Journal of Experimental Psychology: General
2016, Vol. 145, No. 10, 1351–1358

0096-3445/16/$12.00 http://dx.doi.org/10.1037/xge0000209

A General Benevolence Dimension That Links Neural, Psychological, Economic, and Life-Span Data on Altruistic Tendencies

Jason Hubbard, William T. Harbaugh, and Sanjay Srivastava
University of Oregon

David Degras
DePaul University

Ulrich Mayr
University of Oregon

Individual and life span differences in charitable giving are an important economic force, yet the underlying motives are not well understood. In an adult, life span sample, we assessed manifestations of prosocial tendencies across 3 different measurement domains: (a) psychological self-report measures, (b) actual giving choices, and (c) fMRI-derived, neural indicators of "pure altruism." The latter expressed individuals' activity in neural valuation areas when charities received money compared to when oneself received money and thus reflected an altruistic concern for others. Results based both on structural equation modeling and unit-weighted aggregate scores revealed a strong higher-order General Benevolence dimension that accounted for variability across all measurement domains. The fact that the neural measures likely reflect pure altruistic tendencies indicates that General Benevolence is based on a genuine concern for others. Furthermore, General Benevolence exhibited a robust increase across the adult life span, potentially providing an explanation for why older adults typically contribute more to the public good than young adults.

Keywords: altruism, personality, prosocial behavior, neuroimaging

Supplemental materials: http://dx.doi.org/10.1037/xge0000209.supp

The public good is funded in part through altruistic behavior, and much of this occurs through individuals in the later part of the life span. In the United States, charitable donations average about 2% of household income (Bekkers & Wiepking, 2011a) and donations more than double from about 1.7% among 21- to 29-year-olds to about 4.1% among those over 65 (e.g., Bekkers & Wiepking, 2011b; see also Freund & Blanchard-Fields, 2014; Midlarsky & Hannah, 1989). Thus, it is important to understand why some people give more than others and why contributions increase with age.

In this context, a longstanding question has been whether charitable acts are merely a means to a selfish end, such as signaling trustworthiness or wealth, or whether they are truly altruistic (Andreoni, 1990; Decety & Cowell, 2014; Eisenberg, 2014; Eisenberg, Fabes, & Spinrad, 2006; Harbaugh, Mayr, & Burghart, 2007). At least some prosocial behavior is most parsimoniously explained as arising from a true concern for others (Batson, 1987; Eisenberg, 2014). However, the attribution of a genuine altruistic motive requires highly sophisticated experimental designs (Batson, O'Quin, Fultz, Vanderplas, & Isen, 1983) that are difficult to apply when assessing individual differences or making comparisons across the life span (e.g., Eisenberg et al., 2006).

The present research utilizes the complementary information provided by an individual differences perspective, a behavioral economics perspective, and a neuroscience perspective on prosocial behavior. Specifically, we test the hypothesis that a large portion of the interindividual variability across these different measurement domains is driven by a single dimension that reflects a genuine, altruistic concern for others. We refer to this as the *General Benevolence* hypothesis. Furthermore, based on theories that emphasize motivational shifts across the life span toward a more ego-transcending focus (Carstensen, Isaacowitz, & Charles, 1999; Erikson, 1982; Freund & Blanchard-Fields, 2014; Roberts, Wood, & Caspi, 2008), we expected that the General Benevolence dimension is more strongly expressed in older than younger adults.

The Present Study

In order to assess participants' genuine altruistic concern, we measured their neural activity in value/reward areas via functional MRI (fMRI) while they passively observed monetary transfers either to charities or to themselves. Theoretically, the difference in neural activity between the charity-gain condition and the self-gain

This article was published Online First August 11, 2016.

Jason Hubbard, Department of Psychology, University of Oregon; William T. Harbaugh, Department of Economics, University of Oregon; Sanjay Srivastava, Department of Psychology, University of Oregon; David Degras, Department of Mathematical Sciences, DePaul University; and Ulrich Mayr, Department of Psychology, University of Oregon.

This study was supported by National Institutes of Health Grant R21-AGR21AG030783-01 (principal investigator: Ulrich Mayr).

Correspondence concerning this article should be addressed to Ulrich Mayr, Department of Psychology, University of Oregon, Eugene, OR 97403. E-mail: mayr@uoregon.edu

condition (i.e., the "charity-gain/self-gain contrast") should indicate individuals' "pure altruistic" motivation (Andreoni, 1990; Harbaugh, Mayr, & Burghart, 2007; Morelli, Sacchet, & Zaki, 2015). The fulfillment of a pure altruistic motive depends on the utility of the recipient, and not on who is responsible for the act of giving (Andreoni, 1990).[1] Thus, a pure altruistic motive should be expressed even when individuals passively observe transfers to a charity. In contrast, "impure" altruistic motives (Andreoni, 1990), such as the prestige from signaling one's good character or the "warm glow" from experiencing oneself as generous, require a voluntary act of giving and therefore are not fulfilled when individuals passively observe transfers to a charity.

In a life span sample of 80 participants, we used the charity-gain/self-gain contrast to derive at a "Neural Utility" signal. We also derived a measure of voluntary giving (i.e., "Giving Choices"), using a variant of the "dictator game." Here, participants chose whether or not to endorse donations from their own account to several charities (Forsythe, Horowitz, Savin, & Sefton, 1994; Hoffman, McCabe, & Smith, 1996). In addition, we pooled information across self-report measures of agreeableness, empathic concern, perspective taking, and altruistic motivation (John, Donahue, & Kentle, 1991; Davis, 1980; Wood, Nye, & Saucier, 2010) to arrive at broad, "Prosocial Disposition" construct. As a test of our main hypothesis, we examined to what degree individual differences in these three sets of constructs/measures could be accounted for by a second-order, General Benevolence factor.

