

*Interdependence Condition*

Social network graphs are often used to visualize ***close relationships***. For example, if you were to imagine yourself as the red dot in the figure below, the yellow dots would represent your ***closest*** relationships in the network.



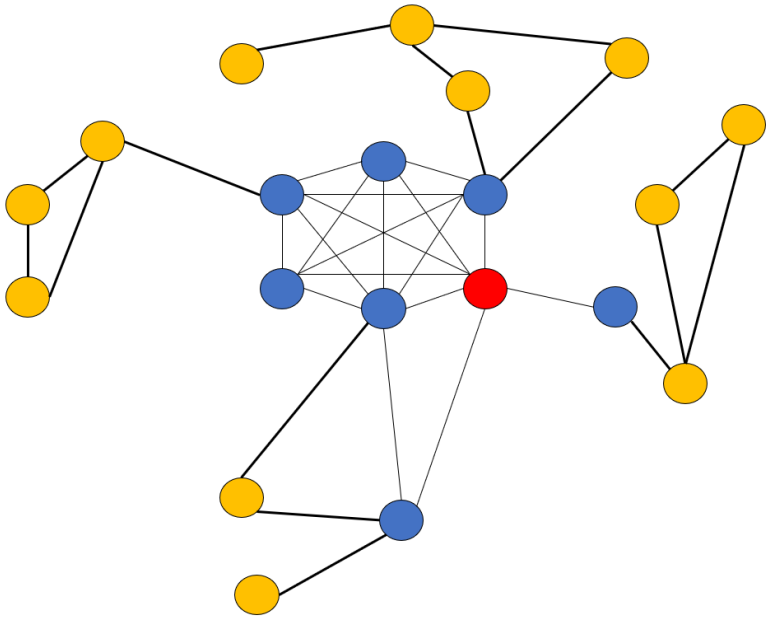
**Each paragraph below would be displayed "on click" in Qualtrics**

These people are ***people you know very well and could be your closest family or your best friends***. They are likely ***very central*** to your life. In other words, your lives are mostly ***interdependent,*** meaning that your decisions and actions really ***do*** affect them, and their decisions and actions really ***do*** affect you.

Take a moment to think of someone in one of your own social networks that fits this description. ***Imagine how your decisions and actions are dependent on each other's. Then, think of ways that your decisions and actions might affect each other's throughout your lives—***for example, try to think of things like career changes, the decisions you might make, or the places you might go. After you have done this, please write 3-4 complete sentences about who this person is and ***how/why your decisions and actions are dependent on each other's***.

*Non-Interdependence Condition*

Social network graphs are often used to visualize ***distant relationships***. For example, if you were to imagine yourself as the red dot in the figure below, the yellow dots would represent your ***most distant*** relationships in the network.



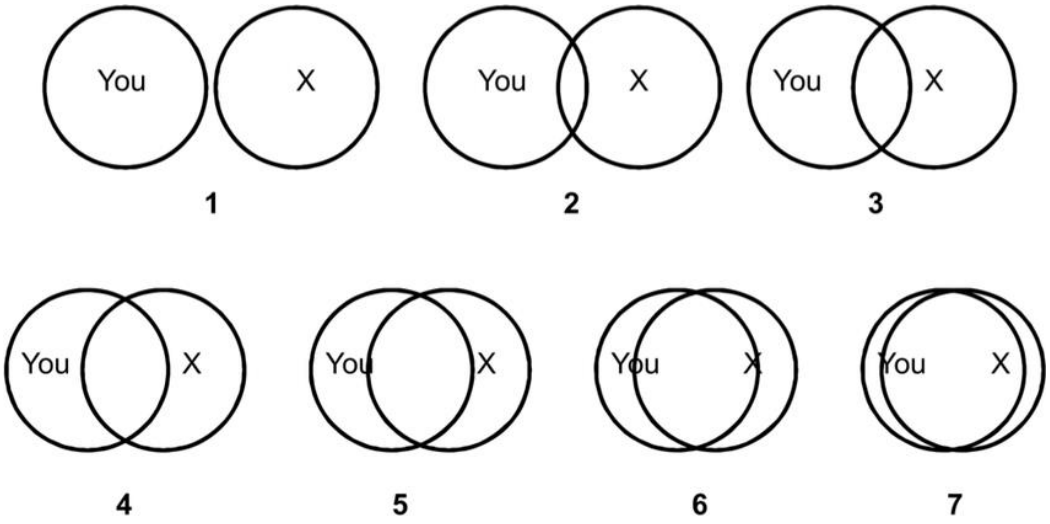
**Each paragraph below would be displayed "on click" in Qualtrics**

