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The Role of Prospection in Altruistic Bone Marrow Donation Decisions

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CITATION

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Objective: The decision to become an unrelated allogeneic bone marrow or hematopoietic stem cell (HSC) donor is a consequential and complex one. Although new registry members pledge to donate if asked in the future, significant proportions ultimately reconsider when they are notified as a potential match for a patient and are asked to undergo confirmatory typing (CT), resulting in many patients failing to receive transplants. We consider the roles of prospection, or thinking about the future, and ambivalence, or having mixed emotions about an event, in this phenomenon. Prospection theory dictates that distant and improbable events are construed more abstractly than near-term and probable events. We hypothesized that construals about donation in new registry members versus those asked to undergo CT would differ in accordance with these patterns, and that variation in construals would be associated with decisions about whether to proceed toward donation. Method: In collaboration with the National Marrow Donor Program, we measured donation intentions and CT decisions in 516 new registry members and 213 members asked to undergo CT, respectively. Participants were asked to describe what they imagined would happen in the donation process. Results: We found that the valence and heterogeneity with which registry members construed donation were significant predictors of donation-related decisions. Assuming the temporal ordering of cognitive processes, ambivalence about donation was a mediator of these relationships. Conclusions: Findings suggest that encouraging a focus on positive central features of marrow and HSC donation may reduce ambivalence and decrease attrition from the registry.

Keywords: bone marrow donation, hematopoietic stem cell donation, prospection

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Every year, more than 4,000 Americans donate hematopoietic stem cells (HSCs) to unrelated, anonymous strangers (Center for International Blood and Marrow Transplant & U. S. Department of Health and Human Services, 2016). The objective goal of these donations, as reflected by the mission statement of the National Marrow Donor Program (NMDP), is to help “every patient get the life-saving transplant they need” (Be The Match, 2018). HSC donations represent potential cures for patients with blood cancers like leukemia and lymphoma that may be otherwise untreatable, and some 70% of patients who require an HSC donation will need a transplant from an unrelated donor (Besse, Maiers, Confer, & Albrecht, 2016). But key features of unrelated allogeneic donations result in some patients failing to get the transplant they need. Among these is that the decision to register as a donor (which entails pledging to donate if asked) may take place months or years before the opportunity to donate arises. Thus, registering and pledging to donate requires potential donors to imagine (or prospect about) their own future desires and choices at the time of registration (Dasgupta, 2018). A significant proportion of registry members appear to inconsistently prospect about their future donation-related decisions, as up to 50% of members who are later contacted ultimately opt not to proceed with donation—a discrep-
ancy with potentially life-threatening consequences for patients (Switzer et al., 2013). This statistic conforms to a large body of research on commitment–behavior inconsistency, which finds surprising inaccuracy in the self-prediction of future actions (Rogers & Aida, 2014). Improved understanding of the role of prospec-
tion—the mental representation of future events—in decisions about marrow donation may aid in reducing such discrepancies.

Prospection entails the prediction of one’s own future cognitions and behaviors by mentally simulating potential scenarios. Con-
strual theory stipulates that events that are improbable and distant in time are construed differently than those that are probable and close in time, and these differences affect the accuracy with which people predict their own future emotions and behavior (Gilbert & Wilson, 2007). Future events that are unlikely to occur or that are temporally distant are construed relatively abstractly, in little de-
tail, and with an emphasis on the central focus of the event. Conversely, situations that are likely to occur or are temporally close are construed more concretely, in more detail, with a greater focus on peripheral features (Trope & Liberman, 2003, 2010).

For example, when people are asked to consider future possible good and bad days—either in the near future or 1 year from the exper-
iment—and list events that might happen on each type of day, they estimate that positive days will be more uniformly positive, and negative days will be more uniformly negative, when they are further away in time. This suggests that representations of tempo-
rally distant events are more general and schematic than tempo-
rrally proximal events (Liberman, Sagristano, & Trope, 2002). Such differences affect predictions of future behavior. For example, when people are asked to estimate their likelihood of attending an enjoyable future event, their decisions are influenced more by how much they would enjoy an event in the distant future but more by peripheral details (like how difficult it would be to get to) for
an event in the near future (Liberman & Trope, 1998). Differences in the way temporally close or likely events are construed relative to temporally distant or unlikely events increases the difficulty of predicting one’s own responses to distant or improbable events (Gilbert & Wilson, 2009) and may explain frequent experiences of regret as previously committed-to events draw nearer in time (Gilbert & Wilson, 2007).