Based on previous evidence we expected positive age differences in the Prosocial Disposition (e.g., Roberts et al., 2006; Srivastava et al., 2003) and the Giving Choices factor (e.g., Freund & Blanchard-Fields, 2014; Midlarsky & Hannah, 1989). If these previously observed age differences reflect an increase in pure altruistic motives then there should also be age differences in the Neural Utility factor, and accordingly in the second-order, General Benevolence factor.

Method

Participants

Our sample consisted of 80 individuals between 18 and 67 years of age ($M = 44.23$, $SD = 11.49$; average years of education = 15.24, $SD = 1.98$; average annual income = \$36,618, $SD =$ 19,079). In order to maximize comparability of individuals across the life span, participants were recruited from a homogeneous pool of nonteaching (classified) staff at the University of Oregon. The correlation between age and years of education was nonsignificant ($r = -.12$, $p = .28$). Half of the participants were men, both within the subgroup of those above 45 and those below 45. The sample size was determined after considering available effect-size estimates for the pairwise correlations between the main constructs/variables in our design (see the online Supplemental Material).

Task, Stimuli, and Procedures

Prior to entering the scanner, participants read a booklet with information about each of 24 charities (Table S1) and were endowed with \$100. Then, participants went through two separate tasks in the scanner, the passive-viewing task (see Figure S1) to assess the neural, "pure-altruism" signal, and the active-choice task, which we used to assess behavioral giving choices (see Figure S2).

In the passive-viewing task, participants acknowledged transfers involving either their own endowment or one of 12 randomly selected charities. There were four possible transfer conditions: money-to-oneself (\$20 to participant, \$0 to charity), money-to-charity (\$0 to participant, \$20 to charity), loss-to-oneself (\$20 from participant, \$0 to charity), and baseline (\$0 to participant, \$0 to charity). Each charity was presented once in each condition, for a total of 48 trials (i.e., 4 transfer conditions $\times$ 12 charities). Following previous work (Harbaugh et al., 2007), we only used the money-to-oneself and the money-to-charity conditions here across a set of a priori defined, neural valuation areas to construct the Neural-Utility construct (see the online Supplemental Material for detailed results about the remaining conditions and the fMRI procedures).

In the active-choice task each trial involved a transfer of \$10, \$20, or \$40. The amount was always taken from the participant's endowment and donated to the charity named on that trial. Participants had the option to "Accept" or "Reject" each transfer. In total, 72 choice trials were presented (3 transfer conditions $\times$ 24 charities). These 72 choice trials were split up into six "parcels" to represent the Giving Choice factor (Little, Cunningham, Shahar, & Widaman, 2002).

In this phase we also manipulated whether choices were private or public on a trial-by-trial basis. This manipulation was originally included in order to experimentally vary the relevance of prestige/signaling motives. The private/public manipulation was effective on average as the rate of giving increased significantly in the public condition. However, a reliable individual differences factor could not be established from this condition, nor did the public/private manipulation interact with age. Therefore, we ignored this experimental factor within the main manuscript, but provide additional information in the online Supplemental Material.

Participants were instructed that one transaction from the passive phase and two from the choice phase would be chosen at random to affect both their own and the charity's payoff. Participants were also carefully instructed that aside from the public condition, all of their responses and brain imaging results would be strictly anonymous and that out of principle, researchers conducting economics experiments cannot mislead participants in any manner.

Following the scanning phase, participants completed self-report questionnaires meant to reflected the Prosocial Disposition construct: the agreeableness scale from the Big *F*, which includes empathic concern and perspective-taking, and a scale of personality descriptive adjectives related to altruistic behavior (Wood, Nye, & Saucier, 2010). Participants also completed the remaining scales from the Big Five Inventory, a survey on basic demographic information, a detailed account of household income, dollar amounts and time spent volunteering for various causes, as well as a questionnaire on engagement for charitable causes (Moll et al.,

[1] Pure altruism as defined by Andreoni (1990) should not be confused with pure altruism in the Kantian sense. The economists' "pure altruism" motive is still geared toward maximizing one's own utility (albeit, directly linked to the recipient's utility). Instead, a Kantian altruist would provide assistance to people in need, even in the absence of any internal or external rewards (Kant, 2002).

2006). We also assessed religiosity (Duke University Religion Index; Koenig, Parkerson, & Meador, 1997) and political belief through a one-item, liberal-to-conservative rating.

Results and Discussion

Structural equation modeling (SEM; e.g., Kievit et al., 2014; Kline, 2011) allows a direct test of our key prediction that inter-individual and life span differences across all of the self-report, behavioral, and neural indicators of prosocial behavior can be explained through a common, underlying factor. By traditional standards our sample size, although substantial for a neuroimaging study, was too small for the type of model we needed to run. Therefore, as a robustness check we present alongside with the SEM results, zero-order correlations based on simple, unit-weighted aggregates of our observed measures.

We first confirmed the construct validity of our three factors (i.e., the measurement model; Figure 1A). The observed measures exhibited large loadings on their three corresponding latent factors. To our knowledge this is the first study that attempts to represent common variance in activity across a set of related, a priori specified neural areas in form of a latent factor. Therefore, it is noteworthy that the indicators based on the neural, charity-gain/self-gain contrast carried a high degree of overlapping variance (between 64% and 45%), validating the a priori choice of value/utility areas. In the online Supplemental Material, we confirmed the divergent validity of this pattern using a set of a priori defined cognitive control areas (see Figure S6).