These people ***could be acquaintances—people whose name you know but do not know well, like a friend of a friend***. They are likely ***not very central*** to your life. In other words, your lives are mostly ***independent,*** meaning that your decisions and actions really ***do not*** affect them, and their decisions and actions really ***do not*** affect you.

Take a moment to think of someone in one of your own social networks that fits this description***. Imagine things that might happen to them throughout their life—***for example, try to think of things like career changes, the decisions they might make, or the places they might go. After you have done this, please write 3-4 complete sentences about who this person is and ***the kinds of things you imagine might happen to them throughout their life***.

*Inclusion of Others in Self Scale (IOS; Aron et al., 1992)*

Please indicate which pair of circles best represents your relationship with the person you thought about during the network task.




*Task Difficulty*

How difficult was it to answer the prompt about the person you chose to write about on a scale of 1, *Not at all difficult,* to 7, *extremely difficult*?

*Age Progression Manipulation*

# *Task 2: Future Self*

Instructions: In this study, we are interested in testing people's ability to imagine themselves at different points in the future. As a part of this study, we will ask you to take a picture of yourself and to imagine that the picture is of you in the future. In a moment, we will give you some instructions to take a picture of yourself using your computer's camera that you will use for the study.

**p's click the arrow to reveal the instruction**

Please open your computer's camera so that you can take a picture of yourself to use for the study. For the picture, please remove hats or glasses and face the camera straight on. Please also keep a straight face in the picture. Below is an example of an acceptable picture.

Once you have taken a picture of yourself that follows the instructions we gave you, save the picture to your computer.

**Current Self Task (Completed first):**

Now we would like you to imagine that the picture is from the ***very near*** future.

Please open the picture that you saved and take a few moments to look at it.

When you look at the picture, pretend that this is a picture of you that was taken ***2-months in the future.*** Think about how your life might be the same or different ***2-months*** from now. Try to think about things that might change or stay the same, such as your priorities, responsibilities, personality, or relationships.

Please try to imagine as vividly as you can and write a 3-4 sentence description below. We are interested in evaluating your written responses, so please be as detailed as possible so we can accurately evaluate your ability to imagine.

**Page break in Qualtrics**

*Perceived age, i.e., how old do you feel?*

After looking at the picture and thinking about yourself in 2-months, how old do you feel (in

years)?

Please only enter a number (e.g., __ years-old)

After thinking about yourself in 2-months, how much older do you feel?

-slider bar from 0-100 with anchors, not at all, a little bit, somewhat, quite a bit, a lot

*Time Horizon Questions (7-point rating scale ranging from 1, Not at all, to 7, Extremely)*

1. In this current moment, I feel that my time horizon is vast and expansive
2. In this current moment, I feel that my time horizon is narrow and limited
3. In this current moment, I feel like I have a lot of time left to achieve my goals
4. In this current moment, I feel like it is important to cherish the things that I have (present focus).
5. In the current moment, I want to focus on gaining new knowledge and resources (future focus).
6. In the current moment, I want to focus on my emotional well-being.

*Personal Distress (from Batson et al., 1987)*

In the current moment, please rate how much you are feeling each of these adjectives on the scale of 1, *Not at all*, to 7, *Extremely*

1. Upset
2. Grieved
3. Sorrow
4. Distressed
5. Worried
6. Anxious

*Williams' (2009) Need Satisfaction Scale*

Instructions: *For each question, please indicate the number that best represents your feelings after reflecting on yourself 2-months in the future. (1, not at all, to 5, extremely)*

*Belonging*

1. I felt "disconnected" (R)
2. I felt rejected (R)
3. I felt like an outsider (R)
4. I felt like I belonged*

*Self-esteem*

5. I felt good about myself
6. My self-esteem was high
7. I felt liked
8. I felt insecure (R)
9. I felt satisfied

*Meaningful existence*

10. I felt invisible (R)
11. I felt meaningless (R)
12. I felt nonexistent (R)
13. I felt important
14. I felt useful

*indicates a modified item.