Thus, consistent with construal theory, we hypothesized that indi-
viduals would express greater ambivalence at the CT stage relative to registration. Ambivalence, as it has been traditionally measured, is a broad construct that reflects an unspecified mixture of posi-
tively and negatively valenced (hence the term “ambi-valent”) affects and motivations. In that construals capture specific nega-
tively and positively valenced features of donation, we anticipated that construal valence and heterogeneity would be associated with
construal-related ambivalence at both registration and CT.

To test our hypotheses, we collected cross-sectional survey data, including construals about donation, from both new registry mem-
bers, for whom donation is unlikely and far in the future, and
potential matching donors, that is, individuals recently contacted to undergo CT, for whom donation is more likely and closer in time.

Among both new registry members and potential matching donors at CT, we predicted that intentions and decisions to donate would be associated with more positive and more homogenous construals of donation. We also hypothesized that potential matching donors’ construals of donation would be more negatively valenced and heterogeneous (focused on peripheral details) than those of new
registry members, and that more negatively valenced and hetero-
geneous construals would be associated with the choice to opt out of donation at the CT stage. Finally, we aimed to test whether the hypothesized relationship between construal valence, which re-
flects rapid, low-level affective responses to various features of
donation, and donation intentions or decisions, would be mediated
by ambivalence, which is a broader construct reflecting an unspec-
ified mix of motivations and affective responses.

Method

Participants

In collaboration with the NMDP, we recruited a national cross-
sectional sample of 729 young adults, ages 18 to 31 years (M = 22.07, SD = 2.97), from the Be The Match registry. Following Switzer et al. (2003), new registry members (N = 516; ages 18–30
years; M = 21.29, SD = 2.58) were recruited within 12 weeks of registering as potential donors through Be The Match (see Table 1
for additional participant demographics). All 29 U.S. domestic Be The Match donor centers through which Be The Match recruits

1 Experimental work has demonstrated distinct influences of psycholog-
ical distance and construal level on affect-based evaluation. Whereas abstract (relative to concrete) thinking increases positively valenced thinking, psychological distance (relative to closeness) reduces the intensity of the affective feelings (Williams, Stein, & Galguera, 2014).
and manages donors, including the Be The Match operated Donor Center 001, participated in study recruitment. New registry members were excluded who had been medically deferred since joining, were active in search (identified as a match for a patient), had a status of “temporarily unavailable,” or did not have English as their language preference. New registry members who were older than 30 were also excluded to improve the demographic match between these participants and CT stage participants, who are predominantly under 30. Following the initial invitation, one reminder e-mail was sent to all members who had not completed the survey. As a result, 7,756 of the total 10,906 registry members who recently been contacted by Be The Match because they were found to be a potential match for a patient (see Table 1 for participant demographics). Registry members who were participating in other NMDP-sponsored research projects, had been medically deferred since joining, had a status of “temporarily unavailable,” did not have English as their language preference, or were over the age of 30 were excluded from recruitment. “Continuing toward donation” was defined as meeting medical suitability criteria, consenting to donation, and scheduling an appointment for a blood draw. Importantly, all potential matching donors had already decided either to continue toward donation or to opt out of the registry (those who opted out were distinct from those who were ineligible for medical reasons). Following their decision, representatives from Be The Match verbally invited participants via telephone to take part in the study. Reminder e-mails were sent to individuals who had verbally consented to participate in the survey every 1 to 2 weeks, for a maximum of four outreach attempts. Invitations for this phase of the study were extended to 935 of the total 1,718 (54.42%) eligible potential matching donors on the Be The Match operated Donor Center 001 registry between December 2015 and October 2016. Of the 1,718 eligible individuals, 550 verbally agreed to participate in the study (32.01%), and 213 individuals (12.40%) provided complete data. The overall response rate was 9% for targeting the survey and 7% for providing complete data.