Correlations among first-order factors were positive, suggesting that the three measurement approaches capture a common empirical phenomenon. Each of the three factors was also positively related to age, with correlations ranging between 0.35 and 0.42. In addition, Figure 1A shows the slightly smaller, but still highly reliable, correlations based on unit-weighted aggregates (i.e., bottom correlations).

To test the General Benevolence hypothesis, we examined the degree to which a single, second-order factor represents the correlations among the three first-order factors (see Figure 1B). The model fit was excellent, with substantial loadings of the first-order factors on the General Benevolence factor. Given that the second-order factor represents what is common to all three measurement domains, the high loadings of the neural factor suggest that the shared variance captured by General Benevolence reflects individual differences in pure altruism. To estimate the lower-bound estimates for these relationships we also computed the correlations between each domain-specific aggregate score and the average of each of the two remaining scores (analogous to item-total correlations in scale analyses). Again, these correlations remained highly reliable, albeit smaller than the SEM-based estimates (see Figure 1B, bottom correlations).

The General Benevolence factor exhibited a strong age trend (see Figure 1B and Figure 2), suggesting that purely altruistic, prosocial tendencies gather strength across the adult life span. Freeing up individual paths between age and each of the three first-order factors did not significantly increase the model fit (all $\Delta\chi^2$s $< .88$, $p > .7$). Also, the age correlations remained highly reliable when using a simple aggregate of all three domain-specific measures to represent General Benevolence (see Figure 1B and Figure 2). The relationship between age and General Benevolence was unusually strong compared to typically found age trends for standard personality measures. We attribute the strength of this relationship to the high degree of information aggregation across three measurement domains in the General Benevolence factor. In fact, the correlations between age and observed personality measures (e.g., agreeableness) were close to the range reported in the literature (rs = .18–.27; see Table S2).

In the online Supplemental Material we present as robustness checks analyses that assess (a) the pattern of results in simplified models (Figure S4), (b) the construct relationships after controlling for age (Figure S5), and (c) the divergent validity with regard to the neural measures (Figure S6). In addition, we provide detailed analyses of the behavioral choices and the neural-level contrasts.

Additional Measures

To put General Benevolence within a broader context and present additional information on convergent and divergent validity, we show in Table 1 relationships between the General Benevolence factor and a set of additional variables. Of the remaining Big 5 measures, neuroticism showed a moderate negative relationship and conscientiousness a tendency toward a positive relationship. The relationship with empathic distress was negative (though nonsignificant), consistent with previous results that altruistic tendencies cannot be explained in terms of a (selfish) desire to alleviate one's distress from experiencing someone else's suffering (Batson et al., 1983). Religiosity shows a moderate, positive relationship, a finding that is consistent with previous research (Lodi-Smith & Roberts, 2007), whereas gender and political orientation showed no relationship. Annual income was not reliably related to General Benevolence, indicating that the observed age difference was not simply due to older adults being generally wealthier (see also Bekkers & Wiepking, 2011a). Finally, General Benevolence exhibited a positive relationship with individuals' amount of charitable giving and volunteering over the previous year, as assessed by a standard, and detailed economic survey.

The Neural Basis of General Benevolence

Our main results are based on a priori defined neural areas. However, it is also useful to examine how both distinct and common elements of the General Benevolence model are reflected on the neural level in a whole-brain manner. Figure 3 shows the brain areas in which the charity-gain/self-gain contrast correlated with individuals' Prosocial Disposition, Giving Choices, or age (see the online Supplemental Material). Correlations with the discipline-specific factors (or combinations of factors) lie in areas previously associated with the representation of value and reward, including the NAcc, caudate, anterior insula, and posterior cingulate cortex (Clithero & Rangel, 2014; Kable & Glimcher, 2007; D. J. Levy & Glimcher, 2012). Relationships with all three variables (i.e., Prosocial Disposition, Giving Choices, or age) converged in the medial prefrontal, perigenual anterior cingulate cortex (ACC), as well in the ventral striatum/nucleus accumbens (see Figure 4). The perigenual ACC region has been particularly associated with self-relevant processing (see Murray, Debbané, Fox, Bzdok, & Eickhoff, 2015, for a recent meta-analysis). This pattern is consistent with the general hypothesis that other-related and