Item 4 of belonging subscale originally read "I felt like I belonged to the group."

*Task Difficulty*

How difficult was it to imagine yourself 2-months in the future on a scale of 1, *Not at all difficult*, to 7, *extremely difficult*?

**Age-Progressed Self Condition (Completed second):**

Next, we would like you to imagine that the picture is from the ***very distant*** future.

To help you do this, we will use a software to age-progress your picture. Please open this link *link displayed here* and click through the prompts to upload the picture you took. Please select "Ageing Only" when asked about lifestyle options. Once the website has processed your photo, drag the slider to view your age-progressed picture. Please take a screenshot of the picture and save it to your computer. Once you have saved you screenshot, please close the age-progression app and return to this page to proceed with the study.

**Page break in Qualtrics**

Reminder: Please make sure to take a screenshot of your age-progressed picture and close the age-progression app before you continue!

**Page break in Qualtrics**

Please open the screenshot of your age-progressed face that you saved to your computer.

**Page break in Qualtrics**

These age progression algorithms tend to over-exaggerate the aging effect. It's more likely that this picture is closer to a picture of your face 15 to 20 years in the future. When you look at the picture, pretend that this is a picture of you that was taken ***20 years in the future.*** Think about how your life might be the same or different ***20 years*** from now. Try to think about things that might change or stay the same, such as your priorities, responsibilities, personality, or relationships.

Please try to imagine as vividly as you can and write a 3-4 sentence description below. We are interested in evaluating your written responses, so please be as detailed as possible so we can accurately evaluate your ability to imagine.

**Page break in Qualtrics**

*Perceived age, i.e., how old do you feel?*

After looking at the picture and thinking about yourself in 20 years, how old do you feel (in years)?
Please only enter a number (e.g., __ years-old)

After thinking about yourself in 20 years, how much older do you feel?
-slider bar from 0-100 with anchors, not at all, a little bit, somewhat, quite a bit, a lot

*Task Difficulty*
How difficult was it to imagine yourself 20 years in the future on a scale of 1, *Not at all difficult,* to 7, *extremely difficult*?

*Instruction following*
When you looked at your +10 years age-progressed photo, did you also look at your 20+ years age-progressed photo?
Note: This will not affect your credit/payment, but it is important for our research to know if you looked at both age-progressed images so we would appreciate your honesty.

Please attach your age-progressed photo for this question. As a reminder, we will not analyze any data in the photo and your photo will be deleted after data collection is finished. We only ask that you submit your photo as proof that you completed the task as instructed.

**Study 3b**

**see Study 3a above for the mDES, interdependence manipulation, and age progression manipulation**

*Interdependent Self-construal*

Instructions: **Thinking about yourself [2-months / 20 years] in the future**, please indicate how much each of the following statements is descriptive of you on a scale of 1, *not at all descriptive of me,* to 7, *perfectly descriptive of me*

*Interdependent*

1. I have respect for the authority figures with whom I interact
2. It is important for me to maintain harmony within my close relationships
3. My happiness depends on the happiness of my close others
4. I respect people who are modest about themselves
5. I will sacrifice my self-interest for the benefit of my close relationships
6. I often have the feeling that my relationships with my close others are more important than my own accomplishments
7. It is important to me to respect decisions made by my close others
8. I will stay with my close others if they need me, even when I'm not happy with them
9. If my close other fails, I feel responsible
10. Even when I strongly disagree with my close others, I avoid an argument

*Portrait Values Questionnaire (PVQ; Schwartz, 2003)*

Instructions: Here we briefly describe some people. Please read each description and think about how much each person is or is not like yourself [**2-months / 20 years] in the future**. Please indicate how much the person in the description is like yourself [**2-months / 20 years] in the future** on the scale of 1, *not like me at all*, to 6, *very much like me*.