Potential matching donors (n = 213; Ages 18 to 31; M = 23.97, SD = 3.02) were current members of the registry who had all recently been contacted by Be The Match because they were found to be a potential match for a patient (see Table 1 for participant demographics). Registry members who were participating in other NMDP-sponsored research projects, had been medically deferred since joining, had a status of “temporarily unavailable,” did not have English as their language preference, or were over the age of 30 were excluded from recruitment. “Continuing toward donation” was defined as meeting medical suitability criteria, consenting to donation, and scheduling an appointment for a blood draw. Importantly, all potential matching donors had already decided either to continue toward donation or to opt out of the registry (those who opted out were distinct from those who were ineligible for medical reasons). Following their decision, representatives from Be The Match verbally invited participants via telephone to take part in the study. Reminder e-mails were sent to individuals who had verbally consented to participate in the survey every 1 to 2 weeks, for a maximum of four outreach attempts. Invitations for this phase of the study were extended to 935 of the total 1,718 (54.42%) eligible potential matching donors on the Be The Match operated Donor Center 001 registry between December 2015 and October 2016. Of the 1,718 eligible individuals, 550 verbally agreed to participate in the study (32.01%), and 213 individuals (12.40%) provided complete data. The overall response rate was 9% for targeting the survey and 7% for providing complete data.

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was obtained from all participants before survey completion. The median time to complete the survey (which included other measures after the construal questions were presented) across all participants was approximately 1 hr 2 min (approximate completion metrics: \( M = 58 \) min, minimum = 29 min; maximum = 2 hr and 15 min). Participants were compensated \$30 for their time and effort.

Prior to data collection, we estimated the sample sizes necessary for estimating effect sizes. Using sample sizes generated from the relevant literature for which prior studies provide sufficient data to estimate effect sizes, we determined that to test the effect of temporal distance on construal (\( r_{\text{estimated}} = 0.28; \) Liberman et al., 2002), a sample of 98 would retain 80% power at an alpha of .95.

**Measures**

Survey measures were presented in the order described in the following sections.

**Donation construals.** Participants were instructed to imagine being asked to donate marrow or stem cells to a patient at some specific future time and to spend a few minutes thinking about the various things that would happen as a part of the donation process (see the online supplemental materials for exact instructions).

All participants then wrote out each item they imagined in up to 10 text-entry boxes provided. After submitting their responses, all participants viewed the total list of items they had provided and were prompted with the following instructions: “Now go back and rate how positive or negative each of the things you listed would be if it did happen, with ‘–3’ being the most negative, ‘0’ being neither positive nor negative, and ‘3’ being the most positive.” In keeping with previous construal theory work, the number of items listed, mean valence of the items, and standard deviation of their valence (heterogeneity) were calculated (Liberman et al., 2002).

We conducted qualitative analyses to determine what proportion of participants mentioned the central focus or purpose of donation, which we drew from the mission statement of Be The Match—to provide recipients with lifesaving donations—among the items they listed. Individual construal items were coded as “1” following a text search for the following terms: “save,” “saving,” “life,” “live,” “help,” “benefit,” “patient,” “recipient,” and “survive,” or as “0” if there was no mention of any of these terms, which were drawn directly from the mission statement of NMDP as described in their online materials (Be The Match, 2018). Responses were visually inspected and additionally coded as “1” if the respondent mentioned saving a life or helping the recipient in any of their listed items, and “0” if there was no mention of the recipient or only of meeting the recipient. All participant items were coded by two independent coders, with satisfactory agreement between coders (proportion agreement = 86.0\%, \( \kappa = 0.62, SE = .04 \)). A third independent rater resolved any discrepancies in the initial coding; this was the case for 14.0% of participant responses (items from 102 participants). The mean valence of items coded “1” was then calculated for each group.

**Intention to donate.** For new registry member participants, intention to donate was assessed via the question, “If you are found to be a match with a patient and are asked to donate, what is the likelihood that you will donate?” on a scale of 1 = extremely unlikely to 7 = extremely likely, with 4 = undecided. CT decisions for matched potential donor participants were coded as 0 = “no” or 1 = “yes.” Responses for intention to donate demonstrated a ceiling effect (\( M = 6.07, SD = 1.23 \), with a skewness of −1.99 (\( SE = .11 \)), violating assumptions of normality. Reverse scoring (to maintain ordering of variable) and reciprocal transformation reduced skewness to −.08 (\( SE = .11 \)). The transformed variable (range = 0.14–1.0) was used in subsequent analyses, with the transformed mean of 0.68 (\( SD = .30 \)). After transformation, higher scores still indicated greater intentions to donate.