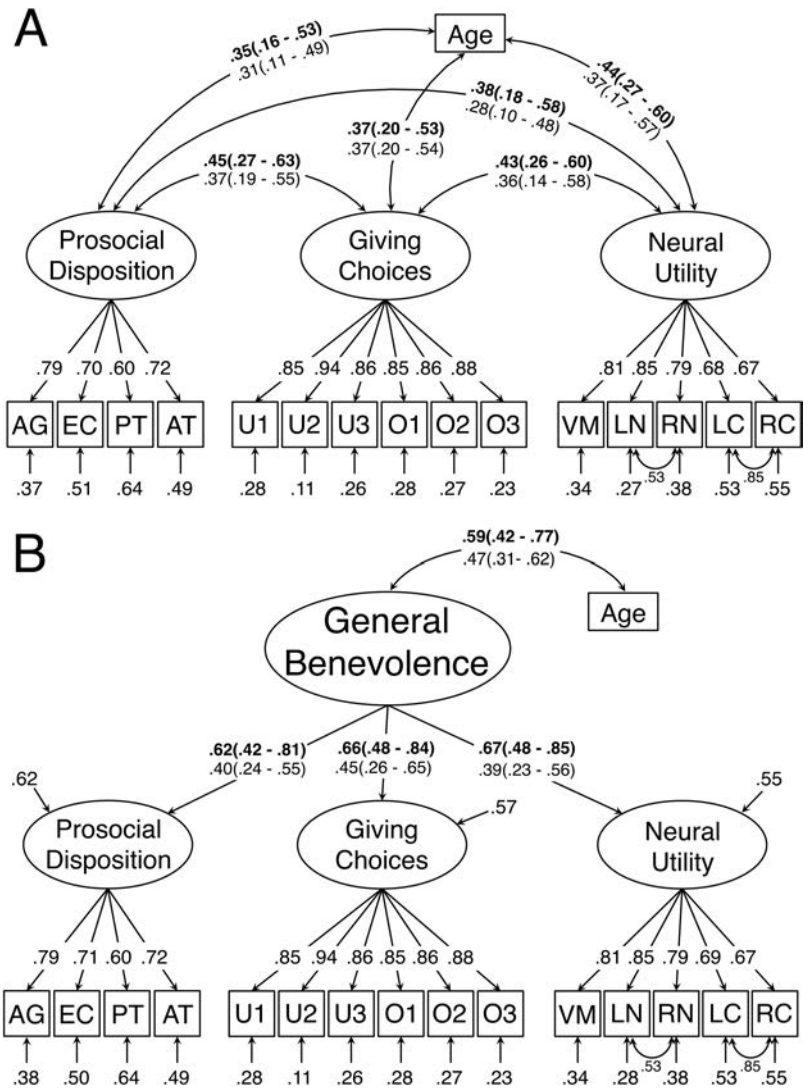

Figure 1. Results from the structural equation models and analyses of unit-weighted aggregate scores. (A) The measurement model establishing three stable discipline-specific factors and their correlations with age, $\chi^2(97) = 112.72$, $p > .13$; comparative fit index (CFI) = .983, root-mean-square error of approximation (RMSEA) = .045, standardized root mean square residual (SRMR) = .056. (B) The structural model that tests the prediction that a second-order General Benevolence factor can explain individual differences across the three measurement domains, $\chi^2(99) = 113.63$, $p > .15$; CFI = .984, RMSEA = .043, SRMR = .058. In each panel, measured variables (i.e., indicators) are depicted as squares, and latent factors are indicated by ovals. Straight, single-headed arrows reflect directed relationships (in this case, factor loadings), while curved, double-headed arrows reflect undirected relationships (i.e., correlations) between variables. For between-factor correlations or second-order loadings we report both estimates from the structural-equation model (upper, bold numbers) and Pearson correlations from a unit-weighted model (bottom numbers). Confidence intervals for both types of models are reported in parentheses. For the unit-weighted analyses, aggregate scores were calculated as the mean of the z-scored indicators, and the second-order factor was calculated as the mean of those aggregates. Cronbach alphas of the unit-weighted scores for Prosocial Disposition, Giving Choices, and Neural Utility, were .80, .95, and .90, respectively. In Panel B, correlations between each first-order factor and General Benevolence were computed as item-total correlations (i.e., Pearson correlation between each factor and the average of the other two factors). AG = agreeableness; EC = empathic concern; PT = perspective taking; AT = altruistic adjectives; U = unobserved giving behavior (from giving task); O = observed giving behavior; VM = ventromedial prefrontal cortex; LN = left nucleus accumbens; RN = right nucleus accumbens; LC = left caudate; RC = right caudate.

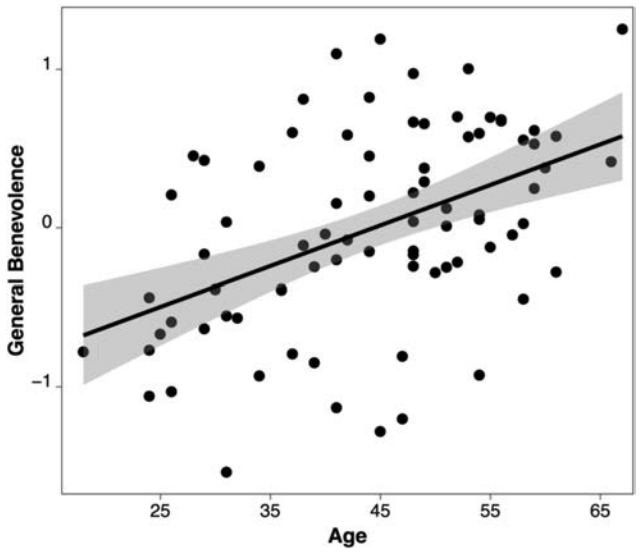

Figure 2. Correlations between the General Benevolence factor score and age for each individual. Note that rather than the Age–General Benevolence relationship depicted in Figure 1B, here we show the more conservative assessment of this relationship ($r = .47$) based on a General Benevolence factor that is derived from a unit-weighted aggregation of standardized indicators (for details, see the online Supplemental Material).

self-related concerns can be mapped onto the same utility dimension (Zaki et al., 2014) and that pure altruism as defined by Andreoni (1990) is fueled by the utility that comes from knowing that the public good is increased.

General Discussion

We found that a substantial portion of the individual differences in self-reported prosocial disposition, actual altruistic choices, and neural measures of altruistic tendencies were accounted for by a common General Benevolence factor. Moreover, this is the first report of robust life span/cohort differences across multiple aspects of altruistic tendencies, including positive age differences in anonymous giving choices (see the online Supplemental Material), and in a neural, "pure-altruism" signal.