1. It is important to him/her to be rich. He/she wants to have a lot of money and expensive things.
2. He/she thinks it is important that every person in the world be treated equally. He/she believes everyone should have equal opportunities in life.
3. It's important to him/her to show his/her abilities. He/she wants people to admire what he/she does.
4. It is important to him/her to listen to people who are different from him/her. Even when he/she disagrees with them, he/she still wants to understand them.
5. It's very important to him/her to help the people around him/her. He/she wants to care for their well-being.
6. Being very successful is important to him/her. He/she hopes people will recognize his/her achievements.
7. It is important to him/her to get respect from others. He/she wants people to do what he says.
8. It is important to him/her to be loyal to his/her friends. He/she wants to devote himself/herself to people close to him/her.
9. He/she strongly believes that people should care for nature. Looking after the environment is important to him/her.

*Benevolence:* 5,8
*Universalism:* 2,4,9
*Achievement:* 3,6
*Power:* 1,7

*Self-transcendence:* Combine benevolence and universalism
*Self-enhancement:* Combine achievement and power

*Drawing Task #1 (Completed after 2-months age progression task)*

Instructions: As a part of this study, you will have a chance to earn up to an extra $15 through a drawing. You will also be able to decide to give some of that money as a charitable donation or to keep some of that money for yourself as a bonus payment if you win the drawing.

In a moment, we will present you with two different charities and a brief description of their missions. You will be able to indicate how much money you want to donate to either charity or keep as a bonus payment if you win the drawing. You are free to allocate money to any of the three options, but the total of your choices must be $15.

For example, someone might choose to allocate $6 to charity A, $4 to charity B, and $5 as a bonus for themselves ($6 + $4 + $5 = $15).

If you win the drawing, the amount you allocated for donation will actually be donated to the charities. For example, if the person in the previous example won the drawing, then we would donate $6 to Charity A and $4 to Charity B on their behalf, and pay them a $5 bonus.

**Page break in Qualtrics**

**Note: the order of the charities (NRDC & Sierra Club / Nature Conservancy & Friends of the Earth) was counterbalanced**

**Here is some more information about the charities you can possibly donate to before you make your decision.**

**Natural Resources Defense Council (NRDC)**


**To protect future generations, we work to cut carbon pollution and expand clean energy.**

The NRDC focuses on conservation and sustainability to protect the Earth for future generations

**The Sierra Club**


From city parks to forests of redwoods, from the air we breathe to the water we drink, everyone depends on a vibrant and healthy world.

The Sierra Club focuses on making the Earth's natural habitats cleaner here and now

Now it is time for you to make your decisions. Please indicate below how much of the $15 you would like to allocate to each option. Remember, the total amount you allocate cannot exceed $15, and that your choices will be carried out if you win the drawing.


Donate $X to the Natural Resources Defense Council
$0----------$5----------$10----------$15


Donate $X to The Sierra Club
$0----------$5----------$10----------$15

Keep $X as a bonus payment
$0----------$5----------$10----------$15

Independent of your donation decisions, which charity do you feel more drawn to?

(Note: we are interested in your intuitive response here, so it's better to respond with your first thought)

Sierra Club -3 -------- -2 -------- -1 -------- 0 -------- 1 -------- 2 -------- 3 NRDC

*Drawing Task #2 (Completed after 20 year age progression task)*

It is now time for the second drawing. The rules for this drawing are exactly the same as the first. You will have a chance to earn an extra $15 and you can decide to give some of that money as a charitable donation or keep some of that money for yourself as a bonus payment if you win the drawing. The charities you can choose to donate to are different from those in the first drawing.

In a moment, we will present you with the two charities and a brief description of their missions. You will be able to indicate how much money you want to donate to either charity or keep as a bonus payment if you win the drawing. You are free to allocate money to any of the three categories, but the total of your choices must be $15.