**Donation construals.** All participants were instructed to imagine being asked to donate marrow or stem cells to a patient at some specific future time (in 1 year for new registry member participants and 1 week for matched potential donor participants) and to spend a few minutes thinking about the various things that would happen as a part of the donation process. They then wrote out each item they imagined in up to 10 text-entry boxes provided. After submitting their responses, participants then viewed the total list of items they had provided and were asked to provide a valence rating of how positively or negatively they felt about each event (+3 to +3). Following previous assessments of construal theory, the number of items listed, mean valence of the items, and standard deviation of their valence (heterogeneity) were calculated (Liberman et al., 2002). We also conducted qualitative analyses to determine what proportion of participants mentioned the central focus or purpose of donation—which, according to the mission statement of Be The Match, is to provide recipients with lifesaving donations—among the items they listed.

The online supplemental materials include additional qualitative coding details.

**Ambivalence.** Donation-related ambivalence was assessed using variants of the seven-item Ambivalence Scale (Switzer et al., 2005, 2013). In new registry members, ambivalence was assessed using the seven-item Ambivalence Scale adapted for recently registered individuals (Switzer et al., 2003), and for potential matching donors, ambivalence was assessed using the seven-item Ambivalence Scale adapted for individuals who were recently notified as a potential match (Switzer et al., 2005, 2013). For both scales, scores on all items were averaged, with higher scores indicating greater ambivalence.

**Demographics.** Participants indicated their age, gender, race, ethnicity, and education level. For all regression analyses, gender was coded as female = 0 and male = 1, and race was coded as non-White = 0 and White = 1.

**Analytic Strategy**

We compared new registry members with the two groups of potential matching donors (continue and opt-out) across all study measures using independent samples t tests and chi-square analyses (demographic comparisons in Table 1). Next, to investigate relationships among variables for new recruits and those at the CT stage, we used bivariate correlations and multiple regression analysis to determine associations with donation intentions and actual decisions, focusing on the hypothesis that features of donation construals would be associated with ambivalence about donation as an indicator of donation decision. Construals about donation likely reflect low-level, very rapid responses during the donation process that may contribute to the variance associated with the (previously demonstrated) relationship between ambivalence and donation decisions. This hypothesis was further tested using statistical medi-
ation analysis with ambivalence as a mediator between construals and intentions or decisions. As this is a cross-sectional and not longitudinal sample, the word predictor refers to statistical predictors within a regression equation, and temporal order between variables was assumed rather than directly established.

Participants who provided complete data for either the ambivalence measure (99.6%) or the construals measure (99.5%) were included in the final analytic sample. Approximately 0.5% of participants had one or two missing demographic data points; one participant with 3 or more missing demographic data points was not included in the final analytic sample. Participants who provided inconsistent group identification data (e.g., they were recruited as having opted out of the donation process but reported that they planned to donate, or vice versa) were excluded from the final analytic sample (n = 4). Most of the participants excluded from the final analytic sample opened the survey and started it but did not finish key measures of interest.

Results

Donation Construals in New Registry Members and Potential Matching Donors

For newly registered participants, the number of items generated relevant to marrow donation (how many construal items they supplied, or construal item total) was tabulated. These participants provided a mean of 7.65 (SD = 2.67, Mdn = 9.0, range = 1–10) construal items, with a mean valence of 1.19 (values >0 indicate positive valence, SD = 1.16) and a mean heterogeneity of 1.13 (higher values indicate more heterogeneity, SD = 0.74, range = 0.00–4.24; see Table 2). Bivariate correlations indicated that more positively valenced construals were associated with stronger intention to donate (r = .272, p < .001; and see Supplementary Figure 1 of the online supplemental materials for a breakdown by specific intention-to-donate responses). Neither number of items nor construal heterogeneity was significantly associated with intention to donate for new registry members. A multiple linear regression that included the independent variables construal items, with a mean valence of 1.00 (SD = 1.20) and a mean heterogeneity of 1.05 (SD = 0.67) was statistically indistinguishable from new registry members in terms of all three construal variables: for construal items, n(666) = –1.52, p = .13, construal valence, n(665) = –1.53, p = .07, and construal heterogeneity, n(665) = 1.13, p = .26. By contrast, participants who opted out of the registry at the CT stage had significantly more negative construal valence relative to new registry members, n(565) = 7.69, p < .001, and greater construal heterogeneity, n(565) = –2.31, p = .021. (Figure 1) Independent samples tests indicated that participants who had decided to continue toward donation were statistically different from participants who had decided to opt out of the registry in terms of both construal valence, n(208) = –5.81, p = .000, and construal heterogeneity, n(208) = 2.95, p = .004, but not construal items, t(211) = –1.40, p = .163. A binary logistic regression model statistically predicting decisions at CT for potential matching donors using all three construal related variables plus demographic covariates entered in the model (χ² = 43.016, p < .001, with df = 7, Nagelkerke's R² = .271) indicated that construal valence (B = .814, p < .001), construal heterogeneity (B = –.553, p = .042), and race (B = .908, p = .019) were all statistical predictors of CT decisions. Prediction success overall for the model was 78.6%.