The neural index of altruistic tendencies is particularly important as it constrains the interpretation of the General Benevolence dimension. Likely, this index reflects an individual's utility when the public good (represented through the charities) receives a windfall and therefore can be interpreted as an expression of a pure altruistic motive (Harbaugh et al., 2007; Zaki et al., 2014). The second-order factor in the structural equation model represents the common variance across all three domains and inherits the pure-altruism interpretation from the neural measure. Conversely, the suggested interpretation of the neural index is validated through its relationship with traditional measures of prosocial dispositions (e.g., agreeableness, empathy), with altruistic choices, and with real-world giving as measured through standard survey techniques (see Table 1). More generally, the converging evidence across three complementary domains of measurement supports the interpretation of General Benevolence as a broad, and behaviorally relevant dimension.

Table 1
Correlations Between General Benevolence Factor Scores and Various Personality and Demographic Variables

Variable	*r*
Openness	.06
Conscientiousness	.19*
Extraversion	.10
Neuroticism	−.31**
Distress	−.12
Female	.11
Religiosity	.39***
Conservatism	.02
Annual income	.10
Helping behavior	.40***

Note. The helping behavior measure reflects the standardized amount of (a) the money spent on charitable donations (log-transformed), (b) the total time spent volunteering, and (c) the sum of activities listed in the engagement questionnaire.
* $p < .10$. ** $p < .01$. *** $p < .001$.

Life-Span Changes in General Benevolence?

Previous research had suggested that older adults often behave more charitable than younger adults (Bekkers et al., 2011b; Freund & Blanchard-Fields, 2014; Midlarsky & Hannah, 1989), but did not provide an explanation for this age-differential pattern. Our finding of a sizable age difference in General Benevolence indicates that older adults' more generous behavior be attributed at least to a large part to a strengthening of pure-altruistic tendencies. Consistent with this conclusion, the age-giving relationship was fully present when giving decisions were anonymous and it did not further increase when decisions were observed by an audience (a condition that arguably evokes prestige/signaling motives; see Figure S3). These results are also consistent with a number of theories, which posit an age-related motivational shift toward ego-transcending goals (Brandstaetter, Rothermund, Krantz, & Kühn, 2010; Freund & Blanchard-Fields, 2014; Jonas, Schimel, Greenberg, & Pyszczynski, 2002; Lang & Carstensen, 2002).

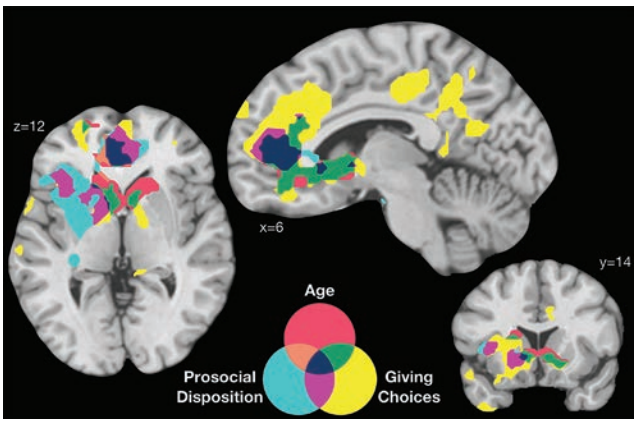

Figure 3. Correlation between brain activity in the charity-gain/self-gain contrast and factor scores for the Prosocial Disposition, the Giving Choices factors, as well as age. All three aspects overlap in the perigenual anterior cingulate cortex and the striatum.

As nearly all life-span work in this domain, our study is cross-sectional in nature and therefore does not distinguish true developmental change from cohort differences. Indeed, the observed age difference might arise because younger cohorts are more self-centered than their parent generation. Yet empirical evidence for such secular changes is much more limited (Trzesniewski & Donnellan, 2010) than claims in the media might suggest (Textor, 2007) and in some instances points into the opposite direction (Inglehart, 2008). Moreover, longitudinal results on self-report measures of prosocial dispositions provide robust evidence for a positive age effect (Roberts et al., 2006), supporting the interpretation that the age effect for General Benevolence represents actual life-span growth.

Caveats

Our conclusions rely on a sample that, even though substantial for a neuroimaging study, is smaller than the standard sample size for structural equation models. Therefore, these results need to be replicated with a larger number of subjects and ideally using a longitudinal design. Nevertheless, there are several reasons to believe that our results are robust. First, we used a homogeneous sample with similar work/life experiences (i.e., all were University of Oregon, nonteaching staff). This reduces error variance and the influence of potential age confounds that can affect life-span comparisons within typical convenience samples. Second, many of the individual, construct-to-construct relationships underlying our model have strong a priori grounding in previous work (see the online Supplemental Material). Finally, our basic set of results survived several robustness checks (e.g., using unit-weighted aggregate measures, partialing out age, or assessing the divergent validity of the neural factor).

Broader Implications

In a recent review on prosocial development, Eisenberg and colleagues indicated the necessity to discuss prosocial behavior broadly "because it usually is impossible to differentiate between altruistically motivated actions and actions motivated by less noble concerns" (Eisenberg et al., 2006, p. 647). Our results suggest that a more differentiated analysis of the source of individual differences in prosocial behavior can be achieved. Specifically, neural measures that reflect a genuine concern for others can be used to validate more easily deployable self-report or behavioral assays of prosocial tendencies.

It should be particularly useful to clarify the motives that drive altruistic action when considering interventions to foster prosocial behavior. Interventions and socialization experiences are likely to be designed differently depending on whether they target either pure altruistic motives or behavior that is contingent on ultimately selfish concerns. Indeed, growing evidence indicates that a range of psychological dispositions, including the ones measured and investigated here, are affected by socialization experiences throughout the life span (Eisenberg et al., 2006; Roberts et al., 2005; Srivastava et al., 2003). This raises the possibility that positive development along the General Benevolence dimension can be promoted through appropriately targeted, individual-level (Klimecki, Leiberg, Ricard, & Singer, 2014) or policy-level interventions (Heckman & Masterov, 2007).