A separate winner will be chosen for this drawing. The same person cannot win twice. **Please do not feel like you need to make the similar decisions as you did for the first drawing, as the drawings are completely separate from each other.**

**Page break in Qualtrics**

**Here is some more information about the charities you can possibly donate to before you make your decision.**

**The Nature Conservancy**


Conserving the lands and waters on which all life depends

The Nature Conservancy focuses on preserving natural habitats here and now

**Friends of the Earth**


Friends of the Earth strives for a more healthy world

Friends of the Earth focuses on making the planet healthier for future generations

Now it is time for you to make your decisions. Please indicate below how much of the $15 you would like to allocate to each option. Remember, the total amount you allocate cannot exceed $15 and that your choices will be carried out if you win the raffle.


Donate $X to The Nature Conservancy
$0----------$5----------$10----------$15


Donate $X to Friends of the Earth
$0----------$5----------$10----------$15

Keep $X as a bonus payment
$0----------$5----------$10----------$15

Independent of your donation decision, which charity do you feel more drawn to?
(Note: we are interested in your intuitive response here, so it's better to respond with your first thought)

The Nature Conservancy -3 ----- -2 ----- -1 ----- 0 ----- 1 ----- 2 ----- 3 Friends of the Earth

*Instruction following*

When you looked at your +10 years age-progressed photo, did you also look at your 20+ years age-progressed photo?
Note: This will not affect your credit/payment, but it is important for our research to know if you looked at both age-progressed images so we would appreciate your honesty.

- Yes
- No

**Page break in Qualtrics**

Please attach your age-progressed photo for this question. As a reminder, we will not analyze any data in the photo and your photo will be deleted after data collection is finished. We only ask that you submit your photo as proof that you completed the task as instructed.

*Donation Behavior*

How often do you donate to charity in a typical year?

- Never
- Rarely (once or twice a year)
- Often (A few times a year)
- Regularly (once a month or more frequently)

*Familiarity with Charities*

Before participating in this study, how familiar were you with the Natural Resources Defense Council (NRDC) charity?

Not at All Familiar -1 -------- 2 -------- 3 -------- 4 -------- 5 -------- 6 -------- 7 Very Familiar

Before participating in this study, how familiar were you with The Sierra Club charity?

Not at All Familiar -1 -------- 2 -------- 3 -------- 4 -------- 5 -------- 6 -------- 7 Very Familiar

Before participating in this study, how familiar were you with The Nature Conservancy charity?

Not at All Familiar -1 -------- 2 -------- 3 -------- 4 -------- 5 -------- 6 -------- 7 Very Familiar

Before participating in this study, how familiar were you with the Friends of the Eart charity?

Not at All Familiar -1 -------- 2 -------- 3 -------- 4 -------- 5 -------- 6 -------- 7 Very Familiar

# Appendix B: Confirmatory and Exploratory Factor Analyses

*Confirmatory Factor Analyses for Scale Measures Used in Study 2*

| Scale Measure | $\chi^2$ | *df* | CFI (> .9) | RMSEA (< .06) | SRMR (< .08) |
|---|---|---|---|---|---|
| 1. Interdependent Self-Construal | 182.48* | 35 | .804 | .103 | .071 |
| 2. Generativity | 761.31* | 170 | .826 | .094 | .066 |
| 3. Self-Transcendence | 19.04* | 5 | .961 | .084 | .042 |
| 4. Self-Enhancement | 17.23* | 2 | .970 | .138 | .032 |
| 5. Horizontal Collectivism | 17.07* | 2 | .974 | .138 | .031 |
| 6. Agreeableness | 115.92* | 2 | .819 | .379 | .092 |
| 7. Conscientiousness | 1.46 | 2 | 1.00 | .000 | .010 |
| 8. Empathic Concern | 94.64* | 9 | .938 | .155 | .050 |
| 9. Gratitude | 152.67* | 20 | .906 | .129 | .059 |
| 10. Guilt | 128.64* | 44 | .887 | .070 | .055 |

*Exploratory Factor Analyses for Scales that Failed to Meet Psychometric Criteria for Reliability in Study 2*