A review of individual responses provided by participants at registration and CT phases identified several notable patterns consistent with construal theory. First, the percentage of respondents who spontaneously mentioned the central focus of donation (marrow being donated to a patient, saving a life, or helping someone) went from 31.4% among new registry members to 30.3% among registry members who opted in at CT, to only 15.5% among those who opted out (see Supplementary Table 2 of

Table 2

<table>
<thead>
<tr>
<th>Donation-related variables</th>
<th>Group</th>
<th>All (n = 516)</th>
<th>Opt in (n = 155)</th>
<th>Opt out (n = 56)</th>
<th>Statistics a (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambivalence, M (SD)</td>
<td></td>
<td>1.94 (.61)</td>
<td>1.75 (.58)</td>
<td>2.83 (.49)</td>
<td>.001</td>
</tr>
<tr>
<td>Construal total, M (SD)</td>
<td></td>
<td>7.65 (2.67)</td>
<td>8.02 (2.63)</td>
<td>7.41 (3.24)</td>
<td>.227</td>
</tr>
<tr>
<td>Construal valence, M (SD)</td>
<td></td>
<td>1.19 (1.16)</td>
<td>1.00 (1.20)</td>
<td>–.071 (1.09)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Construal heterogeneity, M (SD)</td>
<td></td>
<td>1.13 (.74)</td>
<td>1.05 (.67)</td>
<td>1.37 (1.75)</td>
<td>.020</td>
</tr>
</tbody>
</table>

a Statistics represent the results of a one-way ANOVA for all variables, comparing three groups (newly registered members, potential matching donors opting in for confirmatory typing, and potential matching donors opting out of confirmatory typing).
the online supplemental materials for sample responses). These proportions did not differ significantly between new registry members and opt-in donors ($\chi^2 = 0.10, p = .75$) but did differ significantly between opt-in and opt-out donors ($\chi^2 = 4.77, p = .029$). This is noteworthy in light of the uniformly positive valence of items related to helping and life-saving across groups (new registry members: $M = 2.81, SD = 0.63$; opt in: $M = 2.98, SD = 0.15$; opt out: $M = 3.00, SD = 0$). The presence of peripheral items that were rated most negatively (−3), like pain or hospital stays, significantly differed across groups as well. Only 10.87% of new registry members and 7.69% of potential matching donors who opted in included any extremely negative items, but 41.34% of registry members and opt-in donors; $\chi^2 = 34.00, p < .001$ between opt-in and opt-out donors).

### Relationships Between Ambivalence and Construals About Donation

Results confirmed that ambivalence was significantly associated with construal valence and heterogeneity. More negative construals were associated with greater ambivalence among new registry members ($r = -.381$) and at CT ($r = -.488$), respectively (both $p < .001$). Similarly, ambivalence was significantly and positively correlated with construal heterogeneity, with more heterogeneous construals being associated with greater ambivalence among new registry members ($r = .192$) and at CT ($r = .301$; both $p < .001$). Number of construal items listed was not associated with ambivalence for either group.