Conclusion

Our results indicate that data on prosocial tendencies from very different theoretical and measurement traditions can be represented in a parsimonious, low-dimensional manner. Such "information compression" comes with important advantages, as the resulting General Benevolence factor inherits the interpretational constraints of each approach. In particular, the loading on the neural factor clarifies that the individual and age differences in General Benevolence can be interpreted in terms of differences in "pure altruistic" tendencies.

References

Andreoni, J. (1990). Impure altruism and donations to public goods: A theory of warm-glow giving. *Economic Journal, 100,* 464–477. http://dx.doi.org/10.2307/2234133

Avants, B. B., Epstein, C. L., Grossman, M., & Gee, J. C. (2008). Symmetric diffeomorphic image registration with cross-correlation: Evaluating automated labeling of elderly and neurodegenerative brain. *Medical Image Analysis, 12,* 26–41. http://dx.doi.org/10.1016/j.media.2007.06.004

Batson, C. D. (1987). Prosocial motivation: Is it ever truly altruistic? In L. Berkowitz (Ed.), *Advances in experimental social psychology* (vol. 20, pp. 65–122). San Diego, CA: Academic Press.

Batson, C. D., Duncan, B. D., Ackerman, P., Buckley, T., & Birch, K. (1981). Is empathic emotion a source of altruistic motivation? *Journal of Personality and Social Psychology, 40,* 290–302. http://dx.doi.org/10.1037/0022-3514.40.2.290

Batson, C. D., O'Quin, K., Fultz, J., Vanderplas, M., & Isen, A. M. (1983). Influence of self-reported distress and empathy on egoistic versus altruistic motivation to help. *Journal of Personality and Social Psychology, 45,* 706–718. http://dx.doi.org/10.1037/0022-3514.45.3.706

Bekkers, R., & Wiepking, P. (2011a). A literature review of empirical studies of philanthropy: Eight mechanisms that drive charitable giving. *Nonprofit and Voluntary Sector Quarterly, 40,* 924–973. http://dx.doi.org/10.1177/0899764010380927

Bekkers, R., & Wiepking, P. (2011b). Who gives? A literature review of predictors of charitable giving: Part 1. Religion, education, age and socialization. *Voluntary Sector Review, 2,* 337–365. http://dx.doi.org/10.1332/204080511X6087712

Brandtstädter, J., Rothermund, K., Kranz, D., & Kühn, W. (2010). Final decentrations: Personal goals, rationality perspectives, and the awareness of life's finitude. *European Psychologist, 15,* 152–163.

Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously. A theory of socioemotional selectivity. *American Psychologist, 54,* 165–181. http://dx.doi.org/10.1037/0003-066X.54.3.165

Clithero, J. A., & Rangel, A. (2014). Informatic parcellation of the network involved in the computation of subjective value. *Social Cognitive and Affective Neuroscience, 9,* 1289–1302. http://dx.doi.org/10.1093/scan/nst106

Cole, M. W., Reynolds, J. R., Power, J. D., Repovs, G., Anticevic, A., & Braver, T. S. (2013). Multi-task connectivity reveals flexible hubs for adaptive task control. *Nature Neuroscience, 16,* 1348–1355. http://dx.doi.org/10.1038/nn.3470

Dale, A. M., Fischl, B., & Sereno, M. I. (1999). Cortical surface-based analysis: I. Segmentation and surface reconstruction. *NeuroImage, 9,* 179–194. http://dx.doi.org/10.1006/nimg.1998.0395

Davis, M. H. (1980). A multidimensional approach to individual differences in empathy. *JSAS Catalog of Selected Documents in Psychology, 10,* 85.

Decety, J., & Cowell, J. M. (2014). The complex relation between morality and empathy. *Trends in Cognitive Sciences, 18,* 337–339. http://dx.doi.org/10.1016/j.tics.2014.04.008

Donnellan, M. B., & Lucas, R. E. (2008). Age differences in the Big Five across the life span: Evidence from two national samples. *Psychology and Aging, 23,* 558–566. http://dx.doi.org/10.1037/a0012897

Eisenberg, N. (2014). *Altruistic emotion, cognition, and behavior (PLE: Emotion*). Hove, UK: Psychology Press.

Eisenberg, N., Fabes, R. A., & Spinrad, T. L. (2006). Prosocial behavior. In W. Damon & R. M. Learner (Series Eds.) & N. Eisenberg (Vol. Ed.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (6th ed., pp. 646–718). New York, NY: Wiley.

Erikson, E. H. (1982). *The life cycle completed*. New York, NY: Norton.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41,* 1149–1160. http://dx.doi.org/10.3758/BRM.41.4.1149

Fehr, E., & Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. *Quarterly Journal of Economics, 114,* 817–868. http://dx.doi.org/10.1162/003355399556151

FeldmanHall, O., Dalgleish, T., Evans, D., & Mobbs, D. (2015). Empathic concern drives costly altruism. *NeuroImage, 105,* 347–356. http://dx.doi.org/10.1016/j.neuroimage.2014.10.043

Forsythe, R., Horowitz, J. L., Savin, N. E., & Sefton, M. (1994). Fairness in simple bargaining experiments. *Games and Economic Behavior, 6,* 347–369. http://dx.doi.org/10.1006/game.1994.1021

Freund, A. M., & Blanchard-Fields, F. (2014). Age-related differences in altruism across adulthood: Making personal financial gain versus contributing to the public good. *Developmental Psychology, 50,* 1125–1136. http://dx.doi.org/10.1037/a0034491