*Interdependent Self-Construal*

| Item | Factor 1 |
|---|---|
| I have respect for the authority figures with whom I interact | .576 |
| It is important for me to maintain harmony within my group | .681 |
| My happiness depends on the happiness of those around me | |
| I respect people who are modest about themselves | |
| I will sacrifice my self-interest for the benefit of the group I am in | .596 |
| I often have the feeling that my relationships with others are more important than my own accomplishments | |
| It is important to me to respect decisions made by the group | .693 |
| I will stay in a group if they need me, even when I'm not happy with the group | |
| If my brother or sister fails, I feel responsible | |
| Even when I strongly disagree with group members, I avoid an argument | |

*Loyola Generativity Scale*

| Item | Factor 1 | Factor 2 | Factor 3 | Factor 4 |
|---|---|---|---|---|
| I try to pass along the knowledge I have gained through my experiences | .546 | | | |
| I do not feel that other people need me* | | .740 | | |
| I think I would like the work of a teacher | | | | |
| I feel as though I have made a difference to many people | .516 | | | |
| I do not volunteer to work for a charity* | | | | |
| I have made and created things that have had an impact on other people | | | .648 | |
| I try to be creative in most things that I do | | | .532 | |
| I think that I will be remembered for a long time after I die | | | | .609 |
| I believe that society cannot be responsible for providing food and shelter for all homeless people* | | | | |
| Others would say that I have made unique contributions to society | | | | |
| If I were unable to have children of my own, I would like to adopt children | | | | |
| I have important skills that I try to teach others | .648 | | | |
| I feel that I have done nothing that will survive after I die* | | .697 | | |
| In general, my actions do not have a positive effect on others* | | .646 | | |
| I feel as though I have done nothing of worth to contribute to others* | | .743 | | |
| I have made many commitments to many different kinds of people, groups, and activities in my life | .519 | | | |
| Other people say that I am a very productive person | .571 | | | |
| I have a responsibility to improve the neighborhood in which I live | .504 | | | |
| People come to me for advice | .511 | | | |
| I feel as though my contributions will exist after I die | | | | .583 |

*indicates reverse coded item

*Big Five Mini IPIP: Agreeableness*

| Item | Factor 1 |
|---|---|
| I sympathize with others' feelings | .679 |
| I am not interested in other peoples' problems* | .771 |
| I feel others' emotions | .618 |
| I am not really interested in others* | .813 |

*indicates reverse coded item

*TOSCA-3, Guilt Self-Talk*

| Item | Factor 1 |
|---|---|
| "Stood up friend" | .550 |
| "Broke something" | .510 |
| "Procrastination failure" | |
| "Co-worker blamed for your mistake" | .710 |
| "Accidental harm" | .662 |
| "Hit animal while driving" | |
| "Did poorly on exam" | |
| "Make fun of someone" | |
| "Make a big mistake at work" | |
| "Accidentally let friend's dog run away" | .505 |
| "Spilled wine on friend's carpet" | |

Note: These names only summarize the general idea of the scenario. Please see the Supplemental Materials document for the full text of all items.

*Exploratory Factor Analyses for Scales with Multiple Items in Study 3a*

*Modified Differential Emotion Scale*

| Item | Factor 1 | Factor 2 |
|---|---|---|
| 1. To what extent do you feel amused, fun-loving, silly? | | .668 |
| 2. To what extent do you feel angry, irritated, annoyed? | .698 | |
| 3. To what extent do you feel ashamed, humiliated, disgraced? | .798 | |
| 4. To what extent do you feel awe, wonder, amazement? | | .660 |
| 5. To what extent do you feel contemptuous, scornful, disdainful? | .677 | |
| 6. To what extent do you feel content, serene, peaceful? | | .635 |
| 7. To what extent do you feel disgust, distaste, revulsion? | .648 | |
| 8. To what extent do you feel embarrassed, self-conscious, blushing? | .727 | |
| 9. To what extent do you feel glad, happy, joyful? | | .819 |
| 10. To what extent do you feel grateful, appreciative, thankful? | | .697 |
| 11. To what extent do you feel hopeful, optimistic, encouraged? | | .864 |
| 12. To what extent do you feel interested, alert, curious? | | .650 |
| 13. To what extent do you feel love, closeness, trust? | | .504 |
| 14. To what extent do you feel proud, confident, self-assured? | | .716 |
| 15. To what extent do you feel repentant, guilty, blameworthy? | .814 | |
| 16. To what extent do you feel sad, downhearted, unhappy? | .829 | |
| 17. To what extent do you feel scared, fearful, afraid? | .730 | |
| 18. To what extent do you feel sexual, desiring, flirtatious? | | |
| 19. To what extent do you feel surprised, amazed, astonished? | | .565 |
| 20. To what extent do you feel sympathy, concern, compassion? | .571 | |