As anticipated, ambivalence was negatively correlated with donation intentions and decisions. Ambivalence was associated with intention to donate for new registry members ($r = -.629, n = 516, p < .001$). Multiple regression with demographic covariates entered at Step 1 ($R^2 = .395, F[5, 507] = 66.24, p < .001$) indicated that ambivalence significantly predicted intention to donate ($B = -.312, p < .001$). Ambivalence was also associated with CT decisions, with participants who opted out of the registry expressing greater ambivalence ($M = 2.83, SD = .49$) than those who continued toward donation ($M = 1.75, SD = .58$), $t = 12.36, p < .001$. Binary logistic regression with demographic covariates held constant ($\chi^2 = 108.48, p < .001$, with $df = 5$, Nagelkerke’s $R^2 = .595$) indicated that ambivalence significantly predicted CT decision ($B = -3.37, p < .001$).

### Ambivalence as a Mediator Between Donation Construals and Intention to Donate or CT Decision

As demonstrated by previous findings and corroborated by our results, ambivalence is a strongly statistically associated with intention to donate HSCs and CT decisions. Our goal was not to statistically improve upon this known association but instead to unpack the nature of ambivalence and identify whether the valence and heterogeneity of construals about donation were meaningfully associated with ambivalence and donation outcomes. For the mediation analyses, a temporal ordering of the cognitive processes involved in these decisions was assumed as follows: first, low-level affective responses (construal features) would be followed by higher level abstractions (ambivalence), and then, finally, followed by the behavior or decision (intention or CT decision). As the first step in a mediation model testing whether ambivalence mediates the relationship between donation construals and intentions to donate (and CT decision), we examined the association between these variables and ambivalence at each phase, with demographic variables entered as covariates. For newly registered donors, a multiple regression model predicting ambivalence ($R^2 = .160$, $F[7, 502] = 13.613, p < .001$) from construal variables indicated that construal valence ($B = -.190, p < .001$) and race ($\beta = -.154, p = .007$) were significant predictors, all other variables held constant. For potential matching donors, a multiple regression model predicting ambivalence ($R^2 = .303$, $F[7, 199] = 12.360, p < .001$) from construal variables indicated that that construal valence ($B = .236, p < .001$), construal heterogeneity ($B = .188, p = .006$), and race ($B = -.344, p = .001$) were significant predictors of ambivalence, all other variables held constant.

We next explored whether ambivalence mediated the relationship between donation construals and intention to donate in both groups of participants, with all demographic variables entered as covariates. Using a bootstrap-mediation analysis, we found that ambivalence fully mediated the relationship between construal valence and intention to donate in new registry members (bias-corrected confidence interval for indirect effect = .0462 to .0754). Construal valence exerted an indirect effect of $.0604$ ($SEM = .0075$; Figure 2a). The proportion of the effect of construal valence on intention to donate that was mediated by ambivalence was 85.71%. Post hoc observations from the regression model of construal valence together predicting intention to donate found that the effect of construal valence on intention to donate was no longer significant, suggesting that it is more likely that ambivalence is the mediator between the two variables (rather than construal valence).

The same bootstrap-mediation analysis for potential matching donors found that ambivalence partially mediated the relationship between construal valence (bias-corrected confidence interval for indirect effect = .4718 to 1.268) and CT decision. Construal valence exerted an indirect effect of $.8557$ ($SEM = .1881$; Figure 2b). The proportion of the effect of construal valence on CT decision that was mediated by ambivalence was 41.67%. Ambivalence also partially mediated the relationship between construal heterogeneity (bias-corrected confidence interval for indirect effect = −1.579 to −.4925) and CT decision. Construal heterogeneity exerted an indirect effect of −1.005 ($SEM = .3011$; Figure...
The present study was the first to record and compare how potential marrow donors construe future donations both at the time of registration and at the CT stage. Results were interpreted in accordance with construal theory, and were generally consistent with previous observations about how temporally distant and improbable versus temporally close and probable events are construed. Specifically, new registry members' construals of donation were, on average, positive and relatively homogenous, and these respondents were most likely to spontaneously mention the central purpose of donation (saving a life, helping someone, or providing a patient with marrow) when asked to list what donation would entail. When considering participants at the CT stage, significant differences were observed as a function of whether participants had chosen to proceed with CT or not. Those who opted to proceed were statistically indistinguishable from new registry members in terms of all three construal variables as well as their likelihood of spontaneously mentioning saving a life. By contrast, potential matching donors who opted not to proceed with CT construed donation in terms that were more negatively valenced and heterogeneous. The relationship between construal variables and intention to donate/CT decision were statistically mediated by ambivalence about donation at both time points, when assuming the chronological ordering of variables. All relationships held after accounting for demographic variables like race, age, and education level, when all variables were simultaneously entered into regression analyses.