Gorgolewski, K., Burns, C. D., Madison, C., Clark, D., Halchenko, Y. O., Waskom, M. L., & Ghosh, S. S. (2011). Nipype: A flexible, lightweight and extensible neuroimaging data processing framework in python. *Frontiers in Neuroinformatics, 5,* 13. http://dx.doi.org/10.3389/fninf.2011.00013

Greve, D. N., & Fischl, B. (2009). Accurate and robust brain image alignment using boundary-based registration. *NeuroImage, 48,* 63–72. http://dx.doi.org/10.1016/j.neuroimage.2009.06.060

Harbaugh, W. T., Mayr, U., & Burghart, D. R. (2007). Neural responses to taxation and voluntary giving reveal motives for charitable donations. *Science, 316,* 1622–1625. http://dx.doi.org/10.1126/science.1140738

Heckman, J. J., & Masterov, D. V. (2007). The productivity argument for investing in young children. *Applied Economic Perspectives and Policy, 29,* 446–493.

Hoffman, E., McCabe, K., & Smith, V. L. (1996). Social distance and other-regarding behavior in dictator games. *American Economic Review, 86,* 653–660.

Inglehart, R. F. (2008). Changing values among Western publics from1970 to 2006. *West European Politics, 31,* 130–146. http://dx.doi.org/10.1080/01402380701834747

John, O. P., Donahue, E. M., & Kentle, R. L. (1991). *The Big Five Inventory* (Versions 4a and 54). Berkeley, CA: University of California, Berkeley, Institute of Personality and Social Research.

Jonas, E., Schimel, J., Greenberg, J., & Pyszczynski, T. (2002). The Scrooge effect: Evidence that mortality salience increases prosocial attitudes and behavior. *Personality and Social Psychology Bulletin, 28,* 1342–1353. http://dx.doi.org/10.1177/014616702236834

Kable, J. W., & Glimcher, P. W. (2007). The neural correlates of subjective value during intertemporal choice. *Nature Neuroscience, 10,* 1625–1633. http://dx.doi.org/10.1038/nn2007

Kant, I. (2002). *Critique of practical reason*. Indianapolis, IN: Hackett.

Kievit, R. A., Davis, S. W., Mitchell, D. J., Taylor, J. R., Duncan, J., & Henson, R. N. A., & the Cam-CAN Research Team. (2014). Distinct aspects of frontal lobe structure mediate age-related differences in fluid intelligence and multitasking. *Nature Communications, 5,* 5658. http://dx.doi.org/10.1038/ncomms6658

Klimecki, O. M., Leiberg, S., Ricard, M., & Singer, T. (2014). Differential pattern of functional brain plasticity after compassion and empathy training. *Social Cognitive and Affective Neuroscience, 9,* 873–879. http://dx.doi.org/10.1093/scan/nst060

Kline, R. B. (2011). *Principles and practice of structural equation modeling*. New York, NY: Guilford Press.

Knutson, B., Adams, C. M., Fong, G. W., & Hommer, D. (2001). Anticipation of increasing monetary reward selectively recruits nucleus accumbens. *Journal of Neuroscience, 21,* RC159.

Koenig, H., Parkerson, G. R., Jr., & Meador, K. G. (1997). Religion index for psychiatric research. *American Journal of Psychiatry, 154,* 885–886.

Lang, F. R., & Carstensen, L. L. (2002). Time counts: Future time perspective, goals, and social relationships. *Psychology and Aging, 17,* 125–139. http://dx.doi.org/10.1037/0882-7974.17.1.125

Levy, D. J., & Glimcher, P. W. (2012). The root of all value: A neural common currency for choice. *Current Opinion in Neurobiology, 22,* 1027–1038. http://dx.doi.org/10.1016/j.conb.2012.06.001

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling, 9,* 151–173. http://dx.doi.org/10.1207/S15328007SEM0902_1

Lodi-Smith, J., & Roberts, B. W. (2007). Social investment and personality: A meta-analysis of the relationship of personality traits to investment in work, family, religion, and volunteerism. *Personality and Social Psychology Review, 11,* 68–86. http://dx.doi.org/10.1177/1088868306294590

Midlarsky, E., & Hannah, M. E. (1989). The generous elderly: Naturalistic studies of donations across the life span. *Psychology and Aging, 4,* 346–351. http://dx.doi.org/10.1037/0882-7974.4.3.346

Moll, J., Krueger, F., Zahn, R., Pardini, M., de Oliveira-Souza, R., & Grafman, J. (2006). Human fronto-mesolimbic networks guide decisions about charitable donation. *Proceedings of the National Academy of Sciences, USA, 103,* 15623–15628. http://dx.doi.org/10.1073/pnas.0604475103

Morelli, S. A., Rameson, L. T., & Lieberman, M. D. (2014). The neural components of empathy: Predicting daily prosocial behavior. *Social Cognitive and Affective Neuroscience, 9,* 39–47. http://dx.doi.org/10.1093/scan/nss088

Morelli, S. A., Sacchet, M. D., & Zaki, J. (2015). Common and distinct neural correlates of personal and vicarious reward: A quantitative meta-analysis. *NeuroImage, 112,* 244–253. http://dx.doi.org/10.1016/j.neuroimage.2014.12.056

Murray, R. J., Debbané, M., Fox, P. T., Bzdok, D., & Eickhoff, S. B. (2015). Functional connectivity mapping of regions associated with self- and other-processing. *Human Brain Mapping, 36,* 1304–1324. http://dx.doi.org/10.1002/hbm.22703

Penner, L. A. (2002). Dispositional and organizational influences on sustained volunteerism: An interactionist perspective. *Journal of Social Issues, 58,* 447–467. http://dx.doi.org/10.1111/1540-4560.00270

Power, J. D., Cohen, A. L., Nelson, S. M., Wig, G. S., Barnes, K. A., Church, J. A., . . . Petersen, S. E. (2011). Functional network organization of the human brain. *Neuron, 72,* 665–678. http://dx.doi.org/10.1016/j.neuron.2011.09.006

Roberts, B. W., Walton, K. E., & Viechtbauer, W. (2006). Patterns of mean-level change in personality traits across the life course: A meta-analysis of longitudinal studies. *Psychological Bulletin, 132,* 1–25. http://dx.doi.org/10.1037/0033-2909.132.1.1

Roberts, B. W., Wood, D., & Caspi, A. (2008). The development of personality traits in adulthood. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (3rd ed., pp. 375–398). New York, NY: Guilford Press.