*Interdependent Self-Construal*

| Item | Factor 1 |
|---|---|
| 1. I have respect for the authority figures with whom I interact | |
| 2. It is important for me to maintain harmony within my group | |
| 3. My happiness depends on the happiness of those around me | .543 |
| 4. I respect people who are modest about themselves | |
| 5. I will sacrifice my self-interest for the benefit of the group I am in | .695 |
| 6. I often have the feeling that my relationships with others are more important than my own accomplishments | .643 |
| 7. It is important to me to respect decisions made by the group | |
| 8. I will stay in a group if they need me, even when I'm not happy with the group | .615 |
| 9. If my brother or sister fails, I feel responsible | |
| 10. Even when I strongly disagree with group members, I avoid an argument | .566 |

*Distress*

| Item | 2 Months | | 20 Years | |
|---|---|---|---|---|
| | Factor 1 | Factor 2 | Factor 1 | Factor 2 |
| 1. Upset | 0.565 | 0.578 | 0.674 | |
| 2. Grieved | | **0.834** | **0.725** | |
| 3. Sorrow | | **0.771** | **0.822** | |
| 4. Distressed | 0.666 | | 0.634 | 0.587 |
| 5. Worried | **.897** | | | **0.909** |
| 6. Anxious | **.765** | | | **0.798** |

*Note. Bold items indicate consistent loading across measurement points.*

*Vast and Narrow Time Horizons*

| Item | 2 Months | | 20 Years | |
|---|---|---|---|---|
| | Factor 1 | Factor 2 | Factor 1 | Factor 2 |
| 1. In this current moment, I feel that my time horizon is vast and expansive | 0.819 | | 0.945 | |
| 2. In this current moment, I feel that my time horizon is narrow and limited | | | -0.522 | |
| 3. In this current moment, I feel like I have a lot of time left to achieve my goals | .647 | | 0.593 | |
| 4. In this current moment, I feel like it is important to cherish the things that I have | | 0.985 | | |
| 5. In the current moment, I want to focus on gaining new knowledge and resources | | | | |
| 6. In the current moment, I want to focus on my emotional well-being | | | | 0.798 |

*Psychological Needs*

| Item | 2 Months | | | 20 Years | | |
|---|---|---|---|---|---|---|
| Belonging | Factor 1 | Factor 2 | Factor 3 | Factor 1 | Factor 2 | Factor 3 |
| I felt disconnected | | | 0.954 | | 0.607 | |
| I felt rejected | | **0.586** | | | **.512** | |
| I felt like an outsider | | **0.643** | | | **0.626** | |
| I felt like I belonged | **0.729*** | | | **0.808*** | | |
| Self-Esteem | | | | | | |
| I felt good about myself | **0.860** | | | **0.799** | | |
| My self-esteem was high | **0.850** | | | **0.836** | | |
| I felt liked | **0.753** | | | **0.856** | | |
| I felt insecure | | | | | | 0.821 |
| I felt satisfied | **0.787** | | | **0.810** | | |
| Meaning | | | | | | |
| I felt invisible | | **0.818** | | | **0.753** | |
| I felt meaningless | | | | | 0.664 | |
| I felt nonexistent | | | | | 0.762 | |
| I felt important | **0.850** | | | **0.827** | | |
| I felt useful | **0.716** | | | **0.753** | | |