As has been observed in multiple previous investigations, we found that donation-related ambivalence was a strong predictor of both donation intentions and decisions (Switzer et al., 2003, 2013; Switzer, Simmons, & Dew, 1996). Our study extended previous findings, however, by identifying a potential source of variation in strong positive and negative feelings among registry members, which is how marrow donation is construed at two time points. Our findings suggest associations between specific aspects of the donation process that registry members focus on and donation intentions and decisions. Ambivalence (as it has been traditionally measured) is a composite variable reflecting an unspecified mix of positive and negative affect. In theory, this construct—which strongly predicts donation decisions—should be decomposable into more granular motivations related to various features of donation. These granular motivations are reflected in our construal measurements at each time point.

In accordance with previous investigations of construal theory, our results indicate that at the time of initial registration, new registry members construe donation relatively abstractly, as reflected by the greater homogeneity of their responses (Liberman et al., 2002), and when asked to list what donation would entail, were the participants most likely to focus on positive features of donation such as helping a patient or saving a life (although even in this group, fewer than one third of participants spontaneously mentioned this outcome). Among new registry members, those who expressed more ambivalence about donation focused more on negative peripheral features of donation and less on positive central features of donation. Numerically, we found construals of donation to be more negative overall among all registry members recently contacted about CT, findings generally consistent with construal theory (Liberman et al., 2002), although opt-in members at CT did not have greater construal heterogeneity than new registry members, despite the proximity of their potential donation.

The three groups did not significantly differ in the number of construal items listed; however, due to technical limitations inherent to Qualtrics, we provided up to 10 response boxes, which meant that participants did not have truly unlimited free-response options (Liberman et al., 2002). The variation we observed in construals of donation among participants at the CT phase may have significant implications for donation-related decisions. Participants who opted to undergo CT and who expressed little ambivalence about donation were more likely to maintain a focus on saving a life, consistent with the mission of Be The Match, and to generate construals of donation that were not significantly more negative or more heterogeneous than those of new registry members. By contrast, those participants who opted not to undergo CT (contradicting their initial pledge to donate if asked), and who expressed significant ambivalence, construed donation negatively, on average, related to their decreased likelihood of considering the central purpose of donating and to their increased likelihood of considering highly negative outcomes of donation, such as significant pain or injury.

It should be noted that due to low participation rates, all groups were self-selected, such that it is possible that participants who were more committed to donation and positive about donation were more likely to respond to the survey. Thus, that potential matching donors who opted to continue with CT did...
not significantly differ from new registry members in terms of how positively they construed donation has two possible interpretations. The first is that this group represents a self-selected group whose construals of donation had been unusually high since the time they registered and have remained unchanged throughout. We are unable to unequivocally rule out this possibility, as our sample was not measured longitudinally, due to both the very small fraction of registry members who are ever asked to donate (approximately 1 in 430) and the long time delay between registration and donation. However, two features of our findings suggest that this is unlikely to be the case. First, ambivalence scores among participants who opted in at the CT stage were nearly identical to those reported previously in larger samples \((M = 1.75 \text{ vs. } 1.78\) in Switzer, Dew, Butterworth, Simmons, & Schimmel, 1997) suggesting that this group’s views of donation are representative of the population. As has been previously demonstrated, the fraction of newly recruited registry members in our sample who indicate that they are unlikely to donate (approximately 3.7%) is significantly less than the 30% to 50% or more of registry members observed to opt out of CT. This is consistent with the possibility that genuine changes in construals of donation occur between the two time points.