Roberts, B. W., Wood, D., & Smith, J. L. (2005). Evaluating Five Factor Theory and social investment perspectives on personality trait development. *Journal of Research in Personality, 39,* 166–184. http://dx.doi.org/10.1016/j.jrp.2004.08.002

Saucier, G., & Srivastava, S. (2014). What makes a good structural model

of personality? Evaluating the Big Five and alternatives. In M. Mikulincer, P. Shaver, M. Cooper, & R. Larson (Eds.), *APA handbook of personality and social psychology* (pp. 283–305). Washington, DC: American Psychological Association.

Singer, T. (2007). The neuronal basis of empathy and fairness. *Novartis Foundation Symposium, 278,* 20–40. http://dx.doi.org/10.1002/9780470030585.ch3

Singer, T., & Klimecki, O. M. (2014). Empathy and compassion. *Current Biology, 24,* R875–R878. http://dx.doi.org/10.1016/j.cub.2014.06.054

Smith, S. M., Jenkinson, M., Woolrich, M. W., Beckmann, C. F., Behrens, T. E., Johansen-Berg, H., . . . Matthews, P. M. (2004). Advances in functional and structural MR image analysis and implementation as FSL. *NeuroImage, 23* (Suppl. 1), S208–S219. http://dx.doi.org/10.1016/j.neuroimage.2004.07.051

Srivastava, S., John, O. P., Gosling, S. D., & Potter, J. (2003). Development of personality in early and middle adulthood: Set like plaster or persistent change? *Journal of Personality and Social Psychology, 84,* 1041–1053. http://dx.doi.org/10.1037/0022-3514.84.5.1041

Textor, K. (2007). The "Millennials" are coming. *60 Minutes* [Television episode]. Retrieved from http://www.cbsnews.com/stories/2007/11/08/60minutes/main3475200.shtml

Trzesniewski, K. H., & Donnellan, M. B. (2010). Rethinking "Generation Me": A study of cohort effects from 1976–2006. *Perspectives on Psychological Science, 5,* 58–75. http://dx.doi.org/10.1177/1745691609356789

Wolf, E. J., Harrington, K. M., Clark, S. L., & Miller, M. W. (2013). Sample size requirements for structural equation models: An evaluation of power, bias, and solution propriety. *Educational and Psychological Measurement, 73,* 913–934. http://dx.doi.org/10.1177/0013164413495237

Wood, D., Nye, C. D., & Saucier, G. (2010). Identification and measurement of a more comprehensive set of person-descriptive trait markers from the English lexicon. *Journal of Research in Personality, 44,* 258–272. http://dx.doi.org/10.1016/j.jrp.2010.02.003

Yamamoto, S., & Takimoto, A. (2012). Empathy and fairness: Psychological mechanisms for eliciting and maintaining prosociality and cooperation in primates. *Social Justice Research, 25,* 233–255. http://dx.doi.org/10.1007/s11211-012-0160-0

Zaki, J. (2014). Empathy: A motivated account. *Psychological Bulletin, 140,* 1608–1647. http://dx.doi.org/10.1037/a0037679

Zaki, J., López, G., & Mitchell, J. P. (2014). Activity in ventromedial prefrontal cortex co-varies with revealed social preferences: Evidence for person-invariant value. *Social Cognitive and Affective Neuroscience, 9,* 464–469. http://dx.doi.org/10.1093/scan/nst005

Received March 15, 2016
Revision received June 16, 2016
Accepted June 20, 2016 ■

Correction to Hubbard et al. (2016)

In the article "A General Benevolence Dimension That Links Neural, Psychological, Economic, and Life-Span Data on Altruistic Tendencies" by Jason Hubbard, William T. Harbaugh, Sanjay Srivastava, David Degras, and Ulrich Mayr (*Journal of Experimental Psychology*: *General*, Advance online publication. August 11, 2016. http://dx.doi.org/10.1037/xge0000209) there was an error in the **Task, Stimuli, and Procedures** section. In the 1st sentence in the 6th paragraph, "Following the scanning phase, participants completed self-report questionnaires meant to reflected the Prosocial Disposition construct: the agreeableness scale from the Big *F*, which includes empathic concern and perspective-taking, and a scale of personality descriptive adjectives related to altruistic behavior (Wood, Nye, & Saucier, 2010)." should have read: "Following the scanning phase, participants completed self-report questionnaires that contained scales to reflect the Prosocial Disposition construct: the Big Five Inventory (BFI; John et al., 1991), from which we used the agreeableness scale to measure prosocial disposition; the Interpersonal Reactivity Index (IRI; Davis, 1980), from which we used the empathic concern and perspective-taking scales; and a scale of personality descriptive adjectives related to altruistic behavior (Wood, Nye, & Saucier, 2010)."

http://dx.doi.org/10.1037/xge0000235