*Note. Bold items indicate consistent loading across measurement points.*

*Exploratory Factor Analyses for Scales with Multiple Items in Study 3b*

*Modified Differential Emotion Scale (MDES)*

| Item | Factor 1 | Factor 2 |
|---|---|---|
| To what extent do you feel amused, fun-loving, silly? | .729 | |
| To what extent do you feel angry, irritated, annoyed? | | .703 |
| To what extent do you feel ashamed, humiliated, disgraced? | | 0.850 |
| To what extent do you feel awe, wonder, amazement? | .767 | |
| To what extent do you feel contemptuous, scornful, disdainful? | | .733 |
| To what extent do you feel content, serene, peaceful? | .681 | |
| To what extent do you feel disgust, distaste, revulsion? | | .815 |
| To what extent do you feel embarrassed, self-conscious, blushing? | | .789 |
| To what extent do you feel glad, happy, joyful? | .887 | |
| To what extent do you feel grateful, appreciative, thankful? | .847 | |
| To what extent do you feel hopeful, optimistic, encouraged? | .824 | |
| To what extent do you feel interested, alert, curious? | .578 | |
| To what extent do you feel love, closeness, trust? | .795 | |
| To what extent do you feel proud, confident, self-assured? | .785 | |
| To what extent do you feel repentant, guilty, blameworthy? | | .820 |
| To what extent do you feel sad, downhearted, unhappy? | | .776 |
| To what extent do you feel scared, fearful, afraid? | | .828 |
| To what extent do you feel sexual, desiring, flirtatious? | .521 | |
| To what extent do you feel surprised, amazed, astonished? | .688 | |
| To what extent do you feel sympathy, concern, compassion? | .622 | |

*Interdependent Self-Construal*

| Item | 2 Months | 20 Years |
|---|---|---|
| | Factor 1 | |
| I have respect for the authority figures with whom I interact | | |
| It is important for me to maintain harmony within my group | .637 | .650 |
| My happiness depends on the happiness of those around me | .667 | .771 |
| I respect people who are modest about themselves | | |
| I will sacrifice my self-interest for the benefit of the group I am in | .686 | .787 |
| I often have the feeling that my relationships with others are more important than my own accomplishments | .656 | .737 |
| It is important to me to respect decisions made by the group | .529 | .599 |
| I will stay in a group if they need me, even when I'm not happy with the group | .589 | .714 |
| If my brother or sister fails, I feel responsible | .529 | .665 |
| Even when I strongly disagree with group members, I avoid an argument | | |

*Self-Transcendence Values*

| Item | 2 Months | 20 Years |
|---|---|---|
| | Factor 1 | |
| Treat others equally | .662 | .708 |
| Listen to people who are different | .686 | .715 |
| Be humble and modest | .737 | .869 |
| Help other people | .599 | .718 |
| Loyal to friends | .555 | .615 |

*Self-Enhancement Values*

| Item | 2 Months | 20 Years |
|---|---|---|
| | Factor 1 | |
| Be rich | .576 | .612 |
| Show abilities | .676 | .772 |
| Be successful | .822 | .896 |
| Get respect from others | .592 | .688 |

*Note.* These names only summarize the actual item text. Please see the Supplemental Materials document for the full text of all items.

# Appendix C: Study 3a Robustness Check

*Robustness Check with Alternative Dependent Variable Computations for Study 3a*

| Dependent Variable | Control | | Test | | Test Statistics | | |
|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | *t* or *F* | *p* | Hedge's *g* |
| Interdependent Self-Construal (Condition Main Effect) | 4.70 | 0.84 | 5.10 | 0.73 | -2.29 | .025* | -0.51 |
| Distress (Age Main Effect) | 2.78 | 1.32 | 2.75 | 1.47 | 0.101 | .752 | |
| Distress (Interaction) | | | | | 0.423 | .517 | |
| Belonging (Age Main Effect) | 3.75 | 0.79 | 3.86 | 0.90 | 1.51 | .223 | |
| Belonging (Interaction) | | | | | 0.026 | .873 | |
| Self-Esteem (Age Main Effect) | 3.04 | 1.08 | 3.12 | 1.13 | 0.558 | .457 | |
| Self-Esteem (Interaction) | | | | | 1.60 | .209 | |
| Meaning (Age Main Effect) | 3.71 | 0.92 | 3.86 | 0.87 | 3.92 | .051 | |
| Meaning (Interaction) | | | | | 2.87 | .094 | |