However, the fact that participants who chose to undergo CT maintain relatively positive, centrally focused construals about donation is reason for optimism that the typical cognitive changes that occur as future events draw closer are not inevitable or uniform. Supporting this, we found that the heterogeneity of participants’ valence ratings did not differ across new members and those continuing toward donation at CT, suggesting that for some participants, construals of donation maintained a relatively homogenous and schematic nature. Our findings should also be considered in the context of research on mental contrasting (Oettingen & Gollwitzer, 2010; Oettingen, Pak, & Schnetzer, 2001), which involves imagining both future positive outcomes and negative obstacles to improve behavior follow-through. When comparing potential matching donors who opt in relative to opt out, we would expect that if opt-in members were mentally contrasting both positive and negative outcomes, construal valence would be more heterogeneous than observed in our sample. It therefore appears that they were focusing more on positive features of donation relative to opt-out members. These findings may have implications for interventions that may increase the proportion of registry members who undergo CT. For example, laboratory studies based on construal-level theory have demonstrated that prompting participants to engage in episodic thinking—for example, generating vivid mental imagery of helping a person in need or simply considering details of the individual in concrete terms—increases prosocial intentions and behavior toward both known others and strangers (Gaesser, Keeler, & Young, 2018; Gaesser & Schacter, 2014). Experimental work has specifically shown that simulating future helping behaviors that elicit positively valenced affect increases willingness to help the person in need through increased perspective taking for the other individual (Gaesser, DiBiase, & Kensinger, 2017). Episodic simulation could be particularly relevant for bone marrow donations, which involve potential costs across a variety of domains (health, time, effort). Research on morrisome (anxiety-provoking) future events has shown that episodic simulation leads to decreases in anxiety and the perceived likelihood of a bad outcome, and increases in the perceived likeliness of a good outcome, for the event (Jing, Madore, & Schacter, 2016). Observational research has also suggested that a focus on patients’ situations, in addition to the logistics of the donation process, may increase recruitment and enrollment efforts for medical donation registries (Dasgupta, 2018), which is relevant for new registry members. Messaging of this nature may be particularly important to consider in communications with registry members in demographic groups whose ambivalence and construals of donation tend to skew more negatively, such as Asian participants (Switzer et al., 2005, 2013; see the online supplemental materials).

Some additional limitations of our study design must be considered in interpreting our results, however. As noted earlier, our cross-sectional design entailed examination of distinct groups of registry members at two key time points during the bone marrow donation process rather than following the same participants from initial registration through CT. Ethical considerations prevented us from surveying participants at the CT stage prior to their deciding whether to proceed with CT, which could have affected their decisions. The inability to experimentally manipulate key variables among potential marrow donors for ethical reasons limits the strength of the conclusions that can be drawn regarding causal relationship between construals and donation decisions. Another issue that should be considered is the unavoidable sequence of events around recruitment, with participants having already made their decision to opt in or out before being invited to complete the survey. This presents the possibility that participants’ reported construals at CT were justifications of an already-made decision and is a limitation of the findings.

The overall sample may also have been skewed by self-selection if new registry members and participants at CT who felt more positively about donation were more likely to respond to our recruitment efforts (although comparisons of ambivalence scores in our samples and previous samples are not consistent with this possibility). Additionally, our sample of potential matching donors who opted out of the registry was limited to those participants who responded to Be The Match’s recruitment efforts after opting out of CT. Such participants are notoriously difficult to recruit (Switzer et al., 2013), a concern that was reflected in the relatively small sample of these registry members who ultimately completed our measure, although the relative proportions of potential matching donors at the CT stage completing our survey who continued toward donation versus opting out and those who responded to any NMDP outreach attempts and continued toward donation versus opting out did not differ from NMDP data from that year (see Method). Regardless, care should be taken in generalizing from our sample to all registry members who opt out of CT. It is most likely that participants who opted out of CT and did complete the study represent a positively skewed subset of all such participants, with registry members who chose not to participate construing donation in even more negative terms, such that the effects we observed would be more extreme in such registry members. These data can therefore be considered an important preliminary step in understanding the role of construals in decision to opt out of marrow donation, which future research should aim to replicate in larger samples. In addition, it should be noted that a strength of our study is that it was conducted anonymously and online, making participants’ responses less susceptible to biases related to social desirability and social norms than in face-to-face interviews (Rich-
man, Kiesler, Weisband, & Drasgow, 1999). Finally, significant demographic differences were observed across groups, particularly for gender, race, and education, which is why all demographic variables were included as covariates in all analyses.

Despite limitations, our results extend research on the psychology of prospection to understand altruistic bone marrow donation decisions for the first time. In addition to increasing knowledge about decision making at two time points in a real-world public health context, these findings also have the potential to inform interventions aimed at reducing attrition from Be The Match. Messages to potential donors that encourage participants to reflect on the central mission of NMDP, generate vivid representations of marrow recipients, or focus on positive outcomes of donation may similarly encourage a focus on the central features of donation and improve patient outcomes.

References